Understanding and managing the impacts of transience in student-led university food gardens

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Notes

On language

This thesis is written in British English, however there are quotes throughout that used American and Canadian spellings. For consistency, these spellings have been adapted to British English in this thesis.

In order to enhance readability, abbreviations are not used, except to describe organisations better known by their abbreviation than their full name (such as UNESCO). Unnecessary capitalisations have also been avoided.

On photographs

All photographs in this thesis have been taken by the author unless otherwise specified. Photos at the beginning of each chapter are not research material. Rather, they intended as a visual accompaniment to the written text.

On simultaneous publications

The following publications were written in parallel with this my doctoral work. Sections of these have been included in this thesis.

Laycock Pedersen, R., Robinson, Z. P., & Surman, E. (2019). Understanding participation dynamics in university student-led food gardens with transient participants. *Sustainability*, 11(10), 2788. doi: 10.3390/su11102788

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Laycock Pedersen, R., & Robinson, Z. P. (2018). Reviewing University Community Gardens for Sustainability: taking stock, comparisons with urban community gardens and mapping research opportunities. *Local Environment*, 23(6), 652-671. doi: 10.1080/13549839.2018.1463210

Laycock, R. (2016, June 3-8). Challenges in student-led food growing initiatives and their solutions: The role of boundary objects in managing participant transience. In: *International Student Conference on Environment and Sustainability 2016 Conference Proceedings*. Paper presented at the International Student Conference on Environment and Sustainability 2016, Tongji University, Shanghai, China.

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Abstract

University student-led food gardens are increasingly used to facilitate learning fostering pro-sustainability attitude and behaviour change. However, they are led by a transient student population, which impacts how they operate and the benefits they provide. This study undertakes the first explicit and empirical inquiry into how students' transience impacts student-led food gardens, and how these impacts might be addressed to maximise the gardens' benefits. I investigated this through an action research study, using a quantitative systematic literature review to assess the benefits of 'sustainable university community gardens' (a proxy for 'student-led food gardens') and take stock of what is already known about the impacts of students' transience on these gardens. I used a case study of the United Kingdom's National Union of Students' Student Eats student-led food growing scheme to understand how transience impacts the participation dynamics of the student-led food gardens, and the ways in which they are vulnerable to students' transience, drawing on interviews, participatory workshops, photovoice, a fishbowl discussion, and a research diary. This data was used to create a causal loop diagram and assess the vulnerability of the gardens using Biggs et al.'s (2012; 2015c) resilience principles. I found the student-led food gardens operated in a vulnerable state because of the impacts of students' transience. Paradoxically, transience both increased and decreased problematic participation, while exacerbating friction and power asymmetries between students and staff, underrepresentation of long-term stakeholders, lack of monitoring slow variables, and a lack of tolerance to ambiguity and uncertainty. In spite of this vulnerability, evidence suggested the gardens provided opportunities for building sustainability competencies. Actions were taken to address the negative impacts of students' transience and build resilience into the gardens. These fed into the recommendation that a portfolio of strategies is needed to address the immediate challenges of problematic participation, and build social-ecological memory in the gardens.

Keywords

action research, causal loop diagram, community gardens, higher education, participation, resilience principles, social-ecological memory, social-ecological resilience, sustainability education, temporary organisations, turnover

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Education concepts

Methodological concepts

Participation, transience & volunteering concepts

Resilience & systems theory concepts

Sustainability concepts

Part 1: The background

Introduction

Chapter 1

…what happens to a species that loses touch with its habitat? And where will all the conservationists come from when kids no longer have a patch of ground that they can truly call my space?

Robert Michael Pyle, Pulling the Plug, n.d.

Let me get it right. What if we got it wrong?
What if we weakened ourselves getting strong?
What if the message carried in the wind was saying something?
From butterfly wings to the hurricane
It's the small things that make great change

Lemn Sissay, Gold from the Stone: New and Selected Poems, 2017, p. 179

Courgette seedlings
Spring 2014

1.1 Introduction

There is little more essential to human life on Earth than food. It is central to sustaining our existence and shapes our day-to-day lives profoundly. However, producing food has impacted our planet dramatically and detrimentally. Agriculture takes up 38% of the Earth's land and contributes to approximately 12% of human-caused greenhouse gas emissions (Foley et al., 2011). In spite of grand efforts to feed the world, over 800 million people are still undernourished (World Bank, n.d.). These figures represent only glimpse of our global food system's problems.

Perhaps one of the most concerning problems underlying these issues is a growing disconnection from nature (Kesebir & Kesebir, 2017) and the food systems on which we all depend. Disconnection from nature is certainly an issue that has occupied the minds of educators (Liefänder et al., 2012; Liu & Lin, 2014; Lankenau, 2016), and rightly so, given that education can be an important tool for shifting "our most deeply held, unconscious set of assumptions and values; the things we take for granted; and that which determines our expectations, frames the questions we ask, and structures our approach to what we do" (Zohar, 1997, p. 22; Olson & Raffanti, 2006). These deep-seated shifts within ourselves can give us the capacity to leverage substantial change in the world we live in and the systems we are a part of (Meadows, 1999).

It is with this in mind that universities have turned to their campuses to facilitate learning that supports pro-sustainability attitude and behaviour change. One type of these initiatives are food gardens, which support students in developing their understanding of where their food comes from. Student-led food gardens are places where groups of university students manage and operate spaces on university campuses where edible plants are grown. There are sometimes other participants, such as university staff or local community members,

but students are the driving force behind these initiatives. Student-led food gardens are appearing in many universities across United Kingdom, in part thanks to funding from the National Union of Students. This study focuses on these student-led food gardens funded by the National Union of Students through a scheme called 'Student Eats.' Eighteen gardens were initially funded between 2011 and 2013, but now sixty-five universities have gardens affiliated with the Student Eats network (NUS, n.d.b). Apart from providing learning opportunities that foster pro-sustainability behaviour change in students, these gardens are thought to have a range of other beneficial outcomes, from providing fresh produce and contributing to healthy diets on campus, to reducing carbon emissions (NUS, n.d.c). However, there has yet to be a systematic assessment of the benefits of these gardens reported in peer reviewed literature. Therefore, the first set of questions this thesis will address is:

1. According to academic literature about sustainable university community gardens[1],
    a) What benefits (both discussed and demonstrated) do these gardens reportedly provide?
    b) How do these benefits compare to the benefits provided by community gardens more generally?
    c) What is already known about the impacts of students' transience on sustainable university community gardens?

If a review of the literature provides evidence that sustainable university community gardens provide mostly positive outcomes, then we can assume that they could be a contributor to a sustainable future. However, in spite of potential contributions to sustainability, these initiatives face a longevity issue: the transience of students. Students' transience, or to pass through with only a brief stay (Merriam Webster Online, n.d.), is caused

[1] Given that the literature about student-led food gardens is so sparse, this question was broadened to include all sustainable university community gardens. This is explained further in section 1.1.2 and in Chapter 4.

by the time-limited nature of academic programmes and periodic holidays. Its main impacts are therefore short-term participation (when people are involved for limited periods of time) and irregular participation (when involvement is inconsistent or non-regular). These can also lead to low participation, which is when limited volunteer hours are invested overall. Ultimately, these modes of participation are problematic for student-led food gardens because they cause problems, such as inadequate maintenance of gardens and a lack of capacity to run activities (McKinne & Halfacre, 2008). In this thesis, the terms short-term, irregular, and low participation will collectively be called 'problematic participation.'

Providing that the literature review brings forth evidence that sustainable university community gardens provide mostly positive outcomes, it is then important to understand how transience impacts the participation dynamics of these gardens. However, to understand how transience impacts them, we first must understand participation dynamics in student-led food gardens. Therefore, the second set of questions this thesis will address is:

2. a) In addition to students' transience, what causes problematic participation in student-led food gardens?

   b) What effects does problematic participation have in student-led food gardens?

   c) What feedbacks between problematic participation, its causes, and effects in student-led food gardens exist (if any)?

Once the causes and effects of short-term, irregular, and low participation, and their feedbacks are known, the next step of this thesis will be to assess how vulnerable student-led food gardens are. The next research question is therefore:

3. In what ways are student-led food gardens vulnerable to students' transience in the context of the participation dynamics outlined above?

Finally, after outlining exploring challenges student-led food gardens face, the final research question is solution-orientated, asking:

4. In what ways can student-led food gardens address the impacts of students' transience and build resilience into their initiatives such that they continue to persist?

1.2 Overview

I have broken this thesis into three parts. The first part (which begins with this introduction chapter) is intended to provide the necessary *background* information for this study. Beyond this introduction, it includes a narrative-style literature review, and chapters outlining my theoretical framework and methodology. The second part presents empirical findings related to transience and participation *problems*. This includes a quantitative, systematic literature review, causal loop mapping of the participation dynamics in student-led food gardens, and an assessment of the vulnerability of the student-led food gardens. The third part is *future*-orientated. It begins with an empirical chapter outlining strategies to address the problems described in the previous section. Following on, I reflect on my methodology and present some suggestions for future research. The final chapter draws together and summarises the main contributions I make in this thesis. I will now explain what each of these sections contain in greater detail, chapter by chapter.

1.2.1 The Background

After this introduction, I begin the second chapter with a narrative-style literature review. In this review, I explain how our current dominant food system in unsustainable and suggest that sustainability science is the field of scholarship that is most appropriate to address it. I then introduce the rationale for and manifestations of sustainability in higher education, the concept of 'living labs' on university campuses, and the role of co-curricular activity as strategies to move to society towards sustainability and sustainable food systems. Finally, I conclude the chapter with a summary of the current state of sustainable food activity

and food gardens in universities, suggesting that it appears that the transience of students may negatively impact the longevity of student-led food gardens and it appears that this is not yet well understood.

Given that it seems that the longevity of student-led food gardens may be under threat due to students' transience, in the third chapter I explain how I will use resilience as a theoretical framework. I chose to work with resilience because it focuses on the "capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same […] identity" (Folke, 2016, p. 4), which is the challenge that these gardens are struggling with. The chapter begins with a brief outline of my ontological and epistemological stance, and then goes on to position my research as being rooted in systems theory, particularly complex adaptive systems theory. Then I go on to explain that resilience is a useful way of thinking about how to maintain the long-term success of a complex adaptive social-ecological system, like a student-led food garden, because it accounts for the uncertainty of complexity. Finally, I outline some key concepts in resilience and a set of principles for building resilience proposed by Biggs et al. (2012, 2015c), and explain how I will be using them in my thesis.

The fourth chapter focuses on the methodology. The first part of the chapter uses pragmatism, critical pedagogy, and the theory of communicative action to make the case for using an action research methodology. Action research is a multi-stage methodology which combines a more traditional research agenda with an action-orientated agenda, focusing on addressing a problem or issue. I then outline my interpretation of action research as a methodology and how I use it. After that, I dig down into some of the more procedural parts of the methodology, beginning by explaining the systematic literature review and the case study approaches used. I used the United Kingdom's National Union of Students' Student Eats campus food growing scheme as a case study with a sample of three gardens as subunits of

analysis (Yin, 2014). The methods used focused on developing an understanding of students' transience as a 'problem', and then creating and assessing strategies to address it. Within the case study approach, I used a range of methods including interviews, workshops, photovoice, and a fishbowl dialogue.

1.2.2 The Problem

The first steps I undertake in the second section of this thesis are to (1) assess the main documented benefits of student-led food gardens compared to community gardens in general, and (2) assess the extent to which transience impacts sustainable university community gardens according to the literature. I review the twenty-two articles that met these criteria using quantitative systematic literature review. These articles are assessed according to their overall characteristics and the benefits they reported the gardens provided. These results are then compared with the results from a similar review of urban community gardens (Guitart et al., 2012).

Having assessed the main benefits of sustainable university community gardens and found that there appeared to be a lack of understanding of how transience impacts them, I then seek to better understand the dynamics of problematic participation in Chapter 6. I outline the causes these forms of problematic participation, the effects they have, and if there are any feedbacks. All of this is depicted in a causal loop diagram.

Given the new understanding of students' transience's influence on participation dynamics in the student-led food gardens, in Chapter 7 I use the resilience principles (outlined in Chapter 3) to assess the vulnerability of student-led food gardens to the transience of their own participant base. In addition to this assessment, I also offer an evaluation of my use of the resilience principles.

1.2.3 The Future

Having spent three chapters exploring what is known about students' transience in student-led food gardens, developing an understanding of the dynamics of problematic participation, and assessing the gardens' vulnerability, the final part of this thesis shifts attention from what is currently happening to what could or should happen. Chapter 8 is the most prescriptive chapter of this thesis, presenting strategies to enhance the resilience of student-led food gardens in the face of transience by drawing on the analyses from Chapters 6 and 7, as well as suggestions from the participants of this study.

The focus of the first half of Chapter 9 will then be to take a step back and consider some of the methodological decisions I made in this study, and the resulting challenges, assets, and complications of my approach. I will also offer some advice for researchers adopting similar methodologies, especially action researchers engaging with transient participants or partners. The second half of the chapter will offer some future research directions off the back of this study, for scholars working with sustainability in higher education, urban agriculture, resilience, and sustainability science more broadly. The final chapter of this thesis, Chapter 10, will summarise this study's contributions to research and practice, and make some concluding remarks. Before diving into the literature review, however, I will make a brief note on my stylistic writing choices.

1.3 A note on the 'voice' in this thesis

Here, I will briefly explain my rationale behind the style of prose I have chosen to adopt in this thesis. My ontological and epistemological assumptions will be outlined at the beginning of Chapter 3 and my methodology in Chapter 4, and these will help to clarify why I

have made these choices. However, to dissuade any reader from assuming I have been sloppy or unconsidered I take this opportunity to explain the rationale for my choices early on.

The reason I am compelled to write this section is because the 'academic voice' is traditionally one characterized by objectivity and dispassion. This is assumed to reduce bias and allow the reader to make up their minds themselves based on objective facts. However, this assumes that there are 'objective facts' to be ascertained. This is an assumption about which there is much debate (Jerneck et al., 2011; Moon & Blackman, 2014).

Even as first-person voice is increasingly accepted in academic writing, there are still widespread assumptions that researchers should use a writing voice that is formal and maintains some distance from the subject. However, I maintain that the use of the 'objective voice' is only a 'safer' way of writing – it is not necessary more 'neutral' in all cases. However, researchers who have objected to the 'objectivity' of 'neutrality' have been subject to criticisms that they let their emotions distort their data (Mitchell, 2017), and those that undertake self-examination are "navel gazing" (Leggatt-Cook, 2011, p. 404) and narcissistic (Finlay, 2002). However, I think this backlash against making the author visible is illustrative of a quote from Ahmed (2017, p. 37): "when you expose a problem, you pose a problem." This quote refers to the exposing of a problem associated with misogyny or racial inequality, but also holds true for scholars adopting a different kind of 'voice' in their scholarship. That is, when scholars have identified problems with adopting an 'objective' voice in academic writing, scholarship that does not do so has been targeted and subject to intense criticism. This being said, I don't think making the author visible is unproblematic. Actually, the opposite: there is very much a need to consider the authenticity in the way first-person writing is used, which I do both in my methodology in Chapter 4, and in my methodological reflections in Chapter 9.

For my doctoral research I used an action research approach, and this has been the main influence on my choice to make myself and my experiences visible within the narrative of this thesis. I will briefly explain action research here, but a more detailed explanation and my rationale for using it can be found in Chapter 4. Action research is characterized cycles where the researcher, in collaboration with relevant stakeholders, make sense of a problem, plan actions to address it, take these said actions, and then evaluate the action. This is a *collective* cycle of action and reflection. Within these cycles the researcher also goes through their own *personal* cycles of action and reflection. Coghlan and Brannick (2014) call these *meta-cycles* because they are action and reflection in relation to the *collective* cycles. The purpose of these *personal* cycles of action and reflection are to enable a heightened level of reflexivity and critical thinking. As a result of these cycles, the researcher (in this case, myself) and researcher's experience is drawn into the inquiry. I used a research diary throughout the research process, and this diary was analysed along with the other data I gathered (such as interview data). I also revisited other relevant documents that I accumulated, like proposals I wrote at different stages of my research process and abstracts for conference presentations in order to build the narrative of this study. As such, I have a relatively strong and verifiable personal narrative that accompanies the data that came from interviews, workshops, and other sources. My personal research narrative was used to help explain and verify the evolution of my thinking throughout the thesis process, and to illustrate points made in the discussion. This is done mainly in the Chapter 4.

Another reason I have chosen to make myself so visible within this thesis is because of my 'insider status.' I unpack my insider-outsider positionality in section 4.4, but in short, I have been a student gardener as both an undergraduate and Master's student, and have been highly active in one of the case study gardens examined in this thesis. Therefore, to

conceal my insider status by omitting myself from the narrative of this thesis would provide an incomplete picture.

Situating my writing from a personal perspective has helped me to be as transparent and truthful as possible in my writing. To write dispassionately, or as if I am somehow disconnected from the research I have undertaken would be untruthful and obscure the reality of the study. Instead I have included information to situate myself and my own experiences to help, you, the reader, to understand where my reasoning comes from so that you can use that to assess the reliability of the assertions I make in my thesis.

In summary, I have been shaped by my experiences, and, in turn, I have shaped the direction of this thesis. Therefore, I have made deliberate efforts to be transparent, authentic and rigorous in my use of voice, my methodology, and my interpretation of the data. In this way, I will be clear about my role in this research throughout this thesis and won't make any attempts to conceal my influence.

Reviewing sustainable food and sustainability in higher education

Chapter 2

Education must be conceived as a continuing reconstruction of experience: […] the process and goal of education are one and the same thing.

John Dewey, 1897, p. 79

Construction of raised beds
Winter 2013

2.1 Introduction

Over the course of this chapter, I introduce the areas of scholarship this thesis engages with. My first efforts focus on outlining the unsustainability of the global food system and its local-level consequences, which will be followed by a brief introduction to the field of sustainability science. I explain why I see my research primarily as a contribution to sustainability science, although my research engages with scholarship from a range of disciplines. I then outline some developments, theories and concepts for sustainability education in universities pertinent to this thesis. After this, I come to the central topic of my thesis, which is student-led food gardens in universities. In addition to explaining what I mean by 'student-led food gardens,' I outline some of the positive contributions these gardens may make to sustainability and sustainability education, and the main challenges they face. By the end of this chapter, you should have a good understanding of the potential student-led food gardens have to make to the education of their participants and how this could contribute to a sustainable future.

2.2 An unsustainable food system and the scholarship to address it

The global food system has led to widespread sustainability problems of both environmental and social natures in an effort to feed the world (Foley et al., 2011). While food production has increased in recent decades, there are also major problems connected to achieving equitable distribution of food as a result of complex factors related to the global market and corporate influence in the food industry (Kneen, 1999; Kasa, 2008; Miller & Harkins, 2010; Marktanner & Noiset, 2013; Rocchi et al., 2013). On top of this, our food system causes serious environmental problems, such as soil erosion, water pollution, and loss of biodiversity (IPCC, 2019).

Alongside the rise of these modern sustainability problems, it is thought that people are becoming increasingly disconnected with nature (Louv, 2008; Kesebir & Kesebir, 2017). There is evidence of this in the language we use, for example, references to nature in dictionaries, books, songs and films feature less nowadays than they did in the past (Wolff et al., 1999; Kesebir & Kesebir, 2017). This is worrisome, not only because nature connectedness can contribute to happiness (Capaldi et al., 2014), but also because having a connection to nature makes people more likely to be concerned about the environment and take steps to act on that concern (Nisbet et al., 2008).

A new area of scholarship is developing to address our profound socio-ecological problems. Sustainability science is an emerging field which, in simplest terms, aims to "understand the fundamental character of interactions between nature and society" in order to meet "fundamental human needs while preserving the life-support systems of planet Earth" (Kates et al., 2001, p. 641). Because the problems it grapples with are complex and far-reaching, sustainability science is united by the issues it addresses rather than "disciplines it employs," much like agricultural or health sciences (Clark, 2007).

Before explaining sustainability science further, I will briefly outline what I mean by the term 'sustainability.' 'Sustainability' and 'sustainable development' are contested and fraught terms, however most definitions are united by a main driving principle of intergenerational equity. The most widely used definition that captures this is from the Bruntland Commission, which says that sustainable development is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). This definition has been criticised for not going far enough (Reed, 2007), as well as for being too vague to operationalise (Broman & Robèrt, 2017), however it has been a useful definition for propelling action.

I would also like to clarify the difference between 'sustainability' and 'sustainable development.' 'Sustainability' often thought to be the 'end goal,' and 'sustainable development' is the path we use to get there (Hector et al., 2014). However, the term 'development,' carries with it a range of connotations, including the ambition of uncontrolled economic growth and "cosmetic environmentalism on the part of both governments and businesses" (Robinson, 2004, p. 374). Or, rather than constituting an entirely new concept, sustainable development is seen as painting development 'green,' which many (myself included) consider to be insufficient for the scale of the problems we face today (Robinson, 2004). I do acknowledge that when others use the term 'sustainable development,' often they are not thinking of it in this negative way. However, so that I am not misinterpreted, I chose to adopt the term 'sustainability' in this thesis. In terms of defining sustainability, I consider the Brundtland definition of sustainable development to be a sufficient definition of sustainability for the purpose of this thesis, in spite of its flaws.

Now that I have explained what I mean by sustainability, I will move on to describing sustainability science. Sustainability science aims to develop "a comprehensive, holistic approach to identification of problems and perspectives" relating to sustainability (Komiyama & Takeuchi, 2006, p. 3). Sustainability scientists advocate for 'transdisciplinary' research to deal with sustainability problems (Hirsch Hadorn et al., 2006; Max-Neef, 2005). Transdisciplinarity, as it is usually understood in sustainability science, involves the cooperation between multiple disciplines driven by different guiding questions (such as 'what exists?' in disciplines like mathematics, ecology and sociology, 'what are we capable of doing?' in disciplines like architecture, agriculture and medicine, 'what do we want to do?' in disciplines like planning, politics, and environmental design, and 'what should we do?' in disciplines like ethics, philosophy, and theology) (Max-Neef, 2005). Sustainability scientists also advocate for the use of participatory processes to produce scientific knowledge, while

also taking action to address sustainability problems (Jerneck et al., 2011; Komiyama & Takeuchi, 2006; Kates et al., 2001). I consider this thesis to be a contribution to the field of sustainability science.

2.3 Sustainability in higher education

Sustainability education is a crucial part of movement towards a more sustainable future. Through sustainability education, students can be equipped with the tools to become effective change agents in the pursuit of sustainability (Jucker, 2011). The role of education has long been a concern for environmentalists. In contemporary environmentalism, it was highlighted internationally as early as the 1992 Earth Summit in Rio de Janeiro (UNCED, 1992; Wals, 2012). During the United Nation's Educational, Scientific and Cultural Organisation's (UNESCO) Decade of Education for Sustainable Development (from 2005 to 2014) sustainability education made substantial advancements (Wals, 2012). This has been followed up with the UNESCO's Global Action Programme on Education for Sustainable Development, which focuses on "reorienting education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to a sustainable future" and "strengthening education and learning in all agendas, programmes and activities that promote sustainable development" (UNESCO, 2014, p. 14). Further evidence that sustainability education is a high priority globally is that sustainability education is included in the United Nation's 4th Sustainable Development Goal, which is: "by 2030 all learners [should have acquired] knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development" (GAML, 2017).

Sustainability education in higher education is of particular importance because university graduates are often the people who go on to take on leadership roles, and therefore have the potential to make large-scale change. Furthermore, university students are typically at a unique point in their lives when they have just moved from home and may be developing habits that stay with them through their lives (Verplanken et al., 2008; Thompson et al., 2011; van Niekerk & Barnard, 2011). These particular windows of time in a person's life when they can be able to make changes to otherwise inflexible habits have been called "life-course transitions" (Elder, 1998; Verplanken et al., 2008; Schäfer et al., 2012). The idea that life course transitions might be ideal moments for behaviour change interventions is called the 'habit discontinuity hypothesis' (Verkplanken et al., 2008). For example, house-hunting is thought to be a 'window of opportunity' in which students acquire new travel-related behaviours (Haggar, 2019). Another example is when young people move from their parental home and begin shopping for and cooking food independently for the first time. If the habit discontinuity hypothesis holds, the students' skills, knowledge, and perceptions on their ability to contribute to positive changes that are developed throughout their university experience may have longer-lasting effects than experiences at other points in their lives (Thompson et al. 2011). It is therefore important to maximise their sustainability learning through their university education. The habit discontinuity hypothesis has been used to justify many of the National Union of Students' sustainability schemes, including Student Eats. Other schemes that have been underpinned by the habit discontinuity hypothesis are Green Impact, an initiative which provides a structured framework for taking pro-sustainability actions on university/college campuses and in students' unions (NUS, n.d.a); Student Switch-Off, an initiative promoting behaviour change around energy reduction (NUS, n.d.f); and Students for Trees, an initiative to "protect, enhance and celebrate woods and trees" on college and university campuses (NUS, n.d.d).

There are many terms that overlap with 'sustainability education', including Education for Sustainable Development (ESD), education for sustainability, and environmental education. Like Sterling (2010) and Hill (2013), I understand 'sustainability education' to incorporate all of these traditions. To formulate my own definition that captures how I understand 'sustainability education', I have drawn on definitions from the United Kingdom's Quality Assurance Agency in Higher Education (Longhurst et al., 2014) and Sterling (2010). In this thesis, sustainability education will be understood as:

> *the process of equipping students with an operating ecological or participatory worldview, and the competencies needed to work and live in a way that safeguards environmental and social wellbeing, both in the present and for future generations.*

I have deliberately left the 'economic pillar' of sustainability out from this definition. The 'economic pillar' is a contested component of the definition of sustainability. The 'three pillar' approach is typically seen as a means to elevate the social and environmental priorities to on to the agenda of businesses by aligning it with the more traditional priority of profit (Norman & MacDonald, 2004). As such, it has been criticised for valuing an instrumental aim (profit) at the same level as intrinsically valuable social and environmental aims. As such, some scholars who believe that environmental and social wellbeing have *a piori* intrinsic value have argued that environmental and social components should therefore be at the centre of the definition, while the economy should not (Robért et al., 2002; Missimer et al., 2010). As a way of reconciling this some suggest that, rather than 'three pillars,' what we need are, rather, three concentric circles in which the economy is embedded in society, and society is embedded in the environment (Giddings et al., 2002).

However, other scholars continue to highlight the importance of the 'economic pillar' in sustainability because of the unsustainability of present economic systems and the need for alternative, more sustainable economic systems. In other words, *because* economies are

so unsustainable, they need to be considered as a vital component of sustainability. Spencer et al. (2018) have offered some propositions of how economic systems might become more sustainable, such as though better valuing care work, biological reproduction, problematising wealth and power concentration, and welcoming diversity and pluralism. There is also increasingly better recognition of alternative, possibly more sustainable, economic practices, such as sharing economies and collaborative consumption (Hamari et al., 2015), while new economic systems, such as degrowth, are being articulated and envisioned (Martínez-Alier et al., 2010).

In the context of sustainability in higher education, neoliberalisation has had considerable impact on the sustainability agenda of universities in the United Kingdom through the marketisation of higher education (Bessant & Robinson, 2017, 2019). In this new system, "financial control, efficiency, [and] value for money" are prioritised (Bessant & Robinson, 2017, p. 421). Furthermore, competition for students has driven universities to place greater emphasis on the 'student experience' and recruiting international students (Bessant & Robinson, 2017). From this, it is clear that economics has considerable influence on and potential to contribute to sustainability and sustainability education. However, I chose not to include it in my definition of what sustainability education is, because I still see the economy as a means to an end, albeit an important means.

I have also combined both an instrumental and an intrinsic view of sustainability education in the definition. The instrumental (sometimes called 'pragmatic,' 'behaviourist,' or 'ESD type 1') tradition of sustainability education focuses on education *for* sustainability – that is, education "as a means to an end" (Vare & Scott, 2008; Sterling, 2010, p. 513). This tradition tends to be more outcomes-orientated, and is "motivated by a sense of urgency and a passion to increase levels of what is commonly referred to as 'sustainability literacy'" (Sterling, 2010, p. 513). Conversely, the intrinsic (sometimes called 'emancipatory,' 'critical,'

or 'ESD type 2') tradition tends to be process-orientated – that is, education *as* sustainability. It therefore "involves the development of learners' abilities to make sound choices in the face of uncertainty and complexity of the future" (Vare & Scott, 2008, p. 3). Like Vare and Scott (2008), I believe drawing on both these traditions is necessary, and moreover, in practice these two approaches to sustainability education rarely, if ever, exist in isolation. Sometimes learning *for* sustainability will result in learning *as* sustainability, and vice versa.

In my definition of sustainability education, I have also replaced the terms "knowledge and understanding, skills and attributes" from Longhurst et al. (2014, p. 5) with 'competencies.' Education is typically thought to have three dimensions: cognitive, psychomotor, and affective. Together, these are sometimes called "heads, hands, and heart" (Sipos et al., 2008). The cognitive dimension deals "with the recall or recognition of knowledge and the development of intellectual abilities and skills," or the 'head' (Bloom et al., 1956, p. 7). The psychomotor dimension, the 'hands,' deals with the ability to physically manipulate a tool or object, that is, to use motor skills (Bloom et al., 1956, p. 7). Finally, the affective domain, or the 'heart,' has to do with the development of "values, attitudes and behaviours and involves the learner emotionally" (Shephard, 2008, p. 88). Competence is a term that brings together all of these domains, which is useful because all three of the domains are thought to be important for sustainability. There is considerable terminological ambiguity with regards "skills, abilities, capabilities, capacities, qualifications and other concepts" related to sustainability competence in general (Wiek et al., 2004, p. 204). However, the term 'competence' can act as a catch-all for all these terms, as it refers to a "functionally linked complex of knowledge, skills, and attitudes that enable successful task performance and problem solving" (Wiek et al., 2004, p. 204). In the sustainability education community internationally, the term 'competency' is used much more widely and tends to be much more inclusive, capturing not only cognitive learning outcomes, but also affective and

psychomotor outcomes as well (de Haan, 2006; Barth et al., 2007; Brundiers et al., 2010; Mogensen & Schnack, 2010; Wiek et al., 2011; Hedefalk et al., 2014). I have chosen to use the term 'competency' in order for the content of this thesis to have wider relevance given the term's more inclusive nature.

One competency framework that has been particularly influential in the sustainability education community in recent years is Wiek et al.'s (2011) key competencies for sustainability. Reviewing, analysing, and synthesising seminal works in the literature about sustainability competencies and learning outcomes, Wiek et al. (2011) proposed a framework integrating five key competencies for sustainability: systems-thinking competence, anticipatory competence, normative competence, strategic competence, and interpersonal competence. Systems-thinking competence is "the is the ability to collectively analyse complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks" (Wiek et al., 2011, p. 207). Anticipatory competence is "the ability to collectively analyse, evaluate, and craft rich 'pictures' of the future related to sustainability issues and sustainability problem-solving frameworks" (Wiek et al., 2011, p. 208-209). Normative competence, then, is "the ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets" (Wiek et al., 2011, p. 209). Strategic competence is "the ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability" (Wiek et al., 2011, p. 210). Finally, interpersonal competence is "the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving" Wiek et al., 2010, p. 211). While Wiek et al.'s (2011) work contains evidence of both the instrumental and emancipatory traditions, overall the framework leans towards the instrumental tradition as

the framework focuses mainly on education for the purpose of problem-solving. More detail on Wiek et al.'s (2011) competencies can be found in Appendix A for interested readers.

A competing, or as I see it, a complementary body of literature focuses around the development of 'action competence' (Bruun Jensen & Schnack, 1997; Breiting & Mogensen, 1999; Mogensen & Schnack, 2010; Hedefalk et al., 2014). Action competence tends to defy definition in that it is an educational ideal rather than a knowledge or skill *per se* (Morgensen & Schnack, 2010), and is more aligned with the emancipatory educational tradition. As such, it is different in essence from other educational competency frameworks with more instrumental aims, such as the one outlined by Wiek et al. (2011)[2]. Action competence is closely linked the German concept of '*Bildung,*' which is associated with self-cultivation, rooted in a critical approach to pedagogy (Morgensen & Schnack, 2010). It has been defined as the "ability, motivation and desire to play an active role in finding democratic solutions to problems and issues connected to sustainable development" which "cannot be reduced to mere education in the sense of cultivation, normalisation, or traditional socialisation" (Morgensen & Schnack, 2010, p. 61). Ultimately, action competence is less of something that someone *has*, but more something that someone *does*.

As I said, I see these as complementary ways of thinking of sustainability competencies. Wiek et al.'s (2011, p. 207, 211) framework offers a more concrete way of delivering sustainability education through an "explicit and commonly shared reference framework" with more concrete concepts, methodologies, and "peer reviewed 'classics.'" However, while this framework is comprehensive, specific, and thorough, it begs some

[2] Wiek et al. (2011) do suggest that action-orientated competence is embedded within their 'strategic competence.' However, this term is used in a different way and has more to do with the instrumental ability to "collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability" (Wiek et al., 2011, p. 2010), rather than abilities, *motivations* or *desires* to play an active role in sustainable development, as described by Morgensen and Schnack (2010).

readers like Shephard et al. (2019) to wonder, where does the learner's independence and freedom factor into the framework? Are democracy and honesty not equally as important as sustainability? For me, this is where action competence comes in, focusing on process, democracy, and the development of the individual as a good in and of itself, rather than for an instrumental purpose. Attempting to combine these two approaches to sustainability competencies is not unproblematic as there are embedded contradictions. Allowing for freedom and democracy is, to some extent, at odds with the desire to produce a specific outcome. However, in this study I have the benefit of having engaged in a more pragmatic line of inquiry: examining the impacts of students' transience in student-led food gardens and how to manage them. Reconciling the internal contradictions in the field of sustainability education that have existed for decades is far beyond the scope of this study. Instead, I recognise these traditions and draw on these two understandings of sustainability competencies (Morgensen & Schnack, 2010; Wiek et al., 2011) as relevant when broaching the topic of sustainability education in this thesis.

It should be noted that the cognitive dimension of learning is privileged in formal education, including sustainability programmes. However, researchers have highlighted the importance of affective outcomes for sustainability education, with the concern that we are only developing 'heads' and not 'hearts' (Ojala, 2007; Shephard, 2008). An important way of thinking about cognitive, affective and psychomotor development in sustainability education is through experiential learning (Shephard, 2008; Sipos, 2008; Brundiers et al., 2010). Experiential learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41).

Another relevant concept which has been influential in sustainability education is embodied learning. Embodied learning is "the active process through which changes and

shifts are experienced in, through, with, and because of the body. It is the mindful attention to, and retention of, this aforementioned process that determines the continuous emergence of self and that facilitates learning and cognition" (Munro, 2018, p. 5). Embodied learning deliberately draws on both the body and the mind in the learning process. Sipos et al. (2008) say that embodied learning engages the "head, hands and heart" (p. 68). The classroom can be a venue for embodied learning, however embodied learning that takes place beyond the classroom can have much more profound impacts than many educators in higher education give it credit for. One strategy to promote students' experiential and embodied learning beyond-the-classroom is through the use of the university campus as a 'living laboratory.' This will be the focus of this next section.

2.3.1 Living Labs

Sustainability education in the higher education context can take place through the formal, informal, and non-formal curriculum, as well as the campus environment, sometimes called the 'hidden curriculum' (Snyder, 1970). The 'hidden curriculum' is made up of "the implicit messages a university sends about sustainability through the institutional environment and values" (Winter & Cotton, 2012, p. 783). This might include message sent though the physical campus environment (How green is it? How accessible?), operations (What is the policy on pesticides? What procedures exist for reporting harassment?), or the work culture ('We compost food waste in our department'). Informal learning refers to learning that takes place in day-to-day life from educational influences in the learner's environment, however non-formal learning refers to organised educational activities that are outside of the formal educational system of schooling and university/college education (Coombs et al., 1973). University food gardens can be included as part of any four of these

curricula, however, in the UK they mainly operate as part of the informal and hidden curricula.

The use of universities as 'living laboratories,' which are often called 'living labs,' is an idea that has been proliferating widely within the sustainability education community, with the recognition that physical university campuses can contribute to and be used as a tool for sustainability learning, and universities as a place for sustainability experimentation. The Environmental Association of Universities and Colleges in the United Kingdom defines living labs within the tertiary education sector as "partnerships or programmes which connect academic activities of the institution (i.e., learning and teaching, and academic research) with non-academic partners" (EAUC, 2018). These non-academic partners can be external to the university, or they can be professional staff within the university, such as estates teams. Many definitions of living labs focus more on their use as a research tool (i.e., Robles et al., 2015; Colding & Barthel, 2017), however, there is a recognition that they can contribute to education (Zen, 2017) and, in the context of sustainability, developing a connection to nature (Colding & Barthel, 2017). The term 'living lab' is sometimes used to refer to a process or methodology, and sometimes to a site. Like Bergvall-Kåreborn and Stålbröst (2009), I see these understandings as complementary – a living lab methodology can be used on the site of a living lab. The EAUC definition is loose enough in this respect to be applicable to either.

Universities have used campus food growing projects as living labs around the world, though not all institutions may label them as such. A well-known example is the University of British Columbia's work developing its Centre for Sustainable Food System's on-campus farm (UBC, n.d.). However, food growing on campuses is also being used in living labs in the UK. For example, the University of Cambridge mentioned their campus community garden in their Living Laboratory Annual Report as early as 2013 (Cambridge Green Challenge, n.d.).

The notion of 'living labs' is relatively new, however the use of on campus food growing has a long history through agricultural training and research (McDowell, 2003). Land grant institutions in the United States have been champions of this. Unfortunately, in recent years there has been an erosion of public funding for these institutions (National Resource Council, 1995), which has resulted in attempts by colleges/universities to recoup funds through increasing tuition fees (Weaver & Diamantides, 1993) and private investments (National Resource Council, 1987). In spite of this, land-grant universities are pioneering the development of sustainable agriculture programmes (Jacobsen et al., 2012; Galt et al., 2013). As such, there is much that can be learned from the land-grant institution model about public engagement in sustainable food growing, as well as producing graduates prepared for and research applied to practical sustainability problems in the 'real world' (McDowell, 2003). However, living labs need not be integrated into the curriculum to contribute to student learning. Learning can take place through this 'living lab' model through student volunteering.

2.3.2 Student Volunteering

Student volunteering in the higher education context is often used or seen as a form of experiential or embodied learning (as in Mooney & Edwards, 2001; Moyer et al., 2014). Student volunteering has been defined as when students volunteer "their time in their local communities through programmes organised at/by their students' union or institution" (Student Volunteering England, 2004; as cited in Darwen & Rannard, 2011). I would clarify this definition to say that 'local communities' include the university community ('inward-facing volunteering') in addition to the surrounding geographic community ('outward-facing volunteering') (Darwen & Rannard, 2011, p. 178). However, 'community' could also refer to communities of interest, practice, or other type of non-geographic community. A concept

related to student volunteering[3] is service learning, which is sometimes used synonymously, but more often refers to learning through 'volunteering' undertaken for academic credit (Mooney & Edwards, 2001).

The sorts of benefits student volunteering provide are hard to summarise because they are so context dependent. Squirrell et al. (2009) have provided a good overview of benefits to students as individuals, (including their employability), as well as benefits to the university, and the local community organisations in their report on student volunteering for the National Co-ordinating Centre for Public Engagement (Darwen & Rannard, 2011). Some of the sustainability-relevant benefits were students "doing something worthwhile," having the "opportunity to put theory into practice," broadening students' perspectives, supporting communities in providing volunteer-run services, and building a more cohesive community between the university and surrounding area (Squirrell, 2009, p. 20).

Student volunteering has been taking place for well over a century, providing social services, running clubs and camps, contributing to the war effort during the First and Second World Wars, undertaking raising and giving initiatives, and engaging in campaigning movements (such as anti-apartheid, tenant's rights, gay rights, and environmentalism) (Brewis, 2014). More recently there has been significant support across political parties at a policy-level for student volunteering. For example, in 2001, the Higher Education Active Community Fund was established to promote volunteering and distributed tens of millions of pounds of funding (HEFCE, 2001). Much of student volunteering in recent times has been "organised and supported within universities, rather than by students under the auspices of student unions," and the reason for this can be attributed to the governmental funding of the initiatives (Holdsworth & Quinn, 2010, p. 116). However, according to Holdsworth and Quinn

[3] There are a range of other similar terms for these and similar types of activities, such as 'learning-linked volunteering' and 'community-engaged learning' (Darwen & Rannard, 2011).

(2010) “relatively little has been documented on student voluntary work, despite the political rhetoric in support of these activities. Furthermore, evidence of the outcomes of student volunteering is piecemeal and fragmented, reflecting the status of student volunteering within higher education institutions” (p. 114).

There are different types of voluntary activity that students can get involved with: mutual aid or self-help (where “people with shared problems work together to […] address them” (Rochester et al. 2010, p. 24-25)), philanthropy and service to others (where an organisation “recruits volunteers to provide a service” to others (Rochester et al. 2010, p. 25)), participation (“the involvement on a voluntary basis in the political or decision-making process” (Rochester et al. 2010, p. 25)), and advocacy or campaigning (“collective action aimed at securing or preventing change” (Rochester et al. 2010, p. 25)). Student-led food gardens could fall under any of these types of activities depending on the aims of the initiative and the activities it undertakes.

Because of their transient nature, students often engage in volunteering episodically. Episodic volunteering is on the rise, and it is “made up of separate, especially loosely connected episodes; of or limited in duration or significance to a particular episode, that is, temporary; occurring, appearing, or changing at usual irregular intervals, that is, occasionally” (MacDuff, 2005, p. 52). Of those that take part in episodic volunteering, some are temporary volunteers who take part for a limited duration of time (usually a period of hours). Interim volunteers take part “on a regular basis for less than six months” (MacDuff, 2005, p. 52). Occasional episodic volunteers take part in the voluntary activity “at regular intervals for short periods of time” (MacDuff, 2005, p. 53). Student volunteers engage in all three of these types of episodic volunteering. Much of the research on episodic volunteering focuses on how to retain them for longer (i.e., Hyde et al., 2016). In other words, research has been undertaken to understand how to make episodic volunteers into long-term volunteers. However, in some

cases, as in student-led food gardens, volunteers are inevitably transient. It is therefore crucial that we have a better understanding of how to manage issues stemming from a transient volunteer base given that it is an inevitable reality for some initiatives and organisations, including student-led initiatives.

2.4 Sustainable food and food gardens in universities

Many universities are striving to encourage sustainability through their campus environment and food system (such as those documented by Sharp (2002), Baldwin and Chung (2007), Rojas et al. (2007), and Barlett (2011)). Others are taking advantage of the opportunities to link these endeavours to the formal curriculum (such as those documented by Rojas et al. (2007), Babich and Smith (2010), Cohen (2010), and Bacon et al. (2011)). For example, Sipos et al. (2008) found that a service-learning project, in a course called 'Edibility and awareness: sustainable food systems,' contributed to transformative learning about sustainable food through reflective practice and engagement of head, hands, and heart. Other activities that can contribute to these transformations in university settings are encouraging sustainable food habits though promotional material and demonstrating a commitment to socially and environmentally ethical procurement. Institutional commitments to sustainable procurement can make a sizable impact on the "conventional food chain" as well, since universities are such large consumers (Bartlett, 2011, p. 101, 111). Sustainability leadership in higher education therefore has the ability to contribute to change in the food system through fostering cultural transformations and "[reshaping] relations between food and place" (Barlett 2011, p. 101). This said, universities are a heterogeneous group of institutions with varied funding streams (i.e., public, private), foci (i.e., research, education, extension/outreach), socioeconomic statuses of students, and sizes. These factors affect how sustainable food initiatives manifest at different institutions.

Part of the more recent growth in university-based food growing initiatives can be explained by a budding interest in enhancing the sustainability of universities and the potential of these garden projects to influence the sustainability attitudes/behaviours of their students, society's future leaders (McKinne and Halfacre, 2008; Johnston et al., 2012). My research focuses on student-led food gardens in universities. I will explain my rationale for this in the remainder of this and the following section, however, first I will briefly describe what I mean by 'student-led food gardens.' Student-led food gardens are places where groups of university students manage and operate spaces on university campuses where edible plants are grown. The students can be at any level of education, and there can also be non-student participants as long as they aren't 'leading' it *per se*. When I use the term 'garden,' I refer to both the physical space where the growing takes place, as well as to the social and organisational structures that facilitate the management of the space.

University food gardens, including student-led ones, are often referred to as 'community gardens' or 'allotment gardens' in both academic literature (e.g., Mycock et al., 2010; Somerset et al., 2010) and by students and other stakeholders involved with them. Community gardens are "open spaces managed and operated by members of the local community in which food and/or flowers are cultivated," (Guitart et al., 2012, p. 364). Allotment gardens, on the other hand, tend to be made up of plots rented or used by individual people or families. The foci of this study are communally run gardens, although one of the gardens studied was called an allotment by the students involved in spite of being run communally.

Some universities are also host to larger-scale food growing initiatives and initiatives that are run by paid staff. Student-led food gardens differ from these models, typically used by agricultural universities and land grant institutions, in that they don't have the level of institutional support and integration into university activities. Initiatives run by non-students

will not be the focus of this study given that my research question centres around managing the impacts of transience, and students tend to be more transient than, for example, university staff.

Community gardens have been linked to building community, making fresh food accessible, improving health, providing economic benefits to their users, and contributing to self-efficacy (the belief in one's capabilities to take action on a given problem) (Pierce & Seals, 2006; Teig et al., 2009; Evans et al., 2012; Guitart et al., 2012). Some of these impacts have direct sustainability implications (like growing food sustainably) and other sustainability impacts are more indirect (like education and community networking) (Evers & Hodgson, 2011). In any case, community gardens are multifunctional in that the benefits they provide are manifold (Valley & Wittman, 2018). There is some evidence university student-led food gardens may provide similar benefits, however the literature is limited and there has yet to be any kind of systematic assessment of these benefits.

In addition to providing these potential benefits, student-led food gardens could be a 'sandbox' where students can explore their role in activism, and how food growing might be a part of their life in future. Importantly, university is also the first time many students have control over their diet, food shopping, and other food practices. Engaging with discussions around sustainable food and developing sustainable habits at this malleable stage could impact food behaviours for the rest of their lives (Verplanken et al. 2008, Thompson et al. 2011, van Niekerk & Barnard 2011). However, this subject is yet to be well-explored empirically and specifically. If these gardens are to provide the benefit outlined here, then it is necessary to understand how to sustain the gardens over the long-term. It is therefore crucial to understand how to manage issues caused by students' transience.

2.4.1 The transience of volunteers in student-led food gardens in universities

Gardens run by university students are faced with a transient membership, resulting in short term participation (when people are involved for limited periods of time) and irregular participation (when involvement is inconsistent or non-regular). Short-term and irregular participation can also result in low participation, which is when there are limited volunteer hours invested overall (Figure 1). In this thesis, I will refer to short-term, irregular, and low participation collectively as 'problematic participation' because they are forms of participation that result in problems (although are not problems in and of themselves). However, it is likely that there are also other causes of problematic participation, in addition

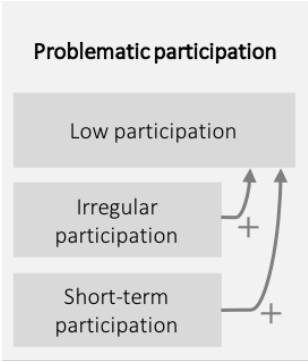

Figure 1. The three forms of problematic participation in student-led food gardens: irregular, short-term, and low participation. The causal relationships are depicted using arrows to indicate the direction of the relationship, and pluses (+) to indicate that an increase in the first variable will lead to an increase in the second variable.

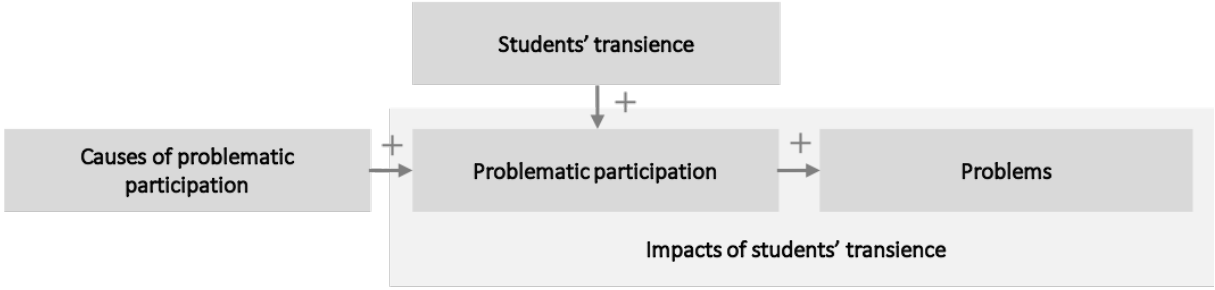

Figure 2. The relationship between problematic participation, transience, its other causes and effects. The causal relationships are depicted using arrows to indicate the direction of the relationship, and pluses (+) to indicate that an increase in the first variable will lead to an increase in the second variable. The greyed section of the diagram represents what are thought to be included in the impacts of students' transience.

to transience. These relationships are illustrated in Figure 2 and will be built upon in Chapter 6.

Throughout this thesis I will also be using two related terms: transience and turnover. Transience refers to *movement in and out of the university* (over the course of degrees and during the academic calendar because of holiday times), and turnover refers *to movement in and out of the student-led food gardens*, which can be accelerated by short-term participation. The terms transience and turnover are often used synonymously in common language, but I draw this distinction between the two to talk about these two different scales of movement (see Figure 3 for an illustration of this). Students' transience in and out of the university community causes high turnover of participants of student-led food gardens. As such, each 'generation' of students within the garden is short-lived compared to volunteer-run gardens based in less transient communities. The set-up of student-led food gardens is also counter-intuitive because students are absent during a long vacation period during the summer and therefore the gardens risk being neglected at the time when they are in most need of care. Furthermore, the summer is the time where students would get greatest benefit from accessing the food produced. Variability in student volunteering during the academic year due to uneven academic course loads, other holidays, and vocational placement requirements is also common.

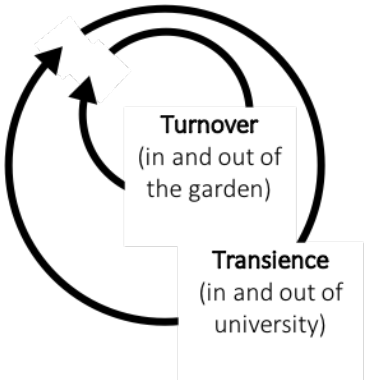

Figure 3. A depiction of how transience refers to movement *in and out of the university*, and turnover refers to movement *in and out of the garden*.

Most students could be characterised as episodic volunteers. High rates of volunteer turnover can cause issues with "organisational effectiveness and efficiency" (Starnes & Wymer, 2001, p. 98), and this is compounded when volunteers need special skills, intensive training, to be committed over the long term, and/or there are not enough qualified volunteers (Fischer & Schaffer, 1993). Students' turnover in university gardens means there is a constant need to generate and maintain interest in the garden to ensure there is "adequate caretaker presence" (McKinne & Halfacre, 2007, p. 153). Adrangi (2013) also found that students can also unintentionally neglect work by other local groups on similar projects (such as by initiating new projects (like community gardens, food bank donations) without realising such projects have already been lobbied for or run by the university or within the local community). Such duplication of efforts thereby can create tensions between non-students and students. Furthermore, the neglect of existing work also deprives students and their projects of "a pool of knowledge and mentors, exposure to new ways of doing things and experiences, pooled human and material resources, and staying power that often exceeds" their own (Adrangi, 2013). Much of the research on short-term volunteering focuses on how to retain volunteers for longer (i.e., work by Hyde et al. (2016)). However, the transient nature of student life means that such comings and goings are inevitable. Therefore, understanding how short-term involvement can be best managed within the context of the student led garden is important. However, the interplay between forms of problematic participation, its causes and effects, and transience have yet to be investigated in any kind of systemic way in student-led food gardens, or even sustainable food organisations more broadly. This is particularly important to understand given that, in society at large, transience is increasing (MacDuff, 2005) and self-organising sustainability movements are strengthening (e.g., Extinction Rebellion, 2019; Wahlström et al., 2019). Furthermore, given student-led food gardens' capacity to facilitate learning about, and behaviour and attitude change for,

sustainability it is important to understand how to enhance the resilience of student-led food gardens in the face of transience.

2.5 Temporary organisations and transience

While student-led food gardens are not temporary organisations because they are typically intended to last over the long-term, organisations with transient participants share much in common with them because of their short-term membership. There is much discussion about what temporary organisations are, but the general consensus is that they are organisations that are time-bounded (Bakker, 2010). While some temporary organisations may be truly ephemeral, and disperse as soon their task is complete, often temporary organisations are connected to a more permanent organisation operating over a longer period of time (Bakker, 2010). Furthermore, even if a temporary organisation is not embedded within a more permanent organisation in some capacity, they are still embedded in "enduring personal networks, epistemic communities, and industries in which their participants embedded" (Bakker, 2010, p. 480). In other words, regardless of whether a temporary organisation is embedded within a more formal and long-standing organisation, they are usually still embedded within wider socio-cultural milieu. Three ways in which temporary organisations might share something in common with organisations with transient participants (like student-led food gardens) are in terms of their approach to knowledge, risk, and time (see Table 1). Temporary organisations tend to have linear understandings of time and problems with knowledge retention, but are more comfortable with risk. Permanent organisations tend to have cyclical understandings of time and better-established knowledge management practices, but are more risk adverse. It is not yet clear what approaches organisations with transient participants have to knowledge, risk, or time. With a better understanding of these

approaches, their strengths, and weaknesses, stakeholders of transient organisations could self-organise more strategically.

Table 1. The differences between how temporary organisations and permanent organisations approach knowledge and risk. Information included comes from Ibert (2004), Bakker (2010), and Brookes et al. (2017).

	Temporary organisations	Permanent organisations
Approach to knowledge	• "Excellent domain for context-specific knowledge-creation" (Brookes et al., 2017, p. 1217) • Knowledge retention is a problem • The orientation towards knowledge is exploratory	• Reduced reflexivity • More established knowledge management practices • The orientation towards knowledge is exploitative
Approach to risk	• Changes that result in risk are viewed positively as they present opportunities • Undertakes high-risk activity • Lacks temporal consistency and therefore is riskier	• Changes that result in risk are viewed negatively as they are a threat to the longevity of the organisation • Undertakes low-risk activity • Has temporal consistency and therefore has less risk
Approach to time	• Linear, where tasks are orientated to "fulfil a one-off mission" (Ibert, 2004, p. 1530)	• Cyclical, where "routines are established to deal with constantly (seasonally, monthly, daily, etc.) reoccurring tasks") (Ibert, 2004, p. 1530)

2.6 Conclusion

Student-led food gardens have the potential to contribute to a range of benefits, not least to sustainability education, and attitude and behaviour change. However, this potential may not be fulfilled if these initiatives are unable to persist in the face of a transient volunteer base. There is, therefore, a need to better understand how student transience impacts student-led initiatives in universities and how transience and its impacts can be managed to ensure the longevity of these projects and the quality of their outcomes.

These questions are of particular note given the emerging interest in the UK, as well as abroad, about how to use university campuses as living laboratories for developing sustainability practices and learning. This study of student-led food gardens will contribute to this emerging body of research. In particular, it can contribute to understanding how student-led activities can be embedded in living laboratories in a way that genuinely benefits all stakeholders.

The examination of transience in student-led food gardens also has implications beyond the university garden plots. Studying transience within student-led food gardens may contribute to understanding how to manage of other self-organising groups with transient participants, regardless of whether their transience is inevitable or preventable. Having described the literature this thesis is engaging with and will be contributing to, I will now move on to outlining my theoretical framework.

Framing through social-ecological resilience

Chapter 3

We can't control systems or figure them out. But we can dance with them!
Donella Meadows, Dancing with Systems, 2001

Vegetables on display at a food festival
Spring 2015

3.1 Introduction

My theoretical framework is rooted in a systems understanding of social and environmental phenomena. Layered on top of this, I draw on scholarship in social-ecological resilience to explain and analyse both how student-led food gardens fit into the wider landscape of change towards a sustainable food system, and the capacity of student-led food gardens to withstand the ongoing changes in their volunteer base and how to increase that capacity. This chapter will present these theoretical perspectives and their key tenets, but before doing so, I will position myself ontologically and epistemologically.

3.2 Ontological and epistemological considerations

My ontological and epistemological orientations are rooted in critical realism. Some social researchers conflate ontology and epistemology (Crotty, 1998), however, critical realists draw an important distinction between ontology, theories of what exists and the nature of existence, and epistemology, theories of knowledge or how we know what we know (Nastar et al., 2018). Epistemological considerations have been at the forefront of my research throughout as I have adopted a research approach with a high degree of reflexivity, which will be outlined in greater detail in Chapter 4.

Unlike interpretivist ontologies, where reality is understood to be socially constructed, a critical realist ontology is similar to positivist ontology in that there is understood to be a reality that exists independent from human understanding of it (Coghlan & Brannick, 2005). However, unlike positivists, critical realists understand there to be different 'domains' of reality (which Bhaskar (2008) calls 'empirical', 'actual', and 'real' domains), and that it is only the 'empirical' domain which can be observed through scientific inquiry. The 'actual' and 'real' domains exist prior to human cognition. The 'real' domain is made up of "objects, their

structures or natures and their causal powers and liabilities," and this includes not only natural things (i.e., gravity) but social things (i.e., human agency) as well (Fairclough et al., 2002). The 'actual' domain is made up of "what happens when [the] powers and liabilities [from the 'real domain] are activated and produce change" (Fairclough et al., 2002). A visualisation of this can be seen in Figure 4. In short, critical realists believe the world is made of very real, however, unobservable things and events, and these can cause events that are observable by scientists (or non-scientists, for that matter). However, just because the events are observable, it does not mean that they are actually observed (scientifically or otherwise).

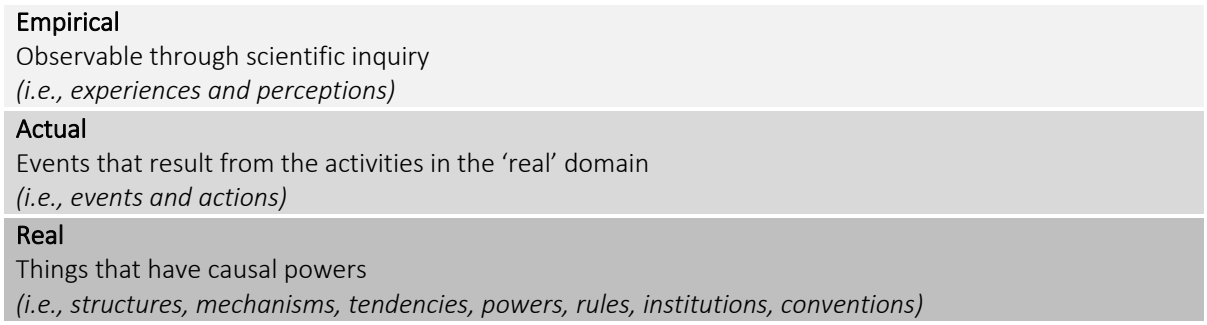

Figure 4. A stratified ontology of critical realism (based on Fleetwood, 2014).

Epistemologically critical realists share more in common with interpretivist traditions. Positivists believe that, through observation and the use of the scientific method we can understand natural and social phenomena. However, like interpretivists, critical realists believe "we 'produce' our experience in the form of our narratives and concepts" (Bhaskar, 1986, summarised in Winter & Munn-Giddings, 2001, p. 259). In this way, critical realists are similar to interpretivists in that they do not think there can be a "one-to-one correlation between knowledge claims and reality" (Koutsouris, 2010, p. 255).

Another way in which critical realism departs from positivism epistemologically is that the means to understand social and natural phenomena are different. Unlike natural phenomena, which are much less relative, society and culture are dynamic and constantly in flux, and as such, critical realists do not strive for universal 'laws' or 'rules' that govern social

systems. Instead, understanding of the context in which social phenomena take place is paramount.

The benefit of an ontological and epistemological stance rooted in critical realism is that it can marry natural and social sciences (Nastar et al., 2018), and qualitative and quantitative approaches without resorting to "paradigm 'switching'" (McEvoy & Richards, 2006, p. 66). This is particularly relevant in sustainability science, where the natural world (typically observed through quantitative research) affects and is affected by people (often observed through qualitative research), regardless of human understandings of it. For example, it is clear that our food system is contributing to climate change in a substantial way, regardless if we know it or not. Through an interpretivist lens, it is more challenging to make a consistent argument that this can be taken as a fact, given the espoused socially constructed nature of reality. However, a critical realist perspective on social phenomena means that, like in interpretivism, understandings of these are still understood to be negotiated and relative.

Research operating under a critical realist ontology and epistemology typically does not focus on producing predictive knowledge, either through induction (building theory from observation) or deduction (testing theory through observation). Rather, it employs retroduction, that is, beginning with an observable phenomenon and then generating possible explanations (Belfrage & Hauf, 2017). Critical realism embodies many concepts that are compatible with systems thinking, such as emergence, open systems, stratification and holistic causality (Mingers, 2015). Building on the critical realist ontology and epistemology outlined here, I will go on to root my research in systems theory in this next section.

3.3 Rooting in systems thinking

Sustainability science is firmly rooted in systems theory, and therefore I have drawn on this area of scholarship and on theories that share these roots for my theoretical framework. Systems theory is based on the premise that the world is made up of interacting systems (including inorganic, organic and socio-cultural systems) with emergent properties[4]. In other words, a system is "a perceived whole whose elements are 'interconnected'" (Ison, 2008, p. 140). Systems theorists contend that systems go through cycles of degeneration and renewal and that these cycles operate on different hierarchical levels which are also interconnected. As a result, actions that are taken can have counterintuitive effects and unintended consequences.

For systems theorists,

> *"The world is not a neat stratigraphic map beginning with inorganic matter, passing to organic matter, and then being transcended by socio-cultural forces. Rather, the world is a complex, interacting array of systems and system processes, bumping into each other in a variety of ways. Social relationships and processes are impacted by the physical world as the physical world is transformed by social activity*."
>
> (Greenwood & Levin, 2008, p. 58)

Sustainability science holds that the relationship between the human and natural world are dynamic and "operate within material boundaries and are capable of transforming material living conditions" (Folke et al., 2002; Greenwood & Levin, 2008, p. 59).

There are different schools of thought within systems theory (Ison, 2008). The starting point of systems theory was challenging reductionist thinking in diverse disciplines, like

[4] Emergence is a "property of a complex system that emerges from interactions of subunits and cannot be understood or predicted by studying individual subunits" (Chapin et al., 2009, p. 345).

biology, mathematics, and philosophy, postulating that it is not enough to study elements of a system in isolation to understand the whole. Cybernetics is a stream of this theory which brought forward the ideas of cyclicity and feedback loops – or, the idea that the output of a system is reused as input to the same system. There are two types of feedback loops: positive or reinforcing feedback loops amplify the changes in a system (the changes amplified can been good or bad changes), and negative or balancing feedback loops dampen changes in, or stabilise, the system (Senge, 2006). These feedback processes can also have delays embedded within them, so consequences can be unexpected or counterintuitive (Senge, 2006). In first-order cybernetics, the interest was not just on the dynamics of these loops, but also the ability to control systems through them. Second-order cybernetics brought a useful epistemological perspective for sustainability science because it postulates that "knowledge is not something we have but arises in social relations such that all knowing is doing" (Ison, 2008, p. 151). This means that, studying complex systems is not objectively collecting knowledge bits, but coming to know a system through social learning.

Complexity sciences, another stream of systems theory, are diverse and not always consistent, but have also brought useful concepts to the table. The main driving idea of complexity is that parts of systems are linked up and interact in multiple, and often unpredictable ways. Complexity sciences have been influential in sustainability science through the conceptualisation of social and ecological systems as linked complex adaptive systems (social-ecological systems) (Folke et al., 2002) Complex adaptive systems are systems "of interconnected components characterized by emergent behaviour, self-organization, adaptation, and substantial uncertainties about system behaviour" (Biggs et al., 2012, p. 425). Although the study of social-ecological systems is a relatively new area of scholarship in systems theory, it has been influential within and beyond the sustainability community (Colding & Barthel, 2019). Social-ecological systems are ecological systems "intricately linked

with and affected by one or more social systems. An ecological system can loosely be defined as an interdependent system of organisms or biological units. 'Social' simply means 'tending to form cooperative and interdependent relationships with others of one's kinds'" (Anderies et al., 2004). These social and ecological systems "contain units that interact interdependently and each may contain interactive subsystems as well" (Anderies et al., 2004).

The idea of 'wicked problems' from the complexity sciences have also been influential in social-ecological systems research (Rogers et al., 2013), sustainability research (Frame, 2008) and sustainability education (Ramaley, 2014). 'Wicked' problems are problems that are difficult to define and there isn't consensus about how to move forward from them because they are characterised by uncertainty and contradiction (Frame, 2008). The global sustainability challenge itself has been called a 'wicked problem' (Blok et al., 2016), as have many sustainability challenges that are more niche, such as wildfire management (Chapin et al., 2008), disappearing coral reefs (Hughes et al., 2013), and food insecurity (Hamann et al., 2011).

Another part of systems theory scholarship that has relevance for my thesis is the idea that there are different places to "intervene in a system" to leverage change to a greater or lesser extent (Meadows, 1999, p. 2). In her seminal work, Meadows (1999) outlined twelve 'leverage points,' starting with shallow leverage points (ones that are easy to leverage but have less of an effect on the system) and moving towards deep leverage points (places in the system that are much harder to change but have a much more substantial effect on the system). The shallow leverage points include things changing system 'parameters' (i.e., changing the amount of land set aside for conservation, minimum wage, taxes) and changing "the size of buffers and other stabilising stocks" (i.e., the number of substitute teachers on-call, the amount of water in a dam). Deep leverage points focus on changing "the

underpinning values, goals, and worldviews of actors that shape the emergent direction to which a system is orientated" (Abson et al., 2017, p. 32). Much of sustainability research and policy has focused on shallow leverage points, and Abson et al. (2017, p. 32) have argued that there needs to be more focus on leveraging change at a deeper level. Sustainability education is a deep leverage point that has a crucial role in changing "the mindset of paradigm out of which the system arises" in order to leverage that change.

In summary, thinking of my research as being underpinned by systems theory means that I understand the issues I have studied as complex, and with social and ecological drivers "under conditions of uncertainty and plurality of values and perspectives" (Popa et al., 2015, p. 2). I consider my research to be transdisciplinary as I (1) collaborated with research participants in setting the research agenda and taking action (Brandt et al., 2013), and (2) drew on "perspectives shared by a wide array of scientists and social reformers of diverse backgrounds and divergent political ideas," rather than being rooted in a "single discipline anchored in [a particular academic department]" (Greenwood & Levin, 2008, p. 57). Understanding student-led food gardens through the lens of systems theory challenges the "radical individualism" that dominates understandings of social behaviour, purporting that the complexities of social and natural systems require a more holistic, open, and democratic theoretical underpinning (Greenwood & Levin, 2008, p. 59). For this reason, I examine each student-led food garden as not only a collection of individual students, but also as a group with synergistic properties, embedded within the wider ecology of a university and society at large.

My research also unfolded in unexpected ways and therefore I found myself adapting my focus and methodology as I went along. Systems theory was a useful theory in this respect because it encourages flexible methods for redefining 'the problem' throughout the research project. Systems theory provided some crucial underpinnings for my research, however a

'resilience lens' helped to operationalise some of these ideas for my data analysis. I will outline what I mean by resilience in the following section.

3.4 Social-ecological resilience

Resilience is a term used in a variety of different fields, such as ecology, organisational studies, psychology, and urban studies, to name a few. The concept has gained significant traction in the field of sustainability, and this school of thought has emerged out of the original work by Holling and Gunderson (Holling, 1973; Gunderson, 2000; Gunderson & Holling, 2002). This early work focused on ecological resilience, or "the capacity for ecosystems to absorb change" (Folke, 2016, p. 4). Since then, the theory has increasingly been understood in much broader terms and has been drawn on in social science and interdisciplinary arenas within the field, with the development of new concepts like 'social resilience' (Adger, 2000), 'social-ecological resilience' (Adger, 2005; Folke, 2006; Gunderson, 2010), 'community resilience' (Berkes & Ross, 2013), 'economic resilience' (Simmie & Martin, 2010), 'urban resilience' (Meerow et al., 2016), and organisational resilience (Seville et al., 2008, Burnard & Bhamra, 2011; Butler, 2018). Many of these terms are not mutually exclusive, and the literature about each of the concepts is quite heterogeneous. I will not outline definitions used in different contexts and disciplines as this has already been done by Quinlan et al. (2016), Meerow et al. (2016), and Brand and Jax (2007), but rather I will explain several alternatives that could have been appropriate to this study, and why I have chosen to work with social-ecological resilience.

Social resilience is "the ability of communities to withstand external shocks, mitigate and recover from hazards" (Adger, 2000; Keck & Sakdapolrak, 2013; Quinlan et al., 2016, p. 125). Some parts of this scholarship tend to focus on resilience at a large scale, and therefore suggested indicators for social resilience include those related to demographic change and

income distribution, for example. The scale at which resilience is being applied in this study is smaller and more niche (that is, to student-led food gardens), rendering such strategies (Adger, 2000) for observing social resilience unusable. There is also yet to be coherence within the literature with regards to how one might try to increase the social resilience of a group or system in a more pragmatic sense, though there are some more pragmatic contributions, like Marshall and Marshall (2007), and Obrist et al. (2010).

Organisational resilience "resides in both the individual and organisational responses to turbulence and discontinuities" involving "both the ability to withstand systematic discontinuities as well as the capability to adapt to new risk environments" (Burnard & Bhamra, 2011, p. 5583). The literature on organisational resilience tends to focus on how organisations cope with an acute crisis event (Seville et al., 2008, Stephenson et al., 2010; Burnard & Bhamra, 2011) such as a natural disasters, although some attempts have been made to explore organisational resilience during "normal operational activities" (Butler, 2018, p. 103). However, most established framings of organisational resilience are built around resilience as a response to an acute crisis event (e.g., Burnard & Bhamra, 2011). As such, organisational resilience was a less useful framing for this study.

Community resilience is defined as "a process of adaptation in a community following a disruption, distinguished by factors such as social capital and community competencies" (Cretney, 2014, p.629). The concept suffers from similar weaknesses as social resilience in that there is a considerable lack of coherence within the literature about how to apply the concept prescriptively. Recent interpretations of community resilience have drawn on both the literature on psychological resilience and social-ecological resilience, in an effort to integrate the two (Berkes & Ross, 2013). This would be the most appropriate approach for this study, given that student-led food gardens (which could be considered 'communities') are primarily social entities that interface with ecological systems rather than resource-

dependent “communities of place” (Berkes & Ross, 2013, p. 16). However, this work is still underdeveloped, particularly for use in the prescriptive sense that would be necessary for this study.

In this study, I draw on the scholarship of social-ecological resilience given that the student-led food gardens in this study are underpinned by social aims, such as increasing pro-sustainability changes in food attitudes and behaviours, as well as environmental aims, such as to produce food sustainably[5]. Social-ecological resilience is the only school of thought within the scholarship of resilience which has a coherent explanation of the relationship between social and ecological systems (unlike social, community, or organisational resilience). However, the scholarship on social-ecological resilience draws on work from these other schools of thought. Previous research on community food growing has also seen the merit of, and therefore adopted, social-ecological framing of resilience (Tidball & Krasny, 2007; Krasny & Tidball, 2009; Barthel et al., 2010). Social-ecological resilience is defined as “the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure and feedbacks and therefore identity, that is, the capacity to change in order to maintain the same identity” (Folke, 2016, p. 8). Vulnerability is the antonym of resilience: the lack of a capacity of a system to withstand change. In recent years, there have been influential attempts to synthesise existing research into some generic principles for building social-ecological resilience in the context of sustaining ecosystem services as the concept of social-ecological resilience has matured (Chapin et al., 2009; Biggs et al., 2012, 2015c).

A key concept in resilience is the idea of ‘basins of attraction’ (Walker et al., 2004). A basin of attraction is an equilibrium state (sometimes called an ‘attractor’) where a system

[5] The aims of the gardens studied will be outlined in more detail in Chapter 4 when introducing the case study.

tends to remain (illustrated in Figure 5 as the darker area towards the bottom of the basin). Walker et al. (2004) state that "all real-world [socio-ecological systems] are[…] continuously buffeted by disturbances, stochasticity, and decisions of actors that tend to move the system off the attractor. Therefore, we think of [socio-ecological systems] as moving about within a particular basin of attraction, rather than tending directly toward an attractor" (p. 5). In this way, the black dot in the basin (Figure 5) could be visualised as a ball rolling around in the basin. A system rolling up to the rim of a basin would be a situation in which the resilience of the system is being tested, and the ball sitting at the bottom of the basin would be a system at its equilibrium state. A system with a deep basin would be considered a more resilient system because the walls of the basin are steep, making it hard for the system to move out of the basin of attraction. However, if the ball reaches the rim of the basin because it had a shallower basin that experienced a moderate perturbation (a less resilient system), or it had a deeper basin which experienced a bigger perturbation (a more resilient system), it may tip into a new basin of attraction. This 'crossing of a threshold' causes what resilience scholars call a 'transformation,' which is when a system becomes "a fundamentally new system when ecological, economic, or social structures make the existing system untenable" (Walker et al., 2004, p. 5).

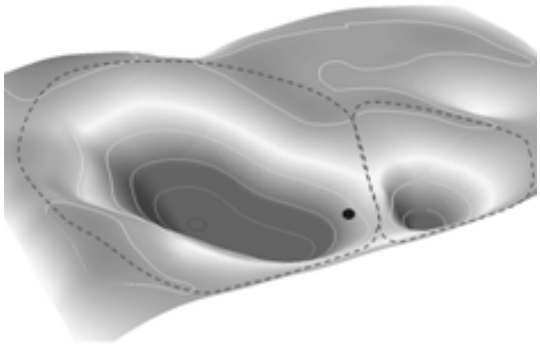

Figure 5. Basins of attraction (Walker et al., 2004).

As can be seen in the above section, resilience can be quite an abstract theory, and as a result has been applied in a range of contexts and interpreted in different ways. For this reason, I adopt a critical approach to socio-ecological resilience. Clarifying a critical approach to socio-ecological resilience is necessary given the wide use of the concept which has been used to ends as diverse as "perpetuating hegemonic values and discourses" and spearheading "a more countercultural form of activism" (Cretney, 2014, p. 631). Given the ecological roots of resilience, it's initial use in the social sciences was predicated on the false assumption that ecological and social systems operate on similar principles (Cote & Nightingale, 2012; Cretney, 2014). Closely related to this is the lack of consideration within resilience scholarship of important social constructs, like power, politics and culture. The absence of these constructs from the theory is what, some have argued, has contributed to the perpetuating of hegemonic values and discourses (Jerneck & Olsson, 2008; MacKinnon & Derickson, 2013). I actively take these aspects into account throughout my study.

In writing about *resilience* in the context of *sustainability*, I also want to be clear about what the differences between these two concepts are and how they can be used. This should not only enhance the clarity in what I mean when I use these concepts, but it should also help to address the questions of what I am suggesting should be resilient, and for whom the resilience should serve (Cote & Nightengale, 2012). Sustainability is a normative term that focuses on equity of access to resources and opportunity, at the present and for future generations (see section 2.2). In short, it is a desirable future vision. Whether resilience is normative or non-normative is more contested (Brand & Jax, 2007; Cote & Nightengale, 2012; Keessen et al., 2013). I choose to treat resilience as a "property of a complex system" that is inherently non-normative as much of the scholarship in social-ecological resilience does (Cretney, 2014; Elmqvist, 2017, p. 352). As such, a system can be resilient in a non-desirable condition. For example, dictatorships can be "resilient across generations" (Elmqvist, 2017, p.

352). Furthermore, resilience and sustainability aims can be at odds with one another. For example, highly efficient energy systems can be more sustainable because less energy is wasted, however, they may be less resilient to changes, such as changes to energy use patterns or unexpected increases in energy use.

3.4.1 Principles for building resilience

Resilience scholars have proposed seven principles for building resilience for sustaining ecosystem services in social-ecological systems (Biggs et al., 2012; Biggs et al., 2015c). The principles are to:

1. Maintain diversity and redundancy,
2. Manage connectivity,
3. Manage slow variables and feedbacks,
4. Foster an understanding of social-ecological systems as complex adaptive systems,
5. Encourage learning and experimentation,
6. Broaden participation, and
7. Promote polycentric governance systems.

Although the principles are new, many of the ideas within them represent already existing suggestions from various resilience scholars (Chapin et al., 2009; Cilliers et al., 2013). These principles have already been influential in sustainability and resilience scholarship (Carpenter et al., 2012; Folke et al., 2016; Quinlan et al., 2016), including in research that is considered to be seminal (e.g., Steffen et al., 2015). The principles are also being taught in a Massive Open Online Course run through the Sustainable Development Goals Academy, and has been integrated into 'Wayfinder,' a "resilience guide for navigating towards sustainable futures" (Enfors-Kautsky et al., 2018; Sustainable Development Solutions Network, 2018).

Before I go on to explain the seven principles, I will briefly explain what ecosystem services are, and why I still choose to apply the principles to the resilience of student-led food gardens (which are not ecosystem services). Ecosystem services are the "ecosystem goods (such as food) and services (such as waste assimilation) [that] represent the benefits human populations derive, directly or indirectly, from ecosystem functions" (Costanza et al., 1997, p. 253). Or, put more simply, they are the "benefits that people obtain through their interaction with nature" (Biggs et al., 2015b, p. 13). While student-led food gardens could be said to provide ecosystem services, such as food production, recreation, pollination, or cultural services, the focus of this study is not on how to sustain these, but how to sustain a student-led organisation itself. In this way, I take a normative view of student-led food gardens in which I assume that these initiatives provide important sustainability outcomes which have been outlined in Chapter 2 and will be explored systematically in Chapter 5.

Biggs et al. (2015b) limit the resilience principles to sustaining ecosystem services because, firstly, "the features of society that promote resilience […] may differ from those that promote resilience of ecosystem services," and secondly, to make the scope of their book "manageable" (Biggs et al., 2015b, p. 17). Biggs et al. (2015b) say that ecosystem services are outcomes not only of ecosystems, but also of social-ecological interactions, citing crop production as an example. Crops require both the ecological conditions, like temperature and rainfall, as well as the social conditions, like skills and technologies, for their provision. However, Biggs et al. (2015b, p. 17) said that they "fully acknowledge that there are other crucial social-ecological systems outcomes of importance to society, such as women's rights or education." If the interactions between social systems and ecological systems through social-ecological systems are as in Figure 6, the focus that the resilience principles have when focusing on ecosystem services have mainly to do with the ecological and social-ecological feedbacks, and much less to do with the social feedbacks. It was reasonable to limit

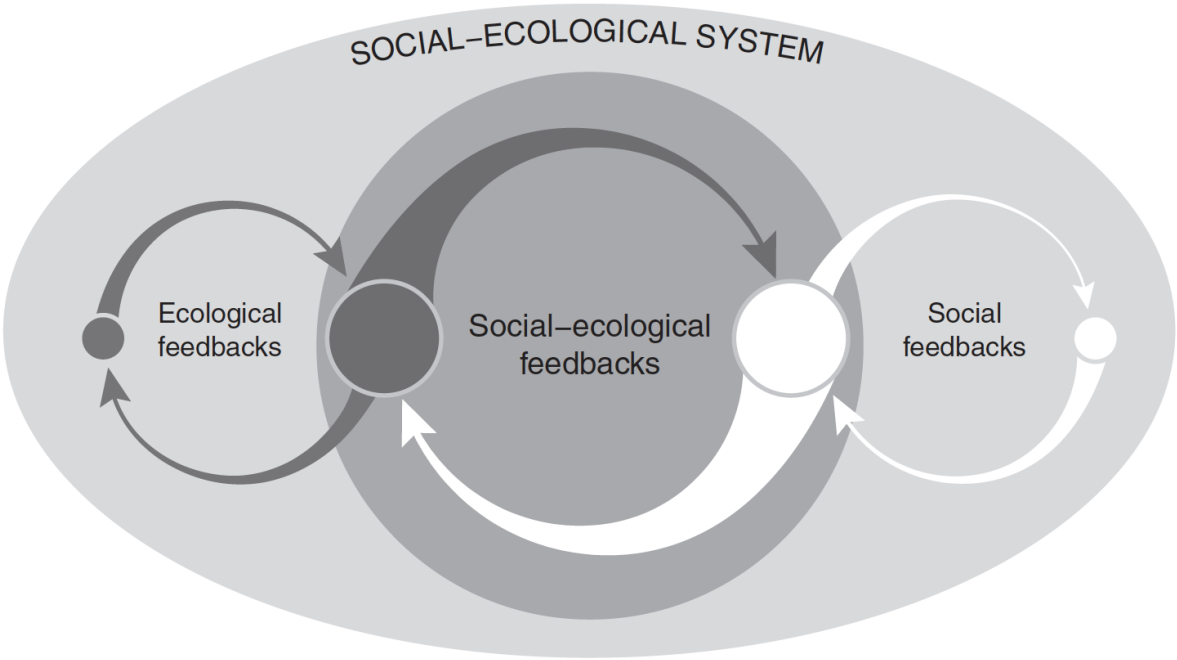

Figure 6. A model of how social and ecological systems interact within a social-ecological system. As Biggs et al. (2015b, p. 8) said, "in the resilience approach, SES are not simply seen as social plus ecological systems. Rather they are viewed as systems centred on the feedbacks between ecological (grey) and social (white) system components, which lie at the interface of social and ecological systems."

the scope of the principles within Biggs et al.'s (2012, 2015c) original work, however, I believe continuing to limit the principles to ecosystem services is doing them a disservice because they can have much broader application.

As such, I intend to apply these principles to assess the resilience of student-led food gardens as social-ecological systems. This differs from the original intended use of the principles in two ways. Firstly, the focus will be on the social-ecological feedbacks and the social feedbacks, shifting the emphasis to the social side of the system. Secondly, I will be applying the principles to the resilience of student-led gardens as organisations in a social-ecological system, rather than ecosystem services within a social-ecological system. It is therefore my intention to use the principles both to help answer my research questions, as well as to problematise the use of the resilience principles outside of their original intended context.

This is not a far stretch given that social-ecological resilience has been applied to social phenomena outside of the ecosystems services lens, albeit this literature is still underdeveloped compared to the more ecologically-orientated literature about resilience. For example, each year between 2007 and 2017, Stockholm Resilience Centre, one of the most prolific scholarly centres working with resilience in the context of sustainability, has produced more natural science publications than social science and interdisciplinary publications combined (Stockholm Resilience Centre, n.d.). Indeed, resilience has been criticised for attempting to take a concept originally from the natural sciences and applying it in a social science context without sufficient reflection on how the application might be different in a social context from an ecological one (Arora-Jonsson, 2016). However, Biggs et al. (2015c) have used examples of feedbacks of social, ecological, and social-ecological natures to illustrate their points, demonstrating that these principles may well apply to social phenomena as well, or at least some. By applying concepts from social-ecological resilience, and specifically the resilience principles, in the context of a socially-focused study I will extend this body of research and consider further how the concepts and principles may need adapting for social systems.

Three of these principles have to do with the general properties of socio-ecological systems (SES) that should be managed, and four are attributes of governance systems of social-ecological systems that need to be managed. The first three principles are quite abstract, and therefore I will be presenting examples of what they might look like in a school.

3.4.1.1 Resilience Principle 1: Maintain diversity and redundancy

The first principle is to maintain *diversity* and *redundancy*. Diversity is made up of three concepts: "variety (how many different elements), balance (how many of each element), and disparity (how different the elements are from one another)" (Stirling, 2007; as cited in Biggs, 2012, p. 245). Diversity is important to build the resilience of systems because

it “provides options for responding to change and disturbance” (Kotschy et al., 2015, p. 50). The principle to maintain diversity applies to both social and ecological system components. In the case of a school, this might include a diversity of staff competencies for teaching different subjects, or diversity in the landscape of the schoolyard, for example. In the case of diversity in the landscape of the schoolyard, the variety would be the number of different types of landscape features (e.g., playground, football pitch, treed area). The balance could then be the balance between, for example, the number of teaching vs support staff. The disparity would then be the how different the competencies are, for example, are all the competencies related to science and mathematics (such as biology, chemistry, and physics), or is humanities competence also present (such as languages and history)?

Redundancy is the “replication of elements or pathways in a system” (Kotschy et al., 2015, p. 53) and is important for the resilience of a system because, in the event of a loss or failure of a system component, another can compensate. However, it is natural for redundancy to be minimised because it reduces efficiency of the system. In the case of a school, redundancy might include having several teachers with overlapping science-based competencies so that if one teacher falls sick, the someone else can cover for them. Another example would be having two football pitches to enhance the flexibility of the system, so that if a group of younger students was already using one pitch, older children could still use the other one rather than having to wait.

With too little diversity and redundancy, social-ecological systems can become ‘brittle’ (rather than flexible or adaptive), and when exposed to stressors are less able to ‘bounce back,’ and can result in the system undergoing a transformation into a new state. In the school example, if there is only one art teacher, and there are no other teachers with artistic competencies this may make the system brittle. If the teacher becomes sick with a long-term

illness and there is no one to run the art classes, the school may need to transform their programme offering to account for the fact that they can no longer teach art.

3.4.1.2 Resilience Principle 2: Manage connectivity

The second principle is to manage connectivity within the social-ecological system. Connectivity means "the way and degree to which resources, species, or social actors disperse, migrate, or interact across ecological and social landscapes" (Biggs et al., 2012, p. 247). How connectivity manifests within social-ecological systems is affected by the "intensity with which components are connected," or the *strength* of the connectivity, and the "presence or absence of links between components and how links are distributed" (Biggs et al., 2012, p. 427-428). Connectivity is important because it "facilitates the exchange of material or information necessary for the functioning of ecological and social processes" in a social-ecological system (Biggs et al., 2012, p. 428). A system that is not well connected will not be able to facilitate these exchanges, resulting in a less resilient system. For example, in a school, if few of the school staff engage with each other, information-sharing may be limited which could reduce the effectiveness of the school's internal governance. These connections can be strengthened or weakened depending, for example, on trust or the degree of reciprocity (Dakos et al., 2015). However, if a system is too interconnected, a disturbance in one part of the system can travel to other parts of the system rapidly. For example, if there is an interpersonal conflict between staff members at a school with high interpersonal connectivity, the conflict could affect the rest of the school more quickly or dramatically than if there were weaker social connections between the staff.

Two key characteristics of social-ecological systems related to connectivity are *modularity*, or the "the extent to which there are subsets of densely connected nodes that are loosely connected to other subsets of nodes," and *nestedness*, or "the degree to which specialist nodes (nodes with few links) interact with subsets of generalist nodes (nodes with a

lot of links)" (Biggs et al., 2012, 428). The difference between modularity and nestedness has to do with scale. Modular connections happen at the same level of the system, for example, the schools within a city could be well-connected modules with loose connections holding the schools together in a wider network. Nested connections happen between different levels of a system. An example would be how a board of education operating at the scale of a city is connected to many individual schools operating at a neighbourhood level. According to Biggs et al. (2012, p. 429), "in highly modular or nested systems, resilience may be jeopardized if some components become overly important compared to others." For example, if there is one teacher in a school who leads many of the school's extracurricular activities and that teacher finds a job elsewhere, many students would be affected.

3.4.1.3 Resilience Principle 3: Manage slow variables and feedbacks

The third principle is to manage slow variables and feedbacks. These slow variables are the background on which other variables depend. A change in the slow variables and feedbacks can cause rapid and unintended consequences to a system if the system crosses a tipping point where the system will be drawn into a new basin of attraction. In the case of community gardens, fast variables might be participation levels and the crops grown, whereas corresponding slow variables might be the land tenure arrangements for the space. When there is a change in a variable, a feedback can occur. Reinforcing feedbacks (often called positive feedbacks) reinforce "subsequent changes of the same type," and balancing feedbacks (often called negative feedbacks) "dampen" them (Biggs et al., 2012, p. 430). An example of a reinforcing feedback loop is a student thinking that they are not smart, and therefore is sloppy with their homework and receives low grade, which then reinforces their belief that they are not smart. An example of a balancing feedback loop is how a school's weekly litter-pick keeps the school grounds tidiness in check. Changes in slow variables and feedbacks can result in nonlinear changes and/or large, permanent changes to the system

such that the system has a different structure and different dynamics - in other words, the defining properties of the system are changed so much that it becomes a different system altogether. Usually these sorts of changes result from “gradual changes in slow variables” combined with an acute “shock” to the system (Biggs et al., 2015a, p. 11).

An example of a situation like this could be when the area around a school becomes increasingly gentrified, therefore driving up land value (a slow variable). After an election (an acute shock), the newly formed local government, incentivised by the high selling price of the land, decide to sell the lot the school’s community garden occupies for development. Identifying and monitoring slow variables and feedbacks means that a decline in resilience is more likely to be identified early on. In this case, this might mean checking local real estate websites to monitor the changing housing prices. By monitoring slow variables, work can be done to strengthen stabilizing feedbacks, if possible, and to build resilience into the system in the event of shocks. In this case, this might include establishing a formal land-tenure agreement for the community garden lot with the local government prior to an election.

It may be desirable to increase or decrease the resilience of a system depending on what the desired system-state is. Increasing resilience would be done by strengthening feedbacks that maintain desired regimes, such as the establishment of the land-tenure agreement in the above example. However, if land on the site was contaminated and school wanted to move to another location, they may attempt to weaken or break the feedbacks that keep the garden in their location by approaching the local government and leveraging the rising land prices and development opportunities to convince the government to give them access to a different plot of land. This would be an example of an attempt to decrease the resilience of the system in order to shift into a new system state. In these cases, monitoring of gentrification and land prices (slow variables) can help the school to identify

how they could increase or decrease resilience to move into or maintain a desirable system state.

3.4.1.4 Resilience Principle 4: Foster complex adaptive systems thinking

The fourth principle, the first of the governance-orientated principles, is to foster an understanding of socio-ecological systems as complex, adaptive systems. Given that a complex adaptive system is "a system of interconnected components characterized by emergent behaviour, self-organization, adaptation, and substantial uncertainties about system behaviour" (Biggs et al., 2012, p. 425), then complex adaptive systems thinking is "a mental model for interpreting the world that recognises [complex adaptive system] properties" (Bohensky et al., 2015, p. 143). Shared mental models are "knowledge structures held by members of a team that enable them to form accurate explanations and expectations for the task, and, in turn, coordinate their actions and adapt their behaviour to demands of the task and other team members" (Cannon-Bowers et al., 1993, p. 221). Bohensky et al. (2015, p. 145) argue that a shared mental model based on complex adaptive systems could offer "insight not only into how managers understand social-ecological systems but also how a manager might act and how he or she perceived the responsiveness of the social ecological system to such management actions." The crucial part of this complex adaptive systems 'cognitive framework' is the non-linear and holistic understanding of social-ecological systems. Through this lens "uncertainty, disturbance, and surprise" are understood to be navigated or managed rather than eliminated (Biggs et al., 2012, p. 432). Furthermore, the recognition of multi-scalar interactions can help foster understandings of why an apparently minor shock to a system can trigger a dramatic change. This sort of thinking also provides rationale for the need to follow other resilience principles, such as managing slow variables and feedbacks, and encouraging learning. A lack of complex adaptive systems thinking can result in management that erodes a system's resilience, and conversely, the adoption of

complex systems thinking can lead to management that maintains or increases resilience in a system.

Bohensky et al. (2015) offer some guidelines for how this fourth principle can be practically used. First, they suggest that an "uncertainty-tolerant culture" should be fostered so that stakeholders don't become paralysed and unable to act without a full understanding of a problem or situation. Secondly, they suggest using a systems framework to bring together different concepts and draw system boundaries, like the Millenium Ecosystem Assessment (MEA, 2005) or Ostrom's (2007) social-ecological system diagnosis framework. Other such frameworks that weren't already mentioned by Bohensky et al. (2015) could include the Sustainable Development Goals (UN, 2019) or the framework for strategic sustainable development (Broman & Robért, 2017), however Bohensky et al. (2015) say that grassroots systems models could also work. Their third suggestion is to "acknowledge epistemological pluralism as a source of complexity" (Bohensky et al., 2015, p. 162). In other words, different ways that stakeholders have of knowing the world may provide different, and possibly competing knowledge claims. These ways of knowing, and their resulting knowledge claims are one of the ways that complexity may manifest, and as such, they need to be acknowledged and incorporated when applying the other principles. The fourth suggestion they make is to "investigate critical thresholds and non-linearities" (Bohensky et al., 2015, p. 162) in order to understand what aspects of the system behave in non-linear ways. The fifth suggestion they make is to change institutional arrangements and functioning to better reflect the reality of complex adaptive system functioning, such as being flexible and adaptable to change (Bohensky et al., 2015). Finally, they also highlight that it needs to be recognised that there are "many barriers to cognitive change" (Bohensky et al., 2015, p. 164), and fostering complex adaptive systems thinking may generate resistance.

3.4.1.5 Resilience Principle 5: Encourage learning and experimentation

The fifth principle is to encourage learning and experimentation. Learning is "the process of modifying existing or acquiring new knowledge, behaviours, skills, values, or preferences" (Biggs et al., 2012, p. 434). As knowledge in complex adaptive systems is assumed to always be incomplete and the landscapes in which knowledge is situated are constantly changing, learning is understood to be crucial for dealing with challenges within them. Drawing on literature about loop learning (Flood & Romm, 1996) and social learning (Reed et al., 2010), Biggs et al. (2012) understand learning to take place at an individual level, as well as "situated within wider groups, organizations, or communities of practice" (p. 434). Single loop learning is learning which asks if things are being done right to enable an "organization to carry on its present policies or achieve its objectives" (Argyris, 1977, p. 116). Double loop learning is a "more comprehensive inquiry" which interrogates into whether the right thing is being done (Argyris, 1977, p. 116). Triple loop learning "involves a more deep-seated questioning of values and norms that underlie institutions and actions by asking, 'how do we know what the right thing to do is?'" (Flood & Romm, 1996; Cundill et al., 2015, p. 178). The other learning theory this principle is built on is social learning, which refers to learning that takes place between individuals, existing in "wider social units or communities of practice" (Reed et al., 2010). Such learning develops though deliberate or spontaneous interactions between individual and shared experimentation and reflection (Cundill et al., 2015).

Learning does not always lead to positive outcomes. It can be "maladaptive or dysfunctional," causing conflict when it is based on misinformation (Cundill et al., 2015, p. 186). Biggs et al. (2012) also warn that unequal power relationships can affect learning by determining who learns and what is learned, and these power relationships are crucial to manage to allow genuine and equitable learning and experimentation. Furthermore, power

asymmetries can contribute to partial learning by devaluing, for example, traditional knowledge systems.

Experimentation and monitoring can also be used as tools to facilitate learning, and Cundill et al. (2015) suggest that this needs to be resourced adequately. This can be done in a formal way (i.e., through research) or informal way (i.e., through traditional knowledge management practices). Cundill et al. (2015) say that monitoring should take place at the appropriate scale and over the long-term. Participation in experimenting and monitoring is also a crucial means to encourage learning by helping actors learn about other actors' viewpoints and enable conflict resolution (Biggs et al., 2012). Participation in experimenting and monitoring should both focus on being diverse and representative, as well as be through prolonged engagement (Cundill et al., 2015). Linking to relevant actors and activities in order to embed learning within other learning networks or communities of practice (Lave & Wenger, 1991) can also be effective for sustaining learningful practices (Cundill et al., 2015).

3.4.1.6 Resilience Principle 6: Broaden participation

The sixth principle is to broaden participation, or the "active engagement of relevant stakeholders in the management and governance process" (Biggs et al., 2012, p. 201). Participation can happen to different degrees, and at different stages of a change management process (i.e., both in times of stability and flux). When facilitated effectively, participation can "increase cooperation between actors," increase transparency, and facilitate diverse input into decision-making (Biggs et al., 2012, p. 436). In turn, these can "improve legitimacy [of the governance], expand the depth and diversity of knowledge, and detect and interpret perturbations" (Leitch et al., 2015, p. 204). Participation from diverse stakeholders can also mutually reinforce the fourth and fifth resilience principles by fostering the development of complex adaptive systems thinking (Danielsen et al., 2005) and learning in more stakeholders (Van Rijsoort & Jinfeng, 2005).

There are two types of stakeholders that are relevant for adaptive co-management of ecosystem services (Leitch et al., 2015). While ecosystem services are not the focus of this study, the principles from the two typologies of stakeholders to engage are still relevant. There are (1) those that engage with the issues on the ground and (2) actors working at different "scales and levels of decision making" (Leitch et al., 2015, p. 203). Participation from different levels means that different perspectives, and knowledge can be drawn on to enable capacity building at different levels.

In order for broadening participation to be successful, it should involve diverse actors, including both typologies above, and those with non-scientific knowledge, and ensure that actors are focusing on long-term visions rather than short-term aims during their participation (Biggs et al., 2012). There should also be a shared understanding of governance process in terms of "goals, roles and expectations" (Leitch et al., 2015, p. 215). Effective leadership and "impartial, open, and approachable facilitators" are also important for broadening participation (Leitch et al., 2015, p. 215). Capacity building through learning and adequate resourcing can also support high quality leadership and facilitation, and therefore broaden participation. However, Leitch et al. (2015, p. 203) caution that the ways in which "conflict and power inequity" complicate participatory processes are often "[glossed] over." They can affect the diversity and inclusion of relevant stakeholders, as well as the quality of participation. Therefore, Leitch et al. (2015) suggest that attention to and management of power differentials can help to broaden participation.

3.4.1.7 Resilience Principle 7: Promote polycentric governance

The seventh principle is to promote polycentric governance, which is a governance system, or "the exercise of deliberation and decision making among groups of people in the act of self-ordering their relationships" (Schoon et al., 2015, p. 228), that has "multiple governing authorities at differing scales" (Biggs et al., 2012, p. 437). According to Biggs et al.

(2012), “in polycentric systems, each governance unit has independence within a specified geographic area and domain of authority, and each unit may link with others horizontally on common issues and be nested within broader governance units vertically” (p. 437). This governance system reflects the understanding of systems as existing within nested systems, in which disturbances in a smaller system can destabilise a larger system, and conversely, a larger system can help a smaller system ‘remember’ and retain its properties and functions after being destabilised (Gunderson & Holling, 2002). Perhaps the most crucial feature of a polycentric governance system is that the level at which a problem is governed should reflect the size of the problem (Schoon et al., 2015). By using this system, efforts can be coordinated at a higher level, while devolved governance can allow for autonomy and integration of local-level traditional and non-scientific knowledge.

More practically, polycentric governance provides opportunities for safer experimentation and learning by building redundancies into the system. In this way, if one part of the governance system experiments with a new policy, for example, and fails other parts of the governance system can continue to fulfil its function, thereby preventing the failure from affecting the whole system. Polycentric governance can also broaden participation by involving more diverse stakeholders though different governance systems at different scales. Good polycentric governance both enables and requires “active engagement of individuals in the problems that directly affect them” in order to allow them to have a part in the governance of systems that affect them, while contributing their own expertise and knowledge to enhance the governance process (Schoon et al., 2015, p. 227). Similarly, polycentric governance can facilitate modularity, and “nested cross-scale linkages” between modules (Schoon et al., 2015, p. 234).

Polycentric governance, however, also comes with challenges. One is that there are divergent and unresolved understandings of what polycentricity is and how it should be

assessed (Schoon et al., 2015). All governance systems can be understood to be polycentric to some extent, therefore it is crucial to understand what scales, what activities, and which actors are to be polycentric. This is likely dependent on the governance context. A balance also needs to be struck between the redundancy and efficiency. Too much redundancy can make the governance slow and uncoordinated, whereas if the system is too efficient it can limit experimentation and therefore learning. There may also be trade-offs that need to be managed, and governance that is devolved may not be able identify and consider the implications of the trade-offs that affect a different part of the system. Furthermore, stakeholders pushing an agenda may go "'scale-shopping' for a more favourable political venue in which to frame a specific issue" (Schoon et al., 2015, p. 237).

3.5 Conclusion

In this chapter, I have outlined the critical realist ontology and epistemology underpinning this research, and framed my research in the context of systems theory, specifically social-ecological systems theory. I introduced social-ecological resilience as a theoretical lens which will be applied to analyse the findings of this study. Specifically, I introduced Biggs et al.'s (2012, 2015) resilience principles which I will use to assess the vulnerability of student-led food gardens and generate strategies for how to best to support student-led food gardens manage the impacts of students' transience. In the next chapter I will go on to explain how I used action research to these ends.

Participatory action research in student-led food gardens

Chapter 4

If you want truly to understand something, try to change it.

Attributed to Kurt Lewin by Henderikus J. Stam, 1996, p. 31

I have often encountered that funny feeling of finding an anomaly […] It is a little irritating feeling, kind of a pre-sneeze sensation – and it is also very exciting. Learning to trust this message is the toughest lesson I have to teach my students – no less than myself.

Susan Leigh Star, 2010, p. 605

Cones marking a newly-built gate
Summer 2013

4.1 Introduction

This thesis is based on an action research study of Student Eats student-led food gardens. This chapter will begin by outlining what action research is and the theoretical underpinnings of the methodology, drawing on pragmatism, critical pedagogy and the theory of communicative action. The more practical process of employing the 'spirals' that characterise action research methodology will be described next. These include the four main stages the study was divided into: constructing the problem, planning action, taking action, and evaluating action (Coghlan & Brannick, 2019).

After outlining the action research spirals, I will take a moment to outline my positionality in relation to the study and reflect on how it impacted the research in terms of quality and ethics. This then leads into a description of my overall research design, where I begin by positioning the research as a multiphase mixed methods approach, and then go on to explain the methods I use to address each research question. First, I explain the methods used to conduct a quantitative systematic literature review of sustainable university community gardens, and then I outline how I used a case study approach within the action research methodology. I used a single case study of Student Eats, investigating three gardens as 'subunits of analysis' (Yin, 2003).

The next section will go into the specifics of the methods employed in each of the research stages of the action research spiral. I will outline how interviews, workshops, photovoice, and a fishbowl discussion were used to collect data. I also explain what sampling strategies were employed, and how data was handled and analysed. The chapter concludes with a reflection on quality and ethical considerations.

4.2 Action research methodology

Action research is:

"*a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities*" (Reason & Bradbury, 2001, p. 1).

In its simplest terms, action research combines a research agenda and an action agenda in a participatory way. Action research studies tend to have features akin to longitudinal research designs in that data is gathered over longer periods of time and change is observed (Bryman, 2012). The main difference between a typical longitudinal design and an action research design is that action research focuses on planning and delivering an intervention. Action research is also a solutions-orientated methodology, and as such tends to be focused around addressing a problem or issue in some capacity. Action research is often advocated as a methodology for sustainability science because of its focus on solving urgent problems in collaboration with stakeholders outside of academia (Wittmayer & Schäpke, 2014; Egmose, 2015). Action research and sustainability science also share an advocation for values in research and have the ambition to contribute to a more equitable future.

Different schools of thought on action research have emerged over the years (Nielsen & Nielsen, 2006; Johansson & Lindhult, 2008). The two main alternatives today are pragmatic and critical action research, which are summarised in Table 2. Oftentimes, critical orientations and pragmatic orientations to action research are painted as two distinct traditions in tension

with one another (Johansson & Lindhult, 2008), however within this study I attempt to draw on the best of both traditions. In the following section I will outline some of the main tenets of the traditions and their theoretical underpinnings. While doing so, I will also explain how I draw on each of these traditions in the application of my methodology.

Table 2. A comparison of the pragmatic and critical action research traditions (Johansson & Lindhult, 2008, p. 102).

	Pragmatic action research	Critical action research
Purpose	Improvement in workability of human praxis	Emancipation
Action focus	Experimental, cooperation	Resistance, liberation
Orientation to power	Power as the ability to do, collaborative relation, practical agreement is sought for	Dominant interests, coercive, conflict is acknowledged
Role of researcher/ related knowledge	Closeness, practical knowledge	Distance, episteme, reflective knowledge
Research focus	Action, dialogue	Reflection
Development focus	Experiential learning, learning by doing	Consciousness-raising
Type of dialogue	Cooperative, experience based, action-orientated	Promote openness to the other
Situation	Fragmentation, compartmentalisation	Asymmetrical power relations

4.2.1 Pragmatic action research

Pragmatic action research focuses on creating useful and actionable knowledge through dialogue. Pragmatism, as a philosophical and theoretical tradition, contains relatively diverse sets of ideas, but what brings them together is a "rejection of foundationalist epistemology" (Parker, 1996, p. 22), which is the idea that knowledge must be secured in some basic, non-self-referential beliefs. For pragmatists, creating knowledge happens only through transformation of "ourselves and the world" (Parker, 1996, p. 23). That is, it is only through interaction between people and the world they are situated in that knowledge is produced. That is, the only way to know anything is to know it in relation to other things, including the self. This is what has been called an 'extended epistemology,' because it goes beyond other theories of knowledge, requiring that knowledge is acted upon in order to be

tested (Reason & Bradbury, 2001). This is because pragmatists believe that through action is how knowledge is validated (Reason & Bradbury, 2001).

This extended epistemology includes ways of knowing beyond the "theoretical, propositional knowledge" that dominates academia (Heron & Reason, 2001, p. 183). It incorporates four ways of knowing: experiential knowing, presentational knowing, propositional knowing, and practical knowing. The most grounded way of knowing is experiential knowing, which is an immediate and affective form of knowing had though direct contact with whatever is being known (Heron & Reason, 2001). The next stage, presentational knowing, emerges out of experiential knowing and is an intuitive and creative type of knowing (Heron & Reason, 2001). This sort of knowing is often pre-language, instead being expressed through, for example, the visual arts, music, or dance. Presentational knowing can therefore be thought of as a means of coming to understand and interpret experiential knowing through creative practices. Propositional knowing, the most accepted form of knowing within the academy, is "intellectual knowing of ideas and theories" and is associated with cognitive development, the use of language and abstraction of ideas (Heron & Reason, 2008, p. 367). Practical knowing is associated with psychomotor development, and refers to "knowing how to do something. Its product is a skill, knack or competence – interpersonal, manual, political, technical, transpersonal, and more" (Heron & Reason, 2008, p. 367).

These ways of knowing interweave and can be experienced simultaneously. All of these forms of knowing are mutually reinforcing; that is, a complete understanding will incorporate all four forms of knowing. As Heron and Reason (1997, p. 282) put it, "it is equally important that action not only consummates the prior forms of knowing but is grounded in them. It is in this congruence of the four aspects of the extended epistemology that lie claims to validity" (see Figure 7).

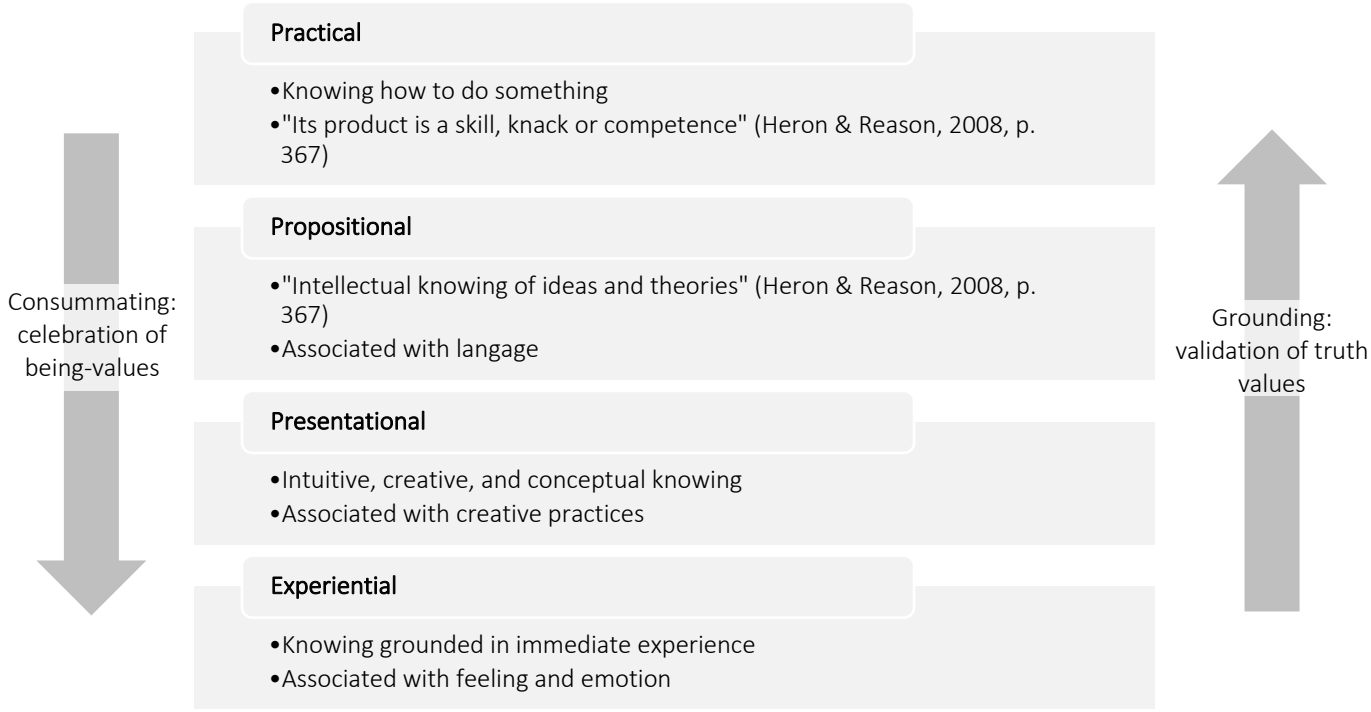

Figure 7. An adaptation of the four aspects of Heron & Reason's (1997) extended epistemology and their relationship.

Pragmatism can also be used as an approach for "transdisciplinarity in sustainability research" to clarify the role of reflexivity (Popa et al., 2015, p. 1). Since sustainability science is such a new area, there is some ambiguity in the understandings of some concepts, including 'reflexivity'. Popa et al. (2015) contend that incorporating a pragmatic understanding of reflexivity will extend it from being used only to build social legitimacy (more akin to a socio-technical approach to action research (Masters, 1995)) to encourage more open-ended approaches to reflexivity where the research design must be flexible enough to allow the problem or research question to be redefined, not only the methodology. Practically, this means that, in addition to considering epistemological and normative questions in reflexive work (such as the "critical consideration of assumptions, values, and socio-institutional" bias and focusing on "convergence on values and normative commitments"), researchers should also engage with more pragmatic concerns (such as "reflexivity on values and understandings in concrete problem-solving and social

experimentation processes") (Popa et al., 2015, p. 52-53). As such, action research is a highly appropriate mode of research for adopting this pragmatic approach to reflexivity.

4.2.2 Critical action research

Critical action research is focused more on dialogue and action that promotes emancipation and disrupts power structures (Johansson & Lindhult, 2008). There have been a wide range of thinkers and doers who have influenced this tradition, but the ones that have had the most profound impact on my approach to critical action research are Freire (2000) and Habermas (1984, 1987).

4.2.2.1 Influences from critical pedagogy

Freire's most influential concept is likely 'education as a practice of freedom.' This idea is based on his assumption that all people have an "ontological vocation to become more fully human" (Freire, 2000, p. 74) or that, by their very nature, people are "driven to be more fully human" (Smidt, 2014, p. 22). The phrase 'to become more fully human' implies a process, rather than a static state, and this was reflected in how Freire saw education – as a practice, rather than an end. In Freire's (2000, p. 84) own words, people need to be affirmed "as beings in the in the process of *becoming* – as unfinished, uncompleted beings in and with a likewise unfinished reality." According to Freire, the process of 'becoming human' is negotiated through dialogue, and people who are not 'becoming more fully human' are not free because they are not striving towards their ontological vocation.

The 'banking model of education' (a term coined by Freire (2000)), where teachers are knowers who deposit information into students, does not foster the process of becoming more fully human. This is because, in this model, students are considered merely receptacles of knowledge rather than critical thinkers with the ability to generate and synthesize information and ideas. To Freire, this type of education dehumanises both parties because

the student is objectified and therefore dehumanised, and the teacher's objectification of the student is also a violent and dehumanising act which dehumanises the teacher. Therefore, both parties are not free because they are both trapped in the role of oppressor and oppressed. The opposite of the 'banking model of education' is 'education as the practice of freedom,' and this latter mode of education is also a means to dismantle the former (Freire, 2000). To Freire (2000, p. 80), education as a practice of freedom is education through dialogue, which transforms the "teacher-of-the-students and the students-of-the-teachers" to "teacher-student with students-teachers." This happens though what Freire calls 'conscientisation' (*conscientização* in Portuguese), which is the process of becoming conscious of consciousness, or developing 'critical consciousness'.

Freire's (2000) ideas outlined above emerged from his work with developing literacy in poor communities in Brazil and as such, one might feel his work may not be applicable to education within formal institutions, least of all in a developed country. While not all aspects of his work are relevant in this study, there are a number of concepts that have been valuable. Moving from the educational context to the research context, I found it useful to think of Freire's banking model of education as a banking model of knowledge. In this model, we can see the relationship between the student and the teacher parallel the relationship between the researcher and the researched: both teachers and researchers are the *knowers* and students and researched are *receptacles of knowledge* or *objects of study*. Thinking of my research outside of a 'banking model' repositions my role as a researcher as more than just an extractor of information. When thinking about my researcher role through this lens, the knowledge creation process is more democratic and involves research participants as co-inquirers where they help shape the direction of the research. The role of the researcher becomes more reflective and as a facilitator, the research has a responsibility to help make visible restrictive and invisible social structures. In addition to helping situate my role as a

researcher and define the researcher-participant relationship, thinking through the lens of critical pedagogy has also encouraged analysis situated in the lived experiences of the research participants that can elucidate patterns and issues within societal systems. Like critical pedagogy, the theory of communicative action also has emancipatory aims, which will be discussed next.

4.2.2.2 Influences from the theory of communicative action

Like Freire's work developing critical pedagogy, Habermas' theory of communicative action has been influential in action research (Kemmis, 2008). Communicative action is "action orientated towards intersubjective agreement, mutual understanding, and unforced consensus about what to do" (Kemmis, 2008, p. 127). The goal of this type of action is to go beyond instrumental aims (through what Habermas (1984, 1987) calls 'strategic action') and to understand (through communication) what overall purpose the given action is meant to achieve.

According to Habermas, to achieve this type of communication, there needs to be an "open communicative space" (Kemmis, 2008, p. 127). The people engaged in communication in this space need to be committed to the idea of communicative action – that is to say, they are prepared to think beyond their instrumental aims and engage in "meta-level" discussions (Kemmis, 2008, p. 127). Some other important preconditions for communicative action are (1) that every person who could make a contribution needs to be included, (2) there are equal opportunities to speak, (3) there is a lack deception or illusion, and (4) that participants are free from coercion (Kemmis, 2008). Furthermore, within this space, people should speak comprehensively, truthfully, authentically, and appropriately (McNiff & Whitehead, 2001). These preconditions create an 'ideal speech situation,' which is an 'intersubjective space', or a space where people relate to one another and are able to engage in rationale dialogue.

This intersubjective space that Habermas (1984) talks about is a linguistic space. While everyone has access and makes use of language, it is not owned by any single person. Furthermore, it is shaped by ongoing subjective interpretations and use. Habermas (1984) believed that through communication we can come to intersubjective agreements that actions can be based upon. However, these intersubjective agreements are time-bounded because no conversation can be fully 'completed,' and circumstances are always changing. Freire (2000) and Habermas (1987) share this understanding of dialogue as an ongoing practice of learning and meaning-making.

Ultimately, what prevents us from coming to intersubjective agreements through communication is that there are bureaucratic systems (like government, organisations, economic systems) that are 'colonising' our 'lifeworlds', which are spaces of intersubjectivity, where truth and morality exist through our interactions with one another. Individuals occupy multiple lifeworlds, and these lifeworlds are plentiful and can "overlap and interweave" (Kemmis, 2008, p. 129).

To explain what it means for a system to colonise the lifeworld, Habermas (1984) outlines two types of action: strategic and communicative. Strategic actions are instrumental and are useful in complex societies to improve efficiency and expedite processes. However, strategic action can create systems that begin to operate relatively autonomously from the lifeworlds, where genuine, valid truths exist. What this means is that systems become 'uncoupled' from the lifeworld, and in effect, subordinates the lifeworld to the system. Another way to describe this is that the system is 'colonising' the lifeworld with "rationalized models of right action that are inappropriate for relationships between people wherever these should properly be based on valid knowledge, solidarity, and personal capacities" (Kemmis, 2008, p. 130). This might mean that people behave in ways such that their actions contract their values. The problem that results from this is an inability to continue to

construct and reconstruct lifeworlds unburdened by the bureaucratic conditions of the social system. The systems then become "increasingly difficult to manage, since the lifeworld anchoring necessary for system operation is no longer secure" (Kemmis, 2008, p. 130).

Universities, and the higher education sector at large, tend to be highly bureaucratic, particularly with recent neoliberal developments (Lorenz, 2012). Wider systems that influence student led-food gardens, such as the university as an institution, their students' union, and the National Union of Students, are systems that may have colonised the gardens' 'lifeworld,' and may be preventing the students and other stakeholders from engaging with one another in a non-instrumental way.

In this study, I have been guided by Habermas' preconditions for creating ideal speech situations when constructing and engaging in interviews and workshops in order to promote open, honest dialogue and enable people to develop a common 'intersubjective space.' The idea of a genuinely ideal speech situation might be seen as somewhat naïve, and I don't claim to meet all the criteria fully. However, I used the conditions for ideal speech situations as a guide to enhance the 'idealness' of the speech situation.

Critical pedagogy and the theory of communicative action, while emerging from quite different intellectual roots, are highly complementary as they are both political and counter-hegemonic (or in opposition to the status quo). They come together in their struggle for democracy, equality, and freedom through participation. They complement each other in that Freire believes that language is never neutral, and Habermas suggests that, although language is socially constructed, perhaps there are situations (i.e., ideal speech situations) in which language can be used to create shared understandings by negotiating what we mean through rational discussion. Both theories are on the more pragmatic side of critical theory, and therefore provide a critical complement to the more pragmatic approaches outlined earlier.

4.2.2.3 Action research spirals

Lewin (1946), often considered to be the father of Action Research, introduced the concept of research spirals that characterise the methodology (see Figure 8). Each spiral is undertaken as a "collaborative venture" between the researcher and participants to examine the present situation, prepare for and undertake some type of action to address the problems as they are then perceived, and finally reflect on the understanding of the situation and the action (Coghlan & Brannick, 2005, p. 23). With each spiral, a clearer understanding of the problem is uncovered, and the actions undertaken become better suited to address the situation. This process is rooted in the pragmatist extended epistemology, where only through testing knowledge in real-life situations can it be validated (Argyris & Schön, 1974; Heron & Reason, 1997).

In each action research cycle, there are four different phases: constructing, planning action, taking action, and evaluating action (Coghlan & Brannick, 2005; French & Bell, 1999; Stringer, 2007). Some models, such as Stringer's (2007), only have three stages, however I will be using the four-stage model to explain my research because it better reflects how my

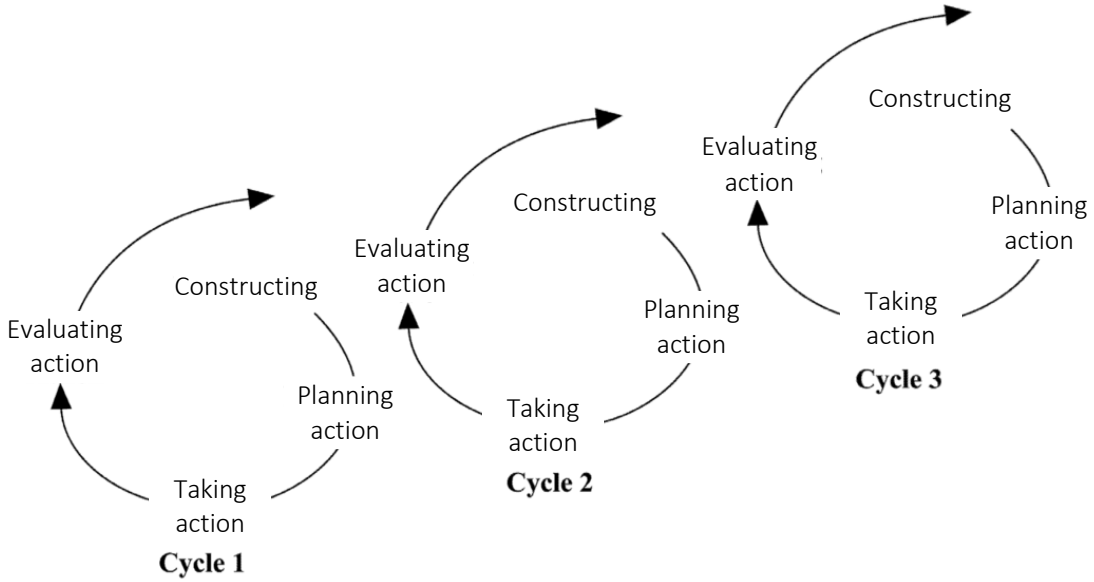

Figure 8. The continuous cycles of action research as modelled by Coghlan and Brannick (2005, p. 10; 2019).

research manifested. The constructing phase is a process of defining the problem to illustrate the context and prepare for planning action. Planning action involves examining the problem construction, and on that basis coming up with "a first step, or a series of first steps" to address the problem (Coghlan & Brannick, 2005, p. 23). These step(s) are then undertaken as the next part of the cycle, taking action, often referred to as an "intervention" (Coghlan & Brannick, 2005, p. 23). Finally, an evaluation takes place to identify the outcomes and to see if the construction of the problem still seems accurate, how successfully the actions addressed the problem, and what information can be taken forward into the next cycle, should there be one.

It is important that the action research spiral is not merely procedural, and rather remains "a series of commitments to observe and problematize through practicing a series of principles for conducting social enquiry" (McTaggart, 1994, p. 249). I draw on Elliot's (1991) understanding of the action research cycle in which "the general idea should be allowed to shift," to prevent reflection from becoming "merely fact finding" rather than analysis (p. 70). In practice, this means not only evaluating and amending the plan of action, but also revising the general idea underlying the project (Elliot, 1991; McNiff, 2013).

The 'core' research cycle depicted in Figure 8 is also complemented by a more reflective process undertaken by the researcher, which Zuber-Skerritt and Perry (2002) call the 'thesis' research cycle (see Figure 9). This reflection on top of the "core" research cycle is in aid of developing a deeper understanding than what would be achieved through "ordinary problem solving" about what the researcher is doing, why they are doing it, and what the implications of it are (Coghlan & Brannick, 2005, p. 25). Through the process of this 'thesis' cycle, the researcher undergoes a process of "learning about learning," or meta-learning (Coghlan & Brannick, 2005, p. 25). In this 'thesis' cycle, Coghlan and Brannick (2005, p. 25) suggest that three forms of reflection should be undertaken, upon: content (which has to do

with the matters under consideration and what is taking place), process (which is related to the methods and strategies), and premise (which includes reflections on underlying assumptions.)

The 'core' and 'thesis' cycles operate concurrently. Coghlan & Brannick (2014) liken this to a clock in which the hour, minute, and second hands are all cycling around the same fixture. The hour hand takes twelve hours to make a full rotation, and the minute hand only takes sixty seconds. So, in the case of this study, a full 'core' cycle took 2.5 years, however, there were many 'thesis' cycles that were cycled through much more rapidly and intuitively. These two cycles also help to propel the project forward. This is akin to the cogs in Figure 9, where a movement forward in the thesis cycle advances the core cycle, and vice versa. The thesis cog is smaller, and therefore cycled more rapidly than the core cog, which is reflective

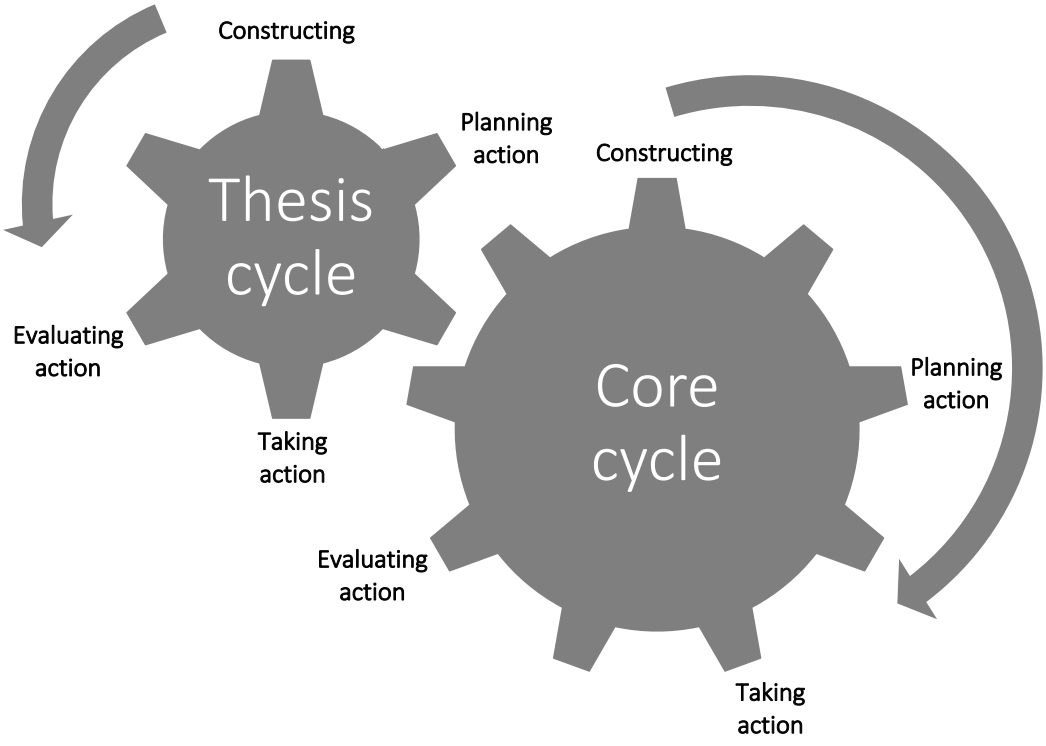

Figure 9. A depiction of the relationship between the 'core' and 'thesis' research cycles of action research.

of the timelines in practice. In this thesis, the core cog had more defined phases, while the thesis cycle was more amorphous in its manifestation.

4.3 Overall study structure

My study incorporates both qualitative and quantitative methods using an approach called multiphase mixed methods (Cresswell, 2014). This is when qualitative and quantitative components are separate components in a study. I began with a quantitative systematic literature review, and then in the next research phases I used qualitative methodologies (see Tables 3, 4, 5 and 6). This separation of the qualitative and quantitative components of a mixed methods study enables a less complex analysis process but with the benefits of drawing on different approaches that offer complementary perspectives (Cresswell, 2014).

It is well-recognised that the reality of conducting action research is not as straightforward as models, like the one in section 4.2.2.3, suggest. However, Cook (2009, p. 7) says that the 'messiness' of action research is actually how Reason and Bradbury's (1997) four types of knowing from their extended epistemology (see Figure 7) "come together and jostle with each other" in the process of knowledge co-construction. However, this poses a challenge in communicating the narrative of the research, including the methodology, the timeline, the evolution of ideas, and the findings. As such, the write-ups of action research studies tend to have less conventional formats (Stringer, 2007). In writing up this study, I have used Habermas' (1987) principles for rationale dialogue as a guide for what information to include or omit, as it would be impossible to include everything that happened during the study. As explained earlier, I have therefore tried to be as comprehensible, truthful, authentic and appropriate in my writing as possible (McNiff & Whitehead, 2011). As such, I will begin by briefly explaining how I arrived at what are now the research questions addressed in this

Table 3. The research timeline.

	2013							2014											2015											2016											2017			
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A
Systematic Literature Review																																														
Articles																																													
Note: • During the darker period I was actively seeking articles and analysing articles. In the light period I was 'topping up' the review as new articles were published. Three articles were added during this period.																																													
National Union of Students																																													
Interviews																	2	1																			1									
Embedded unit: Keele University																																													
Workshops																			1										2			1			1									1
Interviews																			1										1						1					1			1		
Notes: • The first workshop in January 2015 was not audio recorded. • The two workshops in November 2015 were extensions of the same activity. The first workshop was poorly attended so I ran it again the following week. In the first week participants answered questions written on paper taped to the greenhouse walls, and it was not audio recorded given the limited number of participants meant that I didn't facilitate a discussion. The discussion I facilitated on the second week was audio recorded. • The workshop in May 2016 was intended to be an evaluation workshop, however it was poorly attended by those who had not volunteered to deliver an 'action.' It was therefore not audio recorded. • The solicitation of photovoice images took place between May 2016 and February 2017. Photos were received between August 2016 and February 2017.																																													
Embedded unit: University of Warwick																																													
Workshops																				1										1			1			1									
Interviews																													2								1					1			
Visits																				1									1		1		1			1		1							
Notes: • The first workshop was an introduction to myself and my research where I invited the gardeners to participate. It was not audio recorded to allow for more natural interactions between myself and the participants. • The workshop in February 2016 focused both on checking the accuracy of the results as well as action planning.																																												
Embedded Unit: Sheffield University																																													
Interviews																														2					1									
Visits																					1									1					1									
National Union of Students' Student Eats Conference																																													
Workshop																																												1		

Table 4. Legend for Table 3.

Actively constructing
Passively constructing
Planning action
Evaluating

Table 5. Summary of the number of interviews, people interviewed, and workshops undertaken.

	NUS Staff	Keele University	University of Warwick	Sheffield University	Student Eats Conference
Number of interviews	4	6	4	3	0
Number of people interviewed	3	6	3	3	0
Workshops	0	5 (3 recorded)	4 (3 recorded)	0	1

Table 6. Research questions and corresponding methodologies, data sources, and data collection and analysis.

Research question	Methodology	Data source(s)	Data collection method	Analysis method
According to academic literature about sustainable university community gardens, • What benefits (both discussed and demonstrated) do these gardens reportedly provide? • How do these benefits compare to the benefits provided by community gardens more generally? • What is already known about the impacts of students' transience on sustainable university community gardens?	• Action research	• Peer reviewed literature	• Quantitative systematic literature review	• Protocol coding according to thematic areas from Guitart et al.'s (2012) literature review
• In addition to students' transience, what causes problematic participation in student-led food gardens? • What effects does problematic participation have in student-led food gardens? • What feedbacks between problematic participation, its causes, and effects in student-led food gardens exist (if any)?	• Action research • Case study	• Three student-led food gardens • Student Eats conference	• Semi-structured interviews • Workshops • Photovoice • Fishbowl dialogue • Reflective research diary	• Eclectic coding, drawing mainly on holistic coding and descriptive coding • Causal loop mapping using The Brain software
• In what ways are student-led food gardens vulnerable to students' transience in the context of the participation dynamics outlined above?				• Protocol coding according to Biggs et al.'s resilience principles (2012, 2015c)
• In what ways can student-led food gardens address the impacts of students' transience and build resilience into their initiatives such that they continue to persist?				• Eclectic coding, drawing mainly on holistic coding and descriptive coding • Cross-referencing the codes with those from the causal loop diagram

study. A discussion and reflection on the methodological issues will be presented in Chapter 9.

4.3.1 Systematic literature review

In the early stages of my study, I knew I wanted to adopt an action research approach. This was inspired by my pragmatic orientation to research and wanting to 'make a difference,' as well as by the sustainability science literature that calls for sustainability research to engage with practice (Kates et al., 2001; Clark & Dickson, 2003; Lang et al., 2012). From my Master's thesis (Laycock, 2013) I had a rough idea of the landscape of literature about community gardens and the problems they face, however I felt less confident in the realm of community gardening in a university context. Inspired by Guitart et al.'s (2012) quantitative systematic literature review of urban community gardens, I decided to draw on the study's methodology to undertake a quantitative systematic literature review of sustainable university community gardens before approaching any particular garden to work with.

The systematic literature review addressed the first research question, which is: *What is the state of the literature about sustainability-driven community gardens in universities?* My aim was to produce a synthesis of the literature about sustainable university community gardens in order to map current patterns and direct future research efforts (Petticrew & Roberts, 2006). I will explain why I use the term 'sustainable university community gardens' rather than 'student-led food gardens' in section 4.3.1.1, but first it is necessary to explain what a quantitative systematic review is and why it was appropriate for the 'constructing' phase of my thesis.

Quantitative systematic reviews are an approach to reviewing literature that identifies, appraises and synthesises all primary literature on a subject by defining an area of study, systematically and exhaustively identifying literature in the area, and developing a

database with information summarising the current status of the literature (Petticrew & Roberts, 2006). They have been used widely in the social sciences, and increasingly in environmental studies and sustainability science (de Medeiros et al., 2014; Terstappen et al., 2013; Partelow et al., 2018; Nikulina et al., 2019). This style of review is beneficial for mapping trends in the literature and highlighting reliable findings and uncovering biases, through providing "reproducible, reliable [assessment] of the current status of a field of research" (Petticrew & Roberts, 2006; Guitart et al., 2012, p. 365). By appraising the literature using a transparent and clearly articulated methodology, there is reduced potential for authorial bias compared to narrative-style reviews (Guitart et al., 2012). Being a new scholar, my knowledge of the literature was limited and therefore a systematic approach meant that I could appraise the literature and be confident that I was not missing anything (Pickering & Byrne, 2014).

This said, a review was certainly not sufficient to 'construct' the problem to be addressed by the research, least not in a participatory way. The construction of the problem was also shaped and defined through qualitative methods, both in conversation with research participants and through my own experience with student-led food gardens. The rest of the constructing phase will be outlined in section 4.5.3.

Some of the limitations of the systematic literature review method are that the reliability of the review is dependent on the quality and scope of articles analysed, and there is a certain amount of subjectivity in developing inclusion criteria for studies included in the review and identifying themes in diverse literature (Garg et al., 2008). However, this style of review was appropriate for my thesis for several reasons. Given that literature about sustainable university community gardens is newly emerging, a systematic literature review was an appropriate method to take stock of what has been written to date to guide future research efforts. Because Guitart et al. (2012) had published a similar review about urban

community gardens, I was able to use the robust set of themes they had already developed from in the literature. This helped to increase the robustness of the themes, and it also meant I could identify the ways in which sustainable university community gardens were similar and different to urban community gardens.

4.3.1.1 Inclusion criteria

When creating the inclusion criteria I used for the review, I tried to create criteria that would include articles about gardens most similar to Student Eats student-led food gardens. The criteria I eventually arrived at were that the gardens in the articles had to be 'sustainable university community gardens.' The use of the term 'community garden' originated from my initial research focus. Early in my doctoral studies, I focused my research questions around 'university community gardens.' I was planning on working with some of the National Union of Students' Student Eats gardens, and number of them called themselves 'community gardens.' As such, it seemed to be the most appropriate term. In section 4.2.2.3, I wrote that action research is meant to encourage a shift in thinking and that the general idea underlying an action research project should be allowed to change as the issues at stake are better understood (Elliot, 1991; McNiff, 2013). This evolution in the terms I used to refer to the subject of this study is evidence of this shift and should be seen as part of the narrative of how this study developed over time. It was only though the initial inquiry into sustainable university community gardens that I came to see that the term 'student-led food garden' that I use elsewhere in this thesis most accurately represented the Student Eats gardens, as explained in section 2.4.

The three criteria for inclusion in the review were that the articles must have written about garden(s) that: (1) were affiliated to a higher education institution, (2) were community gardens, in terms of being operated and managed collectively by the local community (including any combination of university students, staff, alumni and residents, as well as

people living in the area surrounding the university or garden), and (3) had a commitment to sustainability through practice and/or ethos. Table 7 expands on some of the details of these criteria.

Including gardens affiliated with higher education institutions was a natural criterion given this research's focus on food gardens in universities. The second criterion was intended to exclude farms exclusively run by the institution and allotment-style gardens, as the Student Eats gardens were all run collectively by a group (rather than by an individual) or at the very least had a collectively-run part. This literature was both voluminous and shared little in

Table 7. Descriptions of the inclusion criteria for articles included in the quantitative systematic literature review.

Criteria	Description
The garden(s) in the articles must be… **Affiliated with a higher education institution**	• Garden must have had a sustained relationship with a higher education institution • Garden was on university property, created by the university, or the university had sustained engagement with the garden and planned to continue to do so • Could include participants not affiliated to a university • Example: Gardens affiliated with Cornell's Mosaics Garden programme were excluded, because in spite of the fact that many people from the university played an important role, the gardens were off-campus and run independently from the university (Doyle & Krasny, 2003) • Example: The Siyakhana Project of the University of Witwatersrand (Wills et al., 2010) was included because, in spite of being off-campus, the garden was created and directly affiliated with the University through various departments' applied research projects
The garden(s) in the articles must be… **A community garden**	• Garden must have been an open space "managed and operated by members of the local community in which food, flowers" and/or other plants are cultivated (Holland, 2004; Pudup, 2008; Kingsley et al., 2009; Guitart et al., 2012, p. 364); the community could have included university students, staff, alumni and residents, but could also have included people living in the surrounding area • Included community supported agriculture, farms, botanical gardens and a wildlife habitat garden, in addition to more the conventional smaller-scale community gardens. This mirrors the literature reviewed by Guitart et al. (2012) which included some larger-scale projects (Wade 1987; Karaan & Mohamed, 1998), projects involving restoration ecology/native ecosystem regeneration (Stocker & Barnett, 1998) and those run for commercial purposes (Flynn, 2001) • Must have had a strong agenda or practice for involving people from the university or the area around the garden and/or university (gardens excluded by this criterion include Delate (2006), Ferguson et al., (2006), Schroeder et al. (2006)) • Could not be private gardens (Nell et al. (2000) was excluded by this criteria)
The garden(s) in the articles must have… **A clear commitment to sustainability**	• The commitment must have gone beyond just food growing (given that not all food growing is "sustainable"), for example, a specific commitment to organic food production (e.g., Kobayashi et al., 2010), facilitating research into and practicing ecological restoration (e.g., Barton et al., 2010; Hockenberry Meyer et al. 2010), and horticultural therapy (e.g., Hockenberry Meyer et al. 2010) • Must have included either sustainability practice and/or ethos – the actual contribution to sustainability or the intent to do so (gardens excluded by this criterion include Byers (1999), Hamilton (1999), Olsen et al. (1999), Stimart (1999), VanDerZanden and Cook (1999), Haynes and Trexler (2003), and Stephens et al. (2006))

common with the university community gardens I intended to research. Therefore, I used the qualifier 'sustainable' to both omit much of the less-relevant literature about university farms, as well as to explore university community gardens' potential contributions to a sustainable future.

Articles, such as reports or other accounts, which were not peer reviewed (such as Lund & Orth, 2010) were not included in the review. The types of articles that were included were conference proceedings, feature articles, technical papers, perspective pieces and research articles. The differences and similarities between the term 'sustainable university community gardens' and the term 'student-led food gardens' that is used in the rest of this thesis can be seen in Table 8.

Table 8. The differences and similarities between the inclusion criteria for the review about sustainable university community gardens, Guitart et al.'s (2012) inclusion criteria for their review of urban community gardens, and the definition of student-led food gardens in universities used in this thesis.

Criteria	The term used in the quantitative systematic literature review: **Sustainable university community gardens**	The term used in the rest of this thesis: **Student-led food gardens in universities**	The term used by Guitart et al. (2012): **Urban community gardens**
Self-defined "community garden"	Can be self-defined 'community garden,' but does not need to be	Can be self-defined 'community garden,' but does not need to be	Must be a self-defined 'community garden'
Location	In urban or rural areas	In urban or rural areas	Only in urban areas
Relationship with an HEI	Must have a relationship with a higher education institution	Must have a relationship with a higher education institution	Can have a relationship with a higher education institution, but does not need to
Student leadership	Can be led by students, but does not need to be	Must be led by students	Can be led by students, but does not need to be
Sustainability practice(s) or ethos	Must have sustainability practice(s) and/or ethos	Has a sustainability practice and/or ethos given the mandate of Student Eats funding	Can have sustainability practice(s) and/or ethos, but does not need to
Food growing	Can grow food, but does not need to	Must grow food	Can grow food, but does not need to

4.3.1.2 Method

Articles were found searching the following electronic databases between June 2013 and August 2016: EBSCO, ISI Web of Knowledge and Google Scholar. The keywords used to find the articles were 'university,' 'community garden,' 'food growing,' 'campus,' 'higher

education,' and 'sustainability.' Further articles were found by exploring the references of the initial papers and other literature reviews, as well as those papers which had cited Guitart et al.'s (2012) review of urban community gardens. Most articles were found and analysed before August 2014, after which the review was 'topped-up' as new articles were published until August 2016.

Each article was coded using protocol coding (Saldaña, 2013) according to its authors' affiliation(s), journal's discipline area, year of publication, location of the garden(s) studied, research methods used, garden characteristics and benefits of the gardens, drawing on the thematic areas used by Guitart et al. (2012). The garden characteristics were then broken down into types of gardens (e.g. food gardens, botanical gardens), what plants were grown (e.g. edible, ornamental), whether or not produce was sold and who it was sold to, who participated in the garden (e.g. students, faculty), and if the garden was used in the formal curriculum, and if so, for what subject area.

The benefits (both those that were discussed and those that were demonstrated) that the garden provided were categorised using the themes identified by Guitart et al. (2012). Discussed benefits were "only mentioned as the authors' opinion and/or findings in previous literature", while demonstrated benefits "were confirmed as a result of the research" (Guitart et al., 2012, p. 365). Determining if a benefit was discussed or demonstrated posed a challenge, particularly for articles that did not clearly outline methodology/methods because it was difficult to determine what they were asserting their research contribution was. Furthermore, this categorisation also had the potential to be used as a judgement of the reliability of a paper's findings (i.e., saying that there is not sufficient support for this finding, therefore classing it as a 'discussed' benefit). In order to mitigate the challenges this posed, like Guitart et al. (2012, p. 365), I didn't attempt to assess the rigour of the papers given (1) the interdisciplinary nature of the topic of the review and resulting diversity of criteria for

rigour, and (2) that "each paper assessed had already been evaluated within its discipline as of a suitable standard for publication in the academic literature."

The types of benefits I categorised my results into were: 'social benefits' (which were benefits to a group of people, such as networking and community development); 'access to fresh foods;' 'economic benefits;' 'health benefits;' 'reduced crime/increased safety;' 'educational benefits;' 'environmental sustainability benefits' (such as the use of sustainable/organic farming/gardening methods); 'cultural heritage/development;' 'life satisfaction[6];' 'environmental equity' (a state when a particular group/community does not bear disproportionate negative environmental effects/impacts) and 'increased biodiversity[7].' For this review, I developed three new categories of benefits that did not fit under any of the themes identified by Guitart et al. (2012). These were: 'engagement, attitudes and behaviours for sustainability;' 'additional benefits to individual participants[8];' and 'benefits to the institution.'

The results from this review are presented in Chapter 5 and helped to 'construct' my understandings of sustainable university community gardens in order to better understand what is already known about student-led food gardens and similar initiatives. I will now go on to explain how I continued to 'construct' my understandings of the problems in student-led food gardens through a case study approach.

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[6] Guitart et al. (2012) didn't define what they meant by 'life satisfaction,' so I categorised benefits that enhanced participants' sense of well-being (such as a 'slower pace of life' and improved self-confidence/esteem and/or empowerment) under this category.

[7] Although it could be argued that Guitart et al.'s (2012) 'increased biodiversity' theme fit under 'environmental sustainability,' it is retained as a separate category to better align with Guitart et al.'s review.

[8] While a number of benefits identified by Guitart et al. (2012) could fall under the 'additional benefits to individual participants' category (such as education, life satisfaction), I retained Guitart et al.'s existing categories, and added a new category called 'additional benefits to individual participants' (such as employability benefits and decreased shopping trips) for the benefits that didn't fit under any other of Guitart et al.'s categories to enable clarity in comparing the findings.

4.3.2 Case Study Approach

After the bulk of my quantitative systematic review was complete, I adopted a case study approach to focus on student-led food growing in universities in the United Kingdom. A case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1984, p. 23). Action research studies are usually case studies because they both focus on an "intensive analysis of a single case" or series of cases (Bryman, 2012, p. 709; Dick, 2014). Action research partners well with a case study approach because they both take place in the field, tend to be holistic, and acknowledge the importance of context (Dick, 2014). Using case studies can enable the development of a rich, in-depth understanding of the phenomena by retaining their "holistic and meaningful characteristics" (Bryman, 2012; Yin, 2003, p. 2).

Case study design is not as prescriptive as many other study designs (Yin, 2014), however there are four main types of case study designs, depending on whether there are one or multiple cases, and whether they are holistic or have multiple units of analysis. Table 9 shows these four different types of designs and gives an example of each. I used a single case study approach with three embedded units of analysis (see Figure 10). A single case design was chosen because the research question allowed for the examination of the impacts of transience in student-led food gardens in England as a whole unit. Three gardens were used as embedded units of analysis. Four gardens were approached, however only three ended up being part of the study. The reasons for this will be explained in the following section.

Embedded units of analysis were used was because there were too may gardens funded through Student Eats to be able to conduct action research in all gardens in the depth that such a research approach requires. The gardens were chosen using literal replication,

Table 9. Basic types of designs for case studies, including examples of each (Yin, 2014, p. 50). A single embedded case study is used in this thesis.

	Single case designs	Multiple case designs
Holistic (single unit of analysis)	One case embedded within a context *A simplified example:* Case: student-led food gardening in English higher education institutions Context: English higher education environment	Multiple cases within multiple contexts *A simplified example:* Cases: student-led food gardening in English, Canadian and Swedish higher education institutions Contexts: English, Canadian and Swedish higher education environment
Embedded (multiple units of analysis)	One case with multiple units of analysis within a context *A simplified example:* Case: student-led food gardening in English higher education institutions Embedded units of analysis: student-led food gardens in English higher education institutions Context: English higher education environment	Multiple cases with multiple units of analysis within multiple contexts *A simplified example:* Cases: student-led food gardening in English, Canadian and Swedish higher education institutions Embedded units of analysis: student-led food gardens in English, Canadian and Swedish higher education institutions Contexts: English, Canadian and Swedish higher education environment

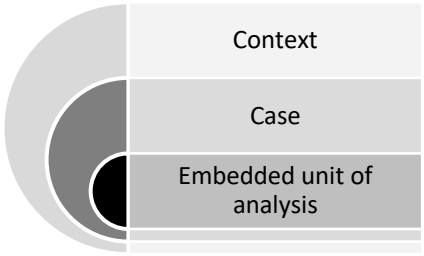


Figure 10. A visual depiction of the relationship between the 'case,' it's context, and the embedded units of analysis. The 'case' is embedded within a wider context, and sometimes embedded units of analyses are employed when a specific phenomenon within a case is to be examined in greater detail (Yin, 2014).

where units are chosen on the basis of their similarities in order to corroborate each other and enhance the credibility of the findings (Yin, 2003). This means the gardens were not chosen for comparative purposes, and therefore the results will be presented with limited comparison between the gardens. The 'core' action research cycles operated separately at each garden, however, in the 'thesis' cycle, the data from all the cases were pooled and they were used to examine Student Eats as a phenomenon. The case and the embedded units of analysis within their wider context will be explained in the next section though the example of a single, embedded case design from Table 9 is a rough illustration.

4.3.2.1 The case study

For my case study, I focused on student-led food growing in universities in England funded by the National Union of Students' Student Eats programme. The reason for choosing to examine only those affiliated with Student Eats was because it meant there was coherence to the case: they all received similar funding and had similar ambitions for their gardens. It also meant that the gardens were easy to identify and get in contact with. The National Union of Students is a confederation of students' unions in the United Kingdom and had a sustainability team that focuses on social and environmental responsibility[9]. The sustainability team ran a range of different programmes focusing on, for example, pro-environmental behaviour change, embedding sustainability in the curriculum, and reducing the environmental footprint of universities and their students' unions. One of these programmes is Student Eats, which supports "institutions across the United Kingdom in cultivating their own *student-led* growing sites for fruit and vegetables" (NUS, n.d.c, emphasis mine). Prior to Student Eats, the National Union of Students ran a programme called Freshers' Freshers supporting seven student-led food growing initiatives in universities. Freshers' Freshers acted as an unintentional pilot for Student Eats, as the National Union of Students subsequently received funding of £315 000 from the Big Lottery's Local Food Fund for Student Eats. Some of this funding was distributed to universities and their students' unions by the National Union of Students in 2012 through their own funding call of approximately £10 000 (see Appendix B). Eighteen sites were funded, all of which were in England, fourteen of which were at universities (higher education institutions) and four of which were at colleges (further education institutions) (NUS, n.d.b). There were institutions with food-growing sites for

[9] At the time of publication, the sustainability team had split from the rest of the National Union of Students to for its own charity, called Students Organising for Sustainability. They have since continued to deliver the same portfolio of activities as they had done previously.

students prior to the funding (such as Staffordshire University, n.d.), however the funding fed the growing interest in student-led food gardens in universities. Subsequent funding initiatives from the National Union of Students also helped spur on engagement, with a £5 million Students' Green Fund supporting several campus food growing initiatives (NUS, n.d.e), and the £998 000 Student Eats Food Enterprise funding, which had already supported the set-up of approximately seventy student-led food enterprises throughout the United Kingdom at the time of publication.

Based on personal communications with staff at the National Union of Students, and their own publication (NUS, n.d.c), the ambition of the initial Student Eats funding from 2012 were to:

- Build physical infrastructure where food is grown,
- Sell produce or value-added products to sustain the initiative financially,
- Increase availability of fresh, local food on campus,
- Strengthen links with the local community,
- Facilitate student learning about sustainable food,
- Provide access to 'ethnic and exotic' crops for international students and students from different backgrounds,
- Engage hard-to-reach students,
- Create a network of growing sites,
- Create pro-sustainability changes in students' food attitudes and behaviours,
- Increase students' employability,
- Produce food in an environmentally sustainable way, and
- Connect students to nature.

Much of the focus of the initiatives was on students learning about growing healthy, environmentally-friendly, and ethical food (NUS, n.d.c). Importantly, the initiatives were meant to be student-led since they were funded by the National Union of Students. However, in practice, some gardens were coordinated or even run mainly by university or students' union staff.

The small number of potential study sites (subunits of analysis) for a qualitative study like this means that a purposive approach to selecting the study sites was necessary (Cresswell, 2014). The three student-led food gardens were chosen as embedded units of analysis in consultation with a staff member at the National Union of Students. The two criteria used to decide which gardens to choose were the extent to which the gardens were successful and student-led. A staff member from the National Union of Students advised on this matter. Student-led gardens were chosen because of the emphasis on students' transience in the research questions. I included 'success' as a criterion for my study given that I wanted to work with gardens that had the capacity to engage with a research project, and suspected that if the initiatives were struggling, they may not have had the capacity[10]. The fact that the gardens used as embedded units of analysis were the most student-led initiatives meant that they were also exemplars of the issues associated with student transience[11]. Four gardens were recommended, three of which became the focus of this study. Initially all three agreed to participate, however, I ended up not pursuing one of the cases because after initial contact was made, communication dwindled and, through social media, I discovered the garden was not as student-led as had been thought. All the gardens were at universities, likely because the higher level of staff support for the gardens at the

[10] The focus on 'successful' gardens is a methodological issue I will take up in Chapter 9.
[11] In section 9.2.3.5 I will problematise this idea of 'exemplifying issues associated with student transience,' and discuss the extent to which these case studies genuinely did this.

further education institutions which meant they didn't meet the student-led criterion. One of the gardens was my university, Keele, and since I was the main contact on behalf of my university, I did not need further permission to study it. I contacted the other gardens with contact information provided by the gatekeeper at the National Union of Students to invite them to participate (see Table 10).

Table 10. Description of the gardens studied.

	Keele University	University of Warwick	University of Sheffield
Size of university	Approx. 10 000 students	Approx. 25 000 students	Approx. 30 000 students
Location of university	Rural	Rural	Urban
Extent to which the garden was student-led	• Mainly undergraduate participants • Supported by a PhD student (myself) • Some support from grounds staff (e.g., mowing lawns)	• Mainly undergraduate participants • Supported by a PhD student • Some support from grounds staff (e.g., provision of compost)	• Mainly undergraduate participants • Limited postgraduate participation • Some support from grounds staff (e.g., provision of compost)
Garden characteristics	• Eleven raised beds of approx. 10 m^2, two of which run by students, the other 9 rented out to staff and campus residents • Located within a historical walled garden with a locked gate • Students had access to a large greenhouse run by the biology department	• Roughly 18 raised beds (approx. 2m^2), a polytunnel (approx. 15 m^2), several of small plots and borders dug directly into the ground, and a shed • Located behind student residences in a low-traffic area on campus	• Six raised beds (approx. 3-4 m^2 each), several beds dug directly into the ground (approx. 12 m^2 total), a shed, a small glass greenhouse, and a pond • Located in between other university buildings and residences, next to an open green space

4.3.2.1.1 Embedded unit of analysis 1: Keele University

Keele University is a small (approximately 10 000 students), rural, post-war institution with a broad-base of studies, including health, natural science, social science, and the humanities, on a 600-acre campus. The institution considers itself to be research intensive with a strong educational profile. Most students and many staff live on the campus, meaning there is a residential community near the garden. The garden was set up through the Estates and Development Directorate in a disused historical walled garden of a family estate the university had been built on (see Figures 11a and 11b). The raised beds took up a small

Figure 11a. A Google maps satellite image of Keele University's walled garden.

Figure 11b. A Google maps satellite image of the raised beds within Keele University's walled garden.

proportion of the whole walled garden space. Within the garden, much of the space was used by the estates team as a space for storage (for items such as unused bricks, wood chips, equipment, etc.), and for a greenhouse operated by the biology department. A large, closed off area contained disused and decrepit bothies (basic housing for farm labourers) and Victorian greenhouses.

Ten 1m x 10m raised beds were set up initially to be let out to staff, university residents and groups (such as the international office and the chapel) before the Student Eats funding was awarded. It initially had a traditional allotment style set-up with several communal beds let out to groups. When the Student Eats funding was awarded to the institution, an eleventh bed was built, and the international office's bed was given to the newly formed Student Eats society.

The Student Eats funding had been applied for by a university staff member, so substantial effort was made to recruit students to the project and set up a student society for the garden at the students' union. For the first few years the Student Eats garden ran as an independent society, and then after several years students decided to merge it with 'Think:Green,' the student sustainability society, as one of a portfolio of different initiatives they ran.

Over the years, the space was developed further by students, with the creation of a social space with foraged tables and benches, a composting system using wooden pallets, and a small (1.5m x 1.5m) plot that was dug directly into the soil. Students and other bed-users initially had access to the greenhouse, however after several years the space in the greenhouse for students diminished and was used for storing plants for the estates team.

The university grounds team mowed the lawns several times a year, would occasionally engage in dialogue with student gardeners, and would often let students use some of their unused bricks or pallets, and take their grass clippings or leaves to compost.

They occasionally had conversations with students about how to use and develop the space but provided limited support to students for that.

The students' union supported the garden in the same way they supported other societies. They did this through reminding them to have elections, providing avenues for their society to get more funding, providing a webpage for the society through the students' union website, and running 'freshers'' and 'refreshers'' fairs to recruit new students to their society. On several occasions students' union staff attended the gardening sessions.

I began working as a Sustainability Project Officer at the university while the final raised bed was built in the winter of 2013. Part of my role was to help support the emerging Student Eats society in establishing the initiative. I was due to start my PhD later that year, so my initial involvement was as a staff member of the university (though at the time I was still a student completing my Master's thesis at another institution).

4.3.2.1.2 Embedded unit of analysis 2: University of Warwick

The second garden was at the University of Warwick, which is also a rural university but more than double the size of Keele (in terms of student numbers) with approximately 25 000 students, a large number of which live in on-campus accommodation (University of Warwick, 2019a, 2019b). Warwick has a similar academic profile to Keele, including teaching and research in medicine, science, social science and the arts (University of Warwick, 2019a). Established in 1964, the university also considers itself to be research intensive with a strong educational profile. The garden (which students called 'the allotment') was small, fenced-off, and in a secluded area behind student accommodation. It was managed entirely collectively (see Figure 12). There were roughly 18 raised beds (1m x 2m), a polytunnel (5m x 3m), and several of small plots and borders dug directly into the ground. The Student Eats funding was used to set up the garden's physical infrastructure (which did not exist prior to the funding). The garden was entirely student-run with mostly undergraduate participants, however, there

were some postgraduate students and university staff involved as well. Notably, a doctoral student had an informal leadership role within the garden throughout the duration of my research engagement. The university's grounds team also supported the initiative by supplying compost.

Figure 12. A Google maps satellite image of the University of Warwick's allotment.

4.3.2.1.3 Embedded unit of analysis 3: Sheffield University

The third garden was at the University of Sheffield, a city-based, multi-campus, research-intensive university established around the turn of the 19th Century. With approximately 30 000 students, the fields of study at the institution mirror the other two cases, with the addition of engineering. The garden was established using the Student Eats funding, and consisted of six raised beds (approx. 1m x 4m), four tiered beds on a hill (approx. 1m x 4m), beds dug directly into the soil on the south side of the garden, a shed, a small glass greenhouse (approx. 1.5m x 1.5m), a pond, and a strawberry patch. Throughout my research engagement with the garden, it was entirely run by undergraduate students and therefore best exemplified the trait of 'students' transience,' though the university's grounds team also

supported the initiative by supplying compost. The garden itself sat in between other university buildings and residences, next to an open green space.

Figure 13. A Google maps satellite image of the University of Sheffield's allotment.

4.3.2.1.4 Stakeholders of student-led food gardens

There were a variety of participants and stakeholders involved with the gardens. The main focus of this thesis is on the student participants, which were mainly undergraduate students. These tended to be the most transient of the participants. Within this group there were also exchange students who were especially transient and would typically leave the university to continue their studies after one or two semesters. There was also a very high proportion of international students involved with two of the case study gardens, some of which stayed in the United Kingdom over summer holidays. A handful of postgraduate students were involved in all three of the gardens, though most were involved in passive or irregular capacities. The exception was at Warwick where there was a doctoral student who took on an informal leadership role, similar to the role I took on at Keele.

University and students' union staff were involved in different capacities in the different gardens, as outlined in the above sections. Gardeners from two of the gardens also had encouraged university and students' union staff to take part outside of their formal responsibilities, but this typically only happened during the summer and in an irregular capacity.

Broadly, I identified four main types of people taking part in the gardens. These are depicted in Figure 14. These typologies are not expected to be transferable to other projects, or even complete understandings of the typologies in the three gardens studied. They are based only on my interactions and observations, and therefore only representative of the people who were engaged in my research. As such, these will not be used as an analytical tool

Figure 14. Typologies of student volunteers involved in the student-led food gardens studied. These are to be used to give context to the quotes provided in subsequent chapters.

or presented as a finding; rather they are used solely to give context to statements made by participants whilst preserving a higher degree of anonymity. In future research, it may be of interest to explore the extent to which these typologies hold up under scrutiny with a larger sample of cases and participants.

4.4 A student gardener studying student gardens as a researcher where she works

Reflection on positionality is considered to be an important part of action research (Coghlan, 2019). While I would not want an exercise in reflexivity to become a "self-indulgent focus on the self thus distancing the researcher from the research focus itself" (Kobayashi, 2003, p. 349), I do think it is important for the purpose of transparency to outline some key aspects of my identity that may have had bearing on the study. These include that I am white, female, able-bodied, and from an upper-middle class family. At the time of fieldwork, I was in my late twenties. I hold British and Canadian citizenship but grew up in Canada. As a British citizen, I am not considered to be an 'international student' as I did not need a visa to live, work, and study in the UK. However, I am often perceived to be an 'international student' because of my Canadian accent. I have been involved and set up student gardens during my undergraduate and Master's studies, and see myself as a student gardener (although this has changed over time as discussed below).

The parts of myself that require attention are the multiplicity of roles I embodied within the study and my student gardener identity. The main roles I embodied during the study were 'researcher,' 'staff member,' and 'student gardener.' At times these roles overlapped, conflicted and became muddled. I often felt myself shifting between these roles when in interviews, workshops, and whilst gardening. When I moved to the UK and began my professional role at Keele University as a Sustainability Project Officer in early 2013, part of

my job was to support a student group to manage the student beds in the walled garden. Later that year, after I graduated from my Master's programme, I officially became a doctoral student. However, from the beginning I had a personal interest in the garden and tending to it, which at times, went beyond my normal job role. For example, I tended to the garden much more actively during the summer while students were away, dropped in to weed on lunchtime walks, and occasionally came in on the weekends to garden. At times, I felt myself to be just another one of the students gardening at Keele, but at other times I felt myself, and was perceived to be, a staff member acting on behalf of the university. In my research diary, I reflected:

> *In my own garden at Keele, I clearly occupy an insider role because I am very involved in it in my Sustainability Project Officer role. However, it's not as simple as that, because it is actually often described as a 'student-led project,' and since I am active in the garden as staff, I am technically not 'in' the garden, so to speak. But I still feel that I am an insider because, of all the people involved in the garden, I probably spend the most time with it (both in terms of actual gardening, as well as in an administrative capacity). Furthermore, since I am engaged with it in a more continuous way (having worked with it already for a year and a half, expecting to work with it for at least three more years, and staying over the summer) I think the best way to describe me as an insider, but with a caveat – an insider with some outsider elements as a result of my employment status.*

The relationship-building with gardeners that happened while I was a 'student gardener' at Keele led participants to be franker and more open with me in interviews and workshops. My insider knowledge, having tended to the garden with other gardeners, allowed me to ask more nuanced questions that were rooted in our shared realities.

Furthermore, as a new staff member, I experienced many of the challenges students also faced in engaging with 'the university.' For example, in the beginning I struggled to navigate the university's organisational structure. Who was responsible for what? How should I go about finding something out? However, as time progressed, this 'student gardener' identity started to shift as I embraced my professional role at the university and learned my way around the university structures. It was then that I started to see the gardens and how they were managed in a different way, and as such, asked questions that corresponded more to the perspective that most university staff members would have. For example, in workshops I questioned how realistic some students' proposed activities were given the student lifespan in the garden, which I would have been more supportive of earlier.

My roles at the Universities of Warwick and Sheffield were much simpler and remained static over time. I was an outsider to their projects as a researcher, though as a fellow university gardener I was perceived as a sympathetic outsider. Because of my outsider role, I was not as emotionally tied up in the success of their initiatives. This afforded me some reprieve from the struggle of balancing my researcher, staff member, and student gardener roles during data collection, which allowed me to be more relaxed and attentive in interviews and workshops. Furthermore, when the gardeners from Warwick and Sheffield engaged in my research, they did so out of curiosity or, as I reflected in my research diary, wanting to *contribute to something bigger*, in contrast to the participants at Keele who felt a sense of obligation to take part because they knew me. As such, participants from Warwick had more independence in carrying out the 'actions' planned through the research because they were not doing them for me, but for themselves.

Throughout my doctoral work, as can be seen in this section, I have been operating in a liminal state between being a student and scholar, in which I occupied multiple overlapping roles. This boundary spanning role (Adler et al., 2009) gave me unique insights to student-led

food gardens that would not have been accessible to a more senior researcher, nor to a full-time doctoral student. This was complemented by my outsider role as a researcher in the gardens at Warwick and Sheffield in which my emotional distance from the initiative allowed for more impartial inquiry. Further reflection on my positionality in section 9.2.2.

4.5 Research stages and main methods

The action research approach guided the overall structure of the study. I attempted a construct-plan action-take action-evaluate process in each garden. These cycles were undertaken in the gardens at Keele and Warwick, however, the participation at Sheffield dropped off so dramatically in the autumn of 2015 that I made no attempt to support the participants in planning or taking action.

Within the action research approach, several methodologies and methods were used to triangulate the findings (Bryman, 2012; Cresswell, 2014). I will first give an overview of the data collection methods used and then explain the research timeline in a more narrative style, explaining context-specific methodological concerns and approaches to analysis.

The principle method I used was the semi-structured interview, a widely-used method in qualitative research (Bryman, 2012). Semi-structured interviews are a method where research participants are asked questions according to a pre-defined set of themes or questions, but "the interviewer usually has some latitude to ask further questions in response to what are significant replies" (Bryman, 2012, p. 716). They are neither as rigid at structured interviews, which means that the interviewee can help shape the interview direction meaning that emergent lines of inquiry can be exploited, nor as unfocused as unstructured interviews, which can produce nebulous, confusing, or off-topic data (Bryman, 2012). The interviews in the study ranged between approximately twenty minutes and two hours in length, and in total there were seventeen conducted between all three case study gardens. Interviews were

an appropriate method because they allowed the participants to construct their answers to the questions on their own terms, and to challenge the questions they were being asked, as well as the overall direction of the research. It also allowed for the data collection process to be more of a negotiation of meaning in which I, as the researcher, was required to justify, rationalise and adjust my research direction as appropriate. One example was when one interviewee expressed frustration that early stages of the research were so problem-centred and they were concerned that this would disempower students and discourage participation. Upon discussion, I found that it was mainly in the written material I had sent participants that had prompted this reaction. I therefore made sure all future interactions with research participants were framed in a solutions-orientated manner, including written material. A further discussion of this will take place Chapter 9.

Interviews were useful in this study because it meant that the interviewees (such as those from the gardens at Warwick and Sheffield, and from the NUS) could provide historical information I could not have otherwise uncovered (Cresswell, 2014), and they also provided insight into how participants experienced the impacts of transience and the extent to which they understood its impacts. In one case I used a go-along interview, which is when "fieldworkers accompany individual informants on their natural outings, and – through asking questions, listening and observing – actively explore their subject's stream of experiences and practices" (Kusenbach, 2016, p. 154). This allowed for in-situ inquiry and for me to help the gardener complete their tasks while they took part in my research. This said, some of the weaknesses of the approach was that information was "filtered through the eyes of the interviewees" and may not have represented other realities, and that as "not all people are equally articulate and perceptive," this can affect the quality of the data (Cresswell, 2014, p. 191). The topics covered in the interviews and types of questions that were asked varied

between interviews because of the shifting focus of the research. As such, the topics of the interviews will be discussed below as I discuss each stage of the research in turn.

During the entirety of the case study component of the research, I used a research diary. Research diaries are widely used in action research for a variety for purposes (Reece, 2014). One way I used my research diary was to log factual information, such as descriptions of activities or events that took place, for recall at a later date (Reece, 2014). I also used my research diary as a tool to work through and reflect on the content, process and premise of my research (Coghlan & Brannick, 2005) in order to be reflexive on a practical, epistemological, and ideological level. Prior to beginning my research diary, I constructed a series of questions to respond to, based on journaling exercises from Coghlan and Brannick (2005). These questions can be found in Appendix C. My research diary also served as an outlet for expressing frustration, worries, disappointment, and fears about my research in a safe way. Being able to write about these things allowed me to express them and 'park' them so that I was able to reduce their influence on my facilitation or bias my research decisions. I have always used writing as a means to work through my thoughts and feelings, so this approach felt like a natural and unforced way to engage in a reflexive practice.

4.5.1 Sampling and recruitment of research participants

Because the study took place over a long period of time with a transient population, recruitment activities were ongoing. There were two levels of sampling: sampling of embedded units of analysis and sampling of participants (Savage, 2005). I chose to sample gardens (embedded units of analysis) that exemplified the trait of being 'student-led' and that were successful. This was outlined in section 4.3.2.1. To sample participants I used purposive sampling, which is to choose participants in a strategic rather than random way (Bryman, 2012). The populations I sampled from were gardeners in the three gardens to be studied and

staff working with Student Eats at the National Union of Students. Some participants I had previous relationships with, while others I did not. As a result, I used different purposive sampling strategies. For some, I recruited participants from "particular subgroups of interest" (participants from each of the most student-led food gardens and staff at the National Union of Students) (Bryman, 2012, p. 419). I also used opportunistic sampling (Bryman, 2012) by attending garden sessions at University of Warwick and recruiting participants that happened to be in attendance. At Keele, I used typical case sampling of participants that I knew had dropped out of the initiative to better understand why they had dropped out although they were still at the university (Bryman, 2012). Those interviewed from the garden at Sheffield University were the only potential interviewees available at the time given low participation.

The question of adequate sample size in qualitative research is a subject of debate (Bryman, 2012). Generally speaking, sample sizes should "not be so small as to make it difficult to achieve data saturation" nor "so large that it is difficult to undertake a deep case-orientated analysis" (Onwuegbuzie & Collins, 2007, p. 289). Data saturation is "when no new information is discovered in data analysis, and this redundancy signals to researchers that data collection may cease" (Faulkner & Trotter, 2017). I believe that data saturation is a subjective ideal towards which we strive, and I contest the idea that data saturation can ever be fully achieved, at least in research in which the 'general idea is allowed to shift' (Elliot, 1991). This is because the data collection and analysis could continue forever as the researcher continuously uncovers new nuances that shift the research focus. However, at some point the researcher must choose to stop collecting and analysing data, and begin writing up their findings. I had a high level of data saturation in my study as I was repeatedly receiving the same answers, in spite of having a small number of interviews and leading a small number of workshops. This is somewhat unsurprising as students had short lifespans as participants within the gardens, and therefore lacked insight into the issues studied (a

phenomenon which will be unpacked further in Chapter 6). Therefore, I would expect that increasing the number of students interviewed or the length of time spent collecting data would not have provided new information. Longer-term stakeholders, such as doctoral student gardeners or staff members of the National Union of Students offered considerable insight, however the number of these stakeholders were limited (though some long-term stakeholders were interviewed twice, as relevant).

4.5.2 Recording and transcription

All interviews and workshops were audio recorded and manually transcribed myself because it allowed for a more "thorough examination of what people say" (Bryman, 2012, p. 482). Whilst transcribing, I also made analytic memos (Saldana, 2013) to record any reflections or 'aha' moments as I went along. While some participants were perturbed by the use of a recording device, most were immediately comfortable. One person expressed concern about the use of the recording device and the use of direct quotes. In this case, I assured them that I would not quote them without checking with them first. The interviewee was forthcoming and natural both times I interviewed them, although occasionally corrected themselves and asked for particular sections not to be quoted. Another interviewee's demeanour immediately changed when the recording device was on, becoming uncomfortable. At times during the interview, I switched off the recording device to allow for more natural conversations and interactions. During the interview, another interviewee chose to write information on a piece of paper that they deemed to be too sensitive to be recorded. Unfortunately, the audio recording for one interview was corrupted, however most of the interview was recorded by a second device. This partial recording was transcribed in lieu of the full recording.

The choice to record and transcribe was fairly straightforward because there were many benefits to the quality of the research. Of course, much of the information conveyed in interviews has to do with *what* is said, but also crucially important is *how* participants say what they say (Bryman, 2012). This includes tone, body language, gestures, and eye contact, for example. If the interviewer's focus is on note taking, they may miss these subtle cues that can help the interviewer prompt and probe for further understandings (Bryman, 2012). Transcription inevitably 'flattens' reality, which is a weakness of the approach (Crichton & Childs, 2005). Although not fully remedying this issue, I addressed this by revisiting the audio recordings during data analysis to help to reanimate the transcript in my mind. While I did not re-listen to all recordings, I listened to some of the workshops several times after transcribing because of the complexity and multi-layered nature of the conversation that took place. This also allowed for quality checks of the transcription (Bryman, 2012). Another benefit of transcription is that it "allows the data to be reused in other ways from those intended" (Bryman, 2012, p. 482). This was crucial in this study given my commitment to reflexivity that allows the overall research agenda or question to shift.

4.5.3 A messy start: Constructing

Early stages of my research were more informed by the pragmatic tradition, and as my understanding of the questions and issues the student-led food gardens were grappling with grew, my research shifted towards a more critical orientation. My original orientation was towards providing practical knowledge developed through experiential learning that could be used by student gardeners and the National Union of Students in their support for student-led sustainability initiatives (more akin to the pragmatic tradition). As my engagement in the initiatives deepened, I began to see the heterogeneity within the gardens' volunteer populations, the conflict between long- and short-term stakeholders, and need for

consciousness-raising among the different stakeholder groups. This marked a shift towards a more critical orientation.

Early iterations of my research questions were guided by an apparent need to assess the environmental sustainability of student-led food gardens (as discussed in the results of the systematic literature review in Chapter 5). It was with this agenda that I applied for ethical approval (see section 4.7 for a discussion of ethics in this study and Appendix D for ethics approval letters). The ambition of my research at this stage was to use an action research approach to support the participatory development of indicators for social and environmental sustainability in sustainable university community gardens[12]. This being said, I was conscious of how much students' transience impacted these gardens. However, rather than seeing it as a dominating issue that needed examination, I saw it as background issue that the students needed to manage in their gardens, and a methodological issue that I needed to manage in my research.

In October and November of 2014, I interviewed three staff members at the National Union of Students who had been working with Student Eats. These interviews were semi-structured and exploratory. They covered the following themes:

- The history of Student Eats
- The aims of Student Eats as a project and the gardens themselves
- How they were measuring and assessing the impact of Student Eats
    - The purpose of the evaluations of the scheme that were being undertaken
    - The extent to which they felt their evaluations were effective and what could be improved

[12] I felt the development of both social and environmental indicator sets would be more useful to create a holistic tool that could be used not only to assess social and environmental sustainability, but also to manage trade-offs.

- How they understood the term ‘sustainability’
- Identifying gardens to use as embedded units of analysis

Two of these interviews took place in the National Union of Students’ office, and one took place over skype. They ranged between 30 minutes and two hours. Following these interviews, I designed a workshop at Keele to begin developing indicators for environmental sustainability in student-led food gardens. However, students struggled to come up with useful and practical indicators for their vision, mainly because students struggled to see the point of it. This is what led to the most crucial revelation of the workshop, which was that all tasks in the garden were subordinate to one crucial task, which was to maintain sufficient participation levels in the face of a transient student population. This revelation marked a shift in my research agenda.

Over the course of the next few months I reformulated my research questions and amended my ethics application (see Appendix D). I interviewed a student who had taken part in the workshop at Keele to gain further insight into the issues discussed in the workshop. I also found Silva’s (2013) recently published report on the different models of engagement for monitoring in urban stewardship, which led me to a data collection toolkit for monitoring the outcomes of urban food growing (e.g., the amount of food produced, environmental, health, and economic outcomes) (Design Trust for Public Space, n.d.). I thought this data collection toolkit could be used to track the vital signs (e.g., levels of participation, food produced, change in attitudes) of the gardens before and after the interventions took place as a way to assess whether the interventions had an impact. I introduced this at Keele progressively during ordinary gardening sessions in early 2015, at the garden at Warwick at an introductory workshop in January 2015, and at Sheffield during one of their gardening sessions in February 2015. This data collection strategy was abandoned in the Autumn of 2015 as the data was

inconsistently recorded, it was labourious, and provided little insight into the garden's vital signs due to the inconsistency of recording.

After this, I came to the conclusion that I had begun the research with too many pre-conceived ideas of what challenge needed addressing in these initiatives and the level of engagement in my research that the gardens could sustain. As a result, I scaled my approach back and conducted five interviews (one at Keele, two at Warwick, and two at Sheffield) and three workshops to better understand issues associated with transience and participation at Keele[13] (November 2015, eight participants) and Warwick (December 2015, five participants). The workshops were based on Vaughn and Lohmueller's (1998) group level assessment method. The method is qualitative and participatory group research method where data is collaboratively generated and analyzed by large group of stakeholders (Vaughn & Lohmueller, 1998; Vaughn et al., 2011). The purpose of the method is both to research through producing data, but it also is intended to create participant ownership and bring groups of people together (Vaughn & Lohmueller, 1998; Vaughn et al., 2011). The workshop, as originally conceived, includes seven steps and has more focus on collaborative and participatory analysis. I amended the workshop to fit the needs of my study and the student participants involved. This meant the workshop was shortened from the recommended three hours to two hours, and the focus was more on brainstorming and thinking through of the main issue(s) in the gardens collectively. The workshops were quite flexible in their structure as some students arrived late and others needed to leave early. In the beginning, I introduced myself and my study to the group as there were usually new participants present. There was

[13] The two workshops conducted at Keele in November 2016 were extensions of the same activity. The first workshop was poorly attended so I ran it again the following week. In the first week participants answered questions written on paper taped to the greenhouse walls, but it was not audio recorded as I chose not to facilitate a discussion given the limited number of participants. The discussion I facilitated on the second week was audio recorded.

then some time spent talking about, reading and filling in the information sheet and consent forms (more on this in section 4.7). After this, the main part of the workshop started, where participants walked around the room responding to questions on the posters. There was approximately 20 minutes spent on this. The questions were designed so there was overlap between them make sure all the main reflections on the topics were captured, with same question being asked several times using different phrasing (see Figure 15a and 15b). After this first part, participants were invited to walk around and silently read and reflect on others' responses for 10 minutes. For the remaining time (approximately an hour and 45 minutes at both gardens) was used for a discussion of the posters and the main issues present in the gardens. At Keele the workshop was held in the greenhouse in the walled garden, while at Warwick the workshop was held in a small seminar room.

Following this, I began the first of two phases of data analysis. I transcribed all audio data and photographed all the posters with written responses. I then compiled the data, including analytic memos, in the Computer Assisted Qualitative Data Analysis Software programme, NVivo. I used thematic analysis as a strategy to make sense of the data, and coded according to the main questions that I was posing to participants at the time of the research, which were:

- How students' transience impacted the gardens
- Causes of problematic participation
- Effects of problematic participation
- Solutions suggested[14]

I coded using a number of different methods over the course of two cycles, a process called eclectic coding (Saldaña, 2013). Some of the data were coded as small chunks of

[14] While I did not solicit solutions in interviews or workshops, many participants volunteered them. As such, I chose to code them.

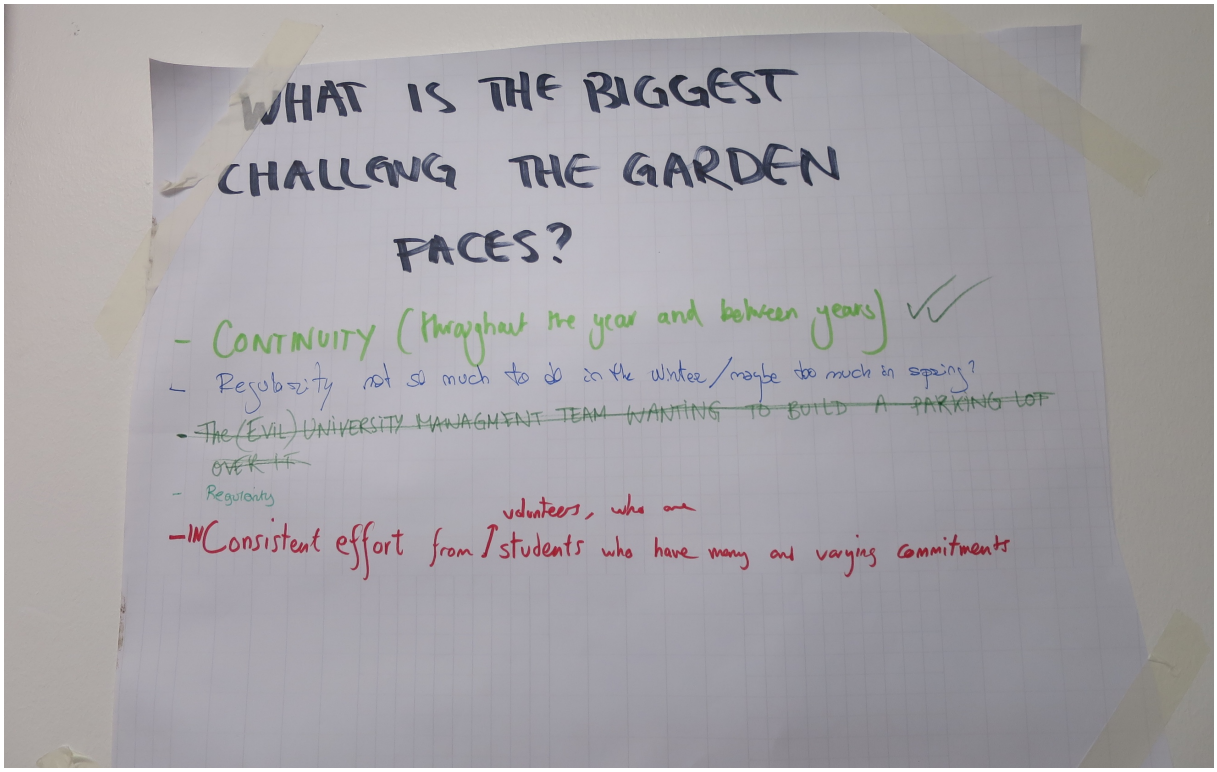


Figure 15a. Written responses to the question, 'What is the biggest challenge the garden faces?'.

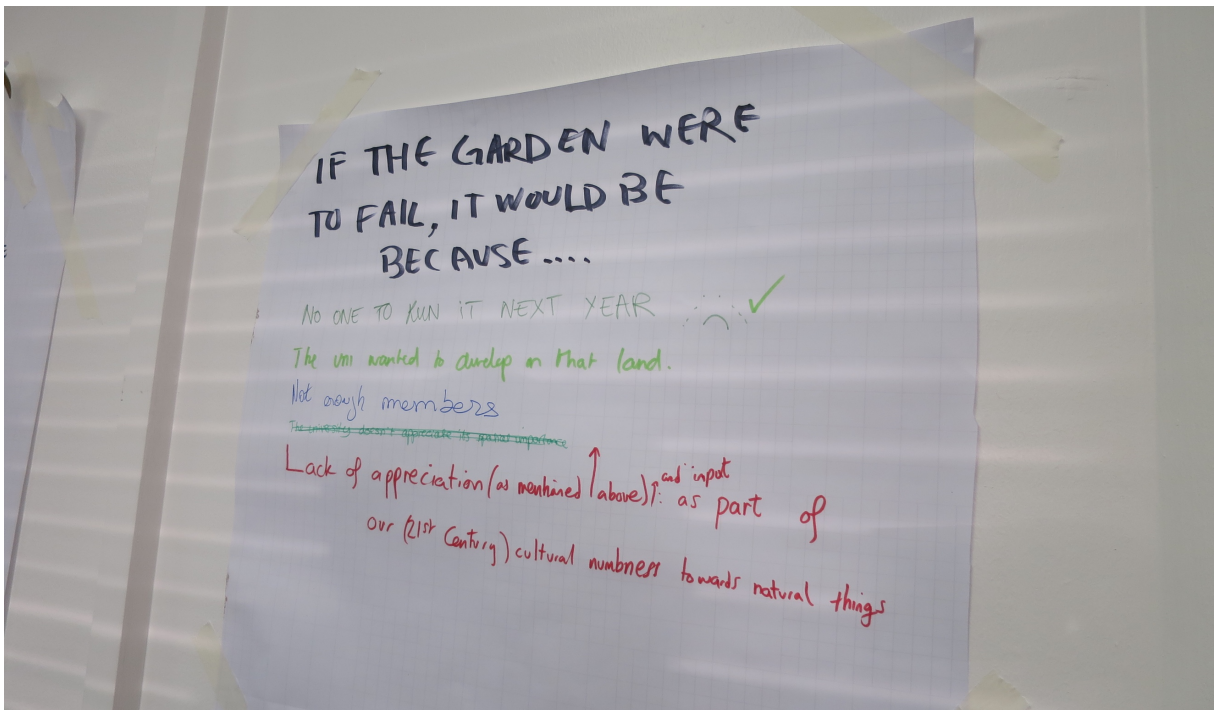


Figure 15b. Endings to the sentence, 'If the garden were to fail it would be because...'.

information (called 'splitting') in the first cycle, and then grouped into themes (called 'lumping') in the second cycle (e.g., positive outcomes of student-led food gardens, and the problem of participation). Other groups of data were analysed by 'lumping' and then 'splitting' (e.g., issues related to transience, problems identified). For both types of data, the

first cycle of coding was made up of a combination of holistic coding, *in vivo* coding, and simultaneous coding (Saldaña, 2013). Holistic coding is coding larger sections of text by capturing the overarching theme of the text, rather than splitting the codes out line-by-line (Saldaña, 2013), and this was the main method used when 'lumping.' Simultaneous coding, when the same passage of text is coded more than once, was necessary because of the complexity and messiness of the content and conversations. *In vivo* coding is when the research participants own words are used as the code (Saldaña, 2013). In line with the ethos of action research, I aimed to include as much of the participants' 'voice' as possible, hence the use of *in vivo* coding (Stringer, 2007). For data that was analysed first by 'splitting' and then 'lumping,' I used descriptive coding, which is when "the basic topic of a passage of qualitative data" is summarised in a word or short phrase (Saldaña, 2013, p. 88). I also complemented the descriptive coding with simultaneous and *in vivo* coding where appropriate.

In these early stages of the research, problematic participation and transience were often conflated by both the participants and myself because they were so interlinked. Often during the interview process, I would seek to explore how students' transience impacted the gardens, but this would quickly shift into a conversation about how to increase participation. Untangling 'transience' from 'participation' identifying their causal relationship became a key focus at this stage. Once it was established that transience caused short-term and irregular participation, a more fine-grained analysis of how transience interplayed with the participation dynamics in student-led food gardens was possible. Having coded in a relatively open-ended manner, I used causal loop mapping to make sense of the relatively long list of codes. Causal loop diagrams are analytical tools that can be used to demonstrate how different variables are related. They are appropriate for understanding wicked problems and complex systems where linear causal thinking is insufficient (Hjorth & Bagheri, 2006). The

process of mapping involved identifying the variables in the system (in this case, many of these were the codes or agglomerations of codes) and how these variables increased or decreased the occurrence of other variables. At this stage, I produced a report (seen in Appendix E) summarising the key findings and presenting them as a causal loop diagram (Figure 16). This causal loop diagram, originally constructed by hand on a whiteboard and then later translated to a digital version, was further refined in later stages of analysis. The final version can be seen in Chapter 6.

4.5.4 Planning and taking action

The planning action phase was much briefer than the constructing phase. It was made up of two workshops, one at Keele with thirteen participants and one at Warwick with five participants in February 2016. From the interviews and attempts to reach out to students at Sheffield, I knew that there was very low or possibly non-existent participation and therefore there wasn't capacity to engage with my research as actively at that time. The workshops at Keele and Warwick had two components: reviewing the findings from the constructing phase, and planning actions to address the problem(s) uncovered in the first phase. Prior to the workshops I sent the report to those who took part in the research in the 'constructing' phase and posted it in the gardens' social media groups. I invited feedback, including changes or additions, however no changes or additions were suggested in the feedback I received.
For the workshop at Keele, I created a large-scale version of the initial causal loop diagram from Figure 16 (see Figure 17).

This was placed on the floor in the centre of the greenhouse for the duration of the workshop. There was not space for this for the workshop at Warwick, so we worked off paper versions of the report in Appendix E. For the first part of the workshop, I (re-)introduced participants with the information sheets and consent forms. Then I provided participants with

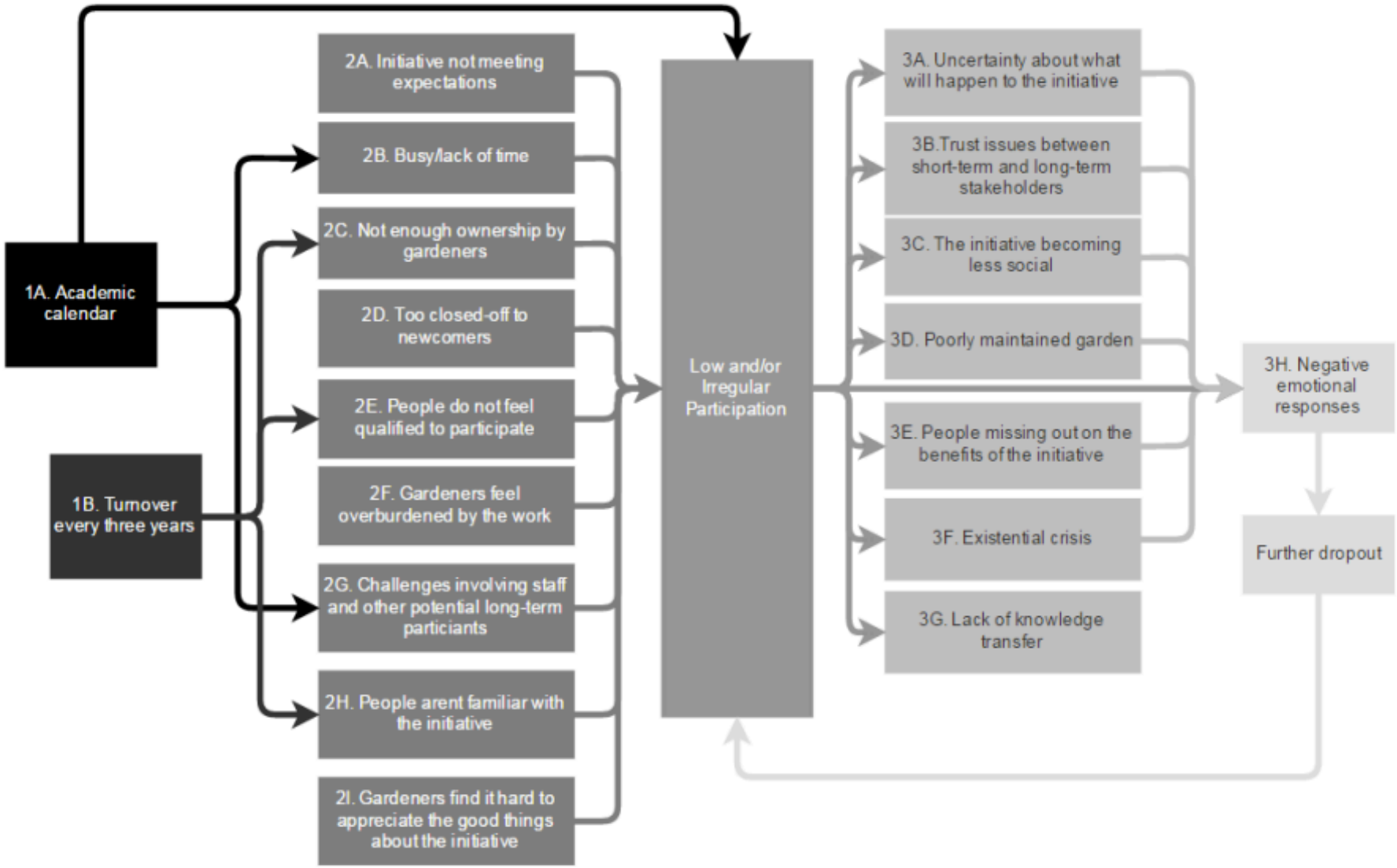


Figure 16. Initial causal loop diagram mapping the relationship between problematic participation, its causes, effects, and transience.

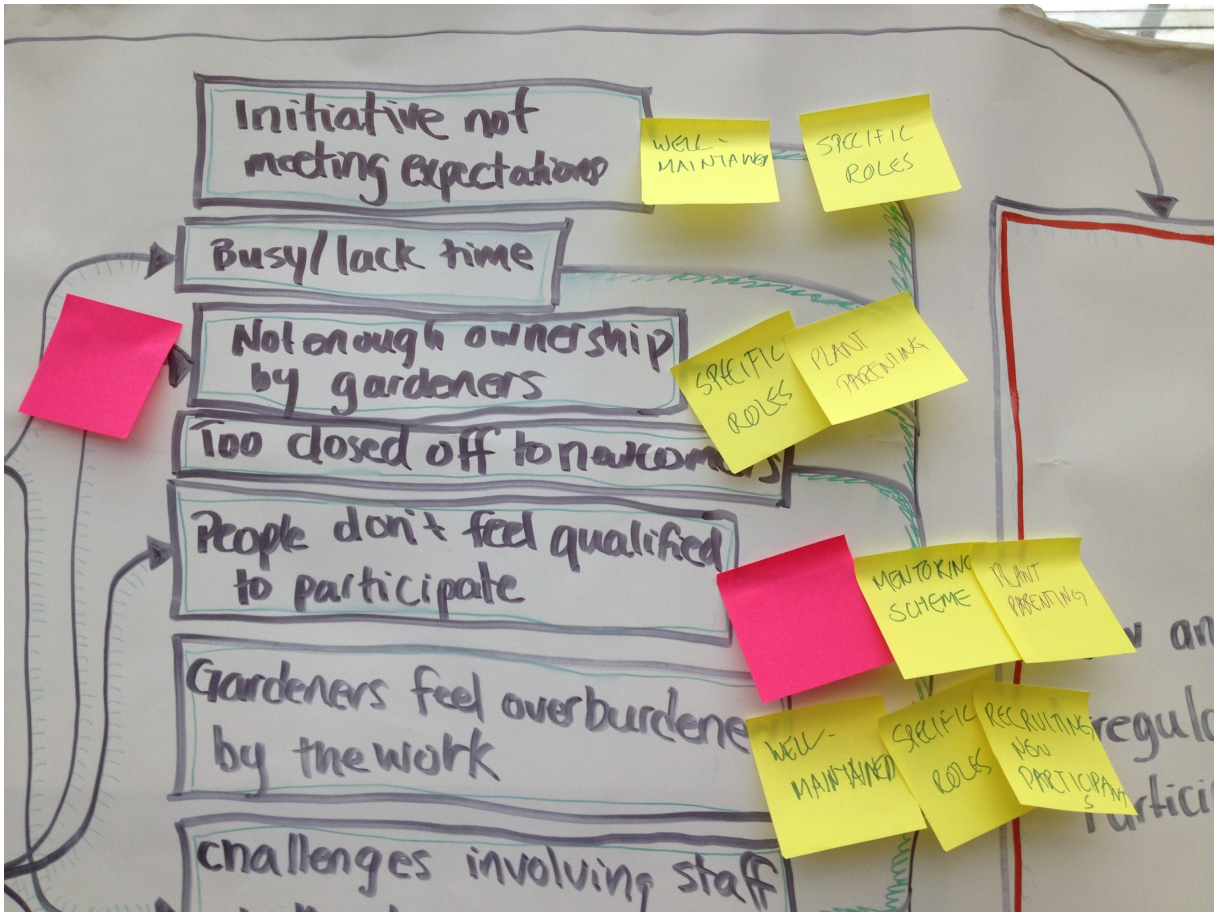


Figure 17. Post-it notes stuck on to a hand-drawn version of the causal loop diagram from Figure 16.

the report and invited them to read the report and provide any feedback, including changes or additions. Reviewing the report also (re)acquainted the participants with the issue the research was intended to address. In both workshops, there was not any dissent in the feedback, and the comments I received were relatively minor. Therefore, I led them to brainstorm ways to address the issues outlined in the report (see Figure 18 and 19). This was done in an informal discussion around a table at Warwick as there were only five participants.

At Keele, there were more participants therefore, the students were asked to brainstorm by independently writing their ideas down on post-it notes, and then everyone presented their top three to the group. In the end, rather than coming up with one or several larger actions to address together, at both gardens, students planned a portfolio of smaller actions to be taken individually. The actions that were actually followed through on will be discussed in Chapter 8, but a summary of all planned actions can be found in Appendix F.

Figure 18. The floor of the greenhouse where workshop participants were arranging post-it notes with suggested solutions to the problems outlined in the causal loop diagram in Figure 16.

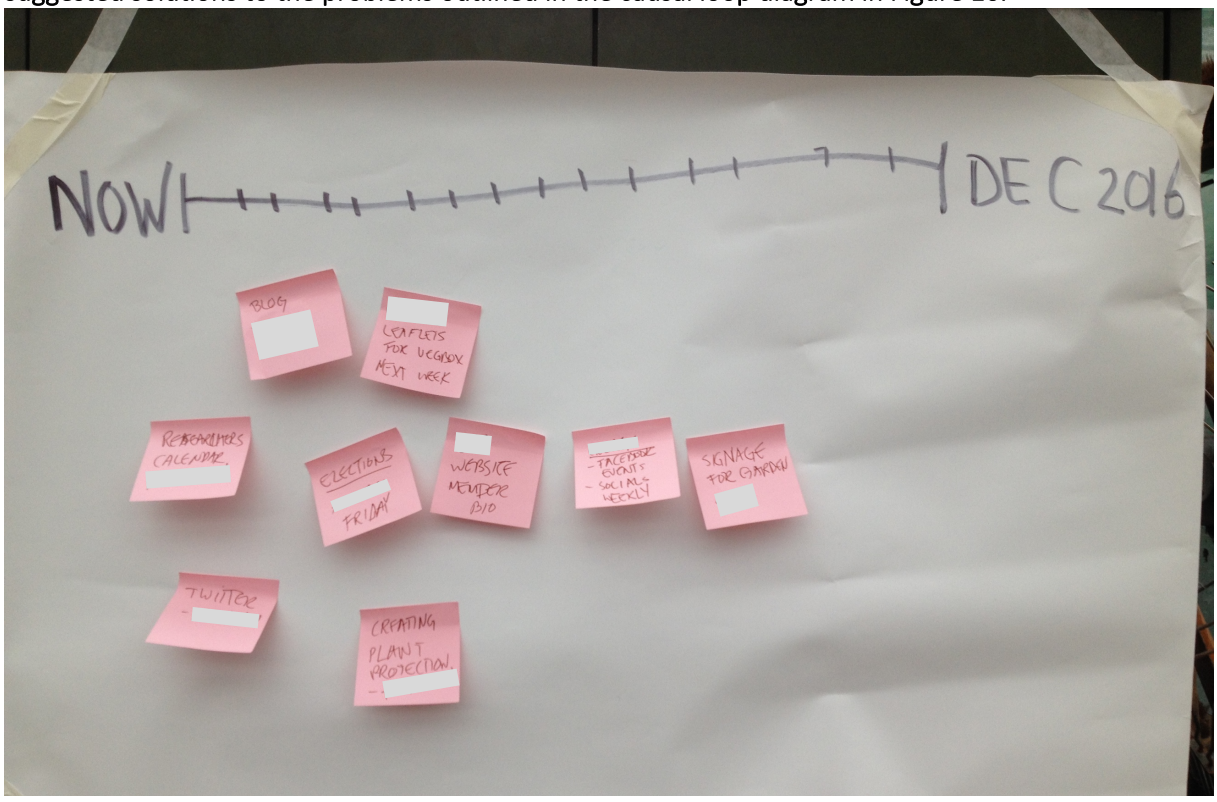


Figure 19. The actions that were chosen to take, with the name of the person responsible and a deadline to complete the task. Names are censored to ensure anonymity.

I followed up with students at both Keele and Warwick several times to see how they were progressing with them and to encourage them to follow through.

Towards the end of this phase I arranged an interview with a gardener from Sheffield University, who was the sole volunteer at the time. The purpose of the interview was to explore the status of the garden, both to develop a better understanding of a garden that had oscillated from being a highly successful student-led initiative to virtually inactive, as well as to explore the possibility to run an action planning workshop. I concluded at this stage it would not be possible to run such a workshop for the garden at Sheffield.

4.5.5 Evaluating

Throughout the evaluating phase, my main focus was on evaluating the actions taken, however I also continued to seek out input to clarify my understanding of the impacts of transience and the dynamics of problematic participation. I, first, attempted an evaluation workshop at Keele in late May 2016, but it was poorly attended and none of those who had signed up to take actions attended. In lieu of a full workshop, I conducted interviews with two students in the following days who were due to graduate in order to evaluate the impact of the actions and assess which had actually been implemented. At Warwick I successfully conducted an evaluation workshop in June 2016. In the workshops and interviews, we went through the list of actions that the students said they would take and (1) discussed whether they were followed through on, (2) if not, why, (3) if so, what the impact was, (4) if the action was effective in addressing issues associated with transience, and (5) what actions they would take in future.

Around the time of the evaluation workshops I began a photovoice component to my study. Photovoice is a participatory methodology that "asks participants to photograph aspects of their lives" so that the knowledge generated genuinely represents the views of the research participants (Bendell & Sylvestre, 2016, p. 357). The purpose of this was to gather data to assess the impact of the actions taken given that, as actions were being taken, it

became apparent that it would be challenging to assess their impact given the transience of students involved in the gardens and the difficulty in attributing changes in the garden to the actions taken.

Typically in photovoice studies, the first step is to train and prepare participants to take part by advising on the mechanics of taking photographs, issues of ethics and power, and to outline the topic of the project itself (see Appendix G). In the next stage, participants take photos responding to a set of prompts or questions and write an accompanying caption. In trying to reach out to a larger number of students, I visited gardening sessions to encourage participants to take part and provided information on social media in lieu of in-person training. However, only four participants took part in total, all of whom I had briefed in-person. Students sent me the photos and captions, and since only eight submissions were received I had them all professionally printed on photo boards. These photo boards were displayed at the Student Eats conference in February 2017, which three of the four photovoice participants attended.

Students were invited to take photos to answer one or more of the following questions:

- What does the gardening session look like in the [garden/allotment/initiative] this week?
- Is the participation (the quality/the amount) better than usual this week? Is it worse?
- What helps improve participation in the [garden/allotment/initiative]?
- What hampers participation in the [garden/allotment/initiative]?
- What do I want to tell other people about participation in the [garden/allotment/initiative]?

I completed the photovoice component of the study with a focus-group style workshop at Keele University. A focus group is like a group interview, but in addition to

eliciting information from participants, it is also allows for interaction between participants to be observed (Bryman, 2016). In the workshop I displayed their photos and we discussed what the photos were of and why the participants took them. We also talked about some of the actions that were taken from the action planning phase and how effective they were at addressing the issues associated with transience. Finally, I invited students to reflect on what the biggest challenges were for the garden and how they would address them.

Several more interviews were arranged to complement the other activities towards the end of the study. In May of 2016, I interviewed two students from Keele who had already graduated (one of whom had already been interviewed before) to explore their understandings of and thoughts on managing the impacts of transience and problematic participation in student-led food gardens post-studies. In August 2016, I arranged an interview with a staff member at the National Union of Students to report back on my initial findings and gather their perspectives again, given the shift in the research agenda.

At the Student Eats Conference in February 2017, where the photovoice photos were displayed, I also conducted a fishbowl discussion with seventeen conference attendees (see Appendix H for the discussion guidelines used). The purpose of this was to broaden the analysis to the scope of Student Eats as whole, rather than just the three gardens used as embedded units of analysis. This method was chosen instead of a questionnaire, for example, because of the limited number of Student Eats gardens at the start of the study (eighteen). At the time of data collection, a fishbowl discussion therefore seemed appropriate to broaden the analysis while allow for more participant-driven framing and discussion that a survey would not allow. Since the beginning of this study the number of Student Eats gardens substantially increased. At the time of publication there were over sixty Student Eats gardens.

A fishbowl discussion is a large-group dialogue method (Garrison & Munday, 2012). Typically, there is a ring of between four and five chairs in the centre of the room, which is

then encircled by larger ring(s) of chairs. Participants sitting in the inner ring are the only participants allowed to speak, but participants are free to move between the inner and outer rings depending on whether they would like to speak or listen. The advantage of the discussion is that a relatively intimate discussion is able to take place, whilst involving a larger number of people than a focus group, for example, would be able to accommodate. The weakness of the method is that not all participants may be willing to speak in front of such a large audience (Garrison & Munday, 2012). However, in this case the group was still quite small and therefore most participants seemed comfortable volunteering contributions. Participants in the discussion were invited to respond to the following questions:

How can we maintain sustainable participation given:

- The typical undergraduate degree is only three years, after which most students leave?
- Most student leave for the summer (and spring/winter) holidays?
- The ebbs and flows of academic workloads, course work and exams?

At the Student Eats Conference, I also interviewed a new student gardener from Warwick's garden to follow up on some of the content they brought up in the fishbowl discussion.

4.5.6 Bringing it all together

Following the evaluating phase, I began to consolidate all the data and findings into a coherent narrative. A second round of transcription and data analysis took place, examining all the data after the constructing phase. The approach taken was very similar to the first round of data analysis and was analysed in the same NVivo project. It built on the same sets of codes from the initial round of coding, but expanding with two new thematic areas:

- Solutions to problems identified
- Changes in the research focus

After this was completed, further analysis was undertaken for each of the research questions.

For the second research question, the initial causal loop diagram was mapped in The Brain software (see Appendix I), and then built upon using the new dataset in order to clarify nuances in the connections, and add new variables and connections. The Brain enabled a more complex analysis than a hand-drawn causal loop diagram would because of features that enabled zooming in and out on particular variables. It also provided different ways of visualising the connections that helped me to think through the relationships more clearly. Once all causal connections had been mapped, I was able to produce condensed versions of the causal loop diagram which are presented in Chapter 6.

For the third research question, I conducted another layer of analysis over the analysis I had already undertaken, using protocol coding. Protocol coding is coding to an already existing frame (Saldaña, 2018), which was, in this case, Biggs et al.'s (2012, 2015c) resilience principles. I created tables in Microsoft Word framed by the seven resilience principles, and recoded previously coded passages of text that demonstrated alignments or misalignments with the resilience principles. Given that earlier iterations of analysis had not been undertaken with the resilience principles in mind, I then returned to the transcripts and my research diary to identify any passages demonstrating further alignments or misalignments. The results of this are presented in Chapter 7.

Finally, for the fourth research question, I returned to the data coded in NVivo to examine the solutions proposed by participants and the actions actually taken. These were condensed into fourteen main strategies and actions, and then were cross referenced with the challenges outlined in the causal loop diagram in Chapter 6. This produced a table indicating which solutions address which problems. These solutions were also complemented with analyses emerging from the discussions in Chapter 6 and 7, to produce a table

summarising all advice for managing the impacts of transience and problematic participation, broken down by stakeholder group. These can be seen in Chapter 8.

4.6 Quality measures in mixed methods action research

Mixed methods studies can be challenging to apply consistent quality measures to as quantitative and qualitative research usually have different quality criteria (Bryman et al., 2008). As such, I will discuss the quality measures of the quantitative systematic literature review separately from the case study component.

4.6.1 Quality in the quantitative systematic literature review

Quality criteria for quantitative social research tends to be much more uniform than for its qualitative counterparts (Bryman et al., 2008). The traditional quality criteria for quantitative research are the extent to which the methodology is valid, reliable, replicable, and generalisable (Bryman et al., 2008). I assert that the methodology I used for the quantitative systematic literature review was of a high quality and outline why in the following paragraphs.

There are several types of validity: measurement validity, internal validity, and external validity. Measurement validity is whether or not a measure "reflects the concept it is supposed to be denoting" (Bryman, 2016, p. 41). Because of the limited number of articles included in the review, it is possible the articles do not accurately represent the benefits of sustainable university community gardens. As such, I temper my findings with this knowledge, and try to focus on the main trends rather than the minutiae. However, because the review was exhaustive, the findings do represent the current state-of-the-art. Internal validity has to do with causality (Bryman, 2016). The purpose of a quantitative systematic literature review is not to demonstrate causality, therefore this criterion is not relevant. External validity deals

with the generalisability of the findings (Bryman, 2016). The external validity of this study is very high since the review was an exhaustive and systematic review of all articles about sustainable university community gardens.

Reliability is concerned with whether or not a study is repeatable (Bryman, 2012). That is, if the same protocol were to be undertaken again under the same circumstances, would the results be consistent? Assuming that the databases searched do not change their search algorithms this would be the case. One factor that could affect the reliability of the method is that different institutions have different agreements with publishers and therefore a researcher from a different institution may not have access to all articles reviewed. However, I did not exclude any articles because of lack of access.

Replicability is concerned with whether the study can be replicated, and therefore the methodology needs to be provided in adequate detail (Bryman, 2012). I have been sufficiently specific and detailed in describing the methodology I used such that it could be replicated. Because I used an established protocol (Guitart et al., 2012), I even demonstrated the replicability of the methodology. When there is analytical ambiguity in categorising the data presented in Chapter 5, I explain my choices and rationalise them. As such, it would be possible for other researchers to replicate the study with a high degree of precision.

4.6.2 Quality in the case study

A subject of heated debate in action research and case study research is how to demonstrate and assess research quality (see Bradbury & Reason, 2001; Feldman, 2003; Kyburz-Graber, 2004; Feldman, 2007). Part of this is due to the connotations that certain terms, such as validity and reliability, have (Heikkinen et al., 2007). Some action researchers (Feldman, 2007) and case study researchers (Yin, 2014) still make use of these more

'traditional' terms. Others use different terms, like authenticity (Coghlan & Brannick, 2005), credibility (Tracy, 2010), and workability (Heikkinen, 2007).

Ultimately, at the core of this debate is the question: how can we know if this research is of a good quality and can be trusted? Instead of being caught up in the language, I have identified what I believe are appropriate quality measures for the case study, and I will explain how I demonstrate them. The quality measures I consider to be important for the case study are:

- The appropriateness of the methods to the concepts being studied (sometimes called construct validity) (Yin, 2014);
- 'Workability,' or how useful the knowledge is in practice (Heikkinen, 2007);
- Transparency, or the clarity and depth in explaining the methods and procedures used to arrive at the study's conclusions (Hiles, 2008); and
- Appropriateness in defining the domain of generalisability (Yin, 2014).

To demonstrate the appropriateness of the methods to the concepts being studied, I have taken two main steps. First, I have provided sufficient definition and theoretical engagement with the concepts I use in this study (see Chapters 2 and 3) to ensure that there is clarity in what I am examining. For example, I have defined what I mean by transience, participation and their differences. I have also given a detailed description the resilience principles in Chapter 3 that will form a core part of my analysis. Second, I have explained why the methodology and methods I have chosen to use are appropriate to my research question and these constructs. For example, my research question focuses on understanding and *addressing* a problem, which is why action research is an appropriate methodology. Furthermore, other studies similar to this one have used similar methodological approaches. For example, Saldivar-Tanaka and Krasny (2004) used an action research approach to study community development in community gardens, Cook and Quigley (2013) used photovoice

with higher education students in an environmental education context, and Yap (2018) used a research diary for his doctoral work studying urban community gardens.

The 'workability' of the knowledge generated in this study is demonstrated by the actions taken. Importantly, 'workability' is not only about what works, but it is also about what does not. The workability of the findings was also assured through embedding aspects of all four of Reason and Heron's (2001) ways of knowing in my study. Practically and experientially, I engaged in gardening in the gardens studied, and took part in organising for the garden at Keele. One of the interviews took place while gardening, and several others took place before, during, and after gardening sessions. These provided opportunities to reflect and refer to garden specific features and phenomena. For example, participants being interviewed while gardening or physically in the garden space meant they more easily related abstract ideas like students' transience to the practical and experienced realities in the gardens. For example, in one garden-based interview, an interviewee had recently laid landscape fabric (a fabric placed around plants to prevent weeds) and this became a focal point of the discussion about how to manage the impacts of transience:

> *I suppose my strategy, as you can see from this fruit patch, is to make it very low maintenance, growing fun stuff that can be eaten, and then hopefully people come down once and think 'that wasn't hard and it was fun.' That, in a nutshell is what I'm trying to do.*

I attempted to embed propositional inquiry into my study through the photovoice component of the study and the use of my reflective diary. I also used posters with questions for participants to respond to with brightly-coloured pens and sticky-notes in workshops to encourage embodied and creative thinking that a sit-down discussion might not inspire.

One of the main ways of being transparent is being clear and complete in what has been done (Hiles, 2008). Striving for clarity and completeness is also one of the ways to

demonstrate replicability of a study, though I do not use replicability as a quality criterion for the case study. Yin (2014) does suggest that replicability should be used as quality criterion in case study research, and while this may be appropriate for some case study research, it is not appropriate in my study given that the ambition of action research is to make lasting change (McNiff & Whitehead, 2011). As such, action research is deliberately non-replicable as it is focused on creating change in a naturalistic context. So, while the strategies for ensuring transparency and reliability are similar, I have no ambition for this study to fulfil the latter criterion.

I have sought to be transparent and clear through the use of first-person inquiry to enhance my own reflexivity through the research process and documenting the evolution of my own thinking in this chapter. Another way to demonstrate transparency is to provide a 'thick description,' which is "in-depth illustration that explicates culturally situated meanings and abundant concrete detail" (Geertz, 1973; Bochner, 2000; Tracy, 2010, p. 843). The purpose of a thick description is to provide relevant and meaningful background information to the data that contextualises it. This allows the reader to understand the phenomena described in its full complexity and with more nuance. This includes not only focusing on "who is talking, and what they are talking about, but also who is not talking and what is not said" (Tracy, 2010, p. 843). In this chapter, I provide a thick description of each of the garden contexts, and provide as much context, complexity, and nuance in the following chapters as possible with restricted space and without breaching promises of anonymity.

Generalisability is one of the more highly debated quality criteria for action research and case study research (Heikkinen, 2007). Traditionally, generalisability has to do with statistical generalisation, or the probability that the findings of the study are applicable to the wider population (Yin, 2014). In much of action research and case study research, this type of generalisability is not appropriate (McNiff & Whitehead, 2011; Yin, 2014). However, many

researchers assert that there is scope for a certain amount of generalisability from action research and case study research (Dick, 2002; Yin, 2014). This is through transferability and naturalistic generalisation, which are when learnings have relevance in other contexts or situations (Tracy, 2010). Transferability is the applicability of findings from one study to another situation. For example, in this study, findings about student-led food gardens may be applicable to other student-led initiatives or a variety of other organisations with transient participants. Naturalistic generalisation happens when the provision of a 'thick description' allows the reader to "make choices based on their own intuitive understanding of the scene, rather than feeling as though the research report is instructing them what to do" (Tracy, 2010, p. 845). While I believe that language cannot be used in a neutral way, and therefore any kind of 'thick description' will always 'lead' the reader to some conclusions, providing a 'thick description' makes it more possible for the reader to come to their own conclusions and genuinely assess how generalisable the findings are.

There are also other quality criteria that are appropriate to this study, however have less to do with the methodological quality and more to do with the overall quality of the study, including the study of a worthy topic, the significance of the research contribution, and the meaningful coherence between the study's purpose, methods, and literature (Tracy, 2010). While these are important considerations, I will not discuss them further here, because they have been and will continue to be demonstrated throughout this thesis.

Earlier case studies of sustainability in higher education have struggled to balance the need for context specificity with rich, thick descriptions (Cresswell, 2014), and the extent to which the findings can be widely generalisable (Corcoran et al., 2004). Because of this, Corcoran proposed some guidelines for enhancing rigour in case studies of sustainability in higher education. I explain how this study meets these quality criteria in Table 11.

Table 11. How this study meets Corcoran et al.'s (2004) criteria for case studies of sustainability in higher education. Table adapted from Bessant (2017).

Quality criteria for case studies of sustainability in higher education		How this study meets these criteria
Clarity in the purpose of the case study		I have outlined research questions in Chapter 1 and in this chapter (see Table 6) I explain which questions are addressed through case study methodology.
Inclusion of data collection methods, including:	Explicit mention of the role of the author/s in the conduct of the study	My positionality is discussed in section 4.4. As I am the sole author of this thesis, all data was collected and analysed by myself.
	Establishment of a clear purpose for the case	I outline the aims of Student Eats in section 4.3.2.1 ad my research questions in Chapter 1.
	All the people involved in the phenomenon were included in the case	As this study uses a single, embedded case with three subunits of analysis, this means that not all Student Eats gardens were included. Furthermore, it was nearly impossible to engage all people in the case given the transience of the students involved. This would have meant that I would have needed to attend all gardening sessions. Like Bessant (2017, p. 152), I believe that case studies are not only an "illustrative examination of a bounded and confined system or entity, but a methodological research design approach embedded within theoretical questioning and reflection." As such, this "renders the design of case study research flexible and contingent upon the researcher and research aims in question" (Bessant, 2017, p. 152). The use of case studies with embedded units of analysis is an established practice when multiple layers of the case in question are being studied (Yin, 2003, 2008). This study considers Student Eats as the case, but it also includes three gardens as embedded units. This enables a fuller understanding of the initiative at an English-scale and at the scale of the gardens.
	The case's potential to contribute to an improvement in the field of sustainability in higher education	Given that this is an action research study, this is embedded in the research design. Corcoran et al. (2004) say action research is methodology well-suited to meet this criteria. Actions were already taken in the gardens during the study to address the impacts of transience in student-led food gardens. This study also includes a chapter (Chapter 8) that focuses specifically on solutions to the challenges outlined in Part 2.

4.7 Ethical considerations

The Belmont Report was a landmark publication establishing core principles of ethical research 'with human subjects' (The National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978). These core principles are:

- Respect for persons: "individuals should be treated as autonomous agents" and "persons with diminished autonomy are entitled to protection" (The National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978, p. 4).

- Beneficence: “do not harm” and “maximise possible benefits and minimise possible harm” (The National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978, p. 6).
- Justice: “research should not unduly involve persons from groups unlikely to be among the beneficiaries of subsequent applications” (The National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978, p. 10).

These principles underpin ethical review processes in the UK and many other countries, and are embedded in, for example, the UK’s Economic and Social Research Council’s Framework for Research Ethics and the UK Research Integrity Office’s guidance for ethical research (ESRC, 2015; UKRIO, 2019). The main way these translate into practice is through attention to fairness in inclusion or exclusion when selecting ‘subjects,’ obtaining informed consent, and assessing the risks and benefits of the study, ensuring the benefits outweigh the risks (Brydon-Miller, 2009).

Overall, the study is relatively low-risk given that I was not intentionally seeking out vulnerable people to study or asking invasive personal questions. Taking part in the study did not pose any major risks to participants, other than taking their time away from their gardening or work tasks. However, the immediate potential benefits for participants of taking part were that actions implemented through the research could help mitigate or manage the impacts of students’ transience. The long-term potential were that the findings from the study could help stakeholders of student-led initiatives mitigate or manage the impacts of students’ transience in their initiatives.

Informed consent was obtained from all of the study’s participants. For planned interviews, the participants were sent an invitation letter, information sheet, and consent form to review in advance of meeting with me. Upon meeting, I provided two paper copies of

the information sheet and consent form, which I gave the interviewee time to read. In some cases, I reviewed the consent form with them verbally. The interviewees were invited to ask questions if they had any. At this point they were invited to choose whether or not they would like to take part in the study. All participants who made it to this point consented to taking part.

For the early workshops, I posted the invitation letter, information sheet, and consent form on the relevant garden's Facebook group, where I invited participants to come take part in the workshop. For others, I created a Facebook event for the workshop, where I posted the invitation letter, information sheet, and consent form. In nearly all cases, these were not reviewed by participants before the workshop, so the first stage of the workshop would involve going through the information sheet and consent form together and inviting questions, as I did with interviewees.

The information sheet first outlined the aims of the study, explained why they (the potential participant) was invited to take part, and that they were free to decide whether they wished to take part or not. They were also informed that were free to withdraw from this study without giving reasons. The information sheet also outlined all the possible research activities the participants could take part in, when and the number of times they would take place, and what they would involve. For each of these activities, I also outlined how the information would be used in the study. For example, information from data collection activities at the beginning of the study was used to shape the overall research direction, whereas, the fishbowl at the conference was used to assess the findings' generalisability more broadly. In the information sheet, potential participants were also told about the possible benefits of taking part. This section of the information sheet was revised and approved by the research ethics committee several times as the research focus shifted. The only risk that was relevant and that they were informed about was that taking part would

require a time commitment. The information sheet also said that it would only be myself and my supervisors who would have access to the information provided by participants. It also said that their personal information (name, identifying characteristics) would be anonymised, though it would possible that they could be identified in publications by people who knew them because of their role. They were also provided with information about how the research was funded and who to get in touch with in the event of the problem.

I have also taken measures to ensure participants' anonymity. Digital copies of transcripts were stored on a password protected computer. Paper copies of transcripts and consent forms were stored in a locked office. As stated in the information sheets for participants, quotes from interviews, workshops, and the photovoice focus group that were included in this thesis were sent to participants for approval. Consent was obtained to use quotes without additional approval from participants in the fishbowl discussion at the Student Eats conference because it would have been too difficult to identify the source of the quotes.

In addition to some of these more traditional concerns in research ethics, action researchers have also outlined some other ethical issues that are of particular concern to action researchers. In particular, reciprocity is considered to be especially important (Maiter et al., 2008). Brydon-Miller (2009) and Hilsen (2006) have begun exploring a new way of thinking about ethics in action research. They propose a shift from contractual ethics, in which informed consent is an "explicit agreement [that] is in most cases documented through the use of a written consent form" (Fischman, 2000, p. 35), to covenantal ethics, which is "the unconditional responsibility and the ethical demand to act in the best interest of our fellow human beings" (Hilsen, 2006, p. 27). Contractual ethics emphasises ethics as a "legalistic exchange," whereas covenantal ethics has a focus on ethics as a process of negotiation with a "focus on relationships, respect, and responsibility" (Brydon-Miller, 2009, p. 2, 7). This is an appropriate approach to ethics in action research because research plans usually involve

some ambiguity about what the later stages of the research will look like because of its participatory and flexible nature (Boser, 2006). As such, it is difficult or impossible for participants to truly give prior informed consent.

Therefore, in this thesis my approach to ethics was constructed to both fulfil both the institutional requirements for a contractual ethical agreement, while adopting a covenantal approach to ethics in my interactions with participants. I amended my ethics application twice following its first approval as the focus and methodology of the study shifted in response to participant input. One of the instances that prompted one of the amendments was when a participant did not agree to the wording in the information sheet. In the information sheet I had written that I would observe '*inconsistencies between what you say and what you do*' which the participant thought sounded accusatory. While this had not been my intention, I did agree that the phrasing did not express the empathy I had for the research participants. I therefore changed the phasing to '*I will also look to see if there are any differences between plans you make and how they are carried out to find out what aspects of it you may find challenging and what obstacles may affect your ability to follow through with them.*' This phrasing, while imperfect, was intended to be more sympathetic and solutions-orientated rather than critical. The participant was more comfortable with this latter phrasing. This revision was formally made in my ethics application and approved by the research ethics committee.

I told all participants that I would provide them with the quotes I intended to use in publications prior to using them. All participants consented to all quotes provided, with the exception of one, who was a key informant. As such, there are several passages of text in this thesis which could benefit from illustrative quotes, but for ethical reasons some quotes were not used. I also asked the key informant for feedback on a passage of text about a particular incident that I planned to include in my methodological reflections. The informant disagreed

with my interpretation of the incident and asked for the passage not to be used. I sought out further clarification from the participant in order to better construct my understanding of the incident to amend the passage to better reflect the events as the informant saw them, however they did not respond to my request. At the time of publication, I still do not have a full understanding of the perspective of the key informant, however I felt that removing the section entirely would omit an important and necessary methodological reflection. As such, I have amended the passage of text, taking into account the limited perspective they did provide and removing their direct quotes. In this way, I have attempted to both adhere to the formal ethics requirements of my study, my personal ethical principles, and my commitment to scholarly rigour through transparency.

Gender-neutral pronouns (they/them/their) are used when describing research participants. This is not a reflection of how participants self-define. Rather, they are intended to provide a higher degree of anonymity given that some interviewees had specialised roles, meaning that specifying their gender would make it possible for them to be identified.

4.8 Conclusion

In this chapter I have sought to explain my approach to studying university student-led food gardens using an action research approach, in which I have drawn on both pragmatic and critical traditions. This thesis is based on a multi-phased project, beginning by constructing the understanding of the impacts of transience in student-led food gardens. To do this, I conducted a quantitative systematic literature review of sustainable university community gardens and began a case study of the United Kingdom's National Union of Students' Student Eats food growing scheme. Three gardens at different universities were used as embedded units of analysis to enable a more in-depth study of the phenomena at play, while drawing on the knowledge and expertise of staff members of the sustainability

team at the National Union of Students. I employed interviews, participatory workshops, photovoice, a fishbowl dialogue, and a research diary. Constructing the understanding of the impacts of transience took over two years of inquiry, which led to and overlapped with the next stages of the research, planning and taking action to address the impacts of transience in student-led food gardens. Two of the gardens took part in this phase and undertook a portfolio of actions (which will be described in Chapter 8). These were then evaluated, again, employing participatory workshops, interviews, photovoice, and a research diary. A fishbowl discussion held at the Student Eats Conference in 2017 complemented the more in-depth inquiry at the three gardens used as embedded units of analysis. At the end of the chapter, I outlined the quality criteria against which this study should be held, and how I have adopted both contractual and covenantal approaches to ethics in my study in order to both fulfill institutional requirements and stay true to my own ethical principles. This chapter concludes the first part of this thesis, providing the background to the remaining parts. I will now go on to explore the 'problem' as it has been constructed, beginning with presenting the findings of my quantitative systematic literature review.

Part 2: The problem

Systematically reviewing sustainable university community gardens

Chapter 5

This mutual skill sharing and the informal learning environment it creates allowed participants who had previously had negative educational experiences to enjoy learning with the Garden Project: 'This is like a real learning experience, it's not like anyone's twisting my arm to go there.'

Erika Mundel & Gwen Chapman, 2010, p. 169

We posit this learning as holistic, taking into account the five human senses, the mind, the body, and heart: gardeners touch, feel taste, smell, listen, see, and learn bodily and emotionally.

Hongxia Shan & Pierre Walter, 2015, p. 23

In order to maintain the garden and conduct community outreach activities, a substantial number of volunteers were needed, and recruiting these volunteers was the most significant challenge faced… Since the garden needs care, regardless of how minimal it is, there needs to continually be a caretaker available to perform those tasks.

Kristian McKinne & Angela Halfacre, 2007, p. 150, 152

Potting herb cuttings
Winter 2013

5.1 Introduction

This chapter will offer an overarching assessment of the benefits provided by sustainable university community gardens and compare these benefits with those reported in Guitart et al.'s (2012) review of urban community gardens. I then will go on to explore what is known about students' transience impacts on sustainable university community gardens. Before doing this, I will first present the authors' affiliation(s), journal's discipline area, year of publication, location of the garden(s) studied, research methods used, and garden characteristics reported in the articles about sustainable university community gardens in order to contextualise the findings. These article and garden characteristics will also be compared to those of urban community gardens as reported by Guitart et al. (2012).

Before beginning, I would also like to remind the reader that sustainable university community gardens were reviewed because the pool of articles about student-led food gardens was too small to provide a meaningful review. As such, I cast the net somewhat wider to capture not only student-led food gardens, but also their associated counterparts. There are two main differences between sustainable university community gardens and student-led food gardens. Sustainable university community gardens can be led by students, but do not need to be, unlike student-led food gardens. Also, crucially, sustainable university community gardens can grow food, but they do not need to by definition. On the other hand, student-led food gardens grow food, by definition. I will begin by presenting and comparing the characteristics of the articles about sustainable university community gardens and urban community gardens and the gardens researched.

5.2 Sustainable university community gardens as compared to urban community gardens

5.2.1 Characteristics of articles and gardens researched

I reviewed twenty-two articles covering twenty-three gardens (one article mentioned two gardens) (see Tables 12 and 13). The majority (77%) of the articles about sustainable university community gardens were written by authors affiliated with institutions in the United States, much like those about urban community gardens (61%). The articles about sustainable university community gardens were published in journals about horticulture (36%), education (36%), health (14%), non-profit/social marketing (9%), and sustainability (5%). The 36% of the articles in journals about horticulture were published in a single journal, several of which were published in a special issue. The disciplines of journals publishing articles about urban community gardens, on the other hand, were "geography (28%), environment and planning (24%), society and culture (23%), health (12%), education (9%), economics (3%) and conservation biology (1%)" (Guitart et al., 2012, p. 366). All articles about sustainable university community gardens were written since 1999, with most written between 2005 and 2012, while articles about urban community gardens reviewed by Guitart et al. (2012) were published between 1985 and 2011, with most being published since 2000. Only eight (36%) of the articles about sustainable university community gardens reported methods they used, seven of which used qualitative methodologies/methods, including case studies, participatory action research, narrative evaluation, autoethnography, interviews, participant observation, and document reviews. The only other study that described its methods was a mixed-methods experimental study using questionnaires. Most articles about urban community gardens used a qualitative or mixed methods approach (using interviews, surveys, text analysis, focus groups, case studies and participant observation), and the

remaining five studies used quantitative approaches (Guitart et al., 2012). In their review on American community gardens, Draper and Freedman (2010, p. 458) found 40% of the articles they reviewed used quantitative methods, however they challenged the rigour of many of these articles for failing to include a "control group or taking pre- and post-test measures." The need for more rigorous quantitative studies about community gardens has also been highlighted in Robinson-O'Brien et al.'s (2009) literature review of garden-based youth nutrition intervention programmes.

Most (78%) sustainable university community gardens were located in the United States and nearly half were described as food gardens (48%). Others were described as farms (13%), community supported agriculture (an agricultural model in which consumers share the economic risks with the producers by paying for their share of produce at the beginning of the season; sometimes consumers volunteer with the garden/farming tasks) (13%), botanical gardens (13%), a wildlife habitat garden, native plant garden, and allotment. This mirrors the

Table 12. Key characteristics of articles about sustainable university community gardens.

Key characteristics of articles		Sustainable university community gardens (Articles, n=22; Authors, n=52)	Urban community gardens (Articles, n=87; Authors, n=195)
Author affiliation	United States	77%	61%
	Canada	10%	9%
	Australia	8%	13%
	UK	4%	9%
	South Africa	2%	2%
	Other	0%	6%
Journal discipline	Horticulture	36%	0%
	Education	36%	9%
	Health	14%	12%
	Non-profit/social marketing	9%	0%
	Sustainability	5%	0%
	Geography	0%	28%
	Environment and planning	0%	24%
	Society and culture	0%	23%
	Economics	0%	3%
	Conservation biology	0%	1%
Methods used	Qualitative	32%	58%
	Quantitative	0%	6%
	Mixed methods	4%	36%
	Not mentioned	64%	0%

Table 13. Key characteristics of the gardens written about in the literature about sustainable university community gardens.

Key characteristics of gardens		Sustainable university community gardens (Gardens, n=23)	Urban community gardens (Gardens, n=89)
Garden Location	United States	78%	57%
	Canada	13%	6%
	Australia	4%	13%
	South Africa	4%	2%
	UK	0%	9%
	Other	0%	13%
Garden type	Food garden	48%	100%
	Farm	13%	No data
	Community supported agriculture	13%	No data
	Botanical garden	13%	No data
	Wildlife habitat garden	4%	No data
	Native plant garden	4%	No data
	Allotment	4%	No data
Participants	Students	87%	No data
	Faculty/academic staff	57%	No data
	Paid interns/garden managers	35%	No data
	Community members	26%	No data
	Organisations	22%	No data
	Other	57%	No data
Plants grown	Edible plants	74%	No data
	Ornamental plants	22%	No data
	Native/endangered species	17%	No data
	Wildlife-habitat-enhancing plants	9%	No data
	Medicinal plants	9%	No data
	Didn't say	9%	No data

literature reviewed by Guitart et al. (2012) which included some larger-scale projects (Wade, 1987; Karaan & Mohamed, 1998), projects involving restoration ecology/native ecosystem regeneration (Stocker & Barnett, 1998), and those run for commercial purposes (Flynn, 2001).

In the literature about sustainable university community gardens, students were the most commonly reported participants (reported by 87% of gardens), followed by faculty (academic staff) (57%), paid interns/garden managers (35%), community members (26%) and organisations (22%). Most (74%) sustainable university community gardens grew edible plants, but ornamental plants (22%), native/endangered species (17%), wildlife-habitat-enhancing plants (9%), and medicinal plants (9%) were also grown. Over a third (39%) of the sustainable university community gardens were reported to sell produce, which was most

often sold to the campus community or to campus food outlets. Nearly two-thirds (65%) of the sustainable university community gardens were used in the formal curriculum through a wide variety of disciplines, with the most common ones being agriculture/horticulture, applied studies/projects, education, and environmental subjects/geography (Figure 20). Types of participants, plants grown, and the number of gardens selling produce and embedded in educational curricula in the literature about urban community gardens were not reported by Guitart et al. (2012).

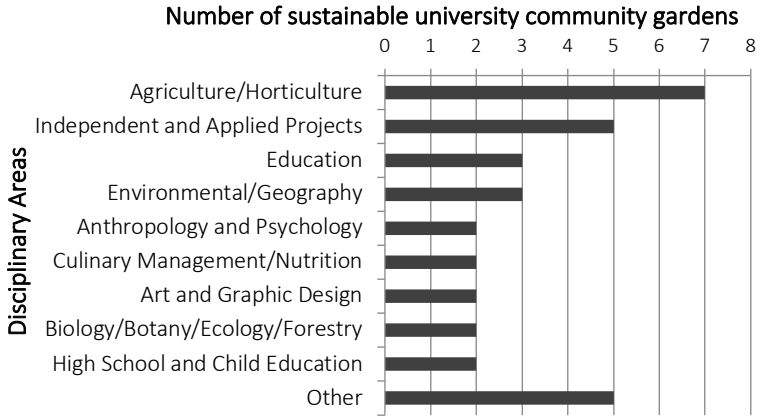


Figure 20. Number of sustainable university community gardens in the reviewed articles embedded in formal curricula of different disciplinary areas.

5.2.2 Benefits of sustainable university community gardens and urban community gardens

In order to understand whether sustainable university community gardens might contribute to a more sustainable future, I compiled the reported benefits of these gardens. I then compared these benefits to those of the urban community gardens reviewed by Guitart et al. (2012) to assess how sustainable university community gardens perform compared to community gardens more widely. All the benefits of urban community gardens identified by Guitart et al. (2012) were discussed and/or demonstrated in the literature about sustainable university community gardens (Figure 21a and 21b). The most frequently mentioned benefits of sustainable university community gardens were educational and social benefits, benefits to the university, and additional benefits to individual participants. In the articles reviewed by

Guitart et al. (2012), social benefits were most frequently mentioned. However, the other most frequently mentioned benefits of urban community gardens differed. These highly-reported benefits were access to fresh foods, health benefits, and economic benefits. The rest of this section expands on the benefits of sustainable university community gardens[15].

Social benefits were demonstrated in fourteen (68%) of the articles about sustainable university community gardens. The proportion of these articles with demonstrated social benefits was nearly consistent with the number of articles it was discussed in (73%). This stands in contrast with 60% of the articles about urban community gardens discussing social benefits, but only 38% demonstrating them. Social benefits of community gardens and urban food growing have also been widely reported in other reviews (Draper & Freedman, 2010; Zasada, 2011; Orsini et al., 2013; Mok et al., 2014; Taylor & Taylor Lovell, 2014). The interactions between different groups of people were one of the main social benefits reported to emerge from sustainable university community gardens. Social interactions reportedly took place between students of different disciplines, faculty and students, growers and consumers, and across cultures. Likely resulting from these interactions, sharing of ideas and experiences, the development of trust and caring among gardeners, and the establishment of a supportive 'community' around specific issues (for example, sustainable food or health promotion) were reported. Some of the social benefits extended beyond the garden. For example, Mundel and Chapman (2010) reported a sense of civic engagement being fostered in participants. Others reported that participants supported each other in cases of illness and death in the family (Wills et al., 2009) (Table 14).

Access to fresh food was discussed in ten (46%) and demonstrated in six (27%) articles

[15] Benefits to health, life satisfaction, environmental equity, biodiversity, and associated with reduced crime/increased safety are not discussed further because their coverage is very similar in articles about both sustainable university community gardens and urban community gardens, and apart from health benefits they were only reported by discussed and/or demonstrated by one or two articles each.

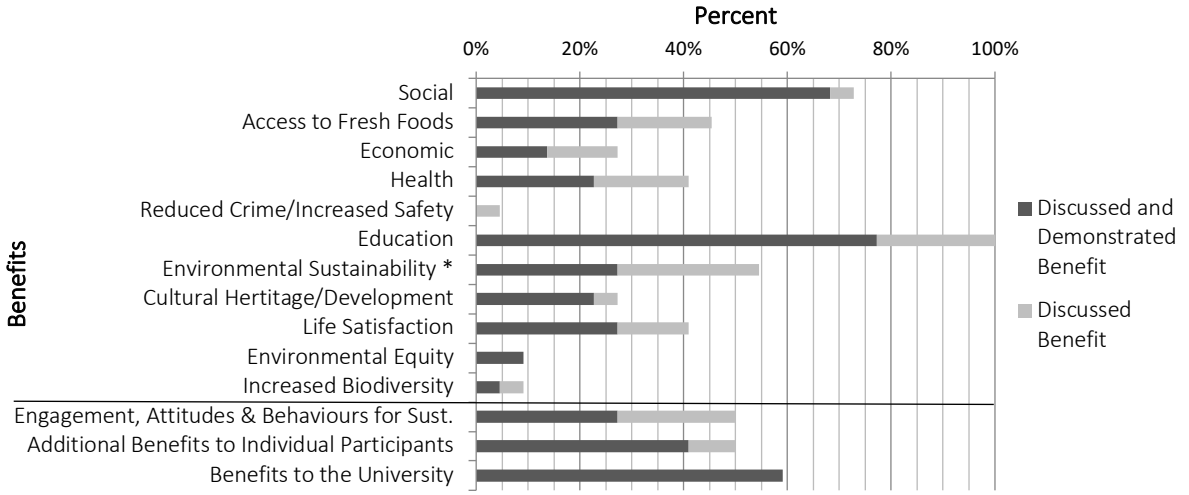


Figure 21a. The percentage of discussed and demonstrated benefits in articles about sustainable university community gardens (n=22). The benefits below the line were three new categories of benefits that were developed for this review as they did not fit under any of the themes identified by Guitart et al. (2012).
*Environmental sustainability benefits exclude benefits that may have been caused by dietary changes (e.g., the displacement of unsustainable food products in participants' or other benefactors' diets by food from the garden). This was discussed in several of the articles; however, I felt that while it could be considered both an environmental sustainability benefit and a benefit in terms of providing access to fresh foods, the category that best captured this outcome was 'access to fresh foods'.

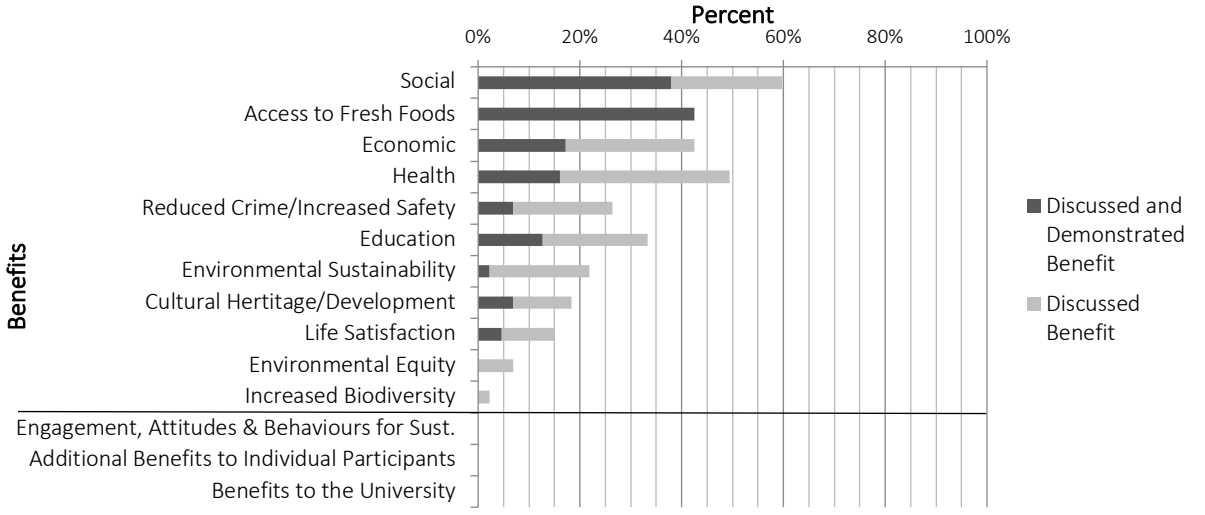


Figure 21b. The percentage of discussed and demonstrated benefits in articles about urban community gardens as assessed by Guitart et al. (2012) (n=87). The benefits below the line were three new categories of benefits that were developed for this review as they did not fit under any of the themes identified by Guitart et al. (2012).

Table 14. The types of social benefits discussed and/or demonstrated in the literature about sustainable university community gardens and the articles reporting them.

Social benefits	Articles citing the benefits
Increased interdisciplinary and faculty-student interaction	Hoffman et al. (2007); Roubanis & Landis (2007); Barton et al. (2010); Kobayashi et al. (2010); Apul & Philpott (2011)
Establishing a supportive 'community' around a specific issue (e.g., sustainable food, health promotion)	Kobayashi et al. (2010); Mundel & Chapman (2010)
Connecting food consumers with growers	Lewis & Affolter (1999); Kobayashi et al. (2010)
Sharing ideas and experiences	Wagner & Fones (1999)
Cross-cultural communication	Hoffman et al. (2007); Shan & Walter (2015); Datta (2016)
Fostering a sense of civic engagement	Mundel & Chapman (2010); Johnston et al. (2012); Datta (2016)
Social interaction in the garden spurred action beyond the garden	Hoffman et al. (2007); Wills et al. (2009); Mundel & Chapman (2010); Datta (2016)
Building trust and caring	Datta (2016)

about sustainable university community gardens. Several articles mentioned that the gardens collaborated with university food services to serve the garden's produce (Ross, 2005; Biernbaum et al., 2006; Wharton & Harmon, 2009; Kobayashi et al., 2010). One article mentioned that their community supported agriculture scheme contributed to "emergency food system efforts in communities and to government-sponsored nutrition assistance programs" (Wharton & Harmon, 2009, p. 114). In Mundel and Chapman's (2010, p. 172) article about a garden in Vancouver, Canada, the emphasis was less on access to *fresh* food, and more on growing and gathering *traditional* food in an effort to "[promote] health through decolonizing Indigenous diets" by "[returning] to more traditional diets and food practices." While these findings indicate that access to fresh food is a notable benefit of sustainable university community gardens, the extent to which urban agriculture and indeed, community gardens, can contribute to self-sufficiency in cities is currently hotly debated and needs to be better understood (Mok et al., 2014). Guitart et al. (2012) did not look for access to fresh food as a discussed benefit in their review, but it was demonstrated as a benefit in 43% of the articles about urban community gardens. The discrepancy between the number of sustainable university community gardens and urban community gardens demonstrating

access to fresh food may be because a number of the articles about sustainable university community gardens implied (but did not explicitly state) that access to fresh foods was a benefit, and I chose not to count these articles as demonstrating access to fresh foods. On the other hand, Guitart et al. (2012, p. 386) wrote that they "assumed that [access to fresh foods] was a demonstrated benefit," indicating that articles that were not explicit about this benefit may have still been counted, accounting for this discrepancy in the access to fresh food demonstrated between the reviews.

Economic benefits were discussed in a greater proportion of articles about urban community gardens (42%) than in those about sustainable university community gardens (27%). However economic benefits were demonstrated in a similar proportion of articles in both bodies of literature (17% in urban community gardens and 14% in sustainable university community gardens). Kobayashi et al. (2010) said that garden they studied sought to be economically sustainable, and Wharton and Harmon (2009) reported that their community supported agriculture scheme distributed economic risk between the farmers and consumers. These economic benefits differed from the ones mentioned in Guitart et al.'s (2012) article, where the economic benefits mentioned were more participant-centred, such as individuals saving or making money. Such participant-centred economic benefits were not mentioned in the articles about sustainable university community gardens.

Educational benefits were found to be a key outcome of sustainable university community gardens (Table 15). They were discussed in all articles, while seventeen articles (77%) demonstrated them. This is in contrast to only 34% of articles about urban community gardens that discussed educational benefits and 13% that demonstrated them (Guitart et al., 2012). Similarly, in their literature review of community gardens in the United States, Draper and Freedman (2010), found that nearly a third of the articles were about youth gardening programmes, many of which reported educational benefits as an outcome. Walter's (2013)

assertion that the pedagogical potential of community gardens for adult learning is substantial and under-researched is supported by the discrepancy between discussed and demonstrated educational benefits in the literature about urban community gardens, and Draper and Freedman's (2010) findings that community gardens facilitate *youth* education.

Table 15. The types of educational benefits discussed and/or demonstrated in the literature about sustainable university community gardens and the articles reporting them.

Educational benefits	Articles citing the benefits
Development of skills	Markhart (2006); Wills et al. (2009); Barton et al. (2010); Mundel & Chapman (2010); Somerset et al. (2010); Apul & Philpott (2011); Datta (2016)
Inter-/multi-disciplinary education	Apul & Philpott (2011); Johnston et al. (2012)
Science, sustainability and environmental education	Apul & Philpott (2011); Johnston et al. (2012); Datta (2016)
Improved outcomes of academic work	Hoffman et al. (2007)
Changing participants' attitudes towards 'education'	Mundel & Chapman (2010)
Increasing participants' agency in their own education through using more informal methods	Markhart (2006); Wharton & Harmon (2009); Johnston et al. (2012); Datta (2016)
Enabling participants to take a more active role in their education	Kobayashi et al (2010); Apul & Philpott (2011); Datta (2016)
'Learning how to learn'	Biernbaum et al. (2006); Apul & Philpott (2011)
Enabling learning that fosters "knowing, connecting, and hybrid knowledge production across cultures"	Shan & Walter (2015)
Providing insight into "challenges facing colonized people"	Mundel & Chapman (2010)
Linking formal and informal learning	Datta (2016)

The reviewed articles suggested that community gardens could facilitate the development of skills/knowledge outcomes, including learning about science, sustainability and/or the environment. They also described different strategies used to enable learning, including multi- or interdisciplinary approaches, and linking formal and informal learning. The informal learning in the garden (through, for example, learning from experience or using the garden as an outdoor classroom) also changed participants' attitudes towards 'education' by allowing "participants who had previously had negative educational experiences to enjoy learning" (Mundel & Chapman, 2010, p. 169) and increasing individuals' agency in their own education. Apul and Philpott (2011, p. 74) also found that students were 'learning how to learn' in the garden they studied by "[identifying] the knowledge base and technical skills they

needed to solve" the problems they faced, and then finding strategies to "develop their competencies."

Several articles about sustainable university community gardens also mentioned cultural aspects of education. For example, Shan and Walter (2015, p. 19) said that one of the gardens they studied fostered "knowing, connecting, and hybrid knowledge production across cultures." In their case, these activities took place between 'westerners' and Chinese immigrants. Mundel and Chapman (2010, p. 172) also mentioned how non-aboriginal students participating an aboriginal health promotion garden provided the students with insight into "challenges facing colonised people." The importance of such cultural exchanges and learning will vary between gardens, but these articles highlight the potential of community gardens for facilitating cultural understanding. However, it should also be noted that gardens are not *de facto* intercultural educational spaces – cultural and racial tensions from other aspects of society can be replicated and reproduced in the garden environment (Mundel & Chapman, 2010).

Environmental sustainability benefits were discussed in twelve (55%) articles about sustainable university community gardens. This is more than the 22% of articles reported to have discussed environmental sustainability in Guitart et al.'s (2012) study of urban community gardens. The proportion of articles demonstrating environmental sustainability in each of these bodies of literature is also consistent with above disparity: 27% of articles about sustainable university community gardens and 2% of articles about urban community gardens demonstrated environmental sustainability (Stocker & Barnett 1998; Holland, 2004). This was an expected result given that the inclusion criteria for this review included sustainability (Table 6 and 7). The most commonly mentioned contribution to environmental sustainability in sustainable university community gardens was the use of organic farming/gardening methods, but other gardens were improving environmental conditions in other ways, such as

through ecological restoration (Hockenberry Meyer et al., 2010), bioremediation (Hockenberry Meyer et al., 2010), and growing endangered plant species (Lewis & Affolter, 1999).

One of the challenges I faced while analysing the articles was determining what actually constitutes a benefit to environmental sustainability in community gardens. I decided that environmental sustainability benefits excluded those caused by reported dietary changes (i.e., displacement of unsustainable food products in participants' or other benefactors' diets by food being produced more sustainably in the garden) because the links between dietary changes and environmental sustainability are too complex to know whether or not they actually have contributed to environmental sustainability without doing a lifecycle analysis. Although there is potential for community gardens to produce environmental sustainability benefits, the literature is limited, particularly in terms of demonstrating these benefits.

The reason why these benefits are not well-demonstrated in the literature may be because environmental impacts and benefits are often linked and have trade-offs, making them challenging to assess. However, they are particularly important to explore because community gardens can also have negative environmental impacts. For example, it has been found that community gardens have "lower levels of arthropod diversity and biocontrol activity by arthropods than undisturbed vacant lots" (Lovell & Taylor Lovell, 2013, p. 291, citing Gardiner et al., 2013 and Yadav et al., 2012), and that an excess of nutrients can also accumulate in garden soils and pollute water sources (Witzling et al., 2011).

Because of the disparity between the claims over and evidence of community gardens' contribution to environmental sustainability, further research is needed to better understand the extent to which they may actually be providing these benefits. This echoes calls from Mok et al. (2014, p. 21) who, when reviewing literature on urban agriculture more broadly, found that a better understanding of the "risks posed by pollutants from agriculture

to urban ecosystems and from urban ecosystems to agriculture" and "the carbon footprint of urban agriculture and use of 'food miles'" is needed. Guitart et al. (2012) suggest that two main questions need to be addressed in order to establish whether food growing projects can be considered 'sustainable'. These are (1) 'What do gardens grow?' to explore agro-biodiversity, and (2) 'How is the food grown?' to explore "the sustainability of gardening practices" (Guitart et al., 2012, p. 369). Recently there have been some attempts to contribute to answering these questions. For example, Guitart et al. (2014, 2015) have assessed the agrobiodiversity in community gardens by exploring the types of food planted using a colour-classification system, and have investigated gardening practices used in community gardens and their ecological integrity. Silva and Krasny (2016) have also suggested that open-access online tools for measuring impacts and outcomes of community gardens should be used (such as Farming Concrete's Data Collection Toolkit (Design Trust for Public Space, n.d.)). They also suggest practitioner-researcher partnerships for more in-depth investigations into the environmental sustainability benefits of gardens (Silva & Krasny, 2016).

However, fostering engagement in research about community gardens from scholars from natural and technical science disciplines will be challenging if it is not regarded as being 'research-worthy' or impactful within those disciplines. Though, there might be fertile ground for a wide range of disciplines to engage with sustainable university community gardens through student research projects, if not through more advanced scholarship. A good example of this is Apul and Philpott's (2011) article about project-based learning in a sustainability engineering graduate programme in a sustainable university community garden. In their article they described how students developed an engineering-based solution for watering the garden, and "estimated the life-cycle cost and environmental impacts of their proposed solutions" (Apul & Philpott, 2001, p. 1).

Cultural heritage and development benefits were discussed in six (27%) articles about sustainable university community gardens. They were also demonstrated in five (23%) of the articles. Cultural heritage benefits were discussed in 18% of articles about urban community gardens and demonstrated in 7% of them. Guitart et al. (2012) did not define the term 'cultural heritage,' however, Shan and Walter (2015, p. 2) has said that the term implies "racial and ethnic boundaries [are frozen] in time," whereas, in reality, culture is dynamic and changing. We chose to adapt Guitart et al.'s (2012) category of benefits, calling it cultural heritage and development to account for ongoing changes in culture.

Some of the benefits associated with cultural heritage and development in sustainable university community gardens included using traditional methods and techniques of growing, cooking and eating associated with a particular culture and/or time period (Lewis & Affolter, 1999; Mundel & Chapman, 2010), accessing culturally appropriate food not available in supermarkets (Somerset et al., 2010), and sharing memories and stories of Aboriginal people (Phillips, 2011). For migrants, the gardens offered opportunities to re-establish and develop traditions and identities, such as through developing 'hybrid foods,' like "eating Chinese vegetables using Western salad sauces" (Shan & Walter, 2015, p. 27). Hoffman et al. (2007) and Datta (2016) also reported that the gardens they studied facilitated reductions in ethnic tensions. Guitart et al. (2012, p. 368) found that most of the research about urban community gardens was about gardens in "low income earning areas with different cultural backgrounds in industrial cities in the USA." There was much less written about the class of the participants in the literature about sustainable university community gardens, though seven articles mentioned involving participants of varying cultural backgrounds.

Additional individual benefits to participants was a new category of benefits that came from this study to account for the additional positive outcomes that benefitted an individual and were additional to those included in Guitart et al.'s. (2012) study. These additional

benefits were discussed in eleven (50%) articles about sustainable university community gardens and demonstrated in nine (41%). The benefits cited included professional development and mentoring, decreased food shopping trips, the enjoyment of food growing and contact with nature, academic improvement, and developing a sense of place (Table 16). Although Guitart et al. (2012) did not include these benefits explicitly, they may have characterized some similar benefits as those associated with 'life satisfaction'.

Table 16. The types of additional benefits to individual participants discussed and/or demonstrated in the literature about sustainable university community gardens and the articles reporting them. While a number of benefits identified by Guitart et al. (2012) could fall under the 'additional benefits to individual participants' category (such as education, life satisfaction, etc.), I retained Guitart et al.'s existing categories, with other benefits to individual participants being captured in this category to enable clarity in comparing the findings.

Additional benefits to participants	Articles citing the benefits
Professional development and mentoring	Wagner & Fones (1999), Somerset et al. (2010), Markhart (2006), Mundel & Chapman (2010), Apul & Philpott (2011)
Decreased food shopping trips	Wharton & Harmon (2009)
Enjoyment of contact with nature and food growing	Roubanis & Landis (2007), Wills et al. (2009), Somerset et al. (2010)
Academic improvement	Hoffman et al. (2007)
Immigrants developing a sense of place	Somerset et al. (2010); Shan & Walter (2015); Datta (2016)

Thirteen (59%) of the articles about sustainable university community gardens discussed *benefits to the university*, and the same number of articles also demonstrated these benefits. The main benefit to the university was research output, which was mentioned in eleven (50%) of the articles. Other benefits included increasing student engagement or involvement with the university (Apul and Philpott, 2011), outreach (such as inviting people or groups from the community on the campus to see the food growing initiative) (Falk et al., 2005; Biernbaum et al., 2006; Markhart, 2006; McKinne & Halfacre, 2008; Wharton & Harmon, 2009; Somerset et al., 2010), teaching (McKinne & Halfacre, 2008), and improved appearance of the campus (Hoffman et al., 2007). Though Guitart et al.'s. (2012) research involved several university-based projects/projects aligned with universities, they made up a small proportion of the articles reviewed, and therefore they did not use this category of benefits.

Engagement, attitudes and behaviours for sustainability were discussed in eleven (50%) and demonstrated in six (27%) articles about sustainable university community gardens. Articles mentioned how volunteering in a garden can deepen participants' relationship with food and the environment (Wharton & Harmon, 2009; Wills et al., 2009; Mundel & Chapman, 2010; Phillips 2011), and that gardening can also promote an interest in (Wagner & Fones, 1999), a sense of responsibility for (Johnston et al., 2012), and even a "dedication for fighting for" the natural world (Apul & Philpott, 2011, p.70). These weren't reported by Guitart et al. (2012), possibly because they did not include sustainability explicitly as an inclusion criterion. It is also possible that these benefits may have been written in the articles reviewed by Guitart et al. (2012), but were included within one of the other categories of benefits. This latter suggestion seems likely since two of the sustainable university community garden articles mentioning engagement, attitudes and behaviour towards sustainability (Wills et al., 2009; Mundel & Chapman, 2012) were also reviewed by Guitart et al. (2012).

To summarise, many of the benefits produced by urban community gardens that Guitart et al. (2012) identified align with those identified in this review of sustainable university community gardens. However, there were different emphases on which benefits were important in the two different areas of literature, which educational benefits dominating the literature about sustainable university community gardens. There were also some additional benefits of sustainable university community gardens literature identified: engagement, attitudes, and behaviours for sustainability, additional benefits to individual participants, and benefits to the university. The similarity in the range of benefits identified in both reviews suggests that these might provide a useful framework in reviewing the efficacy of community gardens projects in a range of different settings. This could be supported by the development of tools (such as Farming Concrete's Data Collection Toolkit (Design Trust for

Public Space, n.d.)) to measure and track food production, as well as environmental, social, health, and economic benefits in farms/gardens.

There also seemed to be some gaps in the literature. The vast majority of the research reviewed was about gardens in the United States and used mainly qualitative approaches. This therefore means that literature may not fully represent the breadth of community garden initiatives that exist, and the perspectives different disciplines could provide. As highlighted earlier, the contribution of sustainable university community gardens and urban community gardens to environmental sustainability is not well-understood. Furthermore, the potential of urban community gardens to contribute to informal adult learning about sustainability may be underacknowledged. I will now go on to discuss dominating benefits of sustainable university community gardens in greater detail, and then consider the absence of discussion about the impacts of students' transience.

5.3 The dominating benefits

The multifunctional nature of community gardens is celebrated as they can achieve pro-sustainability aims through a portfolio approach, rather than focusing on maximising a single outcome (Lovell, 2010; van Leeuwen et al., 2011; Taylor & Lovell, 2013). It is important to recognise the multiplicity of the benefits of these initiatives because if they are evaluated on the basis of a single outcome, their benefits may seem insignificant. Furthermore, focusing only on maximising a single benefit may result in a net reduction of benefits, when all outcomes are considered.

That said, education appeared to be the dominating benefit of sustainable university community gardens in a strictly quantitative sense, particularly compared to how much less it was mentioned in the literature on urban community gardens. While only three articles mentioned contributing to science, sustainability and environmental education (Apul &

Philpott, 2011; Johnston et al., 2012; Datta, 2016), many of the reported educational benefits seen in Table 15 could be seen as the development of sustainability competencies (Wiek et al., 2011). The gardens were reported to be home to learning into the "challenges facing colonized people," (Mundel & Chapman, 2010, p. 172), and facilitating "knowing, connecting, and hybrid knowledge production across cultures" (Shan & Walter, 2015, p. 19). This is evidence that participating in sustainable university community gardens can facilitate the development of normative competence, or the "ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets" (Wiek et al., 2011, p. 2019). Participating in the gardens also seemed to facilitate the development of interpersonal competence, "the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving" (Wiek et al., 2011, p. 211). The intercultural learning highlighted above (Mundel & Chapman, 2010; Shan & Walter, 2015), contributes to interpersonal competence development through "pluralistic and trans-cultural thinking" (Wiek et al., 2011, p. 211). Furthermore, engaging in cross-cultural communication (Hoffman et al., 2007; Shan & Walter, 2015; Datta, 2016), building of trust and caring (Datta, 2016), and establishing a supportive 'community' (Kobayashi et al., 2010; Mundel & Chapman, 2010) demonstrate the use of communication skills and empathy, which are key features of interpersonal competence (Wiek et al., 2011).

There is also evidence of the use and development of action competence, "ability, motivation and desire to play an active role in finding democratic solutions to problems and issues connected to sustainable development" (Morgensen & Schnack, 2010, p. 61). Participants of sustainable university community gardens appeared to develop action competence through exercising a greater sense of agency and confidence in taking action. For example, gardeners were inspired to take a more active role in their education (Kobayashi et al., 2010; Apul & Philpott, 2011; Datta, 2016) and developed a sense of civic engagement

(Johnston et al., 2012; Datta 2016). Furthermore, the social interaction in sustainable university community gardens spurred action beyond them as well (Hoffman et al., 2007; Wills et al., 2009; Mundel & Chapman, 2010; Datta 2016).

The fact that the majority of articles in this review were about gardens in the United States has considerable bearing on the generalisability of these findings to different geographic contexts. Service learning, or learning through 'volunteering' undertaken for academic credit (Mooney & Edwards, 2001), is a well-established tradition in the United States. However, in many other places, like England, service learning is not a common practice. The learning outcomes from activities that are undertaken for academic credit would likely differ from activities undertaken voluntarily in one's free time. Furthermore, the use of service learning models may contribute to more consistent and predictable participation, meaning that the impacts of students' transience may not be as pronounced. This reinforces the need for studies of sustainable university community gardens in other geographic contexts, like this study of student-led food gardens in England.

As highlighted earlier, social benefits were the second most frequently reported set of benefits of sustainable university community gardens. In contrast to educational benefits, however, the proportion of articles about sustainable university community gardens reporting them are much more consistent with the proportion of articles about urban community gardens reporting them. The other outcome that was mentioned most frequently was that the sustainable university community gardens provided benefits to the university. This is a valuable benefit, and perhaps ones that universities might benefit from acknowledging further. However, for student-led food gardens (compared to sustainable university community gardens), many of these benefits may be less notable since many benefits to the university are unlikely to be capitalised on given the limited nature of university staff involvement. For example, if university staff are not involved in student-led

food gardens, they are less likely to use the gardens for teaching, research, or outreach activities.

The fact that sustainable university community garden's main contributions might be educational highlights that they can play an increasingly important role in the sustainability education agenda in universities. Given that education is an international priority for moving towards a sustainable society (UNCED, 1992; Wals, 2012), strategies are needed for embedding sustainability in higher education. Sustainable university community gardens, including student-led food gardens, are one way to do this.

5.4 The absence of students' transience

Knowing what the impacts of students' transience are is key to understanding how sustainable university community gardens function, as highlighted in Chapter 2. However, while students' transience is logically a defining factor of sustainable university community gardens, it is an issue that has not been adequately explored. Only one of the articles mentioned the issue at all, and it only mentioned it as one of several challenges faced by the gardens (McKinne & Halfacre, 2008). In particular, they said that summer caretaker presence and community interest may be difficult to establish and maintain when student volunteers do not know appropriate staff, postgraduate students, or community members to approach (McKinne & Halfacre, 2008). However, the factors that contributed to community interest were not explored, and neither were the knock-on effects that a lack of caretaker presence might have. In summary, little is known about how students' transience impacts student-led food gardens, in spite of the fact that the phenomenon may impact how successfully they are able to run and how it impacts their outcomes. This underscores the need to explore how students' transience impacts student-led food gardens and how these impacts might be managed in order to provide the benefits outlined in this chapter.

5.5 Conclusion

Like the literature about urban community gardens, the literature about sustainable university community gardens is still immature and under-explored. Both bodies of literature are similar in terms of the geographical scope of their authorship and gardens they investigated (both United States-centric), demonstrating the value of a study based in England. Like the literature about urban community gardens, the literature about sustainable university community gardens is from a wide range of disciplines and currently qualitative methods are used much more widely than quantitative methods.

Overall, there was a similar portfolio of benefits provided by sustainable university community gardens compared to urban community gardens, indicating that a better understanding of how students' transience impacts them would be valuable, especially given the notable absence of discussion around the impacts of students' transience on sustainable university community gardens. The benefits reported most frequently for both sustainable university community gardens and urban community gardens include social, educational, economic, and health benefits, as well as benefits associated with accessing fresh food. The dominating benefits of sustainable university community gardens were educational and social benefits, and benefits to the university. It was also clear from the reported educational and social benefits that sustainable university food gardens have the potential to contribute to the development of sustainability competencies. With an understanding that sustainable university community gardens can provide a portfolio of benefits including contributing to sustainability education, I will now move to Chapter 6 where I will begin to paint a picture of how transience impacts the dynamics of problematic participation in student-led food gardens.

Understanding the dynamics of problematic participation

Chapter 6

…sustainability is about passing to future generations. As students, we are, in generations, coming and leaving, and coming and leaving.

Student gardener, Keele University

"All it takes," said Crake, "is the elimination of one generation. One generation of anything. Beetles, trees, microbes, scientists, speakers of French, whatever. Break the link between one generation and the next, and it's game over forever."

Margaret Atwood, *Oryx and Crake*, 2003, p. 261-262

Garlic afflicted with garlic rust
June 2015

6.1 Introduction

Given that the main impact of students' transience on student-led food gardens is problematic participation, it is necessary to understand the dynamics of problematic participation before speculating how to intervene. Therefore, the purpose of this chapter is to explain the causes of problematic participation, its effects, and if any feedbacks exist between these. This is done drawing on the data from the case study component of the research. As outlined in Chapter 2, an *a priori* assumption was made that the causes of problematic participation increased problematic participation, and problematic participation increased their effects (see Figure 2). These uncontentious assumed relationships will now be used as a frame to hang the results of the study on. As such, the first section will outline the causes of problematic participation, and will be followed by an explanation of the effect of problematic participation. Then, I will build on the assumed causal relationships in Figure 2 to map the feedbacks. Before presenting the results, it should first be noted that most participants in the gardens were undergraduate students, and therefore the results presented will pertain to them unless otherwise specified. Quotes will be written in *italics*, with the source of quotes provided according to the typologies from Figure 14 in Chapter 4 in order to give context to the statements made.

6.2 Causes of problematic participation

The causes of problematic participation were categorised into either 'barriers to getting people 'though the garden gate'' or 'barriers to continued engagement.' I will unpack each of these in turn.

6.2.1 Barriers to 'getting people through the garden gate'

To even begin to have an adequate level of participation in a garden, people must make it through the garden gate. However, many participants said that a cultural barrier or background cultural indifference prevented people from getting involved in the projects because students involved in the gardens had difficulty relating to the wider student body (and likely vice versa). The term 'culture' was understood in a very broad sense, referring to norms, beliefs, attitudes, practices, values, etc. shared by a group of people. For example, some said that many students, particularly international students, did not find food growing appealing because of its association with poverty, colonisation, or being a relic of the past. Conversely, students also speculated that some people did not take part because it was seen as part of a subculture that they did not identify with:

> *…there is that kind of, like, that whole kind of coterie of dreadlocks and hippie kind of aesthetic. That people don't want to be associated with. (Long-term mentor)*

Participants speculated that another reason more people did not get involved was because they did not like the actual practice of gardening, whether that be its physicality or getting *mud under your fingernails* (Long-term mentor).

One of the most frequently mentioned barriers preventing students (and other potential volunteers) from getting involved in the gardens was that people were busy, lacked time and had competing commitments. When gardeners were busy or lacked time, it resulted in low or irregular participation. Some students said participation in their garden was not a priority compared to other activities and commitments, echoing Hustinx et al.'s (2005) findings. It was also noted that having competing commitments was not something that could be changed. Students were at university for their degrees and therefore academic work

would be the top priority for most, especially since *[university] is already quite an intense experience* (Passive volunteer).

A lack of external support also resulted in barriers to 'getting people through the garden gate' because it meant less help with recruitment was given. Student volunteering in England is still marginalised in terms of being resourced by universities and therefore many student-led organisations are under-supported, particularly in comparison to institutions in the United States where experiential learning through volunteering is a more established tradition (Brewis & Holdsworth, 2011).

Student's expectations and misconceptions about what gardening entailed and/or the gardens could offer discouraged people from taking part. Quite a few participants mentioned that a lack of confidence, stemming from a lack of knowledge of food growing, prevented students from getting involved in their garden. Other reasons the participants thought others might not want to take part was that they could not see the benefits of it. One gardener said that this might be because young people are used to instant gratification and since the benefits are often not seen immediately, they might become discouraged or bored. Some also said that cost, or perceptions of cost (i.e., for joining the student society, or paying for seeds or tools), could prevent people from wanting to get involved. On top of this, some students did not know that such an initiative existed at their university which prevented them from getting involved. This was compounded by the fact that the gardens themselves could be hard to find. All three gardens were located off the beaten track and, in some cases, there was limited advertising.

6.2.2 Barriers to continued engagement

After participants came through the garden gate, the next challenge was to encourage them to return. The barriers to continued engagement included specific barriers related to

students and student life, and some wider barriers relating to the organisation of the gardens, as well as participants missing an internal drive or competence. In addition to being a barrier to 'getting people through the garden gate,' misconceptions and unrealistic expectations also adversely impacted students' continued engagement.

Possibly the most defining feature of students and student life is transience. However, students' transience meant that eventually nearly all students involved in the gardens at the beginning of this study stopped coming back by the time data collection drew to a close. As such, students' transience increased short-term participation which resulted in a number of issues that will be picked up on in Section 6.3.

Some students said they were unwilling to commit to regular participation or to taking on positions of responsibility for fear that they would not be able to follow through. One student also said that the types of students that their garden attracted tended to be people who were less willing to commit to defined roles or plans because they joined their garden specifically for its easy-going atmosphere. However, students' lack of commitment was often recognised as being a natural thing, because being at university is an opportunity to experiment, learn, and try new things, so naturally, students would realise there are some activities they enjoy more than others.

Unsurprisingly, given students' varying schedules and that student-led food gardens were often one of many academic and social activities on students' plates, students did not always remember to come to gardening sessions even if they wanted to. Poor weather also dampened participation. This was especially problematic given that summer, the most enjoyable season for gardening weather-wise, was when most undergraduate students tended to be away. One garden did not have access to a sheltered space big enough for the group to be inside (such as a greenhouse, shed, or polytunnel) and this was especially challenging during the winter months. Whereas, in the gardens with sheltered space,

gardening sessions could run regardless of weather. A different weather-related issue was that the seasonal participation of students affected students' ability to learn about growing food holistically because they experienced the growing year in a fragmented way because of the way holidays were placed in the academic calendar.

The way the gardens were organised also presented some barriers to continued engagement. Students expressed differences in the degree of organisational structure they preferred. Some student gardeners said they appreciated and/or wanted a high degree of autonomy that a formalised structure would inhibit, whereas others struggled with the *messiness* as they *[came to the garden] expecting someone to tell you what to do* (my research diary). There is an increasing professionalisation of volunteering in the volunteer sector at large (Howlett, 2010), and volunteers want more formalised support than they used to (Rochester, 2009). Most student volunteers in England take part in unstructured volunteering opportunities (Holdsworth, 2010), though students involved in the gardens expressed an interest in both types of opportunities.

The extent of organisational structure played a role determining the extent to which students' 'psychological ownership' (a feeling that something is yours) of the garden was fostered. Psychological ownership made people feel connected to the space, accountable for what happened to it, and encouraged them to keep coming back. Of this, one student said:

> *…you can make [the garden] yours and you can decorate it. You can make it look nice. But you also have to clean it up. Like, there is some ownership. Some responsibility. […] I think that that's super vital and that's really powerful…* (Student leader)

This is in line with previous research that found that psychological ownership in community gardens is closely entwined with a sense of responsibility and concern for the space (Eizenberg, 2012), and that gardeners' sense of ownership is an important contributor to knowledge- and skill-sharing in community gardens (Laycock, 2013) (these terms will be

picked up on further in due course). Some of the main issues related to ownership over the gardens were a tension between the need for individual or collective ownership over tasks, people claiming ownership without contributing to the garden, and long-term participants (i.e., university/students' union staff or postgraduate students) and/or highly involved participants having too much control compared to short-term or less involved participants.

Students being able to self-determine or have control over the garden and the tasks they we involved in was seen to help build a sense of ownership and responsibility over the space, echoing similar findings about community gardens (Eizenberg, 2012). Universities owned the land the gardens were built on, but this did not seem to have limited students' self-determination of the space in two of the gardens. However, students from the other garden repeatedly expressed that they felt they had been limited by the grounds team of the university because they were not allowed to 'break ground' outside of their raised beds without scanning the ground for high-voltage cables first (see Figure 22). Participants also said that students' union-run growing spaces with concrete plans (e.g., sowing calendars) helped provide the consistency to keep it going, but that plans also prevented development of students' psychological ownership and self-determination over the space.

The desire to self-determine was often tied to students' political views. One student felt that people exercising their agency over a public place was a form of resistance in a world where there is increasing privatisation of the commons:

> *[The garden is] a powerful form of resistance. I think sometimes people forget that. The tidal forces of the food system are so strong and so toxic. It's just amazing that there's anything that can withstand that. That's important to me. You know, because,*

Figure 22. Signage from university grounds staff issuing a blanket ban on digging in the soil. Grounds team staff appealed repeatedly to student gardeners to request the grounds team scan the ground for cables before digging. Students broke ground on numerous occasions without requesting scans, after which this sign was erected (censoring covers the university logo and contact information).

> *you watch something like Tomorrow's Food*[16] *and I think yeah, all the kind of tidal forces within the development of the food system are so counter to this [garden]. And yet, these things still exist. A thorn in the side of people who are triumphantly, kind of, modernist.* (Long-term mentor)

However, this long-term mentor also said that sometimes it could be a substantial challenge to actually encourage people to exercise their agency over the space. Whether intentionally or unintentionally, longer-term participants tended to exert more control over the space that prevented newcomers from feeling a sense of psychological ownership over their garden. It is also important to note that not all students expressed a desire to exercise their agency over the space. These students tended to be those seeking more structured ways to take part.

[16] Tomorrow's Food is a television programme about food innovations for 'the future of food' (BBC, 2019), examining, for example, the future role of vertical farming in food production and robots in food service.

As found in previous studies (Staeheli et al., 2002; Spierings et al., 2018), cohesion within the gardening group was an important determinant of continued engagement, however cliquey-ness within the core gardening group prevented some students from wanting to come back. Conflict and internal politics within the group also prevented continued engagement. Some of the issues that conflict centred around included students having different ambitions for the garden space (e.g., what it should grow, how to grow it), and differences in ideas of how the project should be managed (e.g., how and whether money should be spent or saved). Internal politics and conflict were sometimes related to the group being too 'clique-y' or expecting others involved in the garden to share their politics. For example, one former student gardener spoke about groupthink within the group that made it difficult for people with different opinions to take part:

Student leader: *…everyone had to be vegetarian. Or vegan […] I mean, obviously they want outsiders to join, but they don't want outsiders to join at the same time.*

Interviewer: *It's almost like they want people to join, but they also want them to take on their values as well.*

[Sound of agreement]

There was a strong relationship between internal politics/conflict and ownership issues because conflict often resulted in 'power grabs' and more authoritarian approaches to managing the gardens.

A lack of a shared vision caused conflicts within the membership of gardens because it meant students invested their time (and money) in activities that moved the garden in different, and sometimes incompatible directions. Furthermore, without a shared vision, students felt loss of direction and motivation to continue to take part. One student said:

How do you define this project? You know, like, where is it going? What's the goal and stuff? I don't know. (Student leader)

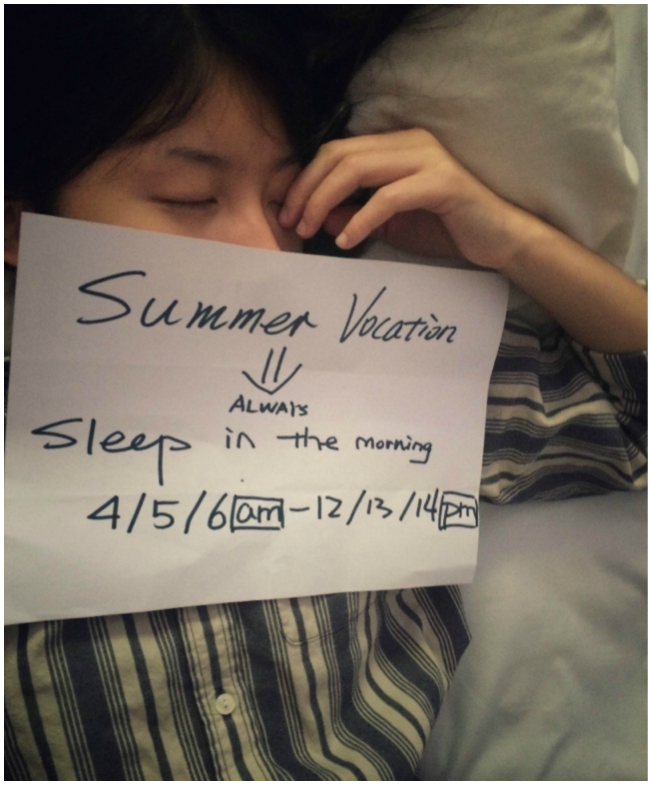
Some students also speculated that one of the reasons why their garden might not continue in future would be because the university wanted to develop the land, indicating that a shared vision, not only between students, but between all stakeholders was important.

It was also thought that some students were missing an internal drive or competence, and this led them to drop out. A lack of responsibility was one of these missing pieces. There was a relationship with the extent of ownership participants felt over the space and the degree to which they felt responsible, which was also thought to be mutually reinforcing. However, active gardeners found it challenging to distribute the workload among volunteers because it was difficult to maintain a balance between delegating too much and too little responsibility. This was because, when new participants took on too much responsibility, it caused them to become overwhelmed, overburdened, or burned out, and this ultimately reduced participation. This will be discussed in greater detail in Section 6.3 below. It should also be noted that some students deliberately avoided taking on a higher degree of responsibility because they knew they did not have the capacity to be more involved.

Participants also reported that some gardeners lacked initiative or struggled to make decisions independently. This may have been caused by a lack of confidence or inexperience which meant they had difficulty understanding the level of initiative and independent decision-making needed for such initiatives to run effectively. In my research diary, I reflected that *part of the reason these gardening projects can struggle with participation/transience is because most students have not been involved in projects that require this much initiative, particularly in a consistent way over a long period of time*. This may also have been exacerbated by a lack of support and encouragement from long-term stakeholders for students to take initiative and be confident in their decision-making capacity.

Many students said they lacked motivation to take part more actively and that they did not know what to do to motivate themselves. One student leader called this *the black box of motivation*. This student said that their own motivation to take part had dwindled because they were *leaving soon anyway* and therefore did not see *what good [it would] do* for the garden to continue taking part. This indicates that it was not just the physical impacts of transience that limited participation (i.e., the students were in a different geographic location from the university and the garden), but the psychological impacts of transience did as well (i.e., lack of attachment to and responsibility for the garden). The students were quite hard on themselves and their peers for what they perceived as *laziness* (Student leader). However, Holdsworth (2010) has suggested that scholars have focused too much on individualised motivations to explain student involvement in volunteering. She asserts that student volunteering is a complex phenomenon and many students volunteer "without a clearly defined purpose" (Holdsworth, 2010, p. 435). A number of the students who took part in this study seemed to have internalised a preoccupation with motivation rather than thinking about taking part in their garden as just something they do incidentally or habitually. This could have been because, in some cases, they were asked about why they (or others) chose to take part. However, in many cases participants brought up motivation on their own accord when being asked about transience and improving participation more generally.

One student leader did go beyond discussing motivation and said their habits prevented them from having more consistent involvement. They explained that their *irregular lifestyle* was one of their *bad habits* that prevented them from being more regularly involved (see Figure 23). It appeared that when students were not participating at the level they wanted to they blamed it on bad habits or a lack of motivation, but did not seem to consider developing more positive habits (such as having a more consistent schedule) to change their participation behaviour.



The reason why I didn't go to garden last week is because I was still sleeping at 13:00! !! This is due to one of my bad habits, irregular lifestyle. Sometimes I sleep very late at night and even go to bed after sun rise. And then I get up in the afternoon. It sounds very irregular, isn't it?

Figure 23. One student's photovoice submission explaining why they missed so many gardening sessions during the summer.

Student's misconceptions and (unmet) expectations about what the gardens could offer also prevented continued participation. Students said their gardens were not sustainable enough, producing enough, big enough, and/or organised enough. Some also believed that there was not enough freedom for students to decide what to do (though, in some cases, this was actually true, as illustrated in Figure 22) and that they would do a different type of work than they expected (especially with regards to gardening versus administrative work). Students' unrealistic expectations and misconceptions also meant that sometimes their ambitions were bigger than their capacity to actually act on them, resulting in frustration and demotivation. One of the misconceptions that was widespread and caused a great deal of frustration and disappointment was that recruitment activities would yield more new recruits than they actually did.

In addition to all the barriers to participation outlined, a number of participants said they just *don't know* why people did not participate. Of this, one long-term mentor said that

they *wouldn't even know where to begin in terms of… prioritising what those [barriers] are […] Because they are quite different for each person that's approaching the garden*. The complexity of factors influencing participation and the resulting uncertainty about what the best strategies to improve participation made it challenging and frustrating to try to improve participation. These barriers to participation caused problematic participation, which then resulted in problems in the gardens.

6.3 Effects of problematic participation

There were many problems caused by problematic participation, and some of these amplified problematic participation itself, as well as the barriers to participation. Many of these problems had to do with the temporal impacts of transience. There were, however, also knowledge retention and deficit issues, and some more general knock-on effects of problematic participation.

Because of the speed of turnover in the gardens, the constant need to recruit was the most immediately felt problem. Participants found themselves mostly organising and facilitating *rather than just participating* (Long-term mentor). Some found it hard to appreciate the good things about being part of their garden because they spent so much time focused on recruitment rather than the gardening activities they had hoped they would be doing. The constant need to recruit caused friction within friendship groups as well. One student said they had repeatedly asked friends to take part in their garden and *when [their friends] didn't want to*, it brought *tension to their friendships and negatively impacted [their circle of friends]* (Student leader). The constant need to recruit also resulted in what one self-directed volunteer called an *existential crisis* for their garden. They said that:

> *…[maintaining participation was gardeners'] number one priority […] but also something that is also taken for granted. And it's kind of an existential crisis if they actually identify surviving as an aim.* (Self-directed volunteer)

When the gardens struggled with participation, their main aim became making sure they did not fold (i.e., the initiative was successful if it continued to exist), and this led students to question the purpose and value of their garden. Why bother recruiting people to take part if their main task will be to recruit more people?

I also observed that the 'feel' of the garden group changed rapidly. I attributed this to the fast-changing and unpredictable social network, and therefore organisational structure, that was caused by the high turnover of students through the garden. The short time that students were involved in the gardens was not enough for them to settle comfortably into a role, with students having 'formal' roles (such as president or secretary) which did not always correspond with the roles they actually played within the group:

> *So, [one of the other gardeners], who's there all the time, said to us, 'who wants to be exec?' and I was like, 'uhhh… I'll do the president thing.' It's admittedly not a very functional exec. I kind of… yeah. I do a lot that I'm not meant to, technically, in the role. So we just kind of do whatever.* (Student leader)

This affected the continuity, retention of knowledge, recruitment of new participants, and running of activities.

In some cases, there was friction between short-term stakeholders (typically students) and long-term stakeholders (such as university or Students' Union staff members). In one garden, the friction stemmed from a lack of trust between students and staff members. This led to some students feeling exploited rather than supported:

It's just not really our space is it? You can't really do what we want with it. It's really limited, so much. When you don't feel like you own the place. Yeah, it's just, you're, like, just extracted for labour basically.

When students were involved in the initiative for a limited period of time, some university staff and other long-term stakeholders found it difficult to trust the students, especially when they felt that past students had not been trustworthy. This problem was thought to be reinforced by stereotypes about students, such as students being lazy.

In temporary organisations, 'swift trust' is reported to develop between participants, rather than more conventional types of trust that take longer to develop (Meyerson et al., 1996). 'Swift trust' is trust that is taken as a given upfront, and then verified or adjusted in time (Meyerson et al., 1996). There was evidence of this between short-term stakeholders (typically students) but not between short-term and long-term stakeholders in the student-led gardens. This may be because long-term stakeholders did not see the gardens as temporary organisations, in spite of the fact that the gardens might have felt that way for students. Trust was also complicated by unequal power relations between long-term and short-term stakeholders.

The gardens also had varying degrees of discontinuity that affected their longevity. Observing these projects over several years, I witnessed substantial turnover in volunteers which resulted in the 'reinvention' of the projects when a new generation of students arrived, sometimes as often as once a year, with a redefinition of aims, activities, planting plans, and so on. This was especially true of the garden run entirely by undergraduate students (without doctoral student input). Discontinuity resulted in a lack of strategic planning and waste of resources (e.g., soil, seedlings), volunteer energy, and potential. Given the high turnover of students, it was hard to ensure the project's longevity. Long-term thinking is especially important for food-growing projects because their success is cumulative. For example,

improving soil health requires work over the course of many years, and mismanagement resulting in, for example, potato blight, can take years to rectify.

Participants also reported not seeing the results of their work given their often seasonal/short-term engagement. This included both gardening work and administrative/strategic work done on the project. For example, some students took action to increase the visibility of the project and never saw whether increased participation resulted from it. Furthermore, because students knew they would not see the results of certain types of strategic work, some did not prioritise it. For example, one student said their group decided not to prioritise planting asparagus because by the time it would be possible to harvest it, the students who planted it would be gone.

Given that students' engagement in the gardens was usually time-bounded, their thinking about them was often limited temporally, though there were exceptions to this, particularly in doctoral and mature students. Students thinking and operating on such short timescales led them to become frustrated with how long it took to make plans a reality. One of the implications of this short-term thinking was that students involved in a short-term capacity lacked insight into how their own transience caused problems in their garden. Some students, for example, saw their garden as more permanent than it actually was and did not express concerns about who would lead it the following year. Others had expectations for the initiative that were not always realistic, for example creating much more elaborate growing plans than was achievable. In other words, students had fragmented understandings of how to cope with transience because they did not grasp the ways in which participants' transience impacted their garden.

The lack of insight into transience as a problem may indicate that long-term and short-term stakeholders in student-led food gardens have different conceptions of time pertaining to their garden, akin to the different perceptions of time in temporary and permanent

organisations. Ibert (2004) has argued that a linear understanding of time is more applicable to temporary organisations, rather than a cyclical understanding of time. This is because temporary organisations are intended as 'one-off missions,' while an organisation operating over a longer period of time will usually have reoccurring routines (e.g., regular meetings). Therefore, it makes sense that shorter-term participants of student-led food gardens exhibited linear understandings of the time (as in Figure 24a) while longer-term participants exhibited cyclical understandings (as in Figure 24b).

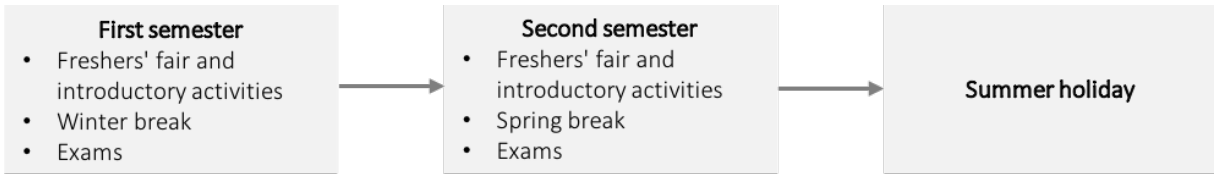


Figure 24a. A linear conceptualisation of time in a student-led food garden that would be typical of participants who have had short-term engagement with the garden.

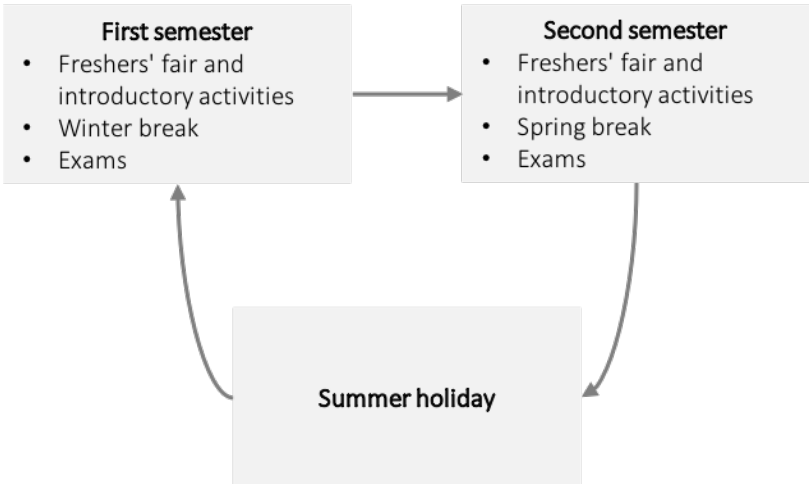


Figure 24b. A cyclical conceptualisation of time in a student-led food garden that would be typical of participants who have had long-term engagement with the garden.

Understanding that long-term and short-term stakeholders might have different conceptions of time helps to explain why there were tensions between these stakeholders. *New students [were] coming in every year who [had] no idea who these [long-term stakeholders were]* (Student leader), and they were encountering the challenge of approaching people which they found intimidating (such as university staff) anew every year.

For staff, however, it was increasingly routine to engage with students asking similar questions year-on-year. The incongruence between the time scales staff and students were working on meant that students and staff had different expectations for how long it takes, for example, to respond to emails and follow through on requests. These different expectations led to ambivalence from staff and frustration for students.

It is also this linear conceptualisation of time that caused problems in retaining knowledge within student-led food gardens, because of the interruption of learning processes (Ibert, 2004). In other words, students "had to give up learning in the moment in which they have gained the deepest insight into the task at hand" and this inhibited the development of organisational memory (Ibert, 2004, p. 1534). While most students appeared to conceptualise time in their gardens in a linear way, some seemed to develop a more cyclical understanding of time through prolonged engagement. For example, students often entered the gardens with unrealistic expectations and misconceptions of what they could get out of the garden or achieve within it. By the time many left, they had much more realistic ambitions for the garden, though readjustment of expectations did not tend to benefit the gardens because students left the university as their expectations readjusted.

Food growing is a knowledge intensive practice, as is running a student-led organisation, and therefore it was important that gardeners had or could develop their knowledge about food growing and running a voluntary organisation. Participants reported a skill and knowledge deficit in these areas, and this was exacerbated, and in some cases caused, by a lack of knowledge transfer within the garden as an organisation. While there was a skill and knowledge deficit some students did come with prior knowledge of food growing, from having worked at a garden centre or coming from a farming family, for example.

I observed that there were four main types of knowledge and/or skills that were necessary for the gardens be sustained. There was basic horticultural know-how, or a set of

generalisable skills and knowledge about food growing. There were also place-based knowledge and skills specific to gardening, for example, what has been planted where in previous years. Administrative and interpersonal knowledge and skills, on the other hand, were not related to food growing specifically, but rather to do with sustaining the garden as an organisation. There were also generalisable and place-based versions of these types of knowledge and skills (see Table 17). The gardeners who came with existing knowledge and skills brought with them the generalisable varieties (e.g., how far apart to plant kale), but the deficit in place-based knowledge and skills (e.g., who to contact if you need compost delivered) persisted due to the high turnover of gardeners. In the study of temporary organisations, this failure to retain knowledge within an organisation is sometimes called 'organisational amnesia' (Brookes et al., 2017). It should also be noted that gardeners learned about other things (as described in Chapter 5), but these are not discussed here as the focus is on the instrumental knowledge/skills that directly contributed to the gardens sustaining themselves.

Table 17. Types of instrumental knowledge and skills needed by participants of student-led food gardens to sustain their garden.

Types of knowledge/skills	Generalisable	Place-based
Horticultural	e.g., how far apart to plant kale, how much sun tomatoes need	e.g., potato blight has recently affected one of the beds and therefore potatoes cannot be planted there, one of the beds drains faster than the other and therefore needs more water
Administrative/Interpersonal	e.g., the most strategic way to recruit new participants, how to manage voluntary workload to avoid burnout	e.g., who to contact if you need compost delivered

The lack of knowledge- and skill-sharing between 'generations' of students resulted in inefficiencies, duplication of work, and reduced student confidence/willingness to take initiative. Some said that inadequate participation or participants lacking necessary skills and knowledge prevented them from applying for funding they needed. Furthermore, when students with less know-how did not get support, it discouraged them from taking part in

future. Paradoxically, temporary organisations are thought to be excellent places for learning, however, knowledge sharing and retention within temporary organisations tends to be much less successful (Brookes et al., 2017; Bakker et al., 2011). This appears to also be true of organisations led by transient participants, like student-led food gardens.

In addition to the temporal impacts of transience and knowledge retention/deficit issues, there were some more general knock-on effects of short-term, irregular and low participation. The most common one that was brought up by the participants was feeling overburdened, overwhelmed, or just burned out. Those that were regularly involved tended to get burdened with more responsibilities than they'd like. To compound this, those coordinating the gardens were sometimes reluctant to delegate responsibility for fear that they would overburden new recruits and scare them away. However, this often resulted in the coordinators becoming overburdened instead. Furthermore, because longer-term gardeners shielded the new recruits from some of the work, which was often the administrative work rather than the horticultural work, the new recruits did not have an understanding of all that the longer-term participants were doing to keep the garden afloat. For some, the responsibility was too much to take, which would cause highly active participants to abandon the project entirely. As such, burnout accelerated an already high turnover rate. Of this, one student said:

> *It seems like, in my experience, [active students] get fed up after a year, because it's too much responsibility. And then they never come again, after they're no longer on the committee. Even though they did it all the time before. Sort of, like, overload. It goes both ways. You can get too much, like, involvement, just out of, like necessity, and get just not involvement because people won't come back.* (Self-directed volunteer)

On top of this, low or irregular participation, compounded by the constant need to recruit, led to inadequate maintenance of the physical gardening space. There was therefore wasted

food-growing potential as the gardens became overgrown and harder to maintain, forcing gardeners to play catch-up with the tasks.

Having lower and more irregular participation also meant there was less social interaction between gardeners—a widely reported benefit of the initiatives, and a reason why people continued to come back. Problematic participation also caused negative emotional responses. The uncertainty of how many people would turn up on a week-to-week basis and how the project would be maintained made participants feel worried. Participants felt annoyed at others for not showing up, a long-term mentor was disappointed that undergraduates did not get to enjoy the joys of summer gardening, while some judged others for *not pulling their weight* (Long-term mentor)*,* and generally felt *fed up* (Self-directed volunteer) with trying to keep the project alive without much result. Frustration was the main negative emotional response reported. Some felt frustrated by the gardens' unfulfilled potential and that others were not taking a more active role. One of the staff members from the National Union of Students said that sometimes it took a long time to set up a university garden, and this caused frustration and lost initial momentum from students. On top of feeling negative emotions, some felt they could not share their feelings without alienating others, and therefore had to keep them to themselves:

> *I don't want to tell them [the other gardeners] that I'm annoyed because then that will make them even less likely to come.* (Student leader)

6.4 A causal loop diagram to understand transience and problematic participation

There were numerous causal connections identified by participants, many of which were outlined in the above sections. Therefore, the assumed causal relationships outlined in Figure 2 were elaborated on by introducing new causal links, creating feedbacks. Two additional variables were also added. These new variables and causal connections are

depicted in a simplified causal loop diagram in Figure 25, and a more detailed diagram in Figure 26. The new variables that were introduced were that: (1) every year there was a new pool of potential recruits; and that (2) some of these potential new recruits would become new participants. The other notable change from Figure 2, other than the new causal connections, is that students' transience was found to have special role in both directly increasing and indirectly decreasing problematic participation.

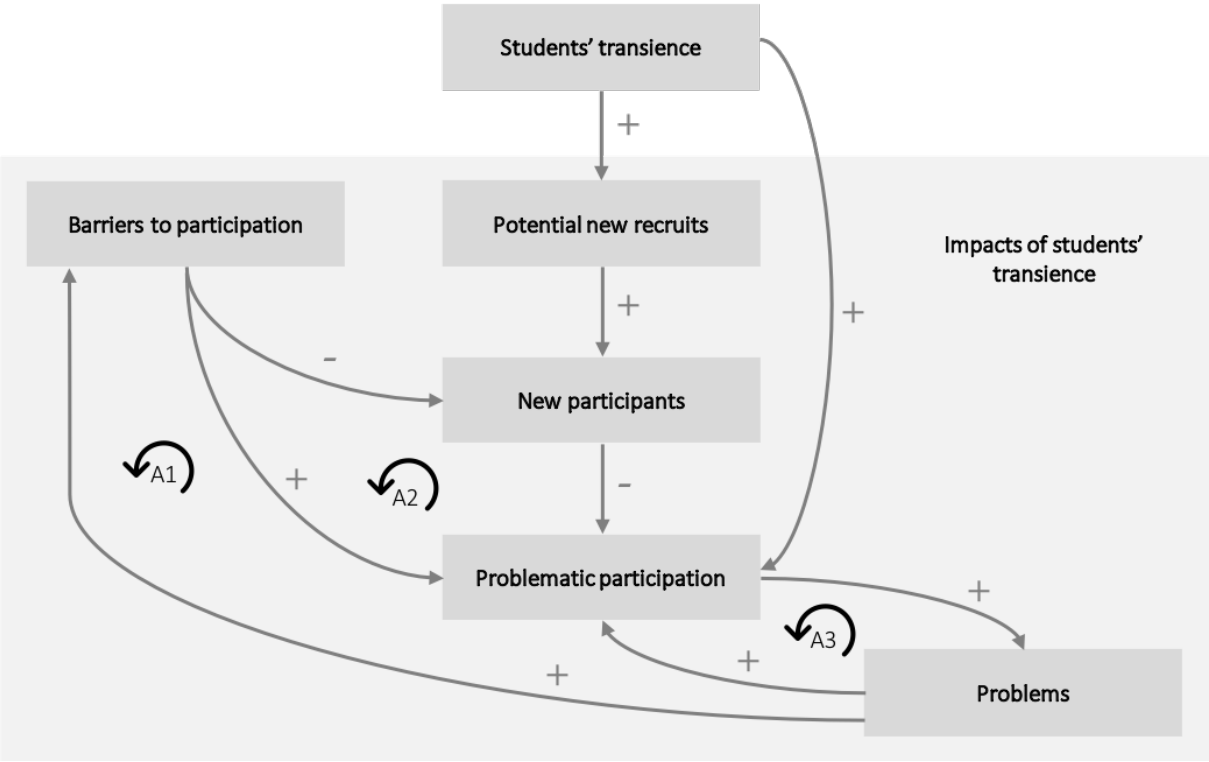


Figure 25. A causal loop diagram outlining the relationships between causes and effects of problematic participation. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow. A1, A2, and A3 mark the three accelerating feedback loops in the system. These are described in the text in greater detail. The greyed section of the diagram represents the impacts of students' transience.
Note: (1) Transience is a barrier to participation, however because of its special role in both directly increasing and indirectly decreasing problematic participation, it is depicted as its own entity, and (2) the term 'causes of problematic participation' was substituted for 'barriers to participation', and 'effects of problematic participation' was changed to 'problems' to best reflect the responses given by research participants.

There were three accelerating feedback loops identified. In the first feedback loop (A1), the effects of problematic participation indirectly increased these modes of participation by increasing the phenomena that cause them. An example of this (depicted in Figure 27a)

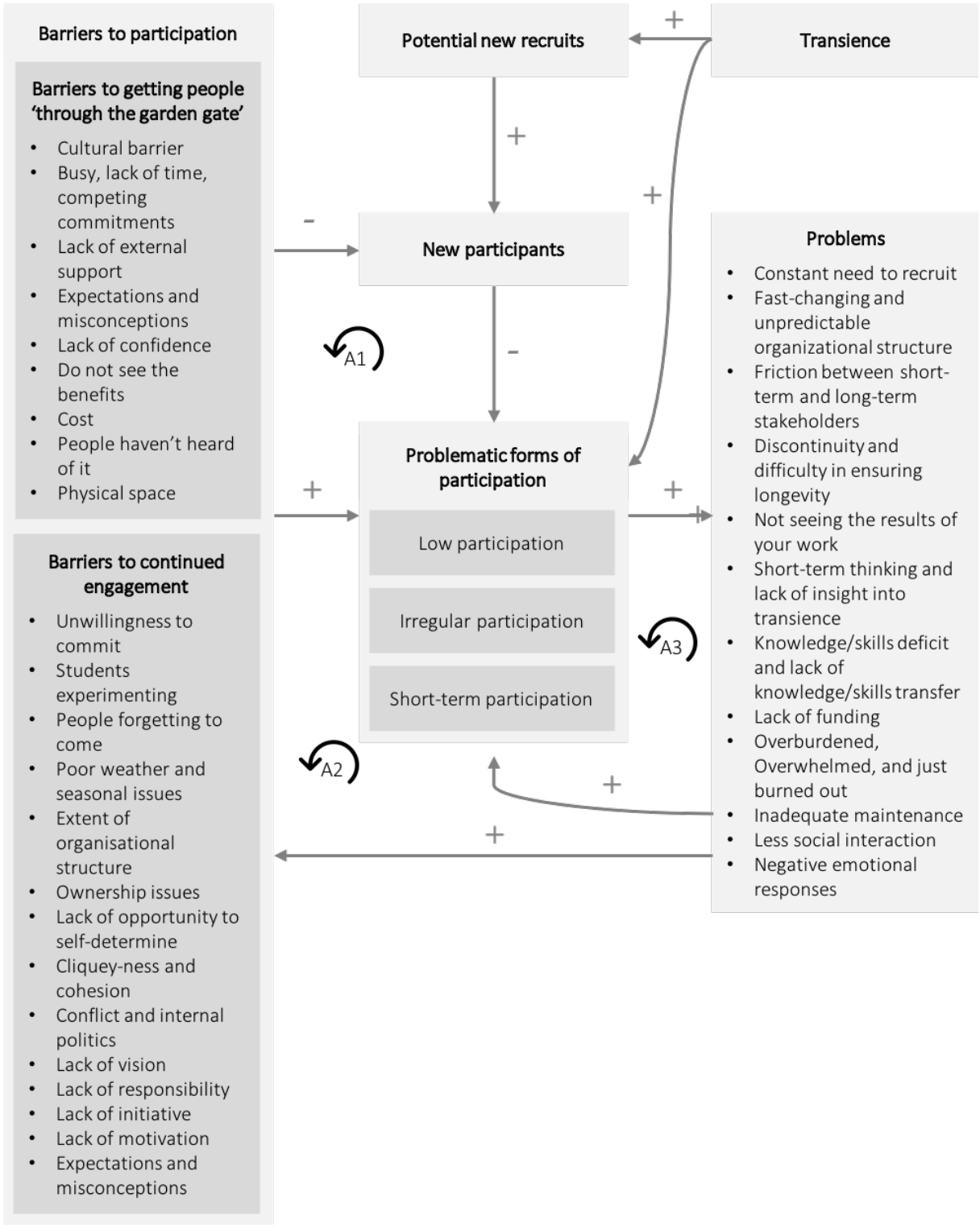


Figure 26. An expanded causal loop diagram outlining the causes and effects of problematic participation, based on Figure 25. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow. A1, A2, and A3 mark the three accelerating feedback loops in the system.

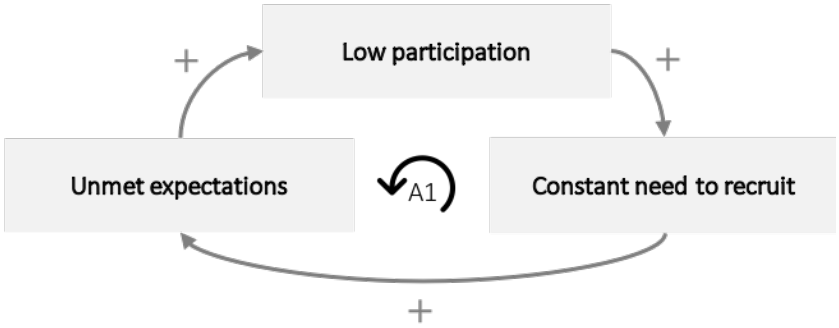


Figure 27a. An amplifying feedback loop of a vicious cycle in which low participation causes a constant need to recruit new participants which results in unmet expectations, further decreasing participation. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow.

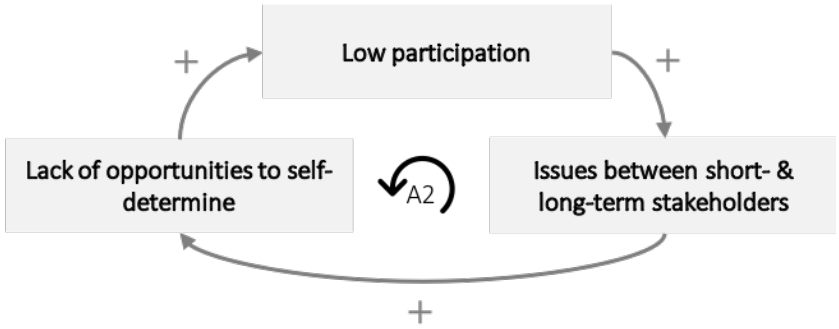


Figure 27b. An amplifying feedback loop of a vicious cycle in which lack of opportunities for students to self-determine leads to fewer new participants. This then leads to low participation, causing issues between short- and long-term stakeholders, which then reduces the opportunities to self-determine. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow. Minus (−) signs indicate that an increase in one variable leads to a decrease in the other in the direction of the arrow.

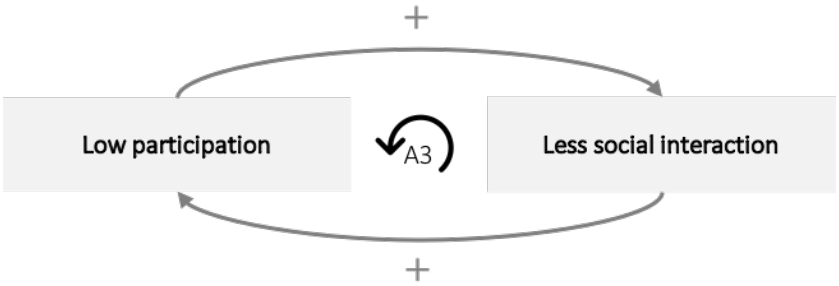


Figure 27c. An amplifying feedback loop of a vicious cycle in which low participation and less social interaction are mutually reinforcing. Plus (+) signs on an arrow indicate that an increase in one variable leads to an increase in the other in the direction of the arrow.

was that when there was low participation in the garden, it resulted in a constant need to recruit to try to increase the number of gardeners. However, this meant that students who joined the garden with the expectation that they would be able to spend most of their time gardening found their expectations unmet. As a result, those students dropped out, decreasing participation levels further.

In the second feedback loop (A2), causes of problematic participation reduced the number of new participants in the garden. Having fewer new participants lowered participation, which resulted in problems. These problems then increased the causes of problematic participation. This is illustrated in the example in Figure 27b: low participation created mistrust of students (short-term stakeholders) by university staff (long-term stakeholders) about their ability to maintain the space. This made the university staff reluctant to give students more control of the garden, which resulted in even fewer opportunities for students to self-determine, disincentivising new participants from continuing to take part. In the third feedback loop (A3), problematic participation and its resulting effects were mutually reinforcing. For example, low participation reduced social interaction in the garden, which then decreased participation further, as in Figure 27c.

There were many more causal relationships that could be drawn from these three feedback loops, as well as more complicated relationships embedded within this simplified causal loop diagram. For example, many of the problems caused by problematic participation also increased negative emotional responses (as seen in the initial prototype of the causal loop diagram in Figure 16. I have chosen to illustrate the dominating causal relationships and feedbacks in order to prevent the analysis from becoming too convoluted.

Unchecked accelerating feedback loops, like the ones outlined above, ultimately destroy the system they are a part of (Meadows, 1999). The check within this system was students' transience. Students' transience provided a buffer to the accelerating and self-

destructive feedbacks loops by providing a regular and predictable inflow of potential new recruits, which increased the number of new participants. This reduced low participation, and in some cases, also short-term and irregular participation. Yet, at the same time, transience also was the most important contributor to increasing short-term participation, thereby often resulting in low participation.

Given the three accelerating feedbacks and the fact that the buffer to these feedbacks (students' transience) increased the very same phenomena it buffered (problematic participation), it is clear that the student-led food gardens operated in perpetually vulnerable states. It is therefore unsurprising that participants expressed that there was no hope in moving away from the vulnerability:

> *I, personally, find it difficult to see how [the maintenance of the garden] is ever going to be a sustainable situation.* (Student leader)

This uncertainty, vulnerability, and, in some cases, hopelessness characterised the internal reality of student-led food gardens. The discussion in the following section, however, will begin on a more optimistic note by outlining where and how the system can be most strategically intervened in to reduce short-term, irregular, and low participation.

6.5 Strategic points for intervention

Here, will explore some strategic points for intervention to address the impacts of students' transience, rather than focusing on reducing transience itself, as has been done previously (Hyde et al., 2016). I will also make some initial reflections on how some of the issues highlighted in the above sections might be address, however this will be considered more substantively in Chapter 8.

In spite of the precarity of the student-led food gardens, knowing what the accelerating feedback loops are means that stakeholders can intervene at strategic points to

slow the feedbacks. Because feedbacks are present, both 'upstream' (focusing on mitigating the problem) and 'downstream' (focusing on adapting to the problem) solutions are relevant. I therefore advocate a holistic approach to addressing the impacts of transience and problematic participation. This includes addressing barriers to 'getting people through the garden gate', barriers to continued engagement, and effects of problematic participation simultaneously. The gardens studied each had different issues that dominated their gardening group. As such, the decision to intervene on a particular issue should be made at the level of the individual garden in question. However, the causal loop diagrams in Figures 25 and 26 could still be used practically by stakeholders of student-led food gardens to plan action to reduce the negative impacts of problematic participation. This could be done by identifying the issues from the causal loop diagram that dominate in their garden and then using this prioritisation to determine the most strategic actions to take. The causal loop diagrams could also be used to assess how holistic the current menu of actions that are being taken to address the impacts of students' transience are. Stakeholders could do this by mapping actions onto the causal loop diagrams to assess if both upstream and downstream interventions are being taken. I do this with the proposed strategies to address the impacts of students' transience in Chapter 8 of this thesis.

6.6 The role of long-term stakeholder support

In Chapter 2, I highlighted that student-led food gardens are not temporary organisations, but I also speculated that they may have features akin temporary organisations because they have such high turnover of participation. In this chapter, I noted that short-term stakeholders of student-led food gardens have conceptions of time and approaches to trust-building akin to those seen in temporary organisations. However, long-term stakeholders exhibited conceptions of times and approaches to trust-building that are more akin to

permanent organisations. As such, student-led food gardens seem to be not-quite-temporary, yet not-quite-permanent in terms of how trust-building manifests and how their stakeholders conceptualise time. This indicates that student-led food gardens, as organisations with transient participants, might actually have an organisational form unique from those seen in temporary or permanent organisations. This is because stakeholders appear to have dual conceptions of both time and knowledge, which produce challenges with managing these different and, at times, conflicting approaches and conceptions. In section 8.2.1, I will expand on this by drawing on the literature about temporary organisations to suggest that student-led food gardens can capitalise on having both long-term and short-term stakeholders in order to both retain knowledge within the garden as well as maximise student learning.

6.7 Conclusion

The internal realities of student-led organisations at universities have not yet been well-explored in the literature, therefore this chapter has taken an initial step towards filling this gap by examining the causes and effects of problematic participation in student-led food gardens, and the feedbacks between these. In this chapter, I have mapped the causes and effects of problematic participation in student-led food gardens, and the feedbacks between these. There were two main causes of problematic participation, which were barriers to 'getting people through the garden gate' and keeping participants coming back. Students' transience prevented students from coming back because of the time-limited nature of university degrees, and this caused short-term participation. However, students' transience also had an important role in increasing participation overall by refreshing the pool of potential new recruits on an annual basis. Problematic participation naturally caused a range of subsequent problems. I mapped how the causes and effects of problematic participation influenced each other and identified three accelerating feedbacks, which were buffered only

by an annual refreshment of the pool of potential new recruits. This mapping illustrated the vulnerability that the gardens' participants described and felt acutely. Within the diagram we can also find the beginnings of how to intervene to de-accelerate the feedbacks. I recommended that both upstream and downstream solutions should be implemented, and that university and students' union staff could play a crucial and subtle role in supporting students. This could be through creating a hybrid management structure where staff input into specific parts of the garden or at particular times of the year, such as during holidays. Towards the end of the chapter, I also reflected that student-led food gardens have features that are akin to both temporary and permanent organisations. Short-term stakeholders experienced the gardens through linear conceptions of time, while long-term stakeholders experienced them through cyclical conceptions of time. These dual approaches to and conceptions of time indicated that student-led food gardens, as organisations with transient participants, might actually have an organisational form unique from temporary and permanent organisations. These conflicting understandings of time were a source of friction, and because the dominating stakeholders were students, 'organisational amnesia' was also prevalent, which exacerbated the gardens' precarity. I also suggested that it might be appropriate to consider further the extent to which these gardens should be student-led and what role university or students' staff might play in supporting them. Having mapped the impacts of students' transience on the dynamics of problematic participation and offered an initial assessment of the gardens' vulnerability, I will offer a more holistic and overarching assessment of the gardens' vulnerability using Biggs et al.'s (2012, 2015c) resilience principles.

Assessing the vulnerability of student-led food gardens

Chapter 7

…the nature of it, is like, inherently non-continuous. Because students, they stay for a year, and then they do something else.

Student gardener, University of Warwick

Carrots and onions in eroding soil
June 2013

7.1 Introduction

This chapter focuses on assessing the vulnerability of the student-led food gardens. I do this by drawing on the principles for building resilience (Biggs et al., 2012, 2015c) outlined in Chapter 3 and considering the extent to which they manifest in the gardens. This means I will consider how well diversity and redundancy are maintained, connectivity, and slow variables are managed, complex adaptive systems thinking is fostered, learning and experimentation takes place, participation in governance is fostered, and polycentric governance is present. Because this is the first time these resilience principles have been fully applied outside of the context of sustaining ecosystem services, I will also assess their broader applicability to other contexts. The first section of this chapter will be spent assessing the overall vulnerability of student-led food gardens. The second section will focus on the extent to which the resilience principles have relevance beyond the application to ecosystem services, and if and how they might need adjustment for different contexts. Some of the themes from Chapter 6 will be revisited in this Chapter, such as the quality of relationships between university/students' union staff and students, ownership issues, cliquey-ness and cohesion, and so on. These, however, will be approached through the lens of the resilience principles to offer a different perspective.

7.2 Assessing the vulnerability of student-led food gardens

In this thesis, I use the term vulnerability to refer to the likelihood of a system "to change to a new state in response to a stress or disturbance" (Chapin et al., 2009, p. 17). This is an antonym to resilience, "the capacity of a system to absorb a spectrum of shocks or perturbations and still retain and further develop the same fundamental structure, functioning, and feedbacks" (Chapin et al., 2009, p. 9). As such, if the resilience principles

manifest in the student-led food gardens to a high degree, the system would be considered resilient, but if they do not manifest the gardens would be considered vulnerable.

7.2.1 Maintenance of diversity and redundancy

The first resilience principle is to maintain diversity and redundancy, therefore I my initial step was to assess the extent to which diversity and redundancy were maintained in the student-led food gardens. Participants brought up several axes of diversity that appeared to impact the resilience of the gardens: the types of participants (and their length of participation, reasons for taking part, management style preferences, and opinions/worldviews), the diversity of activities run, and the diversity of crops grown. These are summarized in Table 18.

Given the instability and resulting uncertainty in student-led food gardens, building in diversity and redundancy is of crucial importance. I reflected on this in my research diary:

> *You don't really know who's going to be the next committed individual to take over the project – are they organized? Are they disorganized? Do they know a lot about food growing? Do they not? Do they prefer to experiment and learn about food growing that way? Or do they prefer a more formal learning experience and would benefit from some documentation of the growing practices used at the site? It's all an unknown, so if you want to build some real resilience into the project, you need to be prepared for all eventualities. And not just prepare for the garden to continue in its current state, however it's run. So, this means anticipating that there might be people coming in who want to experiment, and therefore a crop rotation might go out of whack. So, choosing to plant disease resistant crops and perennials can help for this scenario. Or the next person to come in might be interested in running the project in a more formalized way – so they could benefit from documentation and a handover manual. The more*

Table 18. The extent to which diversity and redundancy were maintained in the student-led food gardens.

Axes of diversity/ redundancy		Key findings	Overall diversity/redundancy
Types of participants	Length and regularity of participation	• Undergraduate students (rapid turnover), postgraduate students and staff (lower turnover) were the main types of participants • Uneven balance of participants, with mainly undergraduate student participants • Few 'leaders' • Students took regular holidays where they left university for long periods, whereas postgraduates and staff were around more consistently over holiday periods	There was some variety in length/regularity of participation, however there was an uneven balance between different lengths of participation. There was low redundancy in participants taking part for longer periods.
	Reasons for taking part	• So varied and disparate that the only way to strategise was to create different ways participants could engage, including through: horticultural/garden maintenance, administration/recruitment, or socialising • Few people interested in the administration/recruitment compared to horticultural/garden maintenance and socialising activities	Reasons for taking part were varied and highly disparate.
	Management style preferences	• Some wanted more structured opportunities for taking part, others wanted more freedom to decide how they engaged • Overall, very informal management styles used in the three gardens studied, however some participants that took part in the fishbowl discussion at the Student Eats conference reportedly had gardens that offered more structured opportunities (particularly at further education institutions)	There was variety in management style preferences within each garden, although management styles practiced were relatively homogenous within gardens. However, there was variety in management styles practiced between gardens.
	Opinions and worldviews	• Often varied viewpoints, usually thought of as a source of conflict rather than an asset • A certain extent of groupthink with regards to 'green issues' in some cases • Some students who were sustainability advocates had difficulties relating to the wider student population	Diversity and disparity of viewpoints between gardeners varied between gardens and over time. In some cases, there was limited diversity of viewpoints within the garden, but high disparity between gardener and non-gardener viewpoints.
Activities run		• Three main activities: horticultural/garden maintenance, administration/recruitment, and socializing • Administration/recruitment activities not seen as enjoyable, but sometimes dominated out of necessity	There tended to be high levels of variety and disparity in activities run, but at times there was an uneven balance between administration/recruitment and other activities.
Crops grown		• More diverse crops meant that people did not want to take them home as they did not like them or know how to cook them • Less crop diversity meant easier management, but this mainly happened in gardens that were less student-led	Diversity in crops grown varied from year to year, but in general there tended to be high levels of variety and disparity, but balance between the amounts of different crops was uneven. Diversity of crops was sometimes limited to make management easier.

systems, and the more types of systems, put into place to cope with transience, the more resilient the project will be.

As such, diversity and redundancy can allow for spontaneous and serendipitous opportunities to be exploited.

Gardeners zealously sought to create redundancy in participation in general, because it was thought that the more people involved, the less likely drop-offs in participation would be. There were three main types of participants: undergraduate students, postgraduate students, and university or students' union staff (though campus residents or local community members had limited involvement in some cases). Undergraduate students were overwhelmingly the main participants, which, to some extent, represented their proportion of the university population. Their rapid turnover in and out of the gardens increased the diversity of interests, opinions, and approaches, which complicated relationship building with long-term stakeholders:

…there's usually, kind of one or two of people that will be involved with the project every, sort of three or four years. So every, sort of academic cycle, that maybe three years at university. And I can imagine that the diversity that comes with that can probably be really, really hard to make a concrete relationship, or to even kind of think of a concrete relationship [with long-term stakeholders]. (Student leader)

There were efforts to increase postgraduate and staff participation, as they were usually present during the summer and undergraduates were not. Having different types of participants often resulted in diversity in the length and regularity of participation. However, it was also noted that a balance between staff and student participation needed to be maintained to ensure students still had autonomy over the garden.

As highlighted in section 6.2.2, there was heterogeneity in participants' management style preferences: some wanted the gardens to offer more structured volunteering

opportunities, while others wanted more freedom in how they used the space. The three gardens studied in detail all had fairly informal organisational structures since they were student-led and this put off students who wanted to take part in more formal opportunities. However, some participants that took part in the fishbowl discussion at the Student Eats conference said their gardens offered more structured opportunities for taking part. These opportunities were mainly offered at further education institutions where there was more staff support for student initiatives.

There was also variability in participants' opinions and worldviews. Rather than being perceived as an asset, varied opinions within the garden were typically referred to as a source of conflict, especially the more disparate they were. Furthermore, it was noted that students involved in the gardens had difficulty relating to the wider student body because their views were too divergent (as in section 6.2.1).

Participants took part in the gardens for a variety of reasons. In fact, a long-term mentor said that *it's kind of confounding how many different reasons there might be for someone coming down to a community garden.* The reasons prospective gardeners became involved or chose to keep coming back were so varied and so disparate that it was difficult or possibly futile to try to create a strategy to appeal to all potential new recruits, other than to try to create a space *where people can engage in multiple ways* (Long-term mentor). As such, there was diversity in the types of activities run in the garden, with the main differentiators being whether it was a task focused on horticultural/garden maintenance, administration/recruitment, or socialising:

> *So what we've done is that we do our activities, our sessions, and do different types of sessions. So we do learn to grow, and then to cook, and then to harvest. And marketing. And all of these things which also includes a broader diversity of students.*

And then we do social events as well, which is associated with our project. (Students' union staff member)

Most students took part in gardens for the horticultural/gardening tasks or for socialising, and administration/recruitment activities were not seen as particularly desirable to work with. Furthermore, because administration/recruitment tasks were so crucial (to the point that at times they began to dominate) it was hard to maintain a balance between horticultural/gardening tasks and the administration/recruitment tasks. The distribution of which participants performed different activities was also uneven, with long-term participants typically taking on more administration/recruitment tasks. This meant that shorter-term participants were not always aware of burden that their long-term counterparts were shouldering.

7.2.2 Management of connectivity

Different aspects of connectivity were mentioned by participants, reflecting modular connectivity, "subsets of densely connected nodes that are loosely connected to other subsets of nodes" (Biggs et al., 2012, 428), and nested connectivity, "where specialist nodes interact with subsets of generalist nodes" (Biggs et al., 2012, 428) (Table 19). The connections between the students in the group and between different student societies were modular, while the connections with other parts of the university (both the physical and the human parts) and Students' Union were nested.

Within the gardening group, there was an ongoing struggle to balance the amount of connectivity between participants such that there was a lively, cohesive social group, but that was not too cliquey and therefore open to newcomers:

…it's really hard to find the right balance, I think, because if it gets too closed then it's more like a friendship group that all do it together. It's hard for new people to join in as

Table 19. The characteristics of the types of connectivity at play in the student-led food gardens.

Types of connections		Key findings
Modular	Connections within Student Eats gardens	There was difficulty balancing between being too cliquey and not cohesive enough, when fostering a lively, cohesive social group.
	Connections between Student Eats gardens	Connections to other Student Eats gardens provided inspiration and a feeling like gardeners are a part of something bigger.
	Connections between student societies	Students involved in Student Eats societies often were active in other societies as well.
Nested	Connectivity to the university	The relationships between participants in the gardens and university staff were weak in all gardens. In some cases the relationships were positive or neutral, but in one case they were fraught with tension and mistrust.
	Connectivity to the students' union	The relationships between the gardens and students' unions were not particularly strong, but were regularly upkept by the students' unions through their organisation of fresher's fairs and reminders about elections.
	Connectivity to the National Union of Students' Sustainability team	The relationships between the National Union of Students' sustainability team and the gardens were mainly through the gardens' leaders and were characterised by information sharing and the facilitation of relationship building between gardens.
	Gardens' connection to the rest of the physical campus	All three of the gardens were in low-traffic areas on campus and one was walled-in and only accessible during working hours.

well. […] It needs to be cohesive enough to keep people in, but not so cohesive that it leaves people out. (Self-directed volunteer)

However, the high turnover of students meant that there was a natural disruption to the formation of cliques.

There were also modular connections between the gardens and other student societies, where students who were active in the gardens were often also active in other student societies. One student leader said that by taking part in the garden, *you kind of get roped into everything*. […] *One minute you've got loads of time, and then the next you're signed up to, like, 10 billion things.* Students reportedly enjoyed this, but it did mean that much of the sustainability and other extra-curricular activity at the universities was being underpinned by a small, overworked group of individuals.

The two nested connections brought up by the research participants were the connectivity of garden groups to the wider university social structures, and connectivity of the physical garden site to the wider physical campus. The two main social structures that the

gardens were nested within were the university and students' union. The connections were relatively weak in the three gardens studied by virtue of the sampling criteria. However, what appeared to be the main determinant of the quality of these connections was their character. In some gardens the relationships between students and the university/students' union were trustful, mutual, and at worst, indifferent. However, in one of the gardens in particular, there were problems with mistrust and power asymmetries which made student-staff relations fraught (as outlined in section 6.2.2 and 6.3). In the gardens where the relationships were positive, the gardens benefitted from, for example, donations of compost. However, in the garden where the relationships were fraught, students were given limited scope to self-determine, which lowered their sense ownership of the space, further escalated the tensions, and lowered participation.

The relationships between the gardens and students' unions were not particularly strong but were generally positive. The relationships were kept alive mainly though the students' unions' organisation of fresher's fairs and their reminders about elections. The connection between the National Union of Students' sustainability team and the gardens were facilitated mainly through the long-term mentors and student leaders. The sustainability team shared information with the garden groups and the facilitated relationship building between gardens, such as through annual conferences. In some cases, the sustainability team also arranged visits to particularly inspirational Student Eats gardens, and students at some gardens also took initiative to arrange visits to other Student Eats gardens.

Finally, the gardens' connectivity with the rest of the campus impacted the likelihood of people stumbling across them and how well-known they were. One garden was *walled-up* with a *padlock on the gate* (Student leader) outside of working hours, which meant the space was not always readily accessible to students. These physical barriers also created a mental

distance, with a *mindset that [the garden] is a secluded and exclusive space for people* (Student leader).

In summary, modular connections within Student Eats gardens and between different student societies were highly variable and changed rapidly. Nested connections between the gardens and the university, and students' union varied between gardens, but tended to be weak (given the gardens' student-led nature). Overall, it was the quality of connections that mattered, with some gardens having good quality relationships with their university and students' union, and one having a more tense relationship. The connections between Student Eats gardens and between gardens and the National Union of Students were weak, but provided positive outcomes overall. The connections between the gardens and the rest of the physical campus were weak, and as such provided limited opportunities for serendipitous engagement.

7.2.3 Monitoring of slow variables and feedbacks

The dominating variables and feedbacks relating to the impacts of transience are outlined in Chapter 6, and in this section I will consider the slow variables and feedbacks in particular (Table 20). Students identified a number of the slow variables, an important precursor to monitoring them (Biggs et al., 2015a). While participants identified causality between these variables, often they didn't discuss them in a way that indicated they saw them as feedbacks. New gardeners typically were not cognisant of these variables, but over time they became aware of them. However, nearly all gardeners left the gardens during the course of this study and therefore there were few who had a grasp of how these variables had changed over time.

There were several slow variables and feedbacks of note. One was the students' indifference or apathy towards gardening as an activity, or sustainability in general. In the

Table 20. The slow variables and feedbacks at play in student-led food gardens

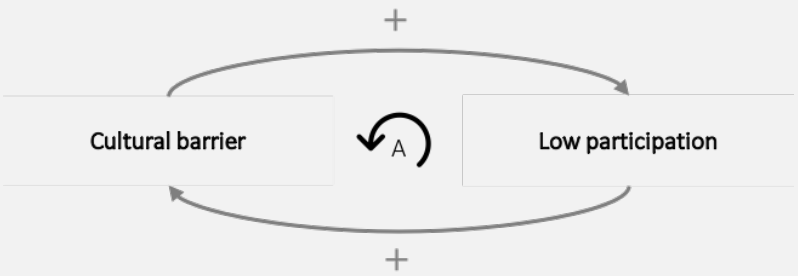
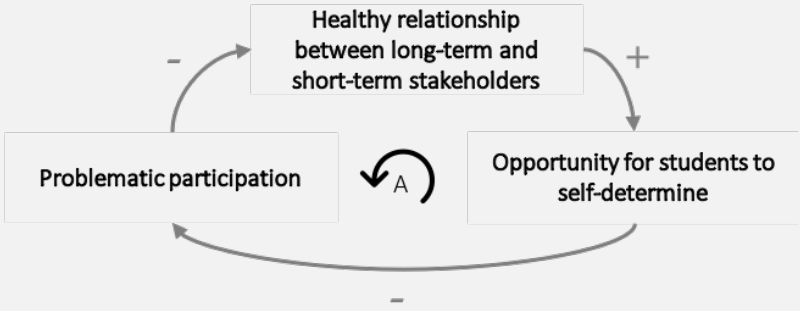
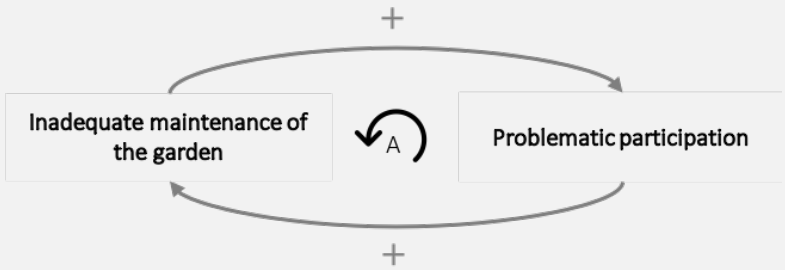
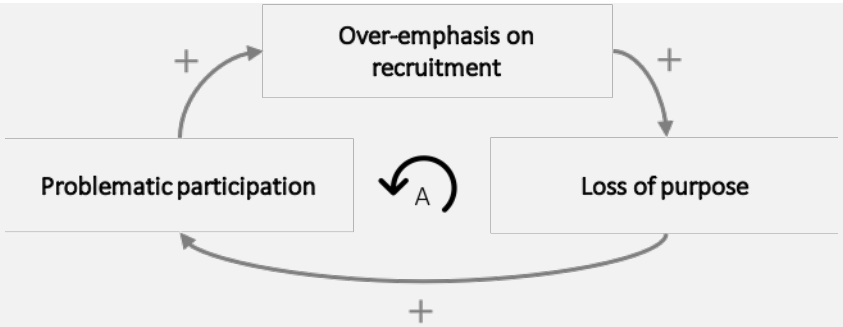
Slow variables	Related feedbacks	Key findings
The 'cultural barrier': Students' indifference/apathy to food growing and sustainability		• Indifference/apathy towards food-growing and sustainability could be changed though participation in the gardens, but low participation limited this 'culture change'
Relationship between long-term and short-term stakeholders		• In gardens where the quality of the relationship between long-term stakeholders and short-term stakeholders was good, more autonomy over the garden space was granted to students which increased the quality and amount of participation (creating a virtuous cycle) • In the garden where the quality of the relationship was low, this cycle became vicious, where students lacked opportunities to self-determine and participation became more problematic
Physical state of the garden		• At the times where the state of the gardens and their infrastructure were inadequately maintained, people were discouraged from participating because of how much work needed to be done to lift the gardens out of a state of disrepair (a vicious cycle) • Conversely, when the gardens were well-maintained there was less problematic participation because people gravitated towards wanting to be part of something successful (a virtuous cycle)

Table 20 (continued). The slow variables and feedbacks at play in student-led food gardens

Slow variables	Related feedbacks	Key findings
Emphasis on recruitment vs other goals		• An over emphasis on recruiting new participants to take part in the garden resulted in a loss of purpose for participants (described in Chapter 6 as an 'existential crisis) which caused participants to drop out or participate irregularly

previous chapter, one gardener called this a 'cultural barrier,' which I used as an *in vivo* code. This was a variable that was of crucial importance and dramatically impacted the recruitment of new participants. However, it was also one that that little additional action could be taken on. The gardens themselves were set up in part to break down this *cultural barrier*, and many students were already active in trying to make change in this area.

Another slow variable of note was the relationship between long-term and short-term stakeholders. In the gardens where the relationship was a productive one, students had more autonomy over the space and the support of staff. In the garden where the existing relationship was tension-filled, students across generations had their autonomy stripped away before they even began taking part because the foundation of mistrust had already been laid.

Another slow variable included the overall physical state of the garden. This included the state of the raised beds, greenhouses, compost bins, seating areas, and the soils, to name some of the key aspects. The built structures in the gardens impacted how easy the space was to maintain in periods of low participation. For example, participants said raised beds kept the space looking tidy. On the other hand, some of the built structures in the gardens degraded over time: greenhouses windows broke, and a rabbit-proof fence was shredded by a string trimmer. During the period of the study, these were not repaired. A lack of monitoring of what had been planted where year-on-year also caused the spread of potato blight in one of the gardens.

7.2.4 Fostering complex adaptive systems thinking

There was little evidence of complex adaptive systems thinking (see Table 21). Unsurprisingly, there was no systems framework used or acknowledgement of epistemological pluralism as a source of complexity given the type and scale of the initiatives.

Table 21. Key findings about the extent to which complex adaptive systems thinking was embedded in student-led food gardens.

Characteristics of complex adaptive systems thinking	Key findings
Uncertainty tolerant culture	• Considerable evidence of participants lacking tolerance to uncertainty • Some evidence of participants developing tolerance to uncertainty through participation
Use of a systems framework	• No evidence
Acknowledgement of epistemological pluralism as a source of complexity	• No evidence
Investigation of critical thresholds and non-linearities	• No evidence
Change institutional arrangements to reflect complex adaptive systems functioning	• While there were formal roles filled by students (president, secretary, etc), there was flexibility in term of how these were fulfilled to account for the rapid turnover and changing landscape of the garden group

While there was some evidence of participants identifying the importance of slow variables, most participants took part for such a short period such that investigation of critical thresholds and non-linearities could not be expected. However, there was evidence that many struggled to tolerate uncertainty, a key feature of complex adaptive systems thinking (Bohensky et al., 2015). Students expressed discomfort and stress about the uncertainty of how many people would turn up on a week-to-week basis, and the long-term uncertainty about how the project would be maintained:

> *… the uncertainty that, you know… every session I'm wondering how many people are going to turn up. Did I make a good enough effort remind people that there is a session on today? Is the weather going to stop people from turning up? And then, also, the more general thing that has to do with that is who's going to run it over the summer when the students that are going home are gone? Who's going to run it when the most amount of people… and also who's going to run it next year? Is it going to dissolve? Or is there going to be a group of people in the spring that are like, 'Yeah, we want to take it on!'* (Student leader)

However, those that were involved over a longer period of time developed more tolerance to the uncertainty of and caused by participation. For example, a long-term mentor said:

> *It's not something that bothers me. Like, 'God, I need people to turn up this week!' Because that would just be unsustainable. Because then you'd just be constantly fretting. Uh. But yeah, I see it [in] other people. People come down and say, 'Is anyone else coming'?*

This indicates that complex adaptive systems thinking might be fostered through taking part in student-led food gardens. However, since there is such a high turnover rate, those that develop complex adaptive systems thinking would likely leave the university before the competence can be exploited in the gardens. There was also some evidence of changes in institutional arrangements to reflect complex adaptive systems functioning. As highlighted in section 6.3, student societies had formal roles, like president, secretary and treasurer, but in practice the functions these roles fulfilled were extremely flexible to account for rapid turnover in participation.

7.2.5 Encouraging learning

Most participants expressed that there was a knowledge deficit in the garden, with many students reporting they did not *feel qualified to participate* (Student leader). However, some students did report learnings that were instrumental for maintaining their garden, such as horticultural and administrative/interpersonal knowledge/skills (see Table 17 in Chapter 6 for examples of these). This type of learning, however, appeared to be limited. This is unsurprising as many participants participated irregularly and peripherally, especially given their seasonal hiatuses. Furthermore, the limited learning that took place often failed to be retained within gardens between generations of students (Table 22).

Table 22. Key findings related to learning in student-led food gardens.

Key findings

• Types of learning taking place:
  o Knowledge/skills
  o Tacit knowledge
• A knowledge deficit was present
• There was a lack of knowledge retention within the gardens
• Opportunities for learning through experimentation were present
• Most students viewed learning as a passive exercise
• Maladaptive learning was present
• Diversity of viewpoints is a potential opportunity for learning
• Unrealistic expectations and misconceptions are potential opportunities for learning

In all three of the gardens, learning through experimentation was encouraged by virtue of the fact that most people knew relatively little about gardening. However, participants tended to discuss education and learning as an outcome rather than a process, which made them eager to seek out expertise and reluctant to experiment. This was compounded by students viewing learning as a passive exercise. For example, one student leader said that other students were willing to take their advice because the other students lacked confidence and therefore were eager to seek out *authority*, even though they (the student leader) had *absolutely no idea what [they were] doing*.

Some of the learning reported by participants also appeared to be somewhat maladaptive, describing learning that made them feel stressed or disengage from their garden:

> *I realized how much I've […] been aware of the limitations… the kind of stressors that come along with being involved in a project like this. Like, seeing everyone saying it's really stress relieving… it's not really anymore for me…* (Long-term mentor)

> *I can now see [the disenfranchisement in the] third- years that I met in first year. I can now see how they had a similar thing of just not doing anything anymore. And at that point I was like, 'What are you doing? There's so much to do, let's do something!' But now I understand a lot better why you would be in that place. And… yeah, I think a lot of it was just, 'Okay, I've done so much. I think it's okay to not do anything anymore.'*

That was a big, big part of that. And also, just, like, feeling like it wouldn't… I don't know. Like, what good would it do? (Student leader)

As mentioned in section 7.2.4, other gardeners reported that they learned to be tolerant to the uncertainty they experienced in the gardens. When asked whether this sort of learning could be shared with others, a National Union of Students staff member said that it would not be possible to pass it on. As such, it seemed that the learning that enabled students to be more tolerant of uncertainty was a tacit form of knowledge, meaning it may not be possible to codify or communicate it. However, this National Union of Students staff member suggested that having reassurance from peers or mentors that what they were going through was normal could help alleviate the worry and anxiety caused by uncertainty until they learn how to better cope.

In sections 6.1.2 and 7.2.1, I outlined how the gardens' participants encountered others with viewpoints that were different from their own in the gardens with regards to, for example, organisational preferences or views on sustainability issues. The interactions between those with divergent viewpoints could be considered a 'boundary interaction,' that is, an interaction where "experiences brought in from the outside [for example, of a garden] generate friction as they encounter the socially defined competence of the community]" (Bendt et al., 2013, p. 19). These boundary interactions can enable learning through negotiation of meaning between the individual and community (Bendt et al., 2013). However, if the competences of the individual and community are too convergent, learning is limited. Conversely, competences that are too divergent will mean there is "no common ground upon which to negotiate meaning" (Bendt et al., 2013, p. 20). As such, the clique problem that limited outsider engagement may have not only limited participation but may have limited learning as well.

Likewise, the finding that students had unrealistic expectations and misconceptions about what they could expect from student-led food gardens indicates that there is substantial potential for learning about, for example, what reasonable expectations are in voluntary initiatives, and how to cope with some of the challenges that come with these (such as growing low-maintenance plants to deal with irregular participation).

7.2.6 Broadening participation

Broadening participation was a central focus of the student-led food gardens (and indeed, a central focus of this thesis) because the principal results of students' transience were short-term and low participation. However, Biggs et al.'s (2012, p. 201) resilience principle defines broadening participation as the "active engagement of relevant stakeholders in the management and governance process," not just participation in an activity in general. Therefore, here I will assess the extent to which participation was broadened in the governance process (see Table 23). In the case of student-led food gardens, that which needed governing was how to use the garden space (e.g., what to plant where, what activities to focus on in gardening sessions), recruitment and associated activities (e.g., how and when to recruit, marketing), and decision-making about the garden group as an organisation (e.g., decisions about the society fees and budget, elections).

There were some stakeholders who were involved in governance, some involved in gardening, and some involved in both (Figure 28). The day-to-day governance of the gardens tended to be undertaken overwhelmingly by long-term mentors and student leaders. It was an ongoing challenge to include other gardeners in governance, because they didn't want to put other students off by overburdening them with responsibilities.

Difficulties broadening participation in the student-led food gardens in general naturally led to difficulties broadening participation in their governance. Some gardeners took

Table 23. Key findings about considerations when broadening participation in governance of student-led food gardens.

Considerations when broadening participation in governance	Key findings
Clarity of goals and expectations in governance	• No evidence, appeared that goals and expectations in governance were largely unspoken
Involvement in governance	• The 'right' stakeholders were not always involved in decisions (e.g., the grounds team were not informed of digging directly into the soil, students were not involved in long-term planning of the land the garden occupied)
Facilitation and leadership	• Effective facilitation and leadership between different stakeholders came from the National Union of Students' sustainability team which facilitated conversations between universities' grounds and sustainability teams, students' unions, and student gardeners • Long-term mentors and student leaders also played a key role in broadening participation in governance through engaging other students and reaching out to university or students' union staff in some cases
Capacity building for participation in governance	• Students' capacity for participation in governance was built through learning and experimentation, though this capacity typically was not retained within the garden because of students' turnover
Power differentials	• The power differential between university staff and student made it *intimidating* (Student leader) for students to approach staff
Resourcing	• There were no financial resources for participation in governance given the small scale of student-led food gardens • The universities seemed to dedicate limited time and effort towards broadening participation in the governance of the space

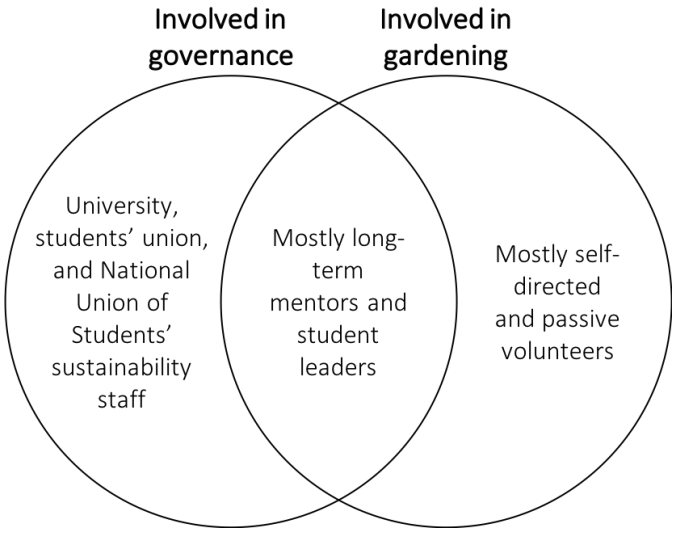


Figure 28. A Venn diagram of those participating (or not) in the governance of student-led food gardens.

leadership with governance because they worried that if they did not, then no one else would step up or others would find it too burdensome and leave the project. This was not a baseless worry. A passive volunteer I interviewed who had been involved in one of the gardens said that the reason they had stopped coming was because it had stopped being *pure fun* and they

started feeling blamed and guilty for not committing more to the project. Because of attempts to diffuse governance responsibility, they felt the fun had been taken out of the garden and stopped taking part. However, not distributing responsibility also caused long-term and/or highly invested individuals to become overburdened with work and/or burn out. Those who were overburdened were cognisant of this issue, but often found it was very challenging to let go of control because the worry and risk involved for the overall success of their garden. Other reasons they reportedly found it difficult to delegate were because it was sometimes seen as less time efficient or more draining than the person in charge doing it themselves, or because they did not feel there were enough people to take on the tasks.

Typically, this 'control' would manifest in subtle ways, such as the more engaged gardeners holding the historical knowledge of the project and more gardening knowledge. Because knowledge was held by participants with higher or longer-term engagement, an information deficit and inadequate information-sharing were brought on. On this, a student leader said:

> *I said, 'We need to organize everything that's going to be planted this year.' And he [a long-term mentor] was saying, 'Oh, the way we've done it before is we've just done it whenever. It allows people to do what they want, it's very flexible.' And I was trying to make the point that 'If you fall off a cliff, so does this allotment.' Not that I'm wishing that upon him. But he's very much holding all the knowledge, and he's saying he doesn't want to hold all the knowledge. Um, and the control. But he does. And because he holds that authority, what he says goes.*

In one of the gardens, the 'right' stakeholders were not always involved in decisions. For example, in one garden students did not inform the grounds team before they dug directly into the soil (as mentioned in section 6.2.2), but likewise, students were not involved in long-term planning for the land the garden occupied. The most effective facilitation and

leadership in governance came from the National Union of Students' sustainability team, who facilitated conversations between universities' grounds and sustainability teams, students' unions, and student gardeners. Long-term mentors and student leaders also played a key role in broadening participation in governance through engaging other students and reaching out to university or students' union staff, in some cases. However, power differentials were not always acknowledged or addressed (as highlighted in sections 6.2.2 and 6.3). University grounds staff typically did not have time allocated within their work schedules to dedicate to engaging with gardeners or to broaden participation in the governance of the space.

7.2.7 Promoting polycentric governance

There were four main 'governing authorities,' to use the term employed by Schoon et al. (2015). Each of these operated at different, but at times overlapping, vertical scales. At a micro-level, the student group tending to the garden made most of the on-the-ground decisions about, for example, when to hold gardening sessions, what to do in the gardening sessions, and what the overall aims and ambitions for the garden should be.

The students' unions supported students with governing and promoting their student societies. The garden societies were one of dozens of societies supported by the students' unions. The students' unions required the societies to have elections annually, and organised 'fresher's fairs' where students could advertise their societies and recruit new members.

The universities themselves owned the land the gardens operated on, and therefore had the responsibility and the mandate to ensure the space was presentable and safe. Some of the universities also had staff supporting the student societies to varying extents, such as student support or academic staff. The National Union of Students' sustainability team supported gardening initiatives at different universities all over the UK with information about food growing and running a food growing society. Their staff also focused on building

relationships between gardens at different universities through site visits and annual conferences.

The linkages between the different governance units were outlined in section 7.2.2. These linkages can also be seen in Table 24, where they are stratified into horizontal linkages (linkages between governance units working at similar scales) or vertical linkages (linkages between governance units working at different scales). In most cases, the 'domains of authority' appeared to be appropriate, though in the garden with tension between staff and gardeners, gardeners had less control of how use the garden space. Horizontal linkages were not especially notable, and seemed to be providing positive functions overall, but there did not appear to be any that were more important than others. However, the vertical linkages were a little more complicated. Relationships between the gardens and the National Union of Students and the gardens were positive and supportive. Relationships between university and students' union staff and the student-led food gardens were weak (likely due to the nature of the sampling: gardens with limited staff involvement were chosen as embedded units of analysis). University and students' union staff could have sought out gardener participation in governance of the garden space to a greater extent, particularly in the garden where the relationship was fraught.

7.2.8 Summary of the vulnerability of student-led food gardens

Overall, the student-led gardens in this study were very vulnerable to the impacts of students' transience. This was especially true of the garden at Sheffield, because it did not have postgraduate participation. A seemingly successful garden could rapidly shift into a garden at risk of total neglect. I was told by a staff member at the National Union of Students that one entirely student-run garden was one of the most successful gardens, and when I came to meet them the first time in the spring, the gardening session I attended was lively

Table 24. Key findings about the promotion of polycentric governance in student-led food gardens.

Governance unit	Domain of authority	Horizontal linkages	Vertical linkages
Student-led food garden group (student society)	• Tending the garden space and running the gardening society • While the garden groups had autonomy over their prescribed growing space in all gardens, in one of the gardens students were limited to growing in the raised beds and not allowed to break ground outside of the beds	• Participants of some gardens visited other Student Eats garden sites throughout the course of the study • Participants of the gardens met and learned from participants of other Student Eats gardens at the Student Eats conferences several times during the course of the study • Many students participating in the gardens were involved with other student societies within their university	• The relationships between the gardens and students' unions were not particularly strong, but were regularly upkept by students' unions through their organisation of fresher's fairs and election reminders • The relationships between gardeners and university staff (particularly grounds staff) were weak in all gardens. In some cases, the relationships were positive or neutral, but in one case they were fraught with tension and mistrust • The relationships between the National Union of Students' sustainability team and the gardens were mainly through the gardens' leaders and were characterised by information sharing and the facilitation of relationship building between Student Eats gardens
Students' union	• Supporting all student societies to self-govern and promote their societies	• The National Union of Students' sustainability team was in contact with the students' unions and universities about spending funding, new funding opportunities, and annual renewal of the institutions membership to the Student Eats programme	• The relationships between student-led food gardens and students' unions were not particularly strong, but were regularly upkept by the students' unions through their organisation of fresher's fairs and reminders about elections

Table 24 (continued). Key findings about the promotion of polycentric governance in student-led food gardens.

Governance unit	Domain of authority	Horizontal linkages	Vertical linkages
University	• In charge of managing the campus grounds (including the garden sites) and initially with setting-up of the garden infrastructure in some cases (raised beds, sheds, etc) • Some universities had staff supporting the student societies to varying extents	• The National Union of Students' sustainability team was in contact with the students' unions and universities about spending funding, new funding opportunities, and annual renewal of the institutions membership to the Student Eats programme	• The relationships between university staff and participants in student-led food gardens were weak in all gardens, but in some cases the relationships were positive or neutral, but in one case they were fraught with tension and mistrust
National Union of Students sustainability team	• Supporting Student Eats initiatives at different universities all over the UK with information about food growing and running a food growing society • Building relationships between gardens at different universities	• The National Union of Students' sustainability team was in contact with students' unions and universities about spending funding, new funding opportunities, and annual renewal of the institutions membership to the Student Eats programme	• The relationships between the National Union of Students' sustainability team and the gardens were mainly through the gardens' leaders and were characterised by information sharing and the facilitation of relationship building between staff and students, as well as between Student Eats gardens

and active. I tried to reach out again in the autumn and struggled to get a response. When I came back again, I was met by only one student who told me they were managing the garden alone. Students' transience, combined with periods of extended holidays, created this vulnerability. However, the gardens at Keele and Warwick each had the engagement a single, long-term mentor, which made these gardens considerably more resilient. The positive relationships between gardeners and other long-term stakeholders in two of the gardens contributed substantially to the gardens' resilience because there were not issues stemming from mistrust or conflict (e.g., reduced opportunities to self-determine, negative emotional responses).

For those actually participating in the gardens, the main issue related to managing connectivity that was struggled with was maintaining the balance between being too cliquey and not cohesive enough. Given the high turnover, this changed rapidly, making it difficult to make an overarching assessment of the extent to which it contributed to the vulnerability or resilience of the gardens. The remote location of the gardens on their university campuses, however, limited serendipitous and spontaneous engagement that came from stumbling across the gardens, reducing redundancy in participation.

Gardeners who had only recently started engaging in the gardens tended to be less tolerant to uncertainty (e.g., whether or not other gardeners would participate week-to-week), however it seemed that taking part enabled gardeners to develop their tolerance to uncertainty, possibly out of necessity. However, because of the high turnover of gardeners, few active gardeners actually demonstrated tolerance to uncertainty, with the exception of long-term mentors, and some student leaders. Furthermore, students' own transience made it extremely difficult for them to monitor slow variables and feedbacks, although these were crucial considerations for the gardens.

While there were good conditions to contribute to learning, including opportunities for learning and experimentation, and interaction with gardeners with diverse viewpoints, gardeners mainly viewed learning as a passive exercise which limited learning. Both instrumental and intrinsic forms of learning took place, however usually the instrumental learning, or the learning contributing to fulfilling the aims of the gardens, was not retained within the gardens due the students' transience. As such, the learning taking place in the gardens appeared to make limited contributions to the gardens' resilience, however the gardens provided space for participants to learn about how to "make sound choices in the face of uncertainty and complexity of the future" (Vare & Scott, 2008, p. 3). As such, the learning in the gardens appeared to do less for the resilience of the student-led gardens, but produced more resilient gardeners.

In summary, student-led food gardens are highly vulnerable to their own students' transience. However, there is evidence of misalignments with the resilience principles that could be realigned through actions taken by different stakeholders of student-led food gardens. Chapter 8 will delve into how, knowing the ways in which student-led food gardens are vulnerable, their resilience might be able to be improved. Before this, however, I will offer some reflections on the resilience principles.

7.3 Reflections on the resilience principles

The resilience principles (Biggs et al., 2012, 2015c) are relatively new, although they do draw on a range of previous scholarship about enhancing the resilience of social ecological systems (Anderies et al., 2006; Walker & Salt, 2006; Walker et al., 2006). Because of how new they are and the fact that I have attempted to apply them outside of their intended context (that is, to sustain ecosystem services), it is fitting to offer some reflections on how their application played out in practice. I have reflections on the phrasing of the first principle

(maximising diversity), ontological humility in the application of the fourth principle (fostering complex adaptive systems thinking), making sense of the fifth principle (encourage learning) in the context of intrinsic and instrumental learning, and how literature about communities of practice could be used to develop the fifth principle. Finally, I conclude with an overall assessment of the appropriateness of applying the resilience principles beyond ecosystem services and offer some tentative suggestions of how the principles could be adjusted for other contexts. Before doing this, however, I offer some general reflections on the usability of the principles.

7.3.1 Usability of the resilience principles

The principles were challenging to work with given that they are so broad. I will use the first principle to demonstrate this. In section 7.2.1, I presented six axes of diversity that were relevant to managing participation in student-led food gardens. Variety, balance, disparity, and redundancy were considered for each of these. That means that there were eighteen aspects to consider in order to be exhaustive with this principle. This is only one of seven principles, making a qualitative and holistic assessment of resilience a monumental task.

To make this task less monumental, users of the resilience principles could make *a priori* decisions about which axes of the principles would be most strategic to consider. I did not collect data with the resilience principles in mind, and as such I did not make an effort to prioritise these through my data collection. For example, in the Wayfinder guide (Enfors-Kautsky et al., 2018) users are invited to reflect on the "aspects of diversity and redundancy [that] are most important in [the] system" and how to maintain these.

The difficultly of managing the complexity and scope of the analysis, however, reflects a more inherent issue with studying complex systems. It is difficult to maintain a balance

between accounting for and retaining the complexity of reality whilst creating tools or frameworks simple enough to understand and use. The resilience principles have made an important step in operationalising a relatively theoretical concept. The Wayfinder guide (Enfors-Kautsky et al., 2018) has made further considerable steps in making the resilience principles much more user-friendly through providing a step-by-step process to follow. However, having applied the principles to assess the vulnerability of student-led food gardens, I would suggest that the principles are still very challenging to apply meaningfully without considerable time, resources and engagement. Therefore, further research could experiment with the principles in different settings to explore if it is possible to identify axes of diversity, connectivity, and feedbacks that are common for particular systems to make the approach more widely accessible. For example, are there common axes of diversity that are relevant for maintaining resilience of organisations, and are there a different set of common axes of diversity that are relevant when maintaining the resilience of ecosystem services?

7.3.2 Maximising or managing diversity

An observation of crucial importance to the continued development of the resilience principles was that maximizing diversity did not always contribute to resilience in the student-led food gardens. High disparity in different viewpoints and motivations for taking part in the gardens affected connectivity in the gardens, causing interpersonal conflicts and making it difficult to meet everyone's needs/wants and accommodate different preferences. These axes of diversity negatively impacted participation, threatening the resilience of the gardens. However, it was clear that diversity contributed to resilience in other cases. For example, running a range of different types of activities meant that there were opportunities to cater to the preferences of a wider pool of existing or potential participants, thereby increasing resilience through increasing the redundancy in the number of participants involved. As such,

diversity had different effects on the resilience of the gardens depending on which axes were considered.

This finding is not an anomaly. For example, researchers of super-diverse populations have found that diversity can "undermine local integration and encourage insularity" at a neighbourhood level (Pemberton, 2017, p. 67). This insularity, or lack of connectivity, could result in 'brittleness,' and therefore reduce resilience, within neighbourhoods. Given that diversity can have paradoxical effects on resilience, I suggest that it would be preferable to phrase the principle as 'manage diversity and redundancy' rather than 'maximise diversity and redundancy.' This phrasing echoes phrasing used in the second principle, to 'manage connectivity.' When managing diversity, taking into account the period of time over which changes in diversity occur may also be important. In this study, the turnover of participants in the gardens was much faster than would be expected in other types of community-led gardens or sustainability organisations in general, leading to rapidly changing levels of diversity. This speed of change made it more challenging for to develop a common purpose and foster a sense of continuity. As such, temporality ought to be considered when applying the first resilience principle.

7.3.3 The need for ontological humility in fostering complex adaptive systems thinking

In the Habermasian tradition, shared understandings are crucial for meaningful, non-instrumental action. As such, having a 'shared mental model' as suggested by resilience (Biggs et al., 2012; Bohensky et al., 2015) and sustainability scholars (Broman & Robért, 2017) is crucially important. However, it is also worth issuing a word of caution about how these mental models ought to come about. For Habermas (1984), the construction of the lifeworld is fundamentally a democratic, co-constructive and participatory activity at its core. As such, I question whether a 'top down' approach to establishing shared 'mental models,' even the

complex adaptive systems model, is appropriate in a sustainability context in which democracy and participation are of paramount importance. Changing the way that "people, individually and collectively, *think about* and *make sense* of social-ecological system dynamics" (Bohensky et al., 2015, p. 145, italics in original) with a particular direction in mind (in this case, towards thinking though a complex adaptive systems lens) runs counter to democratic dialogic processes advocated by scholars like Habermas. The complex adaptive systems lens has been a particularly useful one for this study, however, like all theoretical perspectives, it likely is incomplete. As such, the application of this principle should be done with ontological and epistemological humility. Advocating a complex adaptive systems view of the world is ultimately an ontological question as it deals with the essence of what exists, the properties of what exists, and the relationships between things that exist. It is also an epistemological question as well, as complex adaptive system thinking means accepting that uncertainty must be tolerated and embraced as it is impossible to fully understand the world (Bohensky et al., 2015). Bohensky et al. (2015) advocate acknowledging epistemological pluralism in order to foster complex adaptive systems thinking, evidencing the recognition of a need for epistemological humility.

However, ontological humility should also be exercised when fostering complex adaptive systems thinking. Complex adaptive systems thinking has been useful to many in the sustainability community (some examples of which can be seen in Bohensky et al. (2015)), however, there are also critics of systems thinking, particularly for its application in social systems (Spronck & Compernolle, 1997). These critics suggest that power (Spronck & Compernolle, 1997) and culture (Arora-Jonsson, 2016) are not adequately considered in system thinking. Furthermore, there are difficulties defining system boundaries and making sense of "equilibria, thresholds, and feedback mechanisms" in the face of competing ontologies (Olsson et al., 2015, p. 4). These views are important to engage with with humility

in the movement to a sustainable, resilient future because they may provide important insights into the limitations and shadow-side of complex adaptive systems thinking. Only with ontological humility can these insights be harvested. Bohensky et al. (2015, p. 157-158) did caution that "attempts to foster complex adaptive systems thinking can compromise resilience when a complex adaptive systems model is deliberately or inadvertently treated as static" or "intended to assist transition to a new management paradigm, which is seen as the end point." Similarly, Cilliers et al. (2013) advocate that 'rules' for dealing with a problem should be acknowledged as provisional and should be continuously revised (as in the fifth resilience principle about learning and experimentation). However, ontological humility has not only to do with how the 'rules' of a system are modelled according to complex adaptive system thinking, but also has to do with the very thinking behind complex adaptive systems, like the assumptions of non-linearity, interconnectedness, and uncertainty in social-ecological systems. In order to be truly reflexive, we must be open to alternative worldviews, including those that do not adopt a complex adaptive systems understanding of the world.

However, ontological humility is also distinct from ontological pluralism (see Table 25). Ontological humility means acknowledging that one's understandings about the world and how it functions could be incomplete or even wrong. Ontological pluralism is the understanding that there are different 'worlds' and ways these 'worlds' function. In the case of addressing sustainability problems, I do not advocate ontological pluralism because it may lead to the bewilderment and paralysis (Cilliers et al., 2013), and therefore inaction. However, ontological humility can be embodied more pragmatically. For example, if one acknowledges that there may be limitations to complex adaptive systems thinking, they can still provisionally use and advocate for it with the acceptance that it could be flawed. However, ontological pluralism is more immobilizing. If one assumes that there are parallel worlds, one which might function according to complex adaptive systems thinking, and one which does not, it is

impossible to make shared decisions about how to act because one cannot know with any degree of certainty how a system will respond to a given action.

Table 25. A matrix illustrating the differences between ontological and epistemological humility and ontological and epistemological pluralism.

	Humility *Acknowledging that one's understandings could be incomplete or even wrong*	**Pluralism** *Coexistence of two or more worlds or ways of knowing*
Ontological *The nature of the world and how it functions*	Acknowledging that one's understandings about the world and how it functions could be incomplete or even wrong	Understanding that there are different 'worlds' and ways these 'worlds' function
Epistemological *How we can know the world and how it functions*	Acknowledging that one's understandings about how we can know the world and how it functions could be incomplete or even wrong	Understanding that there are different ways of knowing the world and how it functions

The suggestion to have humility with the application with applying the fourth resilience principle (to foster complex adaptive systems thinking) may seem to be a counterintuitive reflection given that in this thesis, I have aligned my work so closely to this particular way of working and thinking. However, as much as systems thinking feels second nature to me, I am open-minded to the idea I might later find it to be incomplete or inadequate. Though, at this moment, I believe this principle was contextually appropriate, because much of the sustainability thinking in university settings in Western European contexts, particularly amongst young, university-educated people, is rooted in complex adaptive system thinking.

7.3.4 Learning, resilience, and communities of practice

7.3.4.1 Resilient learners or learning for resilience?

Biggs et al. (2015b, p. 186) say that "experience has shown that learning can enhance the resilience […] primarily through its influence on governance and decision-making processes." Based on observations during this study, I would suggest that learning can indeed enhance governance and decision-making processes within student-led food gardens, but

crucially, it can also provide gardeners with transferable knowledge and skills that they can take with them beyond the gardening context. This learning can prepare the gardeners to be more effective pro-sustainability change agents in their careers and/or personal lives, not necessarily because they understand more about (un)sustainability, but because they have developed tacit understandings of how social systems function and change happens. This finding echoes a call from Sterling (2010, p. 511) who called for an integrative paradigm for sustainability education "that reconciles instrumental and intrinsic educational traditions, informed and infused by resilience theory and social learning." Biggs et al.'s (2012, 2015c) principle about learning and experimentation encourages learning for instrumental reasons. However, emphasising learning that creates resilient learners (or intrinsic learning) can potentially have important benefits for the gardens, which, perhaps more importantly, can contribute to the sustainability of our society at large.

7.4.4.2 Using communities of practice to enhance learning for resilience

Another more pragmatic reflection, given that learning is already theorised through a social learning lens in the resilience principles, is that it may be useful for resilience scholars and practitioners focusing on learning to promote resilience to refer to Wenger et al.'s (2002) work on how to cultivate communities of practice. Communities of practice are "groups of people who share a concern, set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area, by interacting on an ongoing basis" (Wenger et al., 2002, p. 4). There are some synergies between Wenger et al.'s (2002) suggestions for cultivating communities of practice and the resilience principles. For example, Wenger et al.'s (2002) first suggestion for cultivating a community of practice is to design for evolution. In other words, flexibility and adaptability are important for creating communities of practice, like they are when fostering resilience in a system. However, Wenger at al.'s (2002) suggestion for cultivating communities of practice could also build on some of the resilience

principles. For example, the sixth resilience principle is to broaden participation in general. However, Wenger et al. (2002) suggests that different levels of participation need to be encouraged to enable 'peripheral participation' (Lave & Wenger, 1991). Peripheral participation can be a pathway for less active participants to become more active in the community of practice and can also provide alternative perspectives which are conducive to learning. As such, it may be advantageous to both broaden participation as well as create opportunities for different levels of participation. Furthermore, a number of Wenger et al.'s (2002, p. 51) suggestions were not reflected at all in the recommendations from the learning resilience principle, such as "create a rhythm for the community" to foster a sense of familiarity, and "combine familiarity and excitement" to create a safe environment for candid conversation while keeping members engaged and interested. As such, Wenger et al.'s (2002) work is highly compatible with the resilience principles in general and, in particular, could enrich the fifth resilience principle.

7.3.5 Broadening participation

The principle of broadening participation focuses on "the active engagement of relevant stakeholders in the management and governance process" (Stringer et al., 2006; Leitch et al., 2015, p. 203). However, the assumed governance conditions in the resilience principles are very different from the governance conditions of student-led food gardens by virtue of the fact that the principles are written for sustaining ecosystem services. Leitch et al.'s (2015) assumption appeared to be that (1) there is interest in participation, limited mainly by powerful stakeholders, and (2) there are large (or at least larger) numbers of stakeholders than can be expected in student-led food gardens (as illustrated by the example of urban water planning in Indonesia which involved over 500 people (Leitch et al., 2015)). Furthermore, because the focus of the principles is on ecosystem services, the authors of the

resilience principles (Biggs et al., 2012; Leitch et al., 2015) drew on the literature about adaptive management, adaptive governance, and adaptive co-governance which are not (as) relevant in other contexts, such as student-led food gardens. Based on this, it would be useful to see this principle applied in different contexts and to draw on literature about participation in governance on a smaller scale (e.g., Rosol, 2010; Silver et al., 2010; Yap, 2019)

7.3.6 Applying the resilience principles beyond ecosystem services

Another important question to ask is who the resilience principles are written for. They are all written in the imperative, but when applied to a self-organising group of people without a leader, it is unclear who the message is directed to. For example, should students' union staff be ensuring complex adaptive systems thinking is fostered in students? Or should students support other students in fostering complex adaptive systems thinking? Furthermore, how does one ensure the application of the resilience principles doesn't become patronizing to other stakeholders?

This 'who' question really came to light because the resilience principles were stratified into two levels: key social ecological system properties to be managed and key attributes of the governance system (Biggs et al., 2015c; see Figure 29). Another way to think of it would be that the first three principles focus on an 'other' that needs to be *governed*, and the remaining four represent an *I* or a *we* that *governs* the 'other'. For example, Kotschy et al. (2015) explained how the first principle (to maintain diversity and redundancy) could be used to enhance the resilience of the system that provides crop pollination (an ecosystem service). They said:

> *"The dangers of relying too heavily on a single species to provide this important ecosystem service [pollination] have been brought into sharp focus recently in the United States, where honeybee populations have undergone sharp declines due to a*

number of interacting factors […] The decline in honeybees has led to declines in crop production, affecting food security and the livelihoods of farmers […] Scientists in California have sought to increase the resilience of pollination services by enhancing both the redundancy and diversity associated with pollination […] Encouraging pollination of crops by native bees, and increasing the abundances of these species on farms, adds redundancy to the ecosystem service of crop pollination by increasing the number of species that contribute to this service […] Farmers, landowners and scientists in California are working together to enhance access of wild pollinators to crops…"

(Kotschy et al., 2015, p. 68-70)

In this particular example, "farmers, landowners, and scientists" (Kotschy et al., 2015, p. 70), were *governers* who were managing the diversity and redundancy of the pollinators (the *governed*). However, in this study, the participants in student-led food gardens were both the

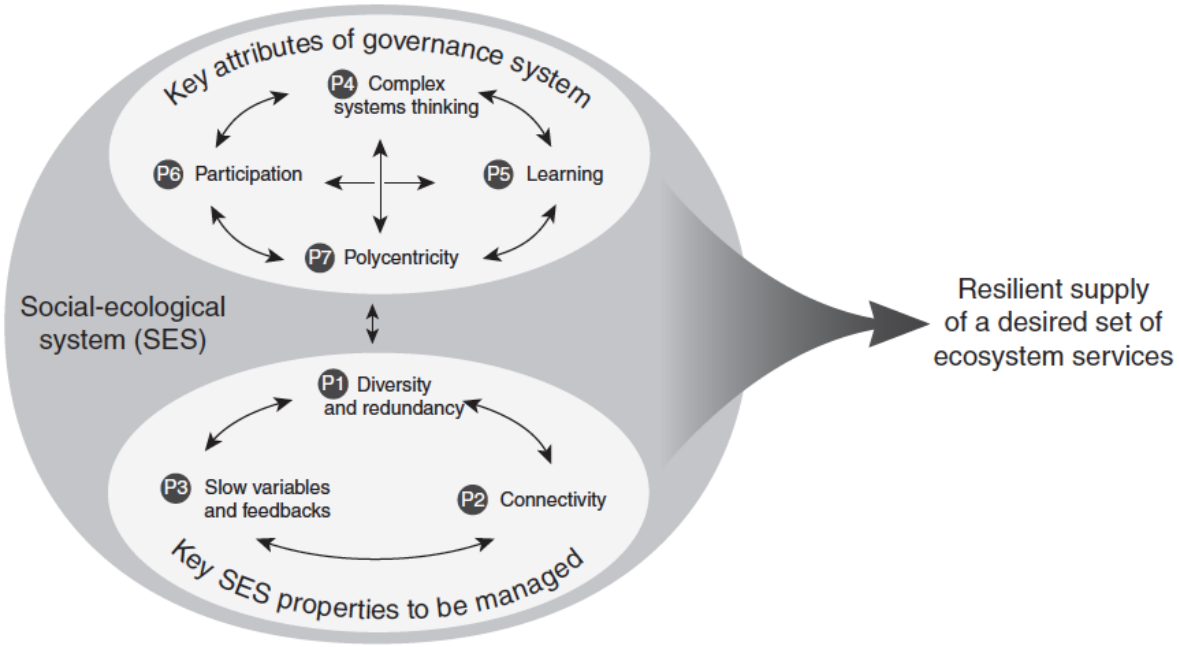


Figure 29. The resilience principles "grouped into those that relate to general SES properties to be managed (P1-P3) and those that relate to key properties of the SES governance system (P4-P7)" (Biggs et al., 2012; Biggs et al., 2015c, p. 25).

governers *and* the governed. The participants were in charge of the governance of the garden, but the impacts of their own transience was what they were managing. As such, in this context, the the sixth (broadening participation) and seventh (polycentric governance) principles were more like guidance for application than they were principles in their own right.

The student-led food gardens were systems with both social (the student society) and ecological (the garden) components. However, the main perturbation that threatened the student-led food gardens' resilience was a social one, that is, the students' own transience and the resulting impacts. As such, what needed 'governing' was actually 'those who were to govern'. With this shift in emphasis towards the social system, the stratification into 'system properties' and a 'governance system' becomes blurred. This is because the governance principles about broadening participation and polycentricity deepen the analysis of the other principles (especially maintaining diversity/redundancy and managing connectivity) (Schlüter et al., 2015). In other words, when such a strong focus was placed on the social component of the system (as in this study), stratifying the system properties and the governance system did not make sense because the governance system is an inextricable part of social systems. In practice, this resulted in excessive effort stratifying the findings into the principles without enhancing the quality of the analysis.

For potential users that want to apply the resilience principles outside the context of sustaining ecosystem services, the first three principles hold up well. The first two are also clarified by the key considerations from Biggs et al.'s (2015c) work for: diversity and redundancy, variety, balance, and disparity should be considered (Kotschy et al., 2015), and for connectivity, the presence/absence, distribution, intensity, strength, modularity, and nestedness of connections should be considered (Dakos et al., 2015). The principles about

participation and polycentricity can also be used to focus attention in the application of the first two principles towards governance.

However, I suggest that the principles about fostering complex adaptive systems thinking (principle 4) and encouraging learning and experimentation (principle 5) should be merged. This would allow for more humility in the application of the fourth principle. The field of complex adaptive systems thinking is not static, it is constantly evolving. As such, learning from practice and the application of these principles could provide more nuance in how we understand complex adaptive systems to operate. Also, I would suggest that learning and experimentation should be encouraged not only for improved governance, but also to create 'resilient learners' (Sterling, 2010). In other words, learning and experimentation should be encouraged with an end goal in mind (instrumentally motivated), as well as being encouraged without a particular aim or sense of direction to help uncover 'unknown unknowns' and create resilient (intrinsically motivated) learners.

To summarise, in the above sections, I found that:

- the application of the resilience principles was somewhat unwieldy,
- when studying a social ecological system where the focus is on the 'social' component the separation between the system properties and their governance system collapses,
- too much diversity can negatively affect connectivity and learning, thereby reducing resilience,
- the speed of change in diversity can affect the extent to which it increases or decreases resilience,
- there is a need for more ontological and epistemological humility with regards to the recommendation to use a complex adaptive systems lens, and
- both extrinsic and intrinsic orientations towards learning should be embedded in the fifth principle.

Based on these findings, I suggest that the resilience principles could be amended in order to: simplify their use by reducing their number and explicitly outlining the axes that could be considered within each principle; enhance nuance in the wording; offer guidance with more ontological humility; and include an intrinsic perspective on learning. I therefore propose that the resilience principles, when used for sustaining social systems or constructs, could read as the following:

1. Manage diversity and redundancy

   …with respect to variety, balance, and disparity…

   a. …including in participation in governance

   b. …including through polycentric governance

2. Manage connectivity

   …with respect to presence/absence, distribution, intensity, strength, modularity, and nestedness of connections…

   a. … including in participation in governance

   b. …including through polycentric governance

3. Manage slow variables and feedbacks

4. Encourage learning and experimentation

   …with respect to the system and its governance, complex adaptive systems, and unknown unknowns

These suggestions are, of course, just that: suggestions. The resilience principles have been developed in collaboration with many experienced resilience scholars who have worked at the interface of research and practice for years (Biggs et al., 2012, 2015c). These proposed amendments come from a single doctoral study from a lone scholar, and as such they represent limited experience within a limited scope. On the other hand, however, this study is the first to go beyond applying these principles to sustaining ecosystem services, to the best

of my knowledge. I have applied these principles to assess the resilience of social systems (student-led food garden groups) that interface with ecological systems (the physical gardens themselves). The use of the principles in this way has demonstrated their applicability beyond their original intended context. However, it has also demonstrated their limitations and incompatibility within contexts where the social component is in focus. This is therefore why I suggest amending the principles as above for their application to social-ecological systems where the emphasis is on the social component of the system. That is, when the object of governance and those governing are one and the same, my proposed framing of the principles may be of better use.

There is substantial examination of the relevance of the resilience principles in ecosystem services governance in Biggs et al.'s (2015c) book, but if the principles are to be useful elsewhere, there also needs to be further examination of the resilience principles in other such contexts. For example, there could be further examination of the applicability of the principles to the resilience of sustaining social systems and constructs, such as governance regimes, policy landscapes, shared mental maps, or women's rights that interface with ecological systems.

Another potential contribution to future research could be considering how different stakeholders could engage with the principles. The principles feel as though they are written towards stakeholders with power and/or resources who have the capacity to make larger-scale interventions. However, there are likely ways that less powerful or well-resourced stakeholders could make contributions to improving resilience of social-ecological systems. Future research could consider what sorts of interventions or strategies for improving resilience could be taken by different stakeholders with difference capacities.

7.4 Conclusion

The student-led food gardens were highly vulnerable to their own transience, as this chapter has demonstrated. This vulnerability was made particularly acute in the case where there were few or no long-term participants, like doctoral students (lack variety in and imbalance between different participants' length of participation), and where relationships with long-term stakeholders were riddled with mistrust and conflict (poor quality connections). A cohesive gardening group was also important for resilience, but when the cohesiveness became cliquey, the garden groups became brittle. Gardens lacking connectivity with the rest of the campus also lacked more incidental engagement.

I also found that those who had only recently started engaging in the gardens tended to be less tolerant to uncertainty, however it seemed that taking part enabled participants to develop their tolerance. However, students' transience limited monitoring of crucial slow variables and feedbacks, such as how an overemphasis on recruitment caused forms of problematic participation, and how the quality of the relationship between long-term and short-term stakeholders and the quality of participation was mutually reinforcing. I found that the learning that took place in the gardens made limited contributions to the gardens' resilience, however, it may have enabled the learners themselves to become more resilient.

Having applied the resilience principles to sustaining student-led food gardens (and not ecosystem services), I also offered some reflections about their transferability to other contexts. The principles were useful to assess the vulnerability of student-led food gardens, however I found it challenging to assess all the principles in full because there were so many factors to consider. Furthermore, I also found it difficult to disaggregate the properties of student-led food gardens as systems and their governance given the focus of the study was weighted more heavily on the social component of the gardens. It also became clear that too

much diversity can negatively affect connectivity and learning, thereby reducing resilience. The speed of change of diversity can also impact connectivity. Finally, I suggested that there is a need for more ontological and epistemological humility with regards to the recommendation to use a complex adaptive systems lens, and that both extrinsic and intrinsic orientations towards learning should be encouraged in the resilience principles. The next part of this thesis will be future-orientated, with the next chapter outlining suggestions for how to address the impacts of students' transience and enhance the resilience of student-led food gardens, drawing on the analysis from this chapter and Chapter 6.

Part 3: The future

Addressing the impacts of transience and building resilience

Chapter 8

Students holding kale, spinach and beet tops
June 2013

8.1 Introduction

This chapter is the first of the future-orientated part of this thesis. It focuses on how to manage the challenges associated with transience and participation in, and building the resilience of student-led food gardens. Out of the analysis in Chapters 6 and 7 some strategies to dealing with these challenges emerged. I will first present these. Then I will go on to share the strategies and actions suggested and taken by the research participants. Those taken are described and evaluated towards the end of sections 8.4.2, 8.4.5, 8.4.6, 8.4.7, and 8.4.9. A more detailed reflections on the challenges associated planning, taking, and evaluating action will be found in Chapter 9. Towards the end of the chapter, I will also provide advice to stakeholders of student-led food gardens as a practical offering.

In previous chapters, the question of *who* has not been as central as it is in this chapter. This is because the focus has been on the challenges related to students' transience and participation as they have manifested within student-led food gardens. The question of *who* in these cases is less relevant because it is more productive to identify the behaviour or circumstances that has caused a problem than the person or people who have. However, this chapter is solutions-orientated, and different stakeholders in student-led food gardens have different capacities and capabilities to act on the problems outlined in Chapter 6 and 7. As such, when making recommendations in this chapter, I will be using active voice as much as possible to indicate what sorts of actions are best suited to which stakeholder.

8.2 Strategies rooted in analysis from Chapters 6

In Chapter 6, I suggested that both upstream (focusing on the causes of problematic participation) and downstream (focusing on the effects of problematic participation) strategies should be considered. This is because there were feedbacks at play between

problematic participation, their causes and effects. As in systems with feedbacks, what is seen as 'upstream' can be easily turned on its head and considered to be downstream depending on how the system is mapped. I also said that the causal loop diagram could be used to help map which parts of the system solutions address. However, I also have another suggestion that could make a substantial impact on managing the impacts of transience, which is to consider the role of university and students' union staff.

8.2.1 The role of university and students' union staff

Because the focus of this study was on participation in student-led food gardens with transient participants, I studied Student Eats' most student-led food gardens as exemplars of transience. But should student food gardens on university campuses actually be led by students? This is a question I was forced to ask myself, in spite of the framing of my thesis. While many students wanted to have control over and autonomy in the decisions made about the space their garden occupied, there were also some students that expressed that they would have liked more guidance from university or students' union staff. This echoes Brewis & Holdsworth's (2011, p., 174) findings that students appreciate support in their volunteering activities, and that "students who are supported by their university to volunteer report better experiences of volunteering than volunteers who are non-supported." Indeed, in Bakker et al.'s (2011, p. 502) study of project knowledge transfer in temporary organisations, they asserted that "there is a clear and unambiguous responsibility of the project owner (the permanent parent organisation) in project knowledge transfer." The responsibility for knowledge transfer was taken on by doctoral students in two of the gardens studied. However, the fact that many students felt that their knowledge/skills were inadequate, and they lacked adequate mentorship indicates that 'organisational amnesia' was still a problem.

This was likely compounded by students' absence over the summer, which meant that they missed out on learning about an important part of the growing calendar.

While many students wanted to self-determine, self-determination does not necessarily preclude support and guidance from university or students' union staff if the support and guidance is on students' terms. However, ensuring staff input into the space is supportive without being overbearing is a fine line to walk. Experienced or skilled staff may be able to manage this intuitively, however others might need clearer models to offer the right level of support. One model of how staff could support in student-led food gardens is to create a 'hybrid' management structure by splitting the garden into two different parts: one with more staff support and structured volunteering opportunities, and another with less staff involvement and a higher degree of student self-determination. Another model could involve staff at key periods, temporally. For example, staff could limit involvement during term-time, and offer hands-on support during holidays and recruitment at the beginning of term.

Having more staff involvement in the space, assuming it does not infringe on students' creativity or self-determination, could provide other positive benefits beyond catering to students' different management preferences. For example, regular interaction between long-term and short-term stakeholders could help staff and students see each other as human beings rather than sources of frustration, developing understanding and trust. Also, staff members being on the garden site more regularly means they would be more likely to notice when the gardens need outside support to restore student engagement or to help manage the space itself. As such, maximising the extent to which the gardens are student-led is likely not desirable. Long-term stakeholders of student-led food gardens could, therefore, have a subtle but crucial role in mitigating the causes and effects of problematic participation, whilst navigating more stable and long-lasting paths for these gardens.

8.3 Strategies rooted in the analysis from Chapter 7

In Chapter 7, I assessed the vulnerability of student-led food gardens. Rooted in this analysis and drawing on my adaptation of Biggs et al.'s (2012, 2015c) resilience principles, there are some natural conclusions that can be drawn. With regards to diversity and redundancy, supporters of student-led food gardens should strive for an appropriate balance between staff and student participation to maximise the benefits to students, while providing the consistency and support from longer-term stakeholders. Ideally, opportunities should be created for both structured volunteering and more free-form ways of taking part. There should also be a variety activities that cater to different people's interests, including both social activities and gardening activities. It is also important that long-term mentors and student leaders are not only saddled with administrative work, but get to take part in the more 'fun' parts, like the actual gardening activities.

In terms of decision-making about the gardens, stakeholders should be involved for the decisions on matters that pertain to them, as advocated for polycentric governance models (Schlüter et al., 2015). As such, students should be involved or responsible for making decisions that pertain to them and the garden as much as possible. University staff, particularly grounds staff who are not usually expected to operate in a student-facing role, should have time specifically allocated to this task. Support for student-led food gardens should come from a diversity of actors. In particular, staff from the National Union of Students can play a facilitative role in supporting student-staff conversations by regularly checking in. University staff working with the university campus operations have a challenging role to play, which is to support gardeners to manage the physical garden space while maintaining the autonomy of the gardeners as much as possible.

One of the most rapidly changing factors in student-led food gardens is the connectivity in the social relationships between gardeners. Supporters of and participants in student-led food gardens need to ensure the gardening group is lively and cohesive, but also open to new recruits in order to prevent becoming clique-y. The connections between the university/students' union staff and student gardeners needs to be characterised by trustful and mutual relationships to mitigate frustration and conflict. University and students' union stakeholders, in particular, need to take on a facilitative and supportive role in governance, particularly to do with retaining knowledge within the garden. Power asymmetries may not be possible to break down, but university and students' union staff should be attentive to these asymmetries to develop strategies to compensate for them. The relationships between student-led food gardens and students' unions should also be trustful, facilitative, supportive and focus on retaining knowledge within the garden. Long-term mentors and student leaders should engage less-active participants in decision-making, and act as a bridge between the less active gardeners and university, students' union, and National Union of Students staff.

The National Union of Students' sustainability team has a special and vital role to play through working with and between the university, students' union, and student-led food gardens. The staff at the National Union of Students did and ought to continue to play a facilitative and mediating role between the university, students' union, and student-led food garden, to strengthen and improve the quality of the relationships of the different stakeholders. The National Union of Students also can and does connect student-led food gardens from different universities to inspire, spread information, and create a sense of being part of something bigger.

Connectivity between the gardens and the rest of the campus should also be maintained. Although it would be inadvisable to move gardens once they have already been established, new gardens that are being built should be placed in a space that is accessible to

participants, both in terms of being in a location that people pass through regularly and in terms of not being behind lock and key.

Slow variables and feedbacks that I identified as being in need of monitoring were students' indifference/apathy to food growing and sustainability, the quality of the relationships between long-term and short-term stakeholders, the physical state of the garden, and the balance between an emphasis on recruitment compared to the 'core business' of the garden. Long-term stakeholders of student-led food gardens are in the best position to monitor these over time because of students' transience. As such, long-term stakeholders should remain attentive to changes in these variables and feedbacks, an intervene early when changes for the worse are observed to prevent amplification of their decline.

In terms of learning and fostering complex adaptive systems thinking, I suggest that all stakeholders involved would benefit from tolerance to ambiguity and uncertainty, and therefore learning that builds tolerance and uncertainty should be fostered. Based on initial observations from this study, it seems that a tolerance to ambiguity and uncertainty can be developed over time in student-led food gardens. As such, an important strategy to build up this tolerance, at least for students, is to keep coming back and taking part.

I also suggest the approach that the gardens take to knowledge should emphasise retention as well as generation, as the knowledge retention in the student-led food gardens was weak. Gardeners should try to think of learning as a process rather than an outcome in order to experiment and engage more actively in learning, and reduce their perceived reliance on outside 'expertise.' Other stakeholders should support gardeners in adopting this process-orientated view of education. University, students' union, and National Union of Students' staff should provide reassurance to gardeners to help alleviate lack of confidence and discomfort with ambiguity and uncertainty. Furthermore, gardeners should remain open

to encountering people with different opinions and viewpoints, and because having a diversity of viewpoints within the gardens can create 'boundary interactions' that can foster learning (Bendt et al., 2013). This is unpacked further in section 8.6. University, students' union, and National Union of Students staff should encourage and facilitate the inclusion of such diversity of viewpoints.

8.4 Strategies suggested by participants

In this section, the strategies presented are ones identified by the research participants. This was an action research study, so some of these actions were actually undertaken by gardeners (see Table 26). I have clustered the suggestions for how to address the impacts of students' transience into fourteen strategies. These strategies are not mutually exclusive as they often served multiple purposes or supported other strategies. These strategies are to:

- Maintain an appropriate and well-managed space
- Run events and activities
- Get support
- Nurture interest and creativity
- Increase visibility
- Create organisational infrastructure
- Recruit
- Document and plan
- Embed within wider organisational infrastructure
- Maintain healthy relationships & social networks
- Connect

- Create vibrancy and focus on value
- Appeal to extrinsic motivation
- Secure funding/resourcing

In Chapter 6, I outlined the barriers to participation and problems caused by problematic participation. These strategies presented above are intended to address these barriers and problems. As such, Table 26 provides an overview of the suggestions to address the impacts of transience, and which problems from the causal loop diagram in Figure 26 they are thought to address. The findings presented here are based on the transcripts of interviews and workshops, and my research diary and analytical memos. I have not taken additional interpretive licence in this table. This means that there may be some relationships between suggested solutions and problems that could be drawn but I have chosen not to do so in order to present the data as was communicated by participants and as I recorded it. I have done this in order to make a clear distinction between the information that comes from the data and the further analysis I will lay over it. There are two exceptions to this, however, because their relationship was so straightforward. First, creating organisational infrastructure addressed problems associated with the extent of organisational infrastructure, which will be unpacked further in section 8.3.6. Second, logically, securing funding and resourcing deals with a lack of funding. It should be noted that there were no suggestions to address students' transience directly as that was recognised to be a natural phenomenon that should not be changed. I will now explain each of the themes in turn.

8.4.1 Have an appropriate and well-managed space

It was widely thought that having an appropriate and well-managed space was important for addressing issues associated with transience and problematic participation. Having an appropriate and well-managed space meant that it was located in an appropriate

Table 26. The suggested strategies to address the impacts of transience mapped on to the problems identified in Chapter 6. Actions that were actually taken by research participants are in bold. See Table 27 for the legend.

[17] Expectations and misconceptions were thought to be barriers both to getting through the garden gate and to coming back. For the sake of simplicity, this problem was included only In the former category.

Table 26 (continued). The suggested strategies to address the impacts of transience mapped on to the problems identified in Chapter 6. Actions that were actually taken by research participants are in bold.

Table 27. Legend for Table 26. The colours represent the participant(s) that said which strategy addressed which problem.

	Student(s)	University, students' union, and/or National Union of Students' staff	Myself (research diary/analytical memos)
	X		
		X	
	X	X	
			X
		X	X
	X	X	X

location, well-maintained, and aesthetically appealing. Some participants appreciated the fact that their garden was secluded because it meant it was a space where they could get away from it all and would encourage them to keep coming back. Others, however felt that a more central space would be more accessible, and easier to stumble across and therefore a

physical reminder to attend sessions. This was thought to contribute to reducing low and irregular participation. In addition to being accessible in terms of being in a central location, it was also important that the space to not have other barriers to entry, such as locked gates or only being open during working hours.

Physical infrastructure was also thought to be important to prevent the gardens from becoming overgrown during periods of low participation. This meant gardeners had less of a hurdle to overcome when the garden was kick-started again. This helped prevent gardeners from becoming overburdened, overwhelmed, and just burned out, and the resulting negative emotional responses. As such, creating appropriate physical infrastructure meant that the space could be left unused for a year or two and still bounce back. Raised beds were thought to keep the space looking nice even if they became overgrown, and some gardens used fabric ground covers to reduce the need to weed. Not all gardens had sheltered space (such as greenhouses, sheds, or polytunnels), but it was thought that these were important so that participants would develop a *good memory association* (Student leader) even on days with poor weather. Furthermore, appropriate spaces for social events, such as a seating area, was important for improving social interaction.

Growing appropriate crops, like early/late cropping and low maintenance plants, was also thought to be important so that gardeners would see the benefits of their efforts. In this way, the bulk of the food produced is ready to eat before students leave for the summer, or after they come back, and there would be a reduced need to water in summer months.

It was important participants had licence to choose how to use the space to build their sense of ownership and responsibility towards the space. It was also important there was enough space for all people who attend to have tasks so they feel their work has a purpose. Indeed, having a physical space was thought to be an important feature when comparing to

other student-led initiatives because it meant that the space actually provided a sense of continuity by just existing:

> *…having a physical place gives [the garden] continuity, like, by itself. Just by being there.* (Student leader)

This will be revisited in section 8.6.

8.4.2 Run events and activities

Another strategy which was widely suggested was to run different types of events and activities. Events and activities were thought to break down the 'cultural barrier' (see section 6.2.1) by bringing new people into the garden and raising awareness of the initiative, while increasing participation and social interaction, though some events/activities were more successful at this than others.

It was crucial to have regular sessions on a set day and time on a weekly basis throughout the year. This helped to remind people to attend and was thought to keep participation going throughout the winter in spite of poor weather. Participants also said that there should be varied activities and events, which might include social events, visits to other gardens, cookery classes, 'taster' sessions at the beginning of term, celebrations (like a harvest festival), and formal courses. Events co-run with other societies brought new people into the gardens. Socials were important for helping people see the benefits of taking part, and to foster a sense of social cohesion, while visits to other gardens and 'taster' sessions were thought to generate interest and inspire. Formal courses led by experts and skill workshops were thought to increase the overall knowledge/skill level in the gardens, while applied skills workshops were also thought to contribute to a sense of ownership and contribute to garden maintenance.

8.4.3 Get support

Research participants thought that gardeners should seek out support, and that university and students' unions' staff, National Union of Students' staff, peers, and more experienced and knowledgeable gardeners should provide it to help alleviate the burden of responsibility from falling too heavily on a small group of individuals. Appropriate support was thought to build confidence in people being supported, increase knowledge and skills within the garden group, and improve the maintenance of the space. Such long-term stakeholders had better insight into the challenges that were caused by students' transience, and also have longer-term views on the gardens. As such, they were in a good position to reassure students when they faced challenges they did not yet understand or experienced frustration and disappointment.

Support from students' union and university staff was thought to be valuable because they had complementary knowledge, skillsets, and experience to student gardeners. As such, the support they offered would be unlikely to be replaced through involvement of more student gardeners. It was noted that support from students' unions and universities might look quite different. Students' unions are set up to advocate on behalf of students and support student societies and student life and therefore could offer support with running their student society as outlined in in section 7.2.7, and support knowledge handover. Their support could help to counter the 'cultural barrier,' and raise awareness about the gardens through, for example, the gardens' participation in 'freshers' fairs' run by students' unions. It was also thought that students' unions could help prevent cliquey-ness and increase social interaction within the society through reaching out to potential participants beyond the friend groups that might dominate the gardens.

University staff could offer different support. Academic staff could help gardeners connect the garden to the formal curriculum by embedding visits into their classes or designing assignments or activities that require visiting the garden (an example of which can be found in section 8.4.9). Grounds staff working with the university campus grounds or estate could support students with maintaining and developing the physical space. In some cases, grounds staff already did provide this support, through mowing the lawn around the garden, providing compost and installing water taps. If staff are experienced gardeners or interested in gardening, they could also support the gardens sharing their knowledge/skills or maintaining the garden over the summer. However, it was noted that not all support was good support. A staff member from the National Union of Students said that some staff support could be overbearing and put students off. Appropriate staff support would therefore be intervening only as needed, such as in moments when participation dropped off and needed a 'kick-start'. A kick-start, according to the staff member from the National Union of Students, would involve publicising the garden in order to recruit new members. Students also expressed hesitancy with getting more support from the university or the students' union:

> *I think it would be sad if it became more under the university's control. Um. So I'm hesitant to get more involved in the [students' union], like a lot of [other Student Eats gardens] are.*

Furthermore, gardeners said that the support from university staff was not always timely in terms of responding to emails or requests for support. This echoes the analysis from Chapter 6, which suggests that support from external stakeholder should be done in a way that retains gardeners' self-determinacy.

The National Union of Students' sustainability team felt that they were important support for the gardens by drawing university and students' union staff's attention to the

garden groups periodically through checking in via email, on-site visits, and at semi-regular conferences. This external prompt encouraged students' union or university staff to 'kick-start' gardens that were struggling with low participation or at risk of folding. Receiving support from the National Union of Students was also thought to make gardeners feel as though they were part of something bigger, and reduce a sense of purposelessness caused by the constant need to recruit. Support from peers was also thought to be important for developing a sense of ownership in supporting peers and reducing isolation, decreasing negative emotional responses.

8.4.4 Nurture interest and creativity

It was thought to be important to nurture interest and creativity to break down the 'cultural barrier' (section 6.2.1) and build confidence by meeting people where they are at. Nurturing interest and creativity were also thought to foster a sense of ownership and motivation through creating opportunities for gardeners to self-determine. There were a variety of different ways to do this, one of which was to provide high-quality leadership and facilitation. This might mean providing mentoring to new recruits and reassurance that they are doing a good job. It also means not overburdening new recruits, while at the same time providing them with encouragement to take on a bigger role and to come back again. One participant said it was important for people in a leadership or facilitative role not to tell people what to do, and instead, to let them ask. In-person communication was thought to be important to nurture interest and creativity, indicating that it is important for people in facilitative or leadership roles to have well-developed soft skills. A long-term mentor reflected on their facilitative role in the following passage:

> *But ultimately, that, it's my responsibility to kind of fashion that dynamic [where people can engage in different ways]. I'm not saying I'm successful in it. But that's*

what I see myself doing a lot of the time. I think. What kind of atmosphere that pertains here?

What can be seen in this passage is a long-term mentor talking about the flexibility required in their facilitative role, where they need to pay close attention and sense into the needs of the group every week in order to try to create an atmosphere where people can engage in ways that suit them.

Other suggestions for how to nurture interest and creativity were to seek out participant input. This might include arranging opportunities for people to discuss what they want to do or finding out what participants want for the garden and from taking part. Participants also said that it was important for gardeners to be allowed to make changes, be creative, and experiment with the garden space. One gardener said:

…what about the... the general dynamic of the university being very, very careful, and very, very cautious with what they do? And what they allow? Maybe? And students being more progressive and wanting to do more edgy things… or more – just try. Because it's a playground, isn't it? A university. You try out things…

As can be seen in this passage, the risk adverse nature of the university was thought to stifle students' creativity and self-determination. This is an important tension for university and students' union stakeholders to be cognisant of.

8.4.5 Increase visibility

Increasing the visibility of the space was thought to be a key way to address the impacts of transience. One way to do this was advertising through the student newspaper, social media, leafletting, emailing, blogging, and creating videos, for example. Mostly, advertising was used to make people aware of the gardens, but social media was also used to remind people to come to gardening sessions and to create a sense of vibrancy in the society

through a lively online community (which will be elaborated on below in section 8.3.12). Participants also said that, to be successful in recruiting new participants, the messaging used in advertising should communicate the benefits of taking part and be tailored to the audience. Including gardening tips in advertising and on social media was thought to increase potential recruits' confidence to take part. Having more people engaging on Facebook was also thought to increase psychological ownership and create a more cohesive social group.

Another way to increase visibility was to focus on the physical garden space. This included putting the garden on the university's official campus map and creating signage. The garden could also be made more visible through ephemeral actions, like sharing and handing out food or plants, walking through campus with food-in-arm, or talking about the garden in social conversations.

Increasing visibility was mainly thought to address barriers to participation, through raising awareness of the initiative so that more people knew about it and were reminded to come, and thereby breaking down the 'cultural barrier' through raising the gardens profile. Ultimately, increasing visibility of the gardens was thought to increase participation. Being on a campus map and being active on social media were thought to contribute to continuity in the project through creating a sense of permanence (through the map) and acting as a catalogue of the historical activities that have taken place (through social media).

Some actions to increase visibility were actually taken by participants. One gardener from the University of Warwick connected with a person tasked with updating their university's campus map, and as a result their garden was included in the most recent version. At Keele University, signage was created to direct people towards a garden and explain what it was, and a twitter account, blog, and Facebook events for gardening sessions were created. It was thought that the sign, being on the campus map, and Facebook events

had positive impacts, but it was hard to assess because the impacts were difficult to perceive in the short-term and/or there were many mediating variables at play.

Although the sign may have had an impact, it is unlikely it is continuing to do so because, since the sign's creation, it has been subject to the wear and tear of outdoor weather, and is therefore no longer readable (see Figures 30a and 30b). The impact of embedding the garden on the campus map (see Figure 31) was difficult to assess on a short timescale, although I suspected it would be possible it could have a more long-lasting impact. I discussed this in the following exchange between myself and a long-term mentor. To give context, in my first statement, I speculated that if the garden at Keele had been embedded in a campus map, it would give it a sense of permanence that would not have existed otherwise.

Interviewer: *Yeah, I think kind of one of the things about being on a campus map is they can't bulldoze over it. For a while at least. Because the campus map is updated. Because it looks kind of awkward if you had a garden and then you bulldoze over it, you know. Which I think […] could be a risk, so.*

Long-term mentor: *I think we're safe here. Everyone keeps saying it's not land they ever want to build on.*

Interviewer: *Yeah.*

Long-term mentor: *And they are building everywhere. But, you're right. It has some kind of institutional memory, just kind of like a physical memory.*

Although there was no immediate intent to build on the space, having the garden in the institution's official map may make it more visible, especially to newcomers on campus. This could create a sense of permanence that might not have been there otherwise, dissuading university planners from building on the space.

Figure 30b. A sign in the garden pointing to the entrance of the garden (October 2016). The sign was placed so that people walking along the path overlooking the garden would be able to see it.

Figure 30c. The sign after several years of wear and tear such that the text is no longer visible (May 2018).

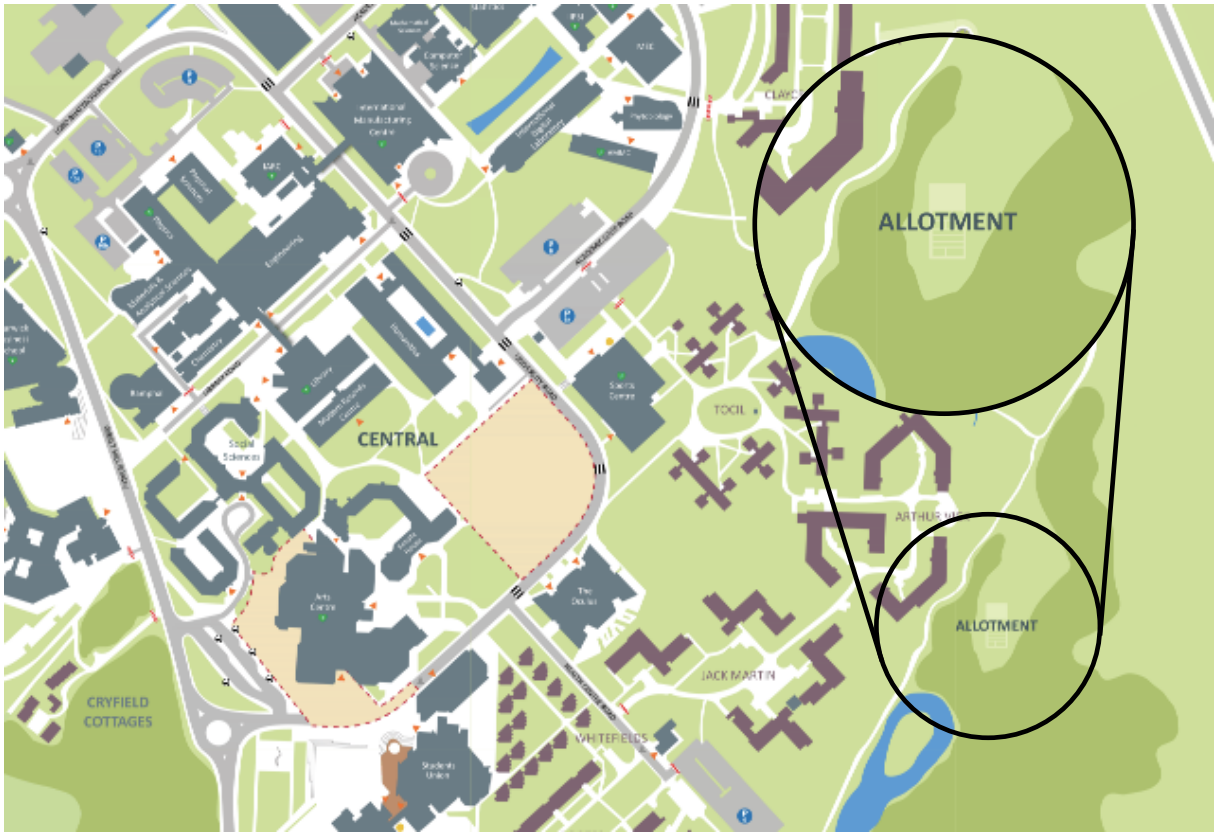


Figure 31. The University of Warwick's Student Eats garden now features in the university's official campus map (University of Warwick, 2015).

The Twitter account and blog for the garden at Keele University, however, were much less effective. At the time this thesis was published, the blog had not been updated since its inception, and the Twitter following was small and was mainly made up of non-students (see Figure 32 and 33). The impact of the Facebook events was difficult to assess as there were so many mediating variables. After the initial spree of creating the events, however, no new events were created which meant this action only lasted a few weeks. This said, following the workshop where this action was planned, I regularly posted on Keele's Facebook page approximately an hour before every gardening session and it seemed to be an effective way to remind people to come to the garden. Of this, one student leader said:

> *Every time, actually, sometimes I forget to go to Student Eats. Oh, I am so irresponsible! Every time Bekki will comment, 'One o'clock pm, who will come?' Okay, I come! Because sometimes I forgot and it really helps.*

Figure 32. A screenshot of Keele's Student Eats Twitter page. As of August 2019, the account has been inactive for nearly a year (@KeeleStdentEats, n.d).

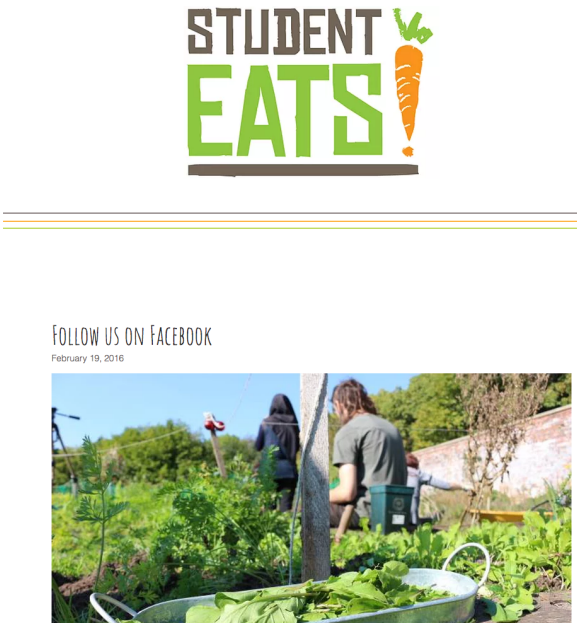


Figure 33. A screenshot of Keele's Student Eats blog. As of August 2019, the account has been inactive for over three years (Student Eats, n.d.).

There was no evidence that social media had any impact on recruitment from outside the garden, knowledge retention, knowledge handover, or any other expected impacts. However, having taken this action and seeing the results (or lack thereof) may have taught

gardeners that these actions are not effective for increasing participation, and this knowledge would likely be carried with the gardeners in their future endeavours. However, if this was learned, it is unlikely that this new knowledge was invested back into the garden since most gardeners were involved for a short period of time. In this way, it would be expected that instrumental learning for the resilience of the gardens was not so effective, however the gardens provide sites for learning that gardeners could take forward into their future endeavours.

8.4.6 Create organisational infrastructure

In Chapters 6 and 7, I wrote that some gardeners preferred a high level of organisational infrastructure, while others found a formal set-up to be off-putting. As such, the suggestion to create organisational infrastructure needs to be applied in context-specific ways, using a great deal of flexibility according to the preferences of current participants. The main, and least contentious, way to create organisational infrastructure in the gardens was to establish a society with committee roles, having elections for these roles, and assigning individual responsibility for tasks (as appropriate).

Gardeners and National Union of Students staff thought that gardeners having individual roles and assigned responsibilities would contribute to a feeling of responsibility and psychological ownership, and increase motivation to continue to take part. A staff member at the National Union of Students said that the Student Eats societies with many roles were particularly effective because having more roles meant more people felt obligated to stay involved. Furthermore, having more roles meant that there would be better distribution of tasks, preventing participants from becoming overburdened and improving garden maintenance overall. Having organisational infrastructure was thought to contribute

to maintaining continuity in the gardens and making handovers between generations of volunteers more likely.

In one of the gardens, one of the actions proposed was to set up elections for a new committee. This was done, and a new committee was elected. However, since the garden was a society within the students' union, it is likely this would have happened even if this research had not taken place. The gardeners who were involved in taking this action were unable to attend future research workshops or interviews and therefore I was unable to ask them how they perceived their impact. However, in my analytic memos, I reflected that:

> *It's not enough to just have roles, they need to be seen as socially legitimate. Many people seem to think that the roles are not democratic enough[18] and are just so we can continue to fit within the student union's structure.*

Students also reflected that although there were elections and people took on formal roles, often people did not actually fulfil the roles they had signed on to:

> *We had beds manager and we had a president going. But they aren't really doing it.* (Passive volunteer)
>
> *So, [a long-term mentor], who's there all the time, said to us, 'who wants to be exec?' and I was like, 'uhhh… I'll do the president thing.' It's admittedly not a very functional exec. I kind of… yeah. I do a lot that I'm not meant to, technically, in the role. So we just kind of do whatever. So yeah.* (Student leader)

However, the roles seemed to be important in a more symbolic sense. When students took on a role, it created a sense of responsibility and obligation towards the garden, even if they did not fulfil their role as it was written. As such, I suggest that it is still advisable to attempt

[18] What I was referring to was that gardeners had often said elections and the roles were not an exercise in democratic governance of the gardens but, rather, only undertaken in order to be considered a legitimate student society within the Students' Union.

to create some organisational infrastructure, even if it does not function in the way it was intended, because it may be providing unintended benefits.

8.4.7 Recruit

Many strategies and actions suggested by participants centred around different ways to recruit new participants, and which potential participants it would be most strategic to recruit. It was felt that the aim should always be to target as many people to recruit as possible, recognising that many people targeted by recruitment would never show up. Many research participants placed a heavy emphasis on the need to build diversity and redundancy in participation. As can be seen in Table 26, students focused most of their suggestions around the barriers to participation and participation itself, with yellow squares featuring less in the rows of the effects of problematic participation. This was also evident in the conversations with students, particularly self-directed and passive volunteers, because the emphasis in the conversations tended to be on strategies to increase participation, with any other impacts of these strategies being thought of as secondary. As one gardener said:

> *…if they are more, a larger group of members we will… we don't need to worry about [participation] in the summer.* (Student leader)

It was also thought to be important to get people involved early in the year, and early on in their degree to maximise the length of time they could be involved in the garden to reduce the need for recruitment and retain a sense of continuity. Use of social media, leafletting, emailing, and other modes of advertising were suggested frequently to raise awareness of the initiative, thereby increasing participation. However, a student leader said that less-active volunteers asking their friends to come was one of the most effective ways to introduce people to the garden and break down the 'cultural barrier'. They said:

…sometimes random people would show up that people just took with them. You know, it was just friends of the core group. And that was really interesting. Because I had a really hard time convincing the people already in the group to come. […] But it was weird that it was apparently really easy for those people to mobilise other people that I've just not reached. Or I've just not tried in the right way. And so that was just them seeing them in the morning and saying 'hey, do you want to come help out?' and that's it. There's no big invitation, it's just a small thing to do.

Some people brought friends to the garden as one of the planned actions. One student leader said that the person they brought only *lasted thirty-five minutes*. A long-term mentor said that in spite of this, inviting friends *extends the network* and that in their garden they rely heavily on *word-of-mouth* for recruitment because it was so effective.

It was also thought that diversifying recruitment was valuable, especially in recruiting 'freshers' (first year undergraduate students), postgraduates, and other long-term participants, like university staff or campus residents. These potential participants were strategic to recruit because they would be able tend to the garden for longer periods than other potential recruits, and some are more likely to be around over the summer months. It was also thought to be useful to recruit participants who were knowledgeable about gardening to elevate overall competence within the garden.

8.4.8 Document and plan

Documenting the history of the gardens and planning for their future was thought to address upstream and downstream causes of problematic participation, and problematic participation itself. Records could be kept to demonstrate impact, catalogue useful resources (e.g., gardening advice), and provide future gardeners with vital information for future strategic planning. Many participants mentioned the need to know what had been planted

where year-on-year to prevent disease, while some gardeners also felt they would benefit from a to-do list or a how-to guide to aid in the week-to-week maintenance of the garden when more knowledgeable gardeners were not present. Gantt charts or visual calendars with pictures of what needed doing when were suggested formats for these aids. Participants said the tangible products of documentation and planning (such as written or online documents) ought to be part of a handover between generations of gardeners.

The main way documenting and planning in the gardens was thought to address the challenges associated with transience was through addressing the knowledge and skill deficit, and especially the lack of knowledge and skill transfer. Documenting and planning were also thought to address participants' lack of confidence by providing information and direction to support their activities in the gardens. A staff member from the National Union of Students thought that a template for a growing calendar would increase psychological ownership as participants could 'plug' their ideas into the template. Research participants said that documenting activities in the gardens and providing handover documents would improve maintenance of the garden and prevent gardeners from becoming overburdened, overwhelmed and just burned out, presumably through increasing the efficiency operations in the gardens. Having a legacy strategy was thought to reduce the risk of low participation in future. In my research diary, I also noted that keeping records would be a way of providing better continuity between generations of students. It was also thought by some that keeping records (for example, recording quantified impacts/outcomes) and having a vision would help to enable potential participants to better understand the purpose of the gardens and care about them more, thereby decreasing the 'cultural barrier.'

Having a shared vision which gardeners input into was thought to contribute to gardeners' ability to self-determine, and therefore build their sense of ownership over the

space. A vision was also thought to be important to increase continuity and foster longer-term thinking. A student leader reflected on this:

> *…you need a bit of a long-term vision for a garden because you don't, obviously… the results aren't immediate. Like, you have to wait a long time. Especially with some crops, like you just have to leave them in the ground for a few years before you get a really good crop. Like we were thinking of doing asparagus, but I was like, there's no point because by the time it's ready to eat, we'll all be gone. Just about choosing your crops really. Like, things that give you a bit more of an immediate benefit rather than the ones you have to wait a long time for. But gardens are more of a long-term project.*

The vast majority of participants felt that to-do lists, guidance documents, and even just provision of general gardening advice would be valuable tools to address the negative impacts of students' transience. In the fishbowl workshop, a students' union staff member described how their garden had taken this to the extreme. They only grew ten crop types, and each person was assigned responsibility for only one. They said:

> *So we have a small library. And everyone who has a small plot has a book. That shows how to grow that kind of vegetable. So they are given the book, and taken through this basic process of growing, of sowing seeds, like that.*

However, this system took place in a college (a further education institution) and had considerable staff time dedicated to their garden. As such, some people were sceptical that such provision of to-do lists and guidance documents would have much of an impact in their food gardens that were more student-led. In one of the evaluation workshops, this was discussed when an 'action' had not been completed. The 'action' was to create a board with information about what tasks needed doing so that even if the knowledgeable gardeners were not there, others could still participate. The following conversation took place:

Long-term mentor: *I mean, would people like a board that said weed bed number 6? And, you know, thin out carrots in bed number 5? Would that be useful to people?*

[silence]

Active gardener: *Because if it says thin out carrots in bed number 5, would people know what that meant? Or?*

Passive volunteer: *No. It's my second time coming. So… uh. I wouldn't know how to do a lot of things. So, I need someone to tell me.*

Interviewer: *So, you need that actual, kind of, person-to-person contact. Okay. So, in terms of that one, scrap that? As an action?*

Long-term mentor: *Yeah.*

The sentiment of the long-term mentor was one that I also shared because I felt that students who were looking to engage passively were not likely to engage in gardening that required the level of independence that reading to-do lists and gardening resources, and figuring out what to do would require. Furthermore, lack of confidence was a big barrier. While information provision might increase confidence to some extent, it seems more likely that a more human-centred approach to learning and confidence-building would be appropriate. Otherwise, a much less labour-intensive way of accessing information about growing would be to find gardening information that is widely available online.

In my research diary I also reflected that:

Having a really well-mapped growing calendar or anything like that would probably teach students more about gardening skills and knowledge in a lead-by-example sort of way. But in terms of managing a complex project, and having the opportunity to self-determine and show initiative, a more 'messy' project does provide many more opportunities for learning – in a problem-based-learning sort of way.

Building a narrative for the gardens was thought to be important for participants to have a sense of the overall purpose of the initiative and feel as though their actions are a part of something bigger. Narrative is widely recognised to be important for creating pathways for sustainable futures (Veland et al., 2018) and thought to be a crucial pedagogical device for sustainability education (Tooth & Renshaw, 2009). Documenting and planning were thought to be a crucial strategy for building a narrative for the gardens. A student leader reflected on the role of narrative and how to build it in the following exchange:

Student leader: *Scenario A: you're a student invited to a gardening session. You turn up. You've been told, hey, let's turn this soil over. Let's plant some things there. You can take some of it home. We meet again next week. That's it. Scenario 2: You get to this place. You meet somebody. And they begin by asking you about how you are and how you got into this, and then they tell you about this place and how long it's been running. And what the story behind it is. Why people are doing it. Why they are doing it together. Why they are doing it in their free time. What's the, kind of, pay, in terms of vegetables and how they think it's a good idea to do it that way. You see, I think if you create this narrative and this story around it, it makes people… it makes it so much easier for people to understand what it's about. And why it's important that they do it. […] If you have some more depth to it. Rather than, hey, we are doing this out of practicality. I don't know what the alternative would be. What would you say if you don't have a story? 'We garden because we garden'? I guess you always have some kind of story. I guess it's… the question is not 'do you have a narrative or no narrative?' The question is how much*

effort do you put in the narrative. Because you always create some kind of story, right?

Interviewer: *Yeah. And so… because I completely agree. I think the whole narrative is really important. But, how do you see a narrative, for example, in the garden being established and taking place when people are turning over. Is it…*

Student leader: *Records. Keeping records. Maybe a one-pager of the history of the garden. The have some kind of yearly calendar of the, kind of, bigger structural things that have changed within the years. Year one we got two beds. Year two we made the compost. Year three, we did that. Right? Something to aid that… turnover. That… I don't know. The progress of the years. To keep record of that. I think that's it.*

8.4.9 Embed in wider organisational infrastructure

Another strategy for addressing challenges associated with transience and participation was to embed gardens in existing organisational infrastructure. Embedding in existing organisational infrastructure was most important for times when participation dropped off. Once embedded, university, students' union, or National Union of Students staff could 'kick-start' a struggling group by advertising and recruiting new members.

One way to embed the gardens in wider organisational infrastructure that was already widely done was to affiliate gardens with students' unions through becoming a student society. This meant they would be expected to have a committee, elections, and, in some cases, membership fees. It also meant that they would benefit from the support that students' unions offered societies, such as funding and advertising opportunities. It was thought that an affiliation with the students' union would help with knowledge handover and

increase continuity. Embedding the garden into students' union volunteering schemes was also thought to make more students aware of the initiative.

The gardens could also be embedded into the university's organisational infrastructure, such as through adding volunteer sessions to university calendars, into internal communications, and on university webpages. Once embedded, these were thought to contribute to a sense of permanence and legacy, whilst serving as automated reminders of the gardening sessions. These were all strategies that contributed to the visibility of the gardens. It was also thought to be helpful to embed the garden into the operation of the grounds or estates maintenance team, although gardeners were cautious about this for fear that more involvement from the university might cause the garden to become 'institutionalised':

> *It's not come to fruition yet, but one of the tasks I was set was to kind of embed the garden in… the actual running of the estates more substantially. I mean, it's complicated, and everyone's wary. But it's quite nice to feel that. On the other side too, we don't want to just be co-oped by Estates. But we want more help. And we want to be… kind of… 'institutionalised' as it were. So I sent a few emails. And there are these sustainability champions that work within Estates. And they've been really good at kind of saying, 'we'll be your kind of go-to people, and we'll talk to the head of estates,' who's really hard to get in contact with, 'about regular compost deliveries, cutting back the pathways…'* (Long-term mentor)

In order to recruit more people and increase participation, participants also suggested Incorporating the garden into the formal curriculum. One way to do this would be through a service learning inspired model, where students would receive academic credit for their involvement. However, this is not the only way it could be done. For example, at one of the gardens studied, international students in a summer English course visited the garden and

engaged in gardening activities. This resulted in some students coming back. Students also regularly used one of the gardens as the topic of an assignment in which students conducted environmental audits of on-campus sustainability. However, different strategies for embedding gardens in the curriculum may have different impacts on students' experiences in the gardens and the benefits that participation may provide. Providing academic accreditation for participation, for example, may increase participation levels and reduce the impacts of transience. However, it may also dampen the capacity for the gardens to remain student-led, and thereby limit creative development and opportunities for more 'intrinsic' forms of learning. When deciding how to embed gardens in the curriculum, consideration should therefore be given to the types of benefits and educational outcomes that are being aimed for, and what types of activities can maximise such benefits and outcomes.

A staff member from the National Union of Students also said that it was important to embed responsibility for the garden into university or students' union's staff member's role description. That way, if a supporting staff member left the university, their replacement would retain supporting the garden in their mandate.

At one of the gardens, one of the proposed actions was to add the gardening session to the postgraduate student calendar. This was done, however there was no evidence that more people were aware of the garden or that it contributed to recruitment. On the other hand, it is likely that more people were aware of the garden because being put in the postgraduate calendar meant that it was included in weekly emails to all postgraduate students.

8.4.10 Maintain healthy relationships and social networks

It was thought that maintaining healthy relationships and networks was important. This includes relationships within the gardens, and between gardeners and external

stakeholders. Some said that being nice and staying positive was one way to do this. It was also thought to be important not to blame or judge people for not pulling their weight, and to show appreciation for the people acting in a more facilitative role as it could be a taxing but invisible job. Cliques could be prevented from forming through befriending new members, and participants thought it to be important to deal with interpersonal conflict. This included interpersonal conflict between gardeners, but also conflict or tensions between gardeners and staff, as described in Chapter 6 and 7.

8.4.11 Connect

It was also thought to be useful to connect to the students' union's current presidents' priorities, other student societies, the National Union of Students' Student Eats Network, and other Student Eats gardens. Connecting to the current priorities of the students' union's president was thought to reduce the 'cultural barrier' by linking the garden to something high on the agenda for the students' union. An example given by a staff member from the National Union of Students was to demonstrate the mental health benefits of gardening in order to connect to the student unions' mental health agenda. Connecting with other student societies was also a way to spread the word about the garden and open it up to new members. For example, one garden invited different societies to come visit their garden sessions[19]. Others suggested that there could be themed gardening sessions by collaborating with other societies.

Connecting to the Student Eats network was thought to put gardeners in contact with resources to improve their gardening knowledge and skills. Furthermore, connecting to other

[19] This, however, did not happen as one of the 'actions' taken through this study.

Student Eats gardens through the network was thought to help gardeners feel they were part of something bigger and made them feel better about the work they were doing.

8.4.12 Create vibrancy and focus on value

I borrowed the phrase 'focus on value' from Wenger et al. (2002) to capture sentiments expressed by the research participants. The meaning of 'value' is context-dependent. What is valuable in one garden may not be in another. Furthermore, actions that are valuable at one point may become less valuable at another point, as the social and organisational dynamics in the garden change. Some of the suggestions about how gardeners can focus on value included ensuring gardening activities were not derailed by committee meetings, making sure recruitment remained a secondary rather than primary purpose, continuing with tasks that need doing even if other people do not show up to gardening sessions, and focusing on activities that were fun and/or useful. It was thought these actions would improve maintenance, and although this was not said explicitly, this suggestion to focus on value seemed to address the 'existential crisis' caused by an overemphasis on recruitment. Focusing on value was thought to help maintain balance between activities that people want to do and activities that need to get done. One students' union staff member said:

> *The struggle we have is that we get task-obsessed sometimes. So not the whole clique thing, but we forget to befriend. So, people who have been there and done it can be like, let's get stuck in that, let's go! Let's do this today, this, this, and this. And then five new people show up and… you just kind of assume you know what's going on. You don't get to actually know them. And then they do it once and they don't come back. Because, you know, it wasn't a purposely trying to exclude people. But they were so focused on something else and forgotten to take a minute…*

Becoming task-obsessed and forgetting to befriend is as problematic as focusing only on the social aspects of being part of the garden group and forgetting to garden. Focusing on activities that bring value to the group can help prevent falling into such either/or traps.

One of the ways to create vibrancy was to have passionate people in the group that believe in the garden. Passionate people were thought to make others care about the garden and break down the 'cultural barrier.' They were also thought to be more likely to take action that creates a better sense of continuity and legacy for the gardens. Another way to create a feeling of vibrancy, according to the gardeners, was to have an impressive harvest in the autumn to inspire new recruits and generate interest from those who might not have heard of the garden. Overall, the focus on creating vibrancy and focusing on value was thought to make the garden more fun and create a positive energy that decreased negative emotional responses.

8.4.13 Appeal to extrinsic motivation & resource adequately

It was also thought that appealing to students' extrinsic motivation would be useful through, for example, giving away free plants and refreshments, or feeding participation in the gardens into volunteering award schemes so students could receive credit for their work. Some also said that paying for membership at the beginning of the academic year would encourage people to continue to take part. Others, however, did not think this was the case, and that it would only discriminate against those who could not afford to pay. It was also felt that the gardens should be funded and resourced adequately, and some thought paid student roles would be useful.

8.5 Problems without solutions

There were a number of barriers to participation (see section 6.2) that were not addressed by any of the suggestions. This is to be expected because, like transience, some of these barriers are not problems that need solving. For example, students trying out gardening and finding it is not for them ('experimenting'), is natural and to be expected. There were other problems that were not addressed by any solutions because they were minor issues. For example, while some gardeners thought that the cost of society fees or buying seeds could be prohibitive for potential recruits, in the three gardens studied, all prospective gardeners were welcomed in regardless of whether they were officially members of the society or could contribute to purchasing seeds or other materials.

However, there were also some solution-less problems that are more problematic and need to be unpacked further. First of all, prospective gardeners' expectations and misconceptions (see section 6.2.1) about the space were not addressed by any of the suggestions. I suspect this is because it is assumed that prospective gardeners coming to the garden and taking part would be the best way to address this. For example, when a new gardener comes into the space with a vision that does not match the group's capacity to act, the best way to recalibrate the vision is to try to put it into practice. Likewise, short-term thinking and lack of insight into transience is difficult to address directly other than to take part, and over time insight into transience and longer-term mindset can be developed. This said, recruiting long-term participants could also be a potential solution to this. As unmet expectations and misconceptions, short-term thinking, and lack of insight into transience all can contribute to negative emotional responses, like frustration, it would also likely be useful to address negative emotional responses to these as a downstream solution (see Table 26 for strategies to address this).

Students being unwilling to commit was another solution-less problem. To some extent, students not wanting to commit is a decision that should be accepted as it may appropriate for students to be able to maintain a balanced, healthy schedule. As such, I would be reluctant to provide strategies that directly deal with this. Instead, I would prefer to focus on increasing initiative, motivation or responsibility, and hope that a greater willingness to commit would be a by-product. However, a similar solution-less problem was gardeners' lack of initiative. It is not entirely unexpected that solutions addressing 'being unwilling to commit' and a 'lack of initiative' were not highlighted because research participants often used terms like confidence, initiative, responsibility, ownership, and motivation to capture the same thing: the intangible quality that makes someone exercise their agency for the good of the garden. Because of the fact that, oftentimes, these terms were being conflated, it is unsurprising some of them were missed when solutions were being suggested.

Untangling how research participants understand each of these terms and how they correspond to how they are defined would be a challenging and interesting route of inquiry. However, in the pragmatist tradition, I would suggest it is sufficient to understand that the solutions increase participants' exercising their agency for the good of the garden, regardless of whether it is to do with increasing confidence, initiative, responsibility, ownership, or motivation. I will elaborate on this further in the following section.

8.6 Increasing participation through 'action competence'

In this section, I will make the argument that there is a mutually reinforcing relationship between the development of 'action competence' (Mogensen & Schnack, 2010; Hedefalk et al., 2014) and participation in student-led food gardens (see Figure 34). That is to say, the more students participate, the more they develop 'action competence,' which makes them more likely to become a more active participant in their garden. But conversely, if

students do not participate, then they do not develop the action competence that drives them to exercise their agency, making them even less likely to participate.

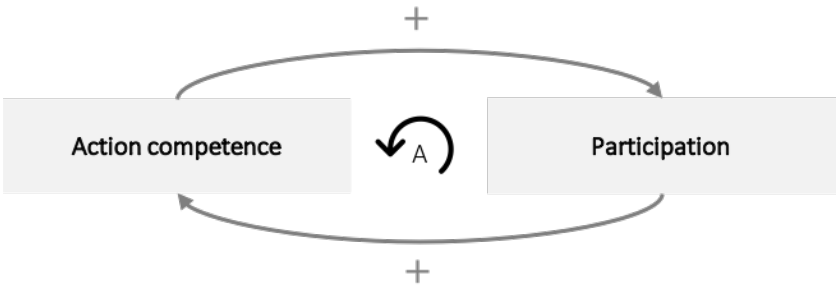


Figure 34. The mutually reinforcing relationship between action competence and participation.

To make this argument, I would first like to suggest that this 'intangible quality' that makes participants exercise their agency for the good of the garden are the pieces that make up 'action competence,' as it is called in sustainability education. As highlighted in Chapter 2, 'action competence' tends to defy definition. However, when scholars do describe it, they use terms like motivation and desire (Morgensen & Schnack, 2010), ownership and commitment (Fien & Skoien, 2002), confidence and responsibility (Almers, 2013), and so on. In the previous section I said that I believe when the research participants used these terms – confidence, initiative, responsibility, ownership, or motivation – they were trying to grasp at the same idea: the intangible quality that makes someone exercise their agency for the good of the garden. I believe this intangible quality to be action competence because it has to do with "ability, motivation and desire to play an active role" in a sustainability-focused initiative (Morgensen & Schnack, 2010, p. 61).

If we take this to be true, the next step is then, to demonstrate that action competence increases participation in student-led food gardens (the upper arrow in Figure 34). As said in Chapter 2, action competence is associated with the intrinsic tradition of sustainability education, and as such is process- rather than outcome-orientated. As such, action competence certainly inspires action of some kind – whether or not it is in student-led food gardens. However, I suggest that it is a safe assumption that if someone has the "ability,

motivation and desire to play an active role" in a sustainability-focused initiative, they would be more likely to take part in a student-led food garden than someone who does not have such an ability, motivation or desire. That is not to say that developing action competence will automatically make a person participate in a student led food garden. Rather, I suggest that the development of action competence in a pool of (potential) gardeners would increase participation in student-led food gardens in general.

Finally, I argue that students can develop action competence in student-led food gardens (the lower arrow in Figure 34). I will do this by outlining how many of the learning environments that are thought to be conducive to building action competence are present in student-led food gardens. First, gardeners worked with "power relations and conflicting interests" through collaborating with other students, and university and students' union staff (Breiting et al., 2005, p. 25). It is through negotiating the challenges associated with working with power relations and conflicting interests, that action competence can be developed (Breiting et al., 2005, p. 25). Through prolonged engagement in the gardens, students can come to consider the "relations between the past, the present and the future," another instance in which action competence can be developed, in order to acquire an understanding of how students' transience impacts student-led food gardens (Breiting et al., 2005, p. 19). In some cases, gardeners had "the opportunity to appreciate and confront diversity," such as through engaging with people with different politics, like in the exchange in section 6.2.2 where a student describes how the garden put vegans and non-vegans into conversation (Breiting et al., 2005, p. 23). This too, is thought to be a situation which can foster action competence. As such, a logical conclusion of this is that the student-led food gardens provide environments in which action competence could be developed.

If we accept all of these propositions to be true, and the relationship between action competence and participation in student-led food gardens is mutually reinforcing, then why is

there a problem with participation? It is, likely in part, because there are many other variables affecting participation, and perhaps development of action competence is not a strong enough driver of continued participation to make a difference. It is also likely that action competence is not developed though peripheral or passive participation because those who engaged in activities that are conducive to building action competence tended to be the more active gardeners. For example, long-term mentors and student leaders were most often the ones managing power relations and conflicting interests, activities conducive to building action competence.

Therefore, to activate this amplifying feedback between participation and action competence, it may be necessary to foster more active participation from passive gardeners. It may also be helpful to create 'boundary interactions' in which gardeners are exposed to opportunities to confront diversity to develop action competence. A boundary interaction is where a negotiation of meaning take place through the juxtaposition of an individual's experience against the socially defined competences of the community (Wenger, 2002). In these boundary interactions, learning happens through "negotiation of meaning as individual experiences and socially defined competences intertwine, or fail to intertwine" (Bendt et al., 2013, p. 19). Wenger et al. (2002) have suggested some strategies to create such boundary interactions. One of these is to "open a dialogue between inside and outside perspectives" (Wenger et al., 2002, p. 51). In addition to building action competence, these interactions can also contribute to problem solving within the community. This is because insiders "appreciate the issues at the heart of the domain, the knowledge that is important to share, the challenges their field faces, and the latent potential in emerging ideas and techniques," whereas outsiders can "help members see the possibilities" for their initiative and how to address challenges it might be facing (Wenger et al., 2002, p. 54-55).

Another strategy to build action competence is through pairing action and reflection (Breiting et al., 2005). In co-curricular activities like student-led food gardens, the focus tends to be on action. It would be untrue to say no reflection takes part, and it certainly did take place in gardening sessions I attended, especially through conversations between gardeners. However, reflection typically only happened incidentally and could be built in more strategically if sustainability education is the principle outcome of these initiatives as suggested in Chapter 5. It is possible that formal opportunities to reflect on their participation could be valuable for those taking part in student-led food gardens. Embedding opportunities like this into already existing programmes could be a strategy to do this. At Keele University, students were able to log their volunteering hours to receive volunteering awards (KeeleSU, n.d.). The volunteer hour log could potentially be accompanied by a written or oral reflection in order for students to get the most learning out of their volunteering. A different, but also optional, scheme run at Keele was a skills portfolio programme accredited by the Institute for Leadership and Management (Keele University, n.d.). Students undertaking the programme are required to read articles on, for example, critical thinking, time management, public speaking, leadership, and so on. They are also required to write between 2400 and 9000 words reflecting on six pre-determined personal and professional development skills, such as techniques for getting organised and dealing with stress. Such a portfolio could be an excellent place to embed reflective exercises reflecting on sustainability-related co-curricular activity. Similar programmes exist at other higher education institutions in the United Kingdom and could be leveraged in this way as well.

8.7 Retaining social-ecological memory

In this section, I will draw on the concepts of 'social-ecological memory' to make sense of how memory was being retained within the student-led food gardens and how it could be

better retained. Social-ecological memory is a relatively new concept that has built on prior theorisation about social memory (Coser, 1992; Gongaware, 2003) and social-ecological systems (Folke et al, 2003; Berkes et al., 2003). Social memory (sometimes called collective memory or cultural memory) is thought to store "experiences of living pasts and influencing behaviours of societies and groups" (Barthel et al., 2010, p. 255). The concept of 'organisational memory' (as brought up in Chapter 6) has typically been theorised through an approach to knowledge akin to Freire's (2000) 'banking model,' in which organisational memory is thought of as a "storage bin" rather than thinking of memory within an organisation as being something that is socially-constructed (Rowlinson et al., 2010, p. 69). However, in recent years the approach to memory in organisational studies' approach has been shifting towards more of a social constructivist view (Rowlinson et al., 2010). As such, one might think of this social constructivist interpretation of organisational memory as the storage of experiences of living pasts that influences behaviours of an organisation. Social-ecological memory is a bit broader, in that it is made up of a set of "collectively shared mental maps for dealing with a complex world" that carry social and "ecological experiences and revises them over time and between people" (Barthel et al., 2010, p. 256). Social memory, organisational memory, and social-ecological memory are all means of carrying forward experiences and mental maps and have relevance to the study of student-led food gardens, but social-ecological memory is the only conceptualisation that encompasses the ecological system in full recognition of its complexity. Furthermore, student-led food gardens are extremely amorphous organisations that are more akin to social networks than the somewhat more formal organisations that the concept of organisational memory is typically written about (e.g., Olivera, 2000; Ibert, 2004). As such, social-ecological memory is the most useful concept to use in this instance.

Social-ecological memory can contribute to local resilience by retaining knowledge about management of social and environmental ecosystem services that can be drawn on in times of crisis (Barthel et al., 2010). It has been found that the main ways that social-ecological memory is retained in urban gardens is through rituals/habits, oral communications, rules-in-use/metaphors (e.g., organic practices, phrases/sayings), physical forms/artefacts, and engagement from/embeddedness in external institutions or physical forms (e.g., artefacts, laws, social networks) (Barthel et al., 2010). These were all present in student-led food gardens.

As highlighted in section 8.4.8 (on documenting and planning), in-person communication (whether it be through rituals/habits, oral communications, or rules-in-use/metaphors) are effective ways to retain memory within a student-led food garden. An example of a ritual that took place through which memory was retained was how, every week before the regular gardening session in one of the gardens, one of the self-directed volunteers would post a picture on social media of what had taken place the previous week:

> *I'm hoping […] just capturing these photos will make a difference in encouraging people. I know it's not the same as […] the actual experience you have, but I'm hoping… that will have an impact on future cohorts coming in.*

Posting the photos not only reminded participants to come to the garden, but produced a log of what had been done in the garden, week by week. However, it was unclear if the log of photos had been used in a way that made use of these memories.

However, given the high levels of student transience in student-led food gardens, it often happened that rituals, oral communication, and rules-in-use/metaphors were not retained or passed on because of high turnover, seasonal breaks in participation, and periods of no participation at all. Over shorter periods and between generations of students that overlap, these strategies may be crucial for retaining memory. However, over longer periods,

I found that physical forms/artefacts, embeddedness in external institutions, and objects beyond the gardens had a more important role to play in keeping retaining social-ecological memory. For example, at one garden there was little or no overlap between participants, which meant that rituals, oral communication, and rules-in-use/metaphors were ineffective for retaining social-ecological memory. However, physical forms/artefacts, like physical garden space itself, and external sources of support, like the students' union, played an important role in retaining social-ecological memory.

It was thought that artefacts like written records, sowing calendars, or Gantt charts were important for addressing challenges associated with lack of knowledge/skills transfer, especially when they were retained in a way that would be accessible to future generations of students. This was because rituals, oral communication, and rules-in-use/metaphors could not be used in cases when generations of gardeners did not overlap temporally. However, the physical features of the gardens themselves seemed to play a more important role in practice. Raised beds, greenhouses, and other physical features served as a reminder of what the gardens had been, even when they weren't being actively managed. Observing the soil told gardeners about what has been there previously. For example, in one of the gardens both miner's lettuce and nasturtiums returned to the beds year on year, regardless of what had been planted there since. Latent disease present in the soil manifested when the crop rotation was not maintained. At Keele, when the garden was created, it was even chosen to be placed in the historical walled garden of the campus estate from the late 1700s, serving as social-ecological memory manifest.

As highlighted in Chapter 6, long-term stakeholders, although they may be 'outside' the initiative, have a vital role in retaining memory within the gardens. Most directly, university staff with gardening experience shared their knowledge and skills with inexperienced gardeners. University and students' union staff also supported students with

the retention of organisational memory by adding gardening sessions to university calendars, into internal communications, and on university webpages. Staff from the National Union of Students contributed to the development of social-ecological memory by supporting student gardeners with guidance about food growing and structure to support record-keeping, such as templates of sowing calendars. However, long-term stakeholders could help students even more by ensuring that gardens' plans and documentation are passed on to future generations of students rather than leaving it entirely in the students' hands. As such, in times of high turnover, physical forms/artefacts and external sources of memory played a more important role in contributing to social ecological memory than did rituals, oral communication, and 'rules-in-use'/metaphors.

8.8 Summary of advice for different stakeholders

Different stakeholders have different roles to play in managing the impacts of transience within student-led food gardens. All the suggestions from earlier in this chapter, including those summarised from Chapters 6 and 7, have been separated out into advice for students, advice for university and students' union staff, and advice to the staff at the National Union of Students and presented in Table 27. Sustainability science and action research are intended to have practical impacts. This advice, summarised and disaggregated by stakeholder, is intended to contribute practically.

The roles actors within universities and students' unions take in the governance of student-led food gardens can be expected to vary between institutions, depending on staff competencies, interests, and institutional roles and arrangements. For example, some universities' sustainability staff are located within the estates, grounds, or operations teams, and other institutions have sustainability staff located with academic faculties, or as a unique unit within the institution. Furthermore, some institutions operate their student-facing

sustainability work out of the students' union. As such, advice to students' union and university staff have been lumped together because to disaggregate them would make the recommendations less widely applicable.

In summary, advice to students is tailored towards how to run the core activities and recruitment in the garden, with a focus on keeping a long-term perspective in mind. The advice for university and students' union staff focuses on supporting student gardeners in a way that students' autonomy over the garden and how it is run is retained. Their support should focus particularly on students' blind spots, like having a long-term view of the garden, ensuring knowledge handover, embedding the garden in the university's activities and infrastructure. In all of this, university and students' union staff should become and stay attuned to the power dynamics between themselves and students, and develop strategies to compensate for them. Advice for the staff from the National Union of Students focuses on providing support to students through providing gardening-specific resources, providing inspiration, facilitating and mediating staff-student relationships, and helping student gardeners see they are part of something bigger. I also suggest that all stakeholders should strive to learn, through reflection and from each other, and treat learning as a process rather than as an outcome.

Some of the advice in this chapter and Table 27 is very specific to the context of the United Kingdom. As highlighted earlier, not all countries have such active or well-funded students' unions at university or national levels. However, it is clear that the National Union of Students has and can continue to fulfil a unique role in linking student groups from different universities to provide guidance and inspiration, and help students see they are part of a bigger movement. As external stakeholders with insight into both the student and staff perspective, hey also help facilitate healthy student-staff relationships, and build bridges across different parts of the university. What this means is that in countries where nation- or

Table 27. Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Maintain an appropriate and well-managed space	• Grow low-maintenance crops that are either early or late cropping (as long as it doesn't prevent gardeners from being creative or dampen interest)	• Provide physical infrastructure required for gardening (e.g., water taps), and infrastructure to reduce the maintenance needs of the space (e.g., raised beds), provide sheltered space for gardening in poor weather, and create social spaces (e.g., seating) • If setting up a garden, consider its location with regards to connectivity with the rest of the campus • Ensure the space is widely accessible, including out of business hours • Pay attention to the physical state of the garden as an indicator of the overall status of the gardening group	• Support student gardeners with information about low-maintenance growing that is congruent with the academic calendar
Run events and activities	• Organise regular year-round gardening sessions on a set day and time on a weekly basis • Create variety in the garden's activities, with balance between 'fun' activities (e.g., socials, workshops) and work that just needs to get done (e.g., recruitment, gardening tasks that some might find boring) • Create opportunities for structured volunteering and more free-form modes of taking part	• Fund visits, short courses, or other events or activities, as appropriate	• Continue to run conferences • Provide information to students about external events and activities they can take part in • Fund visits, short courses, or other events or activities, as appropriate

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students

Ensure students are supported	• Seek out support from:
	  ○ University and students' union staff
	  ○ The National Union of Students
	  ○ Knowledgeable gardeners
	  ○ Your peers
	• For help with:
	  ○ What to grow and how to grow it
	  ○ Retaining the garden's historical knowledge and pass it forward to future generations of students
	  ○ Embedding the garden in the university's activities and infrastructure
		• Ensure there is an appropriate balance between staff and student involvement such that students feel supported but that students' autonomy over the garden and how it is run is retained
		• Reassure students when they face challenges and become frustrated or disappointed
		• 'Kick-start' the garden if it falls into a period of low participation or inactivity
		• Be responsive and timely in interactions with students, but acknowledge they are volunteers and may still be learning to extend the same level of professionalism
		• Students' unions should offer support with raising awareness of the garden, recruiting new participants, running the garden as a student society and support knowledge handover
		• Staff with gardening experience can offer to share their knowledge/skills
		• Grounds or operations staff can mow the lawn within or around the garden and provide compost, as relevant
			• Reassure students when they face challenges and become frustrated or disappointed
			• Support students in building and maintaining productive relationships with university and students' union staff

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Nurture interest and creativity	• Provide leadership, mentorship, and facilitate engagement in the space, even if you are not sure if it is your role to do so • Reassure others when they face challenges and become frustrated or disappointed • Do not overburden yourself or others, but do encourage taking on a bigger role and coming back again • Do not tell other people what to do; instead, let them ask • Be flexible, pay close attention, and sense into the needs of the group so you can create an atmosphere where people can engage in ways that suit them • Communicate in person where possible • Ask other students what their visions for the space are • Listen to others and help them • Stay curious and experiment	• Devolve as much decision-making power to students as possible • Ensure that averting risk stifles students' creativity and self-determination as little as possible	• Provide case studies of impressive or innovative initiatives
Increase visibility	• Advertise the garden through the student newspaper, social media, leafletting, emailing, blogging, and creating videos, for example • Use social media to remind people to come to the garden on a weekly basis through creating online events or messages • Create lively conversations on social media with many people contributing • Hand out or walk around with food/plants • Spread the word about the garden in social conversations	• Put the garden on the university campus map • Create signage directing people to the garden and/or an interpretive sign for the gardening space	

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Create organisational infrastructure	• Establish a student society with committee roles, and have elections for these roles • Create individual responsibilities for tasks if you, collectively, feel this is appropriate to your group • Long-term mentors and student leaders should engage less-active participants in decision-making as much as possible	• Provide gardeners with the framework to set up a student society and reminders to have elections	• Provide guidance to students and Students' Union for the sorts of roles and tasks that are appropriate to a food growing society (in contrast to other student societies)
Recruit	• Recruit as many people as possible through increasing the visibility of the garden, acknowledging that many people who are targeted will never show up • Ask friends to come to the garden • Strive to recruit diverse participants • Strive to involve participants that will stay involved for longer periods (such as postgraduate students, staff, first-year students, or campus residents) • Strive to recruit people who are knowledgeable about gardening		

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students

Document and plan	• Focus on retaining knowledge within the garden by:
	  ○ Keeping records on what has been planted where each year
	  ○ Creating to-do lists and/or how-to guides (could be Gantt charts or visual calendars)
	  ○ Keeping records in an accessible and low-maintenance way so they can be used in handovers between generations of gardeners and catch the eye of outsiders
	• Plan for the future by visioning what the garden should look like in future and creating legacy strategies for the next generation of students
	• Construct and communicate the story of your garden – where has it come from and where is it going to?
		• Help students transfer plans and documentation on to future generations of students
		• Prompt students to document and plan at appropriate intervals
			• Provide guidance (such as gardening information and resources) and structure (such as templates) to support record-keeping

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Embed within wider organisational infrastructure	• Affiliate the garden with a students' union through creating a student society • Take advantage of opportunities provided by an affiliation with the students' union, such as funding or advertising • Embed the gardens into students' union volunteering schemes, if relevant • Seek to add gardening sessions to university calendars, into internal communications, and on university webpages	• Add gardening sessions to university calendars, into internal communications, and on university webpages • Academic staff can offer to embed the garden in their formal curricula, where appropriate • Grounds or operations staff can embed the garden within the schedules to mow lawns and provide compost, if relevant • Embed the responsibility for the garden into university or students' union's staff member's role description • Embed opportunities for reflection about taking part in the garden in leadership accreditations, volunteering awards, or other such schemes, as relevant	
Maintain healthy relationships & social networks	• Create a lively and cohesive garden group, and remain open to new recruits to prevent being seen as clique-y • Be nice to and befriend newcomers • Stay positive and reserve judgement and blame if others do not 'pull their weight' • Address interpersonal conflict • Engage with staff at the university, students' union, and National Union of students in a professional and timely manner, and be patient with them as helping the garden is likely only one of many tasks on their plates	• Help mediate interpersonal conflicts between gardeners, as appropriate • Pay attention to power asymmetries between staff and students, and develop strategies to compensate for them • Pay attention to the quality of relationships between staff and students to identify changes, especially changes for the worse	• Pay attention to the quality of relationships between staff and students to identify changes, especially changes for the worse • Play a facilitative role in student-staff conversations to create a mutual sense of trust and understanding, and mediate as necessary in the event of friction or conflict

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Connect	• Connect the garden to current priorities of the students' union or university • Invite other student societies to the garden or run joint activities • Long-term mentors and student leaders should strive to act as a bridge between the less active gardeners and university, students' union, and National Union of Students staff		• Use the Student Eats network to connect gardens from different universities
Create vibrancy and focus on value	• Find passion in your work in the garden and support other in finding theirs • Plan for an impressive harvest in the autumn • Pay attention to the balance between an emphasis on recruitment compared to the 'core business' of the garden as an indicator of whether the focus needs to shift • Focus on activities that bring the most value to the garden and try not to get side-tracked by activities that might not bring as much value (such as too many committee meetings, or tasks that do not contribute to the vision for or fun in the garden) • Ensure long-term mentors and student leaders get to take part in gardening activities, and not only administrative activities		

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Appeal to extrinsic motivation	• Give away plants or serve refreshments at gardening sessions	• Create opportunities for taking part in the garden to contribute to volunteering award schemes, if relevant	
Secure funding/resourcing		• Consider paid part-time student roles for coordinating the garden and volunteering activities in the garden • Ensure time is allotted for supporting students, preferably from both more traditionally student-facing roles (i.e., students' union or sustainability staff) and estates, grounds, or operations staff	

Table 27 (continued). Advice to different stakeholders of student-led food gardens for how to address the impacts of transience in student-led food gardens.

	Advice to students	Advice to university & students' union staff	Advice to staff at the National Union of Students
Other key messages	• When trying to improve participation and reduce the negative impacts of problematic participation, consider which of the issues in Figure 26 are the most relevant in your garden, and use Table 26 to find appropriate solutions to address those issues • Be patient with uncertainty, and do not let it prevent you from taking part in the garden • Do not worry if your actions do not have an impact right now. They might have an impact in future that you cannot perceive, or it might take ten tries for an action to have impact. Do not stop on your ninth try! • Be open to learning because 'you don't know what you don't know' • Think of learning as a process rather than an outcome – it's not what you get out of it, but how you get there • Reflect, and be open minded with people who might not think the same way as you do because you never know what you might learn from that interaction – even if it is uncomfortable! • Understand that there will be different levels of participation in the garden, and it is okay that some people are more active than others	• When trying to improve participation and reduce the negative impacts of problematic participation, consider which of the issues in Figure 26 are the most relevant in your garden, and use Table 26 to find appropriate solutions to address those issues • Work closely with other staff supporting the garden, whether they be in the students' union, an academic, in the estates, grounds, or operations team, at the National Union of Students, or elsewhere • Ensure students are actively involved in decision-making about the garden space • Be open to learning because 'you don't know what you don't know' • Reflect, and be open minded with people who might not think the same way as you do because you never know what you might learn from that interaction – even if it is uncomfortable! • Encourage students to think of learning as a process rather than an outcome	• Be open to learning because 'you don't know what you don't know' • Reflect, and be open minded with people who might not think the same way as you do because you never know what you might learn from that interaction – even if it is uncomfortable! • Encourage students to think of learning as a process rather than an outcome

region-wide students' union and advocacy groups do not exist or are weak, other strategies for accessing guidance and inspiration, helping students see they are part of a bigger movement, and developing and mediating student-staff relationships may be needed, as least in the short-term. In the long term, student-facing sustainability organisations have an important role to play in linking between local pockets of activity, and these therefore should be strengthened.

8.9 Conclusion

In summary, this chapter has provided suggestions for how to address the impacts of transience and build resilience into student-led food gardens based on the analyses from Chapters 6 and 7, the suggestions made by the research participants, and the actions actually taken in the gardens. It is important for student-led food gardens to maintain an appropriate and well-managed space in which to run events and activities, nurture interest and creativity, create vibrancy, and take actions that bring value to the space. Efforts should be made to increase the visibility of the gardens and recruit widely. At times, this may be through appealing to potential participants' extrinsic motivation. Students should be supported by relevant longer-term stakeholders, which were, in this case, staff from the university, students' union, and National Union of students. Gardeners should be supported in creating organisational infrastructure, like having an elected committee of students. The gardens themselves should also be embedded in the wider organisational infrastructure, like campus maps and calendars. Gardeners should strive to document what has happened in the gardens and what is planned to happen next, and long-term stakeholders should support handing-over documentation and plans between generations of gardeners.

Healthy relationships and social networks should be maintained within the gardens and between gardeners and other stakeholders, such as university maintenance teams.

Connecting with other gardens and organisations can also help gardeners feel like they are a part of something bigger when participating in their garden. Finally, it was important for the gardens to be adequately funded and resourced, especially resourcing for staff time to support the gardens.

Learning was one of the main ambitions of the gardens and the primary outcome of university community gardens, as highlighted in earlier chapters. However, learning and retention of social-ecological memory also play an important role in managing the impacts of transience, particularly though the development of 'action competence', and the use of physical forms/artefacts and external engagement and embeddedness as sources social ecological memory.

At the end of the chapter, I offer practical advice tailored to different stakeholders of student-led food gardens. Advice to students focuses on how to run the core activities and recruitment in the garden, with a focus on keeping a long-term perspective in mind, while the advice for university and students' union staff focuses on supporting student gardeners in a way that students' autonomy over the garden and how it is run is retained. The advice for the staff of the National Union of Students focused more on supporting the gardeners from a distance with gardening resources, providing inspiration, managing staff-student relationships, and helping gardeners see the big picture. The next chapter will also be future-orientated, but will trade the prescriptive orientation for a more reflective one, considering this study's methodology and potential future research directions.

Methodological reflections and future directions

Chapter 9

…a single cause does not lead to a specific affect and yet in research and evaluation we tend to behave as if it did.

Willem van der Eyken, 1996

Mushrooms
Spring 2014

9.1 Introduction

This thesis has caused me to reflect considerably upon the methodology I used, which is where I will begin this chapter. The further lines of inquiry generated in this study will be presented in the second half.

9.2 Methodological reflections

I have already reflected on methodology to some extent in Chapter 7. I reflected on the usability of the resilience principles, and made some suggestions about how to improve the principles' fit with social science literature and intrinsic educational tradition. I also outlined how applying the resilience principles might be done with greater humility, and suggested that the synergies between the ideas of communities of practice and learning for resilience could be drawn out further in future. This section will focus on exploring some further methodological issues.

In writing these methodological reflections, I have attempted to be as candid and honest as possible. Authenticity is an important quality criterion for action research, and part of being authentic is being transparent. Attempting to obscure mistakes or hide behind academic language in order to bolster the credibility of research findings does not serve to deepen understanding or contribute to positive societal outcomes. Therefore, I urge the reader to recognise my mistakes, errors of judgement, and oversights, and use them to learn from and contextualise. As a researcher from Cook's (1998, p. 106) article on mess in action research said: "it's more systematic to admit that you're bumbling than to dress up your bumbling as something else. That's just plain dishonest." Mess in research allows for "getting below rhetoric" through creating "space for contesting interpretations" and methodological plurality (Cook, 2009 p. 288, 289). Scholars in the field of geography echo this, calling for

"open discussion of mistakes, failures, and setbacks [as they] should be part of our collective learning process" (Harrowell et al., 2018, p. 236). In contrast to more conventional views of how research should be presented, I contend that the systematic cataloguing of mess and failure is a mark of rigour. This section (and parts of Chapter 4) are intended to catalogue mess, mistakes, and even failure, to this end.

In this section, I will begin by explaining how keeping research diary enhanced the rigour of this study. This will be followed by a reflection on how my unique positionality as a student-staff member provided me with a unique opportunity for inquiry into the both the worlds of students and staff. The next section will unpack some of the challenges of conducting action research with transient participants, and following that I will reflect on the weaknesses and strengths of combining action research with a single embedded case study approach. I then discuss how I believe my naiveté affected my study, the discomfort an interviewee had with focusing on 'problems' in the first phase of the research, and missing stakeholder involvement. Before going on to discuss potential future research directions, I reflect on conducting causal loop mapping and applying the resilience principles late in the research process.

9.2.1 The changing research focus – and the value of a research diary

Keeping a research diary was a crucial part of my research process. This was also complemented by several 'proposals' I wrote at various stages in my research, for which the main purpose was to clarify my thinking about my study as a whole. I will now use a passage from an analytical memo to unpack how my research diary served my doctoral research. In an analytic memo I wrote while working on early drafts of my methodology, I reflected:

> *Part of what has struck me in this process is the fallibility of my own memory. My proposals are actually a really interesting way for me to see the progress in my*

thinking. And what's really interesting, I think, is that before looking […] at my research proposals I had a narrative in my mind of how my ideas developed which was much more linear than the reality. Upon reflection on these proposals, I discovered there were two main problems underpinning the initial framings of my research. In my mind I thought that I had arrived wanting to study the environmental impacts of community gardening, and through a participatory process I had realised that measuring environmental impacts would have very little relevance for student gardeners on the ground, and that they told me that primarily struggled with participation and their own transience. What actually happened, evidenced by my proposals, was much messier. I actually engaged with the 'transience' phenomenon much earlier than I remembered doing so. A proposal I wrote in October 2013 already stated a research aim as to: "investigate if and how community gardens tended to by transient populations, like university students, are affected by the mobility of their participants". […] But in January of 2014, I had departed somewhat from these ideas in favour of developing indicators to measure the 'social and environmental outcomes' of student food growing projects as I wanted to "evaluate, in collaboration with community gardens affiliated with Student Eats, their social and environmental sustainability." I think the reality here is that I was struggling with understanding what makes research 'legitimate,' and had been highly influenced by Guitart et al.'s (2012) paper that noted most papers about community gardening came from the social sciences, and that while many purport that community gardens contribute to environmental sustainability, few actually demonstrate this. At the time I started writing about wanting to develop indicators for sustainability I was also beginning my own quantitative systematic review of university community gardens (Laycock [Pedersen] & Robinson, 201[8]). And I was also, I believe, feeling the aftershock of my Master's

degree in Environmental Studies and Sustainability Science at Lund University, particularly from a module about 'Sustainability Science.' I very much agreed with the main tenets of sustainability science – a discipline aiming to be transdisciplinary, to break down the divides between "scientists from different disciplines and non-academic stakeholders from business, government, and the civil society in order to address sustainability challenges and develop solution options" (Lang et al., 2012, p. 26). At the time I didn't feel this, but I increasingly do now, the language of 'Sustainability Science' operates much more comfortably within the natural sciences than the social sciences. Even the term itself – Sustainability Science – seems to imply that it is a Science (e.g., geoscience, chemical sciences), rather than a field of study (e.g., gender studies). To me, tapping into the language of 'Science' reads as a strategy to legitimise the field ('It is a real science! It is rigorous!'), which actually undermines its transdisciplinary ambitions through subjugation of some of forms of social sciences and the humanities.

But coming back to the topic at hand, the first main problem with my research framing was that I was attempting impose a quantitative (and environmental science-influenced) approach on a case in which messy, complex social phenomena were at stake.

As is evident from this passage, my research diary and cataloguing of progress served several purposes. On a mundane level, I collected factual information, like my changing research aims and rationale. Collecting this meant that I was more accurately able to chart development of my thinking. I was then able to use this to construct my methodology chapter in a more accurate way than I would have been able to otherwise. This factual information also served my reflective practice. When revisiting this information after several years, it challenged my present perceptions, thereby prompting me to think critically about what

happened, my understandings of the issues at play, how they have changed, and what I have learned. As Engin (2011, p. 303) put it, "the opportunity to re-read and interact with my thoughts was also a strong mediator in understanding my role of researcher and the research process."

Research diaries are thought to be especially useful for novice researchers, enabling us to scaffold our own understandings through using a research diary as "repository for thoughts and reflections" and "as a written account of [our] research [journeys]" (Engin, 2011, p. 303). As can be seen towards the end of the above passage, I reflected on some of my (perhaps unconscious) assumptions about what 'science' is and how this might have affected my initial assumptions that influenced my choice of how to frame my research. In doing this, I have been able to be more transparent (Clark, 2009) about factors that may have influenced my analysis and framing. While not all of these factors were unpacked in the above passage, I revisited my research diary and catalogue of documents whilst writing the section about my methodology to enable me to be as accurate and transparent as possible.

9.2.2 Gaining privileged access to the separate worlds of students and staff

In Chapter 4, I discussed my boundary spanning (Williams, 2002) role as a student-staff member and how this gave me privileged access to the different worlds occupied by students and other stakeholders from the universities, students' unions and the National Union of Students. I would like to note that this boundary spanning role is a bit more complex than a by-the-book practitioner-researcher role because I was a practitioner in two senses: a student practitioner and a sustainability professional practitioner. My focus here is on the boundary spanning between these two practitioner roles. As a student, I took courses, was a member of the students' union, took part in student activities, and was unpaid. As a staff member, I was also employed, interacted with other university staff in a professional capacity,

and built my schedule around a conventional work-week. Many doctoral students have teaching responsibilities, but it is much less common for them to have responsibilities with administration, student support services, or the campus grounds/built environment, in the way that I did. I believe this dual role was pivotal for providing insight into the interface between these two worlds that student-led food gardens occupy. I also believe that these crossover roles could be beneficial for research into other student-focused campus initiatives. Partnerships between student advocacy organisations, like the National Union of Students and universities would well-suited to conceptualise and/or fund such initiatives.

These dual roles, and other complex configurations of positionalities that such doctoral researchers may find themselves in, require a high degree of reflexivity to bring unconscious assumptions to light and allow for inquiry into potential ethical quandaries. As such, the methodologies employed by these boundary spanning researchers are also crucial. Reflection on my positionality in my research diary helped me to find ethical ways to exploit my boundary spanning role, as well as highlight my biases and assumptions. More traditional research approaches that focus on distancing the researcher from the study could actually prove to be more problematic for researchers with these complex roles because of unproblematised positionality that could result in bias or abuse of power (England, 1994). Even in quantitative inquiry, reflexivity "can be an effective, ongoing means of critically reviewing work, process and researcher development" (Walker et al., 2013, p. 38). Some strategies that might be useful for this are self-interviews (Keightley et al., 2012), examining one's positionality (Coghlan & Brannick, 2019), and writing reflexive 'asides' within one's thesis (Forbes, 2008).

9.2.3 Action research with and about transient partners

As highlighted in Chapter 2, there have been calls for action-orientated research in the field of sustainability, a research approach that requires prolonged engagement. However, the world is globalising, and people are moving and travelling at rates that are unprecedented in human history. For example, career change is more common than it used to be and episodic volunteering is on the rise (MacDuff, 2005). This means that understanding how to use action research when working with transient partners or participants is of critical importance. This study has provided some insights into the challenges of doing action research with transient participants and how these might be navigated.

I found several key challenges in doing action research with transient participants. They were (1) a superficial understanding of issues by volunteers as a result of short term engagement, resulting in difficulties identifying or theorising the issue to research; (2) difficulties ensuring the implementation of 'actions' or 'interventions' given those involved in the 'planning' phase had often left by the 'action' phase; (3) a lack of capacity to engage in research given the ongoing challenges to maintain an adequate level of participation; and (4) that participants reported that the introduction of the researcher changed the group dynamics, prompted critical reflections that had not previously taken place, and improved continuity, thereby preventing a 'naturalistic' inquiry into transience as a phenomenon.

9.2.3.1 Transient participants lack insight into their own transience

Part of what makes this study unique is that it is not only conducting action research with transient participants, but it is actually researching the phenomenon of transience itself. Most student gardeners had superficial understandings of the issues faced by student-led food gardens as a result of short term and irregular engagement (as seen in Chapters 6 and 7). This resulted in difficulties collaboratively identifying, theorising, and evaluating the issue

to research. This was particularly evident in the photovoice component of the study. I would characterise the use of this method as relatively unsuccessful in terms of how the participants engaged in answering the questions posed. Most of the responses were off-topic. For example, participants took submitted photos and captions that described things they enjoyed about the garden or particular features of the garden (see Figure 35). As such, these did not provide insight into the issue of transience or participation. The discussion about the photos did provide useful reflections, however the most useful parts of the conversation were disconnected from the photos. The challenge of participants providing off-topic photos has been mentioned in the literature about photovoice (e.g., Gaboardi et al., 2018), however most articles giving an overview of photovoice and challenges associated with it do not mention this (e.g., Catalani & Minkler, 2010; Powers & Freedman, 2012; Povee et al., 2014).

I absolutely LOVE having the opportunity to be a part of something as special and as colorful as gardening at Keele is. Being an international student from the United States and having always loved the outdoors, I fell in complete adoration of the individuals who made up the community as well as the ability to tend to the Earth just as I did back home. xo

Figure 35. One of the off-topic photovoice submissions.

A mantra of many of those who engage in participatory research is that people are experts on their own lived experiences (e.g., Einerson, 1998; Sampson & Wills, 2013). This

was the thinking that underpinned my understanding of participatory research, and as a result I turned to the research participants to help me better understand transience and how it might be managed. However, in doing so, I found that the participants who were the most transient struggled to understand how their own transience impacted the garden. On the other hand, participants that provided nuanced insights were typically ones that would be considered the least transient. While I consider it to be true that people are experts of their own lived experiences, from my research I came to see that people are not always experts on social milieu they operate within. I reflected on this in my research diary:

> *In terms of doing action research with transient participants, I think it's a real challenge, because the people who end up being 'key informants' are the less transient participants. So it's actually the more permanent participants who have the most voice. But similarly, they end up being the ones to say the most interesting things. For example, [one of the long-term mentors] certainly isn't transient, but [they have] so many interesting observations. But at the same time, [they have] obviously spent a long time thinking about the transience of participants. Whereas the genuinely transient participants haven't reflected on it, on their role, and on the project in anywhere near the same depth. So with each person I interview, they say more or less the same things.*

As such, when conducting participatory research with transient participants, gathering perspectives from less transient stakeholders may be necessary. Transient stakeholders are able to provide insights into their lived reality (that is, psychological phenomena). However, equally important are the perspectives of less transient stakeholders because they are better able to provide insight into social and organisational dynamics at play (that is, sociological phenomena) that transient stakeholders may not be able to perceive. As such, researchers may benefit from considering which perspectives will best help them answer their research

questions, depending on the aims of the research study and whether the focus leans further towards the psychological or the sociological (or otherwise).

9.2.3.2 Difficulty providing 'value' to research participants

One of the main features of participatory action research is a focus on reciprocity between the researcher and participants (Maiter et al., 2008). As such, I intended for my research to deliver benefits to the student-led food gardens and their participants. As was outlined in Chapter 8, the benefits of the 'actions' taken were mixed, and it was hard to tell if the 'actions' actually had a meaningful impact. However, because students were only involved in the gardens for short periods, it was difficult to deliver 'value' for them because their engagement was so short. For example, some students' first engagement in their university's garden was through my research, therefore it was hard for me to find ways to 'give back.' Students were incentivised to commit time to the research because they wanted to help me and there were usually snacks provided, however seeing reduction of the negative impacts of transience was not possible for most students.

This said, a long-term mentor reflected that they appreciated engaging in this project because it gave them the time to reflect on the challenges faced by their garden and inspired action that wouldn't have taken place otherwise:

> *So it's been kind of useful to have this engagement. Just full stop. To have some kind of sense of outside perspective being brought in. Whatever that perspective is. It's just helped us to think about our own actions and what actions might be best to address the problems we're facing. Rather than, which has kind of been the norm so far. Which is that we are acutely aware of the problem… but not… really… ever really doing anything about it. [laughs] It's just, kind of, making that part of the experience of the garden. We all struggle in summer. 'Well, don't you know the agricultural calendar is the inverse of the academic calendar!' And, you know, I just find myself saying that,*

for, like the millionth time. And, it's been like, well I guess we'd better do something about that then. And I have done things off the back of this research that I wouldn't have otherwise done.

As such, the study was reportedly beneficial to some participants, at least to some extent. Given that this stakeholder had been involved for a longer period of time (the full length of data collection during this study) they were able to identify some more emancipatory outcomes (*helped us to think about our own actions*) and some more pragmatic actions (*I have done things off the back of this research that I wouldn't have otherwise done*). However, given that most of the research participants were much more transient, many did not see or experience these outcomes.

However, for many there was a sense of doing something for the greater good, and therefore the need to somehow benefit from the research directly didn't matter. One gardener spoke about another gardener who would take part in their garden and harvest (i.e., take home produce) from another without any guilt, under the belief that what goes around comes around: as long as you put in the work somewhere, you can reap the rewards from somewhere else. This willingness to accept ambiguity in the reciprocity of giving and getting from the garden they took part in mirrored the willingness to accept ambiguity in the reciprocity in the research process. This is an especially useful way to think about this for research with transient participants because the benefits of research can come with a delay. As one student observed, *sustainability is about passing to future generations. As students, we are, in generations, coming and leaving, and coming and leaving* (Self-directed volunteer). Like with the sustainability challenges we face, the benefits of today's actions may not benefit those who take them; the benefits may only come to future generations. This sort of thinking may be useful for action researchers when thinking about reciprocity in their research.

Our present realities are shaped by those who created the foundations of them, and future realities will depend on the foundations we lay for our descendants, whether it be our global ecological reality or the reality of a student-led food garden. This idea of intergenerational justice is important for participatory research with transient participants, because today's participants may not benefit from the research, though people in future may. As such, the evaluation of such research should take into account not only the benefits of actual participants who took part, but also potential future beneficiaries.

9.2.3.3 Difficulties implementing 'actions'

A more pragmatic challenge was ensuring a smooth transition from the 'action planning' phase to the 'taking action' phase as most of the participants that helped plan actions had left the project by the time they were expected to take the actions. This is in spite of the fact that the execution of actions were planned to be executed during term-time.

After my realisation that I had been too prescriptive in determining the direction of my research in the early stages, I was particularly keen to make sure I was genuinely participatory in the later stages of the research. I interpreted this as meaning that the research participants would take actions with my support so that there was ownership by the participants, as is often advocated in action research (Löfman et al., 2004). However, students' short-term engagement, combined with a lack of insight into the implications of their own transience, meant that it was difficult to ensure actions were taken and to produce meaningful outcomes. Furthermore, there was a lack of urgency to take the proposed actions by the more transient participants. This meant that many of the planned actions were not implemented. However, I still did not take any actions myself because I felt it was important for people participating in the research to have ownership over the actions that were taken and not feel like they were imposed by an outsider. In hindsight, I also believe that this was due to my unconscious discomfort operating as an 'activist' within the garden, in tandem with

being a 'researcher.' In hindsight, I can now see that, especially at Keele, I was in a much better position to take meaningful actions to address challenges associated with transience than many other gardeners were. Having taken actions would have also informed my reflective process, potentially contributing to a higher level of understanding.

Another issue in doing action research with students in an informal setting was that participation was highly varied and irregular. Most of the suggested interventions would have benefited from a 'little and often' approach, however students tended to concentrate their activity into bursts of engagement, followed by periods of absence and disengagement.

Therefore, I would also advocate that researchers should embrace their agency in their practitioner or activist role, if they have one. The researcher taking action in partner with other project stakeholders need not undermine other stakeholders' ownership if it is done with their blessing and best interests at heart. In working with transient participants, actions taken by a researcher may even be the most effective type of action that can be taken given that they may be the actor with the most capacity to follow through the process from planning to taking action. This is common practice within educational action research, when the researcher inquires into their own teaching practice.

9.2.3.4 Lacking capacity to engage in research

Gardeners also lacked capacity to engage in research given the already ongoing challenge of maintaining an adequate level of participation. In my research diary I reflected that:

> *There needs to be a kind of soft-touch approach to doing research working with students involved in these sorts of projects because they already struggle for participation and are time-strapped as is. So engaging them in a group activity that is not explicitly gardening-focused (or an informal social event) risks putting potential*

participants off the [garden] because it's not what they were anticipating being a part of.

This worry was not unfounded. Because, as I wrote in my research diary:

At Keele we actually lost one person who was a regular because I tried to organize a workshop one week, which flopped (because no one really came), and so re-ran it again the next week. The next week was better attended, and worked, but the person never came after that second week of workshops because it wasn't what he was there for. He just wanted to garden, I think, and he probably was coming to take part because it wasn't an academic thing. And my workshop made a fun, relaxed activity an exercise in critical thinking and… well, work.

In some cases, it was possible to work around the lack of capacity to engage in research by offering some of my own time to help with gardening tasks and by using go-along interviews (Kusenbach, 2018) so that participants' time was not taken away from their core tasks. Furthermore, I aimed to 'give back' to participants through my research, though, as highlighted above, the results of this were mixed. As such, the first of the main strategies that can help address the challenge of participants not having time to engage in action research are to plan research activities that are in synergy or, at least, do not compete with existing activities. The second is to ensure that the action research undertaken provides value to those taking part. This may be through the outcome(s) of the action research, but at the very least, can be through the provision of opportunities to critically reflect.

9.2.3.5 The researcher as 'intervention'

Am I actually gathering data on a truly student-led initiative if I am facilitating interventions? And the answer is probably at least in part, no. (My research diary)

Participants reported that my being involved in the gardens changed the group dynamics, prompted critical reflections that had not previously taken place, and improved

continuity. All of these are, of course, positive outcomes. However, I was concerned this had prevented a 'naturalistic' inquiry into transience as a phenomenon. That is to say, I was involved in the gardens in order to better understand how transience impacts them, and by in getting involved I disrupted the impacts of transience, making it difficult to study them *in situ*.

The impact I had at Keele's garden was most profound because I tended the garden over the summer and had historical knowledge of the space which gardeners would not have had without me. Furthermore, my longer-term engagement imbued me with a higher degree of authority, even though this was something I resisted and attempted to subvert. At the garden at Warwick, the main impact of my visits appeared to be to stimulate periodic reflection that spurred on action. However, given I was much less involved at the garden at Sheffield (due to the low participation levels present), I never met the same person twice. Therefore, at Sheffield, my involvement did not result in any noticeable changes.

Studying three sites meant I was able to triangulate my findings from these different situations to understand the extent to which my presence prevented a 'naturalistic' inquiry of the impacts of transience. Ultimately, this concern appeared to be less problematic than it seemed on the surface, as the findings from the different gardens were not substantially different in spite of my engagement. I reflected on the reasons why in my research diary:

> *I think my interventions are artificial – however, I think they mimic natural processes that happen in gardens. Outsiders do come in and start up projects. How is this any different that a highly engaged student coming in and running a series of workshops over the course of a year? How is it different that a member of academic staff getting involved and making suggestions at various intervals? Or a skilled and knowledgeable community member? The nature of these gardens is that they have transient participants… people like me being one of them!*

My involvement did impact the gardens, and in fact, making change in a real-world context is the intention of an action research inquiry. However, I would suggest that my involvement did not prevent me from exploring transience as a phenomenon because my engagement in the gardens were within the realm of what was normal for a student-led food garden. As highlighted in the passage from my research diary, my involvement may have been longer than many of the other gardeners', but it was not outside of what could be considered normal for a student-led food garden in a university.

In action research, first-person inquiry is thought to be important for enhancing reflexivity using an 'upstream' approach, enhancing reflexivity with regard to researchers' "basic assumptions, desires, intentions and philosophy of life," as well as through a 'downstream' approach, enhancing reflexivity with regard to researchers' "behaviours, ways of relating and their action in the world" (Coghlan, 2019, p. 7). However, action research in the field of sustainability (e.g., Bradbury, 2005; Leclerc, 2009; Hallstedt, 2017) has historically tended not to engage in first-person inquiry to the extent that has been seen in other disciplines. I used a research diary to attempt a more holistic inquiry by engaging in first-person inquiry, in addition to second- and third-person inquiry which are more common in action research in the field of sustainability.

In the action research tradition, within each type of inquiry (first-person, second-person, third-person) there should be both action and reflection in order to engage in all four forms of knowing (as outlined in Chapter 4). Therefore, I advocate that action research in the field of sustainability should engage more in first-person inquiry to complement second- and third-person inquiry in order to attend to the researcher's own "thinking, valuing, way of learning, and behaving" to produce more authentic research (Coghlan, 2019, p. 191).

9.2.4 Using an embedded case study approach while conducting action research

Although not always used in conjunction, action research and case study methodologies are thought to marry well because they both involve a detailed analysis of a particular situation, group of people, or individual (Corcoran et al., 2004). However, the use of multiple, distinct sites within an action research project (as in this study) is much less common, although has been done previously (e.g., Pereira & Vallance, 2006).

I chose to include three gardens in this study because of the expected instability of student initiatives. This decision was affirmed by the fact that the garden at Sheffield ended up being an unable to participate in an action research cycle. However, action research is a context-specific methodology. It cannot be expected that different groups in different contexts and locations would undergo the same sort of process and evolution. Furthermore, if research is intended to be participatory, as in this study, the general coherence in the research agenda between sites may be difficult to maintain if participants at each site have different ambitions. Indeed, all three gardens did undergo their own journey during the research. At Keele and Warwick, different actions were implemented, and no action was undertaken at Sheffield at all.

My engagement at the three gardens was also uneven which affected the data. My engagement at Sheffield and Warwick was considerably less than at Keele by virtue of the fact that I was based at Keele. This limited the passing insights I gleaned by participating regularly in their gardening sessions, which may have resulted in an over-representation of Keele in my results and analysis. I, however, reflected about this in my research diary in order to consider the extent to which my conclusions were Keele-specific and to what extent they were relevant for the other two gardens. Furthermore, I attempted to buffer potential bias by

providing initial results back to the participants (Appendix E) to receive feedback and check the accuracy of my interpretations.

In contrast, a single, holistic case study at only one site (Yin, 2003) would have allowed for deeper immersion in the inner reality of the garden that I was not otherwise able to because my energy was spread across three sites. However, it would have been difficult to elicit more information from the pool of interviewees. There was a clear case of theoretical saturation (Bryman, 2016) due to the fact that most gardeners were involved in the gardens in a time-limited capacity and therefore had limited insights into the question of transience. Data collection would have therefore needed to focus on other methods, such as participant observation, or accessing new data sources within the projects, such as Student Eats' social media.

Since findings of case studies "will be more robust if there are more mediating variables" and more sites provide more variables, the findings from several sites are likely to be more robust than a single-site action research case study (Pereira & Vallance, 2006). This can allow for a broader scope for analytic generalisation. My interactions with gardens beyond Keele also spurred me to critically reflect about the context specificity of the problems and suggested solutions through the juxtaposition of the different gardens. For example, the role a doctoral student played within the project may not have been as apparent without the juxtaposition between the garden at Sheffield (where there were not any) and gardens at Keele and Warwick (where there was). As such, using a single, holistic case study would have required a greater commitment to reflexivity because the lack of interaction with other gardens would mean fewer opportunities for comparison.

In summary, it is difficult to say which would have been a preferable approach in hindsight: focusing on a single site or multiple sites. Having multiple sites meant that it was challenging to create a coherent research project because the different sites were each on

their own journey. Furthermore, it also meant that my high level of exposure to the garden at Keele compared to Warwick and Sheffield may have led me to over-generalise the Keele experience to other sites. However, having multiple sites meant that there was a buffer in case of drop out, lowering the risk of having inadequate data for my doctoral work. It also meant to there were more mediating variables at play, and more points of comparison which meant I was able to provide a more robust analysis.

9.2.5 Implications of early career researcher naiveté

Doctoral study is just that: a form of study, studentship, or apprenticeship. All research can be thought of as a process of learning, however, doctoral research in particular is deliberately designed to *train* a student to be an independent researcher. As such, a doctoral student can be expected to approach research with a certain degree of inexperience and naiveté. Having completed my study, I certainly feel this was present, especially in the early stages of my research. This manifested through how I articulated the problem of transience in my research journey, practiced journaling, and constructed the aims of my research.

When I articulated the problem of transience, I often used the term 'transience' explicitly in interviews and struggled to make clear what I meant by it. This resulted in difficulties with some research participants understanding what I was asking them (however, this was further compounded by the fact that many students struggled to understand how their own transience in the university community impacted their garden).

Furthermore, as a relatively new action researcher, I have been less practiced in the process of journalling and archiving my experience. I mainly focused on reflecting upon experience and exploring my own understandings of the issues in question. In hindsight, I would have made a more consistent practice of journalling with a focus on reflection on the

data and as “an analytic tool where the data can be examined and analysed” (Coghlan & Brannick, 2014, p. 34). I believe this would have resulted in better clarity in my understandings of the themes in the data at an earlier stage through forcing me to engage with the data more analytically rather than descriptively in the analysis process.

I would also have engaged in a more participatory approach to constructing the aims of the research from the start. Prior to my doctoral research, I had little experience engaging with people in a professional capacity, as research required me to do. Many of my ideas of what a good research question was and what I wanted to examine in my research were fairly rigid. This was exacerbated by the tradition of first reviewing the literature and applying for ethical approval before engaging research participants rather than co-constructing the research agenda. Engaging with staff from the National Union of Students and student gardeners at an earlier stage would have helped mould my aims into a more contextually-appropriate research agenda.

Another way my inexperience impacted the elegance (or lack thereof) of my methodology was in the ethical review process. This thesis was my first time undergoing a process of ethical review. I learned a number of things in the process. I learned that often for action research studies, a multi-phase approach to applying for ethical approval is preferable. One of the crucial challenges relating to ethical review of participatory research is that often methods are not decided until first engagement with the community of interest. However, first engagement with the community of interest usually requires ethical approval. For this reason, Khanlou and Peter (2005) suggest that researchers may need to seek ethical approval several times during a project, as the methodology and focus of the project evolves. However, when I applied for ethical clearance, I attempted to apply for my entire study in spite of the fact that how the later stages of the research were to manifest were dependent on how the earlier stages played out. I produced a single information sheet and consent form for

participants to sign for activities taking place years after participants consented. The form was long and contained a lot of information, which raised a pragmatic issue, which was that someone who might have only taken part once had to wade through pages of information that was not necessarily relevant to their participation in the study given that most participants only took part in one activity. However, this also raised ethical issues in terms of whether the participants could reasonably be expected to consent to something so far in the future. I intuitively managed this by reiterating information from the information sheet and consent form to participants and sought out verbal consent when they were taking part in an activity a considerable time after they had reviewed the information sheet and signed the consent form. I also amended my application twice (approval letters can be found in Appendix D) and created new information sheets and consent forms for participants of the fishbowl discussion and photovoice component.

Since undergoing the ethical review process at Keele my first time, there have been changes to simplify the administrative process, and inclusion of a special question about whether the research is 'action research'. This is a good step forward. A useful next step might be to offer some resources with tips and considerations for researchers planning to conduct participatory and/or action-orientated research. Based on my experiences, some useful guidance would include to consider whether it would be more appropriate to break studies into several ethical review applications, and the length of the information sheet and consent form(s). Many of these issues may seem intuitive to more experienced social researchers, however special guidance about navigating ethical review in introductory action research texts and for postgraduate supervision of action research would be valuable. For ethical review boards, it may also be worth considering a different application strategy for participatory and action-orientated research projects. Ethical review panels should also consider that "the potential burden and cost of multiple reviews could be minimized through

the development of guidelines and procedures for participatory action research that facilitate an expedited review process for each cycle of the research" (Khanlou & Peter, 2005, p. 2337).

9.2.6 Problem-focus discomfort

Action research is a solutions-focused approach to research. Its aim is to make positive change. However, in order to create solutions, a problem first needs to be identified and understood. Therefore, the first stage of action research is a reconnaissance to explore an issue to fix or improve. When presenting the initial findings of this stage and the action planning (see Appendices E and F) to a staff member at the National Union of Students, they expressed considerable concern about the focus on problems. The interview began somewhat uncomfortably as the staff member found the framing to be inappropriate. They were concerned the participation in the garden at Sheffield had dropped off dramatically after my research began, and speculated that it may have been caused by focusing too much on negative things during the 'constructing' phase.

Our conversation from there mainly centred around the documents (in Appendices E and F) I had handed the interviewee. They asked many clarifying questions, and as the interview went on, I clarified and elaborated on the text. As we moved into the section about solutions, the interviewee changed their tone and seemed less threatened by the document I produced. They then began to open up, asking if they could take notes, and offering some suggestions of how the research question might be reframed.

Eventually, we came to a common understanding of how the framing of the research ought to be, however, this encounter made me worried that my framing of the research question had negatively impacted the people who had participated in the study or the gardens they were involved with. Therefore, I asked one of the gardeners who I felt would be candid with me if they thought the framing had been problematic. They said:

I think it's fine [to talk about problems], and I share your perspective that… all research, especially participatory action research, should have some degree of looking for problems. Or should have a critical approach embedded within it. Otherwise what's the point? As far as how that's played out… you know, for someone like me or [a student leader] who've kind of been working on more on the inside, on the organisational part… those problems are ones that we may not have talked about that readily. Or… people just don't see, and it doesn't just come up because why would you talk to everyone about the problems of running the space, when we always want to say how good it is. So those moments when people have been invited in who are more on kind of the periphery, or new to the project. To talk about those problems in a systematic way… I think it's really useful. Because people are like, 'maybe it doesn't just materialise here.' This is an important thing for people to understand. And I think, actually, people who have… those people who participated in those workshops. Or who are otherwise getting involved and want to see the project succeed… they, uh, that actually deepened their appreciation of what it is. And gave them a, kind of, an impetus to do more. So, I think… I don't think it's like, 'oh we started dwelling on problems…' and then everyone kind of got really down and left. Not at all. I mean, people left, but it wasn't for that reason. It was reasons of leaving the country or whatever. Yeah, leaving [the university]. I think, again, that helped. And to do it in a kind of… I stressed, I felt it was done in this systematic way, where we identify problems, and then the broader horizon is kind of moving towards… kind of a better system. Rather than being like, 'hey guys, let's just talk about our problems open-endedly.' It wasn't that. That might have been… a problematic way to do it. But that wasn't what we did. So… it was couched in a framework that people could understand

and that was clear. For anyone entering the workshop or the session or whatever it was.

This said, this quote represents the perspective of one individual, and therefore others may have felt differently about the focus on problems in the early stages of the study. My own experiences, however, echoed what this participant said. In addition to providing the opportunity to reflect as mentioned in the above quote, I also sensed that some participants valued the opportunity to vent about their frustrations. When recruiting participants or running gardening sessions, lead gardeners often needed to create a fun, friendly environment, in spite of the fact that they may be frustrated, annoyed, or exhausted. Interviews, in particular, seemed to provide a space where they could let out some of their negative feelings. This said, the workshops did seem to frustrate a small handful of gardeners as the workshops distracted from the main gardening tasks. However, this frustration was not to do with the focus on problems, but the research in general.

Regardless of how the research framing impacted the gardens, the incident raised an important question, which is, to what extent is it constructive to reflect on problems and when does it become unhelpful? I reflected on this in my research diary:

I guess what's good about the 'dwelling on the problem', so to speak, is that people are very quick to come up with solutions and how to fix the problem, as they see it. And I think slowing down and sitting with the problem for as long as we do, did benefit the research quite a bit. And I wonder if there's a bit of resistance from people to dwell on the problems because it is demotivating and depressing and they worry that sitting with that will cause even lower participation. Which might be true… but by sitting with the problem I feel like there is a much better understanding of transience and whatnot. And there is a danger of jumping the gun and suggesting solutions that aren't really related to the root of a problem.

Indeed, an unwillingness to talk openly about 'negatives' may result in a lack of understanding of problems and their causes. However, the concerns raised by the interviewee from the National Union of Students about overemphasising negative aspects of student-led food gardens are genuine as no one wants to climb aboard a sinking ship. The question we must then ask is, how can we talk about these 'negative' things in ways that are helpful[20]? Perhaps one way is to find ways to destigmatise failure, as failure has considerable stigma attached to it (Shepherd & Haynie, 2011). Such stigma may cause a fear of failure, which has been associated with surface learning and "reduced understanding" (Boyle et al., 2007, p. 302). Therefore, it is possible that creating environments where people can talk about 'problems' and 'focus on the negatives' without fear can contribute to learning.

9.2.7 Missing stakeholder involvement

When designing my study, I included participants of student-led food gardens, staff members of the National Union of Students involved in the Student Eats scheme, and staff from the organisations providing funding for Student Eats. The latter were not possible to interview, so I focused mainly on participants of student-led food gardens, staff members of the National Union of Students involved in the Student Eats scheme. I did not consider including university or students' union staff as the gardens were chosen because they were student-led. I therefore assumed that contributions that university or students' union staff would be able to offer would not be particularly helpful to understand how to manage the impacts of students' transience. In two of the gardens, the relationship between students and staff was not a subject of focus, likely because it was positive and/or unremarkable. However, in one of the gardens, the relationship between staff and students was tension-ridden.

[20] In this thesis, I have deliberately chosen to use the term 'problem,' both in order to be accurate – some of the things I have written about are problems – but also because I believe it is necessary to talk about problems openly in order to destigmatize failure.

Interviews with the staff at each of the universities could have provided more insight into what made the relationships what they were, and particularly, could have provided further insight into the roots of these tensions. This is a considerable limitation of the study, because although staff involvement was very limited, the results indicated that the relationship between staff, especially the operational estates team, and students was important. It would therefore be useful to understand the 'other side.' Did staff perceive friction in their relationships with students? If so, how?

However, as a university staff member myself, I was able to reflect from this perspective in my research diary. Staff from students' unions also took part in the fishbowl discussion at the Student Eats conference. These participants were not affiliated with Keele, Warwick, or Sheffield and therefore were not able to offer contributions related to the specific dynamics at those institutions, however, they were able to contribute more generally from the students' union perspective. As such, students' union and university staff perspectives were represented, but were not as fully integrated as they could have been.

9.2.8 On the *ex-post* causal-loop mapping and use of the resilience principles

When I began my doctoral research, I did not intend use resilience as a theoretical framing or use causal loop mapping to analyse the data. The decision to use a causal loop diagram came at the end of the first round of data collection, and the first iterations of data analysis and even early drafts of this thesis were written before I brought in the resilience principles. When I was collecting the data, I therefore did not actively seek out evidence of alignment or misalignment with the resilience principles, nor interrogate the causal relationships between different variables to the extent I might have done had I known I was going to create a causal loop diagram from the beginning. It is therefore possible that I missed opportunities for probing and interrogating the connections between the different variables.

As a result, I chose to reduce the number of connections depicted in the causal loop diagram in order to illustrate only the most robust and important connections so as not to overstate my contribution to knowledge. It is also possible that the assessment of the vulnerability in Chapter 7 could have been more complete had I employed the resilience principles from the beginning. This being said, there were still many reflections in my analytical memos and my research diary that were rooted in resilience thinking in spite of having brought the resilience principles in at a later stage of my thesis. I attribute this to the fact that systems thinking and resilience was a key component of my undergraduate and taught postgraduate studies. I also revisted the raw data (as described in Chapter 4) to see if there was anything else that could be picked up when a resilience principle perspective was applied. Therefore, in spite of this *ex-post* use of the resilience principles, I am comfortable stating that my assessment of the vulnerability of student-led food garden using Biggs et al.'s (2012, 2015c) resilience principles is as complete as could be expected for a complex social-ecological system.

9.3 Future research directions

Elsewhere in this study, I have suggested some future research directions to take under consideration. These are to:

- Explore the extent to which the typologies from Figure 14 hold up under scrutiny with a larger sample of cases and participants,
- Explore the extent to which community gardens provide environmental benefits,
- Experiment with Biggs et al.'s (2012, 2015c) resilience principles in different settings and for sustaining different social-ecological systems and constructs (e.g., organisations, policy environments, governance regimes, shared mental maps, women's rights) to see if it is possible to identify axes of diversity, connectivity, and feedbacks that are common for particular systems, and

- Untangle how student gardeners understand terms like confidence, initiative, responsibility, ownership, or motivation and explore how they correspond to definitions used in academic literature.

In this section I will present some further lines of inquiry that were prompted by this study that should be considered in future research. These are the long-term implications of attitude and behaviour change initiatives in tertiary education; what and how students are learning in student-led initiatives; critical perspectives on pedagogy in urban agriculture; failure in sustainability; intersectional interrogations about student-led food gardens, student-staff relationships in university sustainability initiatives; the ways in which resilience might be at odds with other aims; and transience in sustainability organising. I will begin by explaining why research exploring the long-term implications of attitude and behaviour change initiatives is needed.

9.3.1 Long-term implications of attitude and behaviour change initiatives in tertiary education

Judging by research from the National Union of Students' sustainability team, there are already high levels of pro-sustainability attitudes amongst students (NUS, 2018). However, they have also shown that most students want to know more about sustainability and students want their universities to "actively incorporate and promote" sustainable development (NUS, 2018, p. 2). The extent to which attitude and behaviour change resulting from taking part in student-led food gardens stay with participants beyond their tertiary education, however, has not been demonstrated empirically, even if logical theoretical conclusions have been drawn using the habit discontinuity hypothesis (Verplanken et al., 2008). At a theoretical level, the habit discontinuity hypothesis is a compelling argument for the National Union of Students' sustainability behaviour change initiative. However, there is little peer-reviewed literature based on empirical assessments of the extent to which the

habit discontinuity hypothesis holds up in the context of pro-sustainability behaviour change interventions in higher education.

There is some evidence of university gardening schemes having positive effects on sustainability attitudes and behaviours. Several of the articles about food growing university community gardens reviewed in Chapter 5 demonstrated that taking part in these gardens enabled participants to develop healthy, ethical and eco-friendly attitudes and behaviours towards food. For example, Wharton and Harmon (2009) said that community supported agriculture membership "allows members to deepen their relationship and involvement with food" by decreasing "the number of shopping trips to more conventional venues such as the supermarket" (p. 114). Members of community supported agriculture may also change their food behaviours (such as choosing to eat together as a family or experimenting "with the art of composting") because of the lack of pre-sliced, -washed and -packaged foods provided to them (Wharton and Harmon, 2009, p. 114). In a number of the articles, the change in attitudes and behaviour related to sustainable food was as a consequence of other outcomes. For example, several of the reviewed articles (Falk et al., 2005; Parr and Van Horn, 2006; Wharton and Harmon, 2009; Kobayashi et al., 2010; Datta, 2016) said the sustainable university community gardens they wrote about provided educational opportunities about sustainable food systems, and such education may lead to changes in sustainable food attitudes and behaviours. However, many articles only discussed (rather than demonstrated) the benefits associated with engagement, attitudes, and behaviours for sustainability, indicating that there is a need for more evidence to back these claims.

There is also evidence that volunteering in a university community garden can improve self-efficacy (the belief in one's capabilities to take action on a given problem) (Pierce & Seals, 2006; Hoffman et al., 2007; Teig et al., 2009; Evans et al., 2012). Given that a lack of self-efficacy is a barrier to changing sustainability-related behaviours (such as

recycling), it may be possible that this is also the same for ethical and eco-friendly food behaviours. This is echoed by Delind (2006) who suggests that local initiatives that can connect to people emotionally, sensually and expressively, like community gardens, "may best promote long-term attitudinal and behavioural change in relation to food" (Turner, 2011, p. 513). Improved self-efficacy through food growing projects could increase self-efficacy in other areas of a person's life, increasing their ability to make wider, positive changes for themselves, their communities, and the environment.

A variety of studies have been conducted explicitly about how community gardens impact attitude and/or behaviour change with regard to the environment and participants' food choices (Somerset & Markwell, 2009; Turner, 2011). The results are mixed, and the reason may be that different participants are affected in different ways (Middlemiss, 2011). Middlemiss (2011, p. 265) found that "those who are new to sustainability and who are actively involved in cohesive groups, which are specifically targeting their lifestyles, are more likely to report substantial changes" in sustainable behaviours than those with histories of engagement in sustainable lifestyles or behaviours. Therefore, the capacity of growing projects to contribute to enhancing pro-environmental behaviour is contingent on (1) recruiting participants not already active in sustainability or environmentalism, (2) the cohesiveness of the group, and (3) the beliefs, behaviours, and attitudes of the group.

The implications of this for student-led food gardens are that the transience of their participants may both enhance *and* limit the capacity of these initiatives to actually increase engagement in sustainable lifestyles or behaviours. Because student-led food gardens experience such high turnover, a need for ongoing recruitment is one of their central features. This could result in engaging participants without a history of sustainability or environmental engagement who would be better candidates for attitude or behaviour

change. However, the high turnover could also impact the cohesiveness of the group, providing fewer opportunities for social learning.

Furthermore, there are two other mitigating factors influencing pro-environmental behaviours that have yet to be considered. Firstly, while students may develop sustainable habits while at university, the change from student life to working life may actually be another "moment of change" which could "undo" all the habits developed at university. Therefore, it is equally as important to study how partaking in initiatives like student-led food gardens impact behaviours beyond the participants' time at university to understand the longevity of the initiatives' impacts. Verplanken and Roy (2016) have made some steps in testing the habit discontinuity hypothesis, but so far there is only evidence of short-term (in this case, eight weeks) changes caused by behaviour change interventions at life course transitions (Verplanken & Roy, 2016). Thompson et al. (2011) have conducted a limited number of interviews which explored the potential for university-based sustainability initiatives to contribute to behaviour change. They found that while there are already many existing behaviour change initiatives in universities throughout the United Kingdom that have considerable potential for behaviour change, given that students are a captive audience, there is little evidence of the impact these actually have. This therefore is an area requiring significant further research. Longitudinal studies spanning pre-university to post-university life would be particularly appropriate for understanding the impact of student-led food gardens beyond the university, as has been done in other studies on life course transitions (e.g., Elder, 1998).

Secondly, the impact of pro-environmental behaviour change initiatives needs to be reflected on in relation to infrastructural factors/barriers (in the case of sustainable food habits, whether there are growing spaces, food waste and composting facilities, good access to markets and shops with sustainable food options, etc.). There are also ethical

considerations that instrumental attempts to change students' attitudes and behaviours are somewhat paternalistic in assuming that students are not already conscious of their behaviour, and in reality may actually prevented by infrastructural barriers (e.g., lack of composting facilities, adequate public transport, etc).

Furthermore, there is a risk that the need to demonstrate impact of Student Eats, and other similar projects, to funders or prospective funders brings bias into how research assessing attitude/behaviour change interventions. In particular, it is particularly desirable for the National Union of Students' sustainability team to be able to say that their initiatives increased students' pro-sustainability attitudes and behaviours. However, it would be useful to also inquire into what structural barriers exist that prevent students from behaving more sustainably. What are the university structures that are affecting student behaviour? For example, how well are the student residences' kitchens equipped for cooking and storage of fresh food? How many people share a kitchen? What kinds of fresh food are available to students on campus, and when are they available? What kind of food diversity is available, particularly in terms of plant-based proteins? What kind of messaging are students getting from on-campus catering in terms of meat consumption, portion sizes, availability of fresh foods, and mealtime culture?

9.3.2 What and how are students learning?

In Chapter 5, it was shown that the dominating discussed and demonstrated benefits of sustainable university community gardens were educational. Indeed, one of the aims of Student Eats was "to give students (and other volunteers) the chance to learn about the ethical and environmental impact of their food choices" (NUS, n.d.c). Much of the National Union of Students' sustainability work with educational components tends to take quite an instrumental view of learning, as illustrated in the above section. This reflects the pragmatic

reality of the need to work on sustainability education "with and within the marketised reality" of higher education (Bessant & Robinson, 2019, p. 561). However, based on this study it appears that attitude and behaviour change do not seem to be the overriding outcomes for students taking part in these gardens given that many students involved in them appeared to be 'sustainability converts' already. Indeed, one of the barriers to participation that was highlighted by many students was that students involved in the gardens had difficulty relating to the wider student body because they already had such strong sustainability sensibilities. This meant that the sustainability sensibilities espoused by some existing gardeners that others found to be alienating, in conjunction with the wider student population's apathy or indifference towards gardening/sustainability issues, was preventing the students who would be candidates for learning about ethical and environmental food choices from taking part in the gardens. If student-led food gardens are intended to help students learn about the ethical and environmental impact of their food choices, but most students involved in these initiatives are already sympathetic to sustainability issues, a crucial question must then be raised: Are student-led food gardens preaching to the converted?

I contend that, while most of the students involved in the gardens studied could be considered 'sustainability converts,' there was still much for the 'converts' to learn by taking part in these spaces. Most undergraduate students are in a liminal state, where they are not-quite-children, yet not-quite-adults either (Holdsworth, 2010). The learning these students are doing at this stage therefore might have more to do with their "negotiation of the transition to adulthood" (Holdsworth, 2010, p. 431) than, perhaps, the ethical and environmental impact of their food choices or how to grow food. This might include negotiating their place in the sustainability movement, understanding what realistic tasks for part-time volunteers are, and learning about the types of tasks voluntary (and, indeed, professional) organisations need to undertake to be successful. This sort of learning is much

more akin to the learning advocated in the intrinsic tradition of sustainability education, rather than the instrumental tradition that National Union of Students' initiatives tend to lean into. For example, if students have unrealistic expectations and misconceptions of what a student-led food garden can do, taking part in one can help them better understand what a voluntary, self-organising initiative can offer. Another example of such an opportunity in disguise was the conflict and mistrust between short-term and long-term stakeholders. One student said that it could be *intimidating to approach people who are in supposed positions of power*, like university staff. Indeed, the power relations between staff and students, whether actual or perceived, complicated trust building. However, Holdsworth and Quinn (2012, p. 393) have suggested that "the most valuable form of volunteering" is that which "provides learning opportunities which enable volunteers to deconstruct and resist power structures and inequalities." Students interacting with university staff were faced with such opportunities. However, this would be worth examining further to understand the extent to which students grappling with and resisting power structures within the university actually contributes learning, and if so, what they learn. Therefore, while some barriers or issues could prevent students from engaging in student-led food gardens, students who continue to take part may learn important lessons and skills to take with them into their post-university lives.

Based on all of this, it is clear that further exploration is needed to assess more definitively what students learn from student-led food gardens and other student-led sustainability initiatives, and what conditions facilitate different learning. For example, in what ways does volunteering affect students' negotiation of their identities at this point in their lives? How is learning through volunteering impacted by students' liminality? What type of learning is favoured in this life stage? Does it enable higher levels of reflexivity? What theories can help to explain this type of learning? Are students always learning 'good things'?

Or are students learning things that disempower them and prevent them from being effective change agents?

For the National Union of Students, it may be advisable to evaluate sustainability education programmes not only in terms of the extent to which it facilitates changes in attitude and behaviour, but also in terms of generation of key sustainability competencies (Wiek et al., 2011) and more intrinsic learning (Breiting et al., 2005) to ensure monitoring of all the impacts of their initiatives. Furthermore, knowing that Student Eats is made up mostly of 'sustainability converts' means that future support offered by the National Union of Students can focus more on facilitating intrinsic learning since the more instrumental attitude and behaviour change outcomes would likely be minimal. This said, other sustainability initiatives run out of the National Union of Students, such as Green Impact or Student Switch-Off may be engaging more 'mainstream' students upon which attitude and behaviour interventions may have more impact.

It may also be useful for the National Union of Students to have a two-pronged approach to student sustainability activities, with a prong for sustainability-newcomers and another prong for sustainability 'converts'. Attitude and behaviour change aims and corresponding evaluations would be more useful for initiatives that are geared towards sustainability-newcomers. However, for initiatives, like Student Eats, that draw in more sustainability-converts than sustainability-newcomers, it may be more useful to assess both sustainability and action competence development (Wiek et al., 2011; Breiting et al., 2005). If sustainability-converts already have pro-sustainability attitudes and behaviours, then it would be a case of preaching to the converted. However, these initiatives still provide important development opportunities for students that are sustainability-converts though the development of sustainability competencies (Wiek et al., 2011).

9.3.3 Pedagogy in the critical research agenda for urban agriculture

In 2014, Tornaghi published an article in which she called for a critical geography of urban agriculture. In her article, she proposed four areas of research on urban agriculture that critical geographers should explore: "cultural and political meanings of urban agricultural initiatives in different historical conjunctures and urban contexts in the Global North," "exposure of the socio-environmental injustice and exclusionary dynamics in place within urban agricultural initiatives," "proposing alternative models for a critical envisioning of post-capitalist, de-growth inspired urban living," and "re-politicizing the role of [urban agriculture] in the urban structure" (Tornaghi, 2014, p. 561-563). I suggest that there may be another prong to this critical take on urban agriculture, inspired by this study. Learning in community gardens including, but not limited to, those at universities is an important outcome. But many treat education and 'awareness raising' as unproblematic ways to address sustainability problems. However, to critical educators, education is always a political process. In critical sustainability education, it is generally understood that it is usually more than a knowledge deficit that causes unsustainable behaviour (Fink, 2011), and this is supported by empirical work from psychology (i.e., Schultz et al., 2007). As such, I suggest that another critical perspective on urban agriculture, in addition to those outlined by Tornaghi (2014), is needed. This critical perspective should be through the lens of critical pedagogy. Some of the questions that this research could address are: In what ways does and can urban agriculture act as a form of popular education? What sorts of urban agriculture contribute to building what sorts of sustainability competencies? What kind of horticultural or agricultural knowledge/skills are being developed in different types of urban agriculture, and how might these increase (or reduce) food system resilience? To what extent does dysfunctionality of urban agriculture initiatiatives correlate with development of sustainability competencies?

9.3.4 Failure

As highlighted in section 9.2.6, focusing on problems can be uncomfortable. However, understanding our problems, failures, and mis-steps is important to avoid repeating them. However, failure of community gardens is under-explored in both academic and popular literature. Only positive cases were discussed in the literature about sustainable university community gardens reviewed in Chapter 5, and likewise, in Guitart et al.'s (2012, p. 368) literature review of urban community gardens, only five in eighty-seven papers described negative outcomes (those that did were all related to "insecure land tenure and gardens being demolished for future development.") There were also some mixed and neutral outcomes, but the overwhelming majority of articles described positive outcomes (Guitart et al., 2012). Furthermore, Corcoran et al. (2004) have found that many case studies published about sustainability in higher education are written as success stories (or "make-your-case-studies") and have a "'policing function' that identifies good [cases] from bad" (Corcoran et al., 2004, p. 18). Together, this seems to indicate that sustainability in higher education has a rather one-sided picture of sustainability initiatives. This may even be true of the wider field of sustainability science, where literature on 'seeds of the good Anthropocene' (Bennett et al., 2016), pockets of activity representing what a sustainable future could look like, are being widely celebrated, while the rotting or dormant seeds are hard to find.

It is important to study failure because when we only study positive examples, we can misunderstand what is genuinely making them successful (Denrell, 2003). Commonalities between successful cases can be assumed to contribute to their success when in reality they may be coincidental, and equally feature in examples of failure. Only through exploration of both positive and negative examples can we see what factors contribute to success.

A similar problem is publication bias against papers with negative outcomes. This is a well-documented, however unresolved, phenomenon in medical (Easterbrook et al., 1991)

and social sciences (Franco, et al., 2014). Some of the reasons this may have taken place are "reviewer or editor preferences" and authors' anticipation of "the rejection of negative outcomes" (Easterbrook et al., 1991; Lee et al., 2013, p. 10). To reviewers, editors and authors, positive examples may be perceived as more useful to know about so they can be replicated. Furthermore, authors may prefer to write about their successes rather than their failures for promotional purposes or because they are more likely to write about projects they have positive feelings about (Gill, 2009). Even if researchers are interested in studying examples of failure, they may struggle to find information about failed projects because projects may have collapsed before they came to fruition making it difficult to identify individuals involved.

There is also a time-lag associated with publishing negative or statistically insignificant findings because researchers may prioritise their positive findings (Ioannidis, 1998). Even though results may eventually be published, delays can also force researchers and practitioners to rely on positive findings for up-to-date information.

Scholars of various disciplines are taking steps to understand (Helmig et al., 2014), make space for (Harrowell et al., 2018) define (Halberstam, 2011) and typologise failure (Van Rooij, 2015). However, there is very much a need to understand what failure is in the context of student-led food gardens, and sustainability initiatives more broadly – or if it is even allowed to exist in the minds of those leading them. Indeed, a staff member at the National Union of Students was uncomfortable with even entertaining the idea of any of the Student Eats gardens failing.

So, what is a "failed" community garden? How do temporality and positionality affect understandings of failure in community gardens? Most projects tend to have successful elements from at least one perspective – is this perhaps why community gardens are so frequently framed in the literature as being successful, or at least having mixed outcomes?

And more pragmatically, if we can agree that there is such a thing as a 'failed' community garden, what can be done to prevent them from failing? Or is preventing failure even desirable? This last question is one Halberstam (2011, p. 185) has grappled with in his book, *The Queer Art of Failure*, challenging the idea that failure is something to be avoided, by subverting the idea of a "productive" failure, or "failing again, failing better." This is a useful conceptualisation of failure for researchers, because "good" or "bad" dichotomies are not necessarily helpful in generating nuanced understandings. However, it is unclear how these concepts might be used in the field of sustainability, where to fail might mean the end of humanity as we know it. As such, there is a considerable need to explore the meaning of failure for sustainability initiatives, 'failed' sustainability initiatives (like student-led food gardens), and destigmatise failure in research and the sustainability community.

9.3.5 Intersectional interrogations of student-led food gardens

There is also a need for intersectional interrogations of student-led food gardens, and indeed, student volunteering in general. Brewis and Holdsworth (2011) found that student volunteers with disabilities, from ethnic minorities, and from outside of the UK were more likely to be less satisfied with their volunteering experiences, and we need to inquire as to why.

In the case of the student-led food gardens, there were several students who took part but left university mid-way through their degrees after expressing quite high levels of anxiety and hopelessness in my interviews and conversations with them. This was not a core part of my study and I did not have ethical approval for this line of inquiry, and therefore I did not ask why they chose to leave university. However, I believe there is an important avenue of inquiry here. Students reported feeling overburdened, overwhelmed and burned out, and some stopped taking part in the garden because of it. Some students, however, continued to

be involved in spite of personal and academic struggles, and I worry that their involvement in voluntary activity could have been exacerbating potential mental ill-health.

Those who are involved in student-led food gardens advocate for social sustainability, of which mental health is an important part. There is a recognition that activism can take a toll on the mental health of activists (Vaccaro & Mena, 2011). However, the relationship between mental health and sustainability activism is not yet well-interrogated (Fritze et al., 2008), and the relationship between young person's mental health and sustainability, even less so (Ojala, 2012). However, these are clearly some important lines of inquiry to enable students engaging in these projects to maintain their own health, as well as in terms of actually delivering the aims of the gardens. For example, what is the quality of student learning from taking part in student-led food gardens if students are grinding themselves into the ground in the process?

Another important dimension that I did not dwell much on in this thesis is the engagment of interational and exchange students in student-led food gardens. Why are there such high proportions of international and exchange students in these initiatives? Is it because self-selecting students who choose to travel abroad for their education are more likely to be highly engaged? Or is it to do with place-making and meeting locals? Or is it just to do with making the most of their time abroad? Furthermore, what implications does their engagement have on the projects? Do they usually bring with them knowledge about food-growing from their home countries as in Mundel and Chapman's (2010) study? Or is it typical for international students to be unfamiliar with the practice of food growing before studying abroad? Furthermore, staff from the National Union of Students also said that international students may want to grow foods from their home countries in their gardens, whereas one student at Keele I spoke with this about said they would prefer to grow traditionally English

plants because they already knew what is grown in their own country and wanted to learn about what people grow and eat in England.

It would also be useful to explore ways in which gender roles and stereoypes might be disrupted or reinforced in student-led food gardens, particularly given that it has been found that gender roles can be reinforced in community gardens (Parry et al., 2005). An interviewee from the National Union of Students' said:

> *I think from memory, the men were more interested in the more physical setting-up tasks, like sawing planks of wood, and digging holes and mud and stuff like that. And the women's responses were more interested in the planting and the stuff that came next. Which is really, like gender stereotyped.*

A better understanding of the practices that help disrupt unhelpful norms would be useful, particularly given the ambitions of sustainability education to contribute to an equitable future.

9.3.6 Student-staff relationships in university sustainability initiatives and living labs

One notable gap in my data collection is the limited engagement with non-student stakeholders at the univeristies and students' unions. Given the important role of these stakeholders and the fact that sometimes their interactions with students are reportly so fraught, inquiry into how these groups can better collaborate and create shared understandings would be useful. This does not need to be limited to research about student-led food gardens, and could be a line of inquiry that would be extremely relevant to institutions attempting to adopt the living lab model on their campuses. For example, how can different stakeholder groups (academic staff, professional services staff, students' union staff, local community) with different ambitions for how university sustainability initiatives like living labs should be used (teaching, research, enhancing student experience, delivering

services to the community, etc.) cooperate in a mutually beneficial way? It would also be interesting to examine how the living lab agenda could be used, or perhaps is already being used, as a boundary object (Star & Griesemer, 1989) between different stakeholders.

9.3.7 Resilience at odds with other aims

Further inquiry with a more critical stance on resilience would be a worthwhile undertaking, focusing on the extent to which enhancing the resilience of a system might be at odds with other aims. There has already been some initial exploration of how sustainability and resilience might be in tension (Elmqvist, 2017). For example, a key contributor to resilience is redundancy, whereas efficiency is often an important contributor to sustainability (for example, energy efficiency). It may also be useful to explore if there are tensions between learning and resilience. For example, can an organisation that lacks resilience, like a student-led food garden, provide a productive learning environment by creating space to confront and wrestle with complex problems? In other words, is a resilient student-led food garden less likely to contribute to the development of sustainability competencies?

9.3.8 Understanding transience

Surprisingly little has been written about transience in sustainability science, particularly given that the field has only existed for several decades, a time where people have become more mobile than they have ever been. Furthermore, much of today's sustainability work relies on grassroots and volunteer efforts, and *ad hoc*, one-time, and seasonal volunteering is on the rise (MacDuff, 2005). Therefore, understanding transience and how it affects and can be managed by sustainability organisations is absolutely vital if we want these organisations to be effective in leveraging change for a sustainable future.

Further inquiry about what could be learned from temporary organisations (Ibert, 2004; Bakker, 2010; Bakker et al., 2011; Brookes et al., 2017) for the management of

organisations with transient participants would also be worthwhile. This may include further examination of the similarities between the roles of what I have termed 'long-term stakeholders,' and Bakker et al. (2011) calls 'parent organisations,' or looking into how risk is approached, avoided, or exploited in student-led food gardens and other organisations with transient members.

9.4 Conclusion

The purpose of this chapter was twofold: to reflect on this study's methodological issues and the future research directions it has prompted. Some aspects of the methodological discussion demonstrated the strengths of the approaches adopted in this study, such as the use of a research diary. Others shed light on the weaknesses with the ambition to be honest and transparent, for example, how I had only limited input from university and students' union staff. However, most were more complicated contemplations without conclusive recommendations or outcomes. For example, involving three different gardens in an action research study proved to be challenging and prevented the in-depth inquiry that could have been conducted with just one garden. The future lines of inquiry inspired by the study included exploring both the pragmatic and emancipatory roles of student sustainability initiatives in higher education, critical perspectives on pedagogy in urban agriculture, failure in sustainability, intersectional interrogations about student-led food gardens, the use of the resilience principles in social science-focused sustainability research, and transience in sustainability organising. Engagement with these methodological reflections and exploration of these lines of inquiry will contribute to more rigorous, relevant, and learningful action-orientated research in sustainability in higher education and beyond.

Conclusion

Chapter 10

Carrots ready to harvest
November 2013

10.1 Introduction

This study is the first comprehensive, empirical examination of how university students' transience impacts student-led initiatives. It contributes to emerging areas of sustainability scholarship inquiring into the internal realities of self-organising sustainable food organisations (Keafsey & Hasanov, forthcoming), and the use of university campuses as living laboratories for developing sustainability practices and learning. In this final chapter, I will briefly summarise the main findings from each chapter in order to answer the research questions. In doing so, I will outline the original contributions this thesis makes to both research and practice.

10.2 The benefits of sustainable university community gardens

The first step I undertook in my inquiry into student-led food gardens was to assess the benefits of student-led food gardens in universities in order to understand how they could contribute to addressing some of the sustainability challenges outlined in the literature review in Chapter 2. I also compared this to the literature about urban community gardens to understand how sustainable university community gardens differ from urban community gardens, and the extent to which the benefits they provide are unique. I did this through conducting a quantitative systematic literature review, drawing on a protocol from Guitart et al.'s (2012) literature review of urban community gardens in order to enable comparison. Given that very little was written about student-led food gardens, I broadened the scope of the review to 'sustainable university community gardens'. There were only twenty-two articles that met the inclusion criteria. These articles gave an indication of the general trends in the literature, but the limited number of articles meeting the criteria also demonstrated that this body of literature is currently under-explored.

The literature demonstrated a clear geographical bias mirroring the geographical bias in Guitart et al.'s review, with most articles coming out of the United States and focusing mainly on gardens in the United States. The portfolio of benefits provided by sustainable university community gardens and urban community gardens were very similar, with the most prominent being social, educational, economic, and health benefits, as well as benefits associated with accessing fresh food. However, it was clear that educational benefits were more evident in sustainable university community gardens compared to urban community gardens. There was also evidence that taking part in sustainable university community gardens can contribute to building sustainability competencies (Wiek et al., 2011; Hedefalk et al., 2014).

Beyond the literature review, there was also evidence from the empirical components of the study that learning was an important benefit of taking part in student-led food gardens. However, it appeared that the sort of learning that took place was more akin to the intrinsic rather than the instrumental educational tradition. For example, participants were negotiating their place in the sustainability movement and learning about how to make change in organisations, rather than learning about sustainable food in order to foster pro-sustainability attitude and behaviour change. Overall, there were considerable benefits provided by student-led food gardens, making them worthy of support.

10.3 Existing understandings of the impacts of students' transience

Crucially, it was also found that there was little more than a passing mention of the impacts of students' transience in the literature on sustainable university community gardens, in spite of the fact that participation from students was mentioned in nearly all the articles reviewed. Based on the near-to-non-existent mention of the impacts of students' transience in the literature, and the gardens' potential educational benefits, especially to do with the

development of sustainability competencies, I concluded that an exploration of how to understand and manage university student-led food gardens was indeed worth pursuing. I therefore went on to explore the causes and effects of short-term irregular, and low participation.

10.4 Problematic participation: causes, effects, and feedbacks

The second set of research questions I addressed focused on understanding the impacts of students' transience through examining the dynamics of problematic participation, including its causes, effects, and any feedbacks between them. Students' transience was found to have a paradoxical role in that it caused a form of problematic participation (short-term participation), while indirectly increasing participation overall by refreshing the pool of new recruits on an annual basis. There were many other factors causing problematic participation, which I categorised into barriers to 'getting through the garden gate' and barriers to continued engagement. There were many of each type of barrier, although there were none that stood out as key to address. Rather, it seemed that students' transience was the dominating factor, but this was not something that could or should be changed: students do and should leave university. Naturally, problematic participation led to a range of problems. These included: a constant need to recruit, a fast-changing and unpredictable organisational structure, friction between long-term and short term stakeholders, discontinuity and difficulty ensuring longevity, gardeners not seeing the results of their work, short-term thinking and a lack of insight into transience, difficulty retaining knowledge and skills, lack of funding, gardeners feeling overburdened, overwhelmed, and just burned out, inadequate maintenance, reduced social interaction, and negative emotional responses. A key finding that emerged out of the causal loop mapping was that short-term stakeholders experienced time in the gardens linearly, while long-term stakeholders experienced it

cyclically. These dual conceptions of time likely resulted in university staff members engaging in taxing and repetitive interactions with students, which they may have found frustrating. Students and staff also had different expectations on what appropriate timeframes were for tasks, which also caused frustration in university and students' union staff. As such, these differing conceptions of time were, in some cases, a source of friction between university staff and students. This analysis also indicated that student-led food gardens, as organisations with transient participants, might actually have an organisational form unique from temporary and permanent organisations.

From the causal loop mapping I found three accelerating feedback loops in the interaction between problematic participation, its causes and effects. These were buffered only by an annual refreshment of the pool of potential new recruits, illustrating the vulnerability of the gardens that many of the research participants expressed. Because transience was the main factor driving the vulnerability of the gardens, there were no other factors that stood out as key to address to reduce the effects of problematic participation. As such, it was the cumulative effects of all the barriers to participation and effects of problematic participation that were causing the vulnerability rather than one particular factor that could be leveraged. Because of this, I made some initial recommendations that both upstream solutions (targeting causes of problematic participation) and downstream solutions (effects of problematic participation) should be implemented, and which causes and effects of problematic participation solutions should focus on addressed should be decided on a garden-to-garden basis. Having mapped the relationship between transience, problematic participation, and its causes and effects, I then went on to explore other ways in which student-led food gardens might be vulnerable to students' transience.

10.5 Student-led food gardens' vulnerabilities in the face of students' transience

From developing an understanding of how students' transience impacts the participation dynamics of student-led food gardens, I found student-led food gardens appeared to be vulnerable to the transience of their own participants. Chapter 7 went further with this analysis of the vulnerability of student-led food gardens to students' transience by exploring the extent to which the gardens aligned or misaligned with Biggs et al.'s (2012, 2015c) resilience principles. Through this analysis I make a contribution to social science resilience scholarship empirically and theoretically as, to date, it is underrepresented in comparison to the natural sciences.

In Chapter 7, I explored the *diversity and redundancy* of the stakeholders involved and found that student-led food gardens were, naturally, lacking long-term involvement. In the garden where the relationships between short-term and long-term stakeholders were characterized by mistrust and conflict, the garden was thought to be particularly vulnerable. Gardens that lacked choice in ways that prospective gardeners could take part and ran a limited variety of different activities struggled to maintain participation. Furthermore, when there was an unsuitable balance between the 'fun' gardening activities and the ones that felt more like work for long-term mentors and student leaders, they struggled to see the value in taking part. In one garden, there was a high level of top-down control over the use of the space, preventing gardeners from exercising their autonomy over the space. There also appeared to be limited time allocated for university staff, especially those involved in managing the grounds, to engage with or support gardeners. Support was also needed from a variety of actors, although in most gardens the support from the students' union and university was limited. Staff from the National Union of Students, however, can and did play a crucial facilitative role in supporting staff-student conversations.

The *connectivity* between gardeners changed rapidly, and a fine line between cliquey-ness and cohesiveness needed to be balanced. Throughout the study, there was evidence of this balance both being maintained and falling off-kilter. All three of the gardens studied were poorly connected physically to the rest of the campus, which was thought to increase their vulnerability to transience by limiting incidental engagement. In one garden, the connections between university/students' union staff and student gardeners were not perceived to be mutual, and there was a notable amount of distrust characterising the relationships. Power asymmetries were not attended to or compensated for. In other gardens, the relationships between staff and students were not particularly strong, but overall were positive. However, support to help students retain knowledge within the gardens was limited.

Staff from the National Union of Students played an important role in building the resilience of the gardens through playing a facilitative and mediating role between the universities, students' unions and student gardeners. They also helped to connect gardens at different universities through visits and conferences, which helped gardeners feel they were a part of something bigger and inspired them.

Slow variables and feedbacks that I identified as being in need of monitoring were students' indifference/apathy to food growing and sustainability, the quality of the relationships between long-term and short-term stakeholders, the physical state of the garden, and the balance between an emphasis on recruitment compared to the 'core business' of the garden. Long-term stakeholders, like university/students' union staff or long-term mentors, were in a better position to monitor these and intervene as needed than those who had shorter-term engagement. However, there was little evidence of this sort of monitoring.

Short-term participants tended to be less tolerant to uncertainty and ambiguity, although it was found that it could be developed over time through participation in the

gardens. There was considerable evidence of learning taking place, although the learning seemed to not be the attitude/behaviour change or instrumental learning that was expected by the National Union of students, or perhaps even the students themselves. Furthermore, the retention of knowledge and skills within the gardens was poor which limited the learnings' contribution to resilience. However, the learning that came from participating in the student-led food gardens seemed to be more about students negotiating their transition to adulthood, how to navigate change in complex systems, and the development of the "ability, motivation and desire to play an active role" in a sustainability-focused initiative (Morgensen & Schnack, 2010, p. 61).

10.6 Applying the resilience principles beyond ecosystem services

This study marks a first attempt to apply the resilience principles to a context beyond sustaining ecosystem services, therefore, I also reflected on their transferability in Chapter 7. Overall, I found the principles useful, however because each of the principles had the potential to contain so many variables it was challenging to offer an overarching assessment of the resilience of the student-led food gardens with the depth that a qualitative case study approach requires. I also found it difficult to disaggregate the properties of student-led food gardens as systems ('the governed') and their governance ('the governors') given the focus of the study was weighted more heavily on the social component of the gardens. That is to say, that which needed governance and those who governed were often one and the same. I also found that too much diversity (i.e., in participants' worldviews) negatively affected connectivity and learning, thereby reducing resilience, indicating that it may not always be desirable to increase diversity. I also suggested that the application of the complex adaptive systems lens should be done with more ontological and epistemological humility to create opportunities for complex adaptive systems skeptics to engage with the principles. Finally, I suggested that intrinsic orientations towards learning should be encouraged in the resilience

principles, in addition to the extrinsic orientation already present. Rooted in these reflections, I suggested new phrasings and ways to organise the resilience principles for the application to social-ecological systems where the social component, rather than ecosystem services, is in focus.

10.7 Strategies to address the impacts of students' transience and build resilience

Having explored how transience impacts student-led food gardens and the vulnerabilities it causes, the last part of the thesis was future-orientated. In the first chapter of this part, I explored how to address the impacts of students' transience and build resilience into their initiatives such that they continue to persist. Drawing on the causal loop mapping, analysis of student-led food gardens through the lens of the resilience principles, and research participants' perspectives, I created a list of strategies and a matrix of advice for actions different stakeholders. These are the more prescriptive and practical contributions of this thesis.

I suggested that an appropriate and well-managed garden space should be maintained. This means being located in an accessible, central location, that the site is well-maintained, and it is aesthetically appealing. Physical infrastructure, such as raised beds, greenhouses and benches, should be used to prevent the gardens from becoming overgrown during periods of low participation, as indoor space for gardening in poor weather, and to facilitate a more social experience. Appropriate crops should also be grown to reflect the student calendar. Activities and events should be run weekly on a set day and time. Activities and events should be diverse and varied to appeal to a diverse student population, including gardening-orientated and social activities.

Support should be sought out by gardeners, and should be provided by university and students' unions' staff, National Union of Students' staff, peers, and more experienced and

knowledgeable gardeners. Support should be offered in a way that capitalises on the support-giver's competencies and their role in relation to the garden. That is to say, students' union staff would likely be able to support gardeners in a different capacity than staff working with campus operations. Support should also be offered in a way that enhances, or at least does not infringe upon gardeners' capacities to self-determine within their garden.

Creativity and interest should also be nurtured through high-quality leadership and facilitation (from all stakeholders). This should foster a sense of ownership and motivation through creating opportunities for gardeners to self-determine. Care should be given to ensure participants do not feel overburdened, but still feel encouraged to take on a bigger role and come back again. Participant input should be sought out by asking others what they want to do and finding out what participants want for the garden and from taking part. University or students' union staff overseeing the space should ensure opportunities for students to make changes, be creative, and experiment with the garden space as much as possible.

The visibility of the garden should be increased through advertising and making the actual garden more visible on the campus, such as though putting the garden on the campus map or creating signage. Organisational infrastructure should also be created. This includes establishing a society with committee roles, having elections for these roles, and assigning individual responsibility for tasks. It may also be effective to have a large number of roles within a society in order to distribute tasks more widely and yield a sense of responsibility from participants.

Recruitment should also be in focus, both in terms of who to recruit and how to recruit them. Potential participants that would be able to participate for a longer time and/or over the summer would be more strategic to recruit, such as first-year students, postgraduates, staff members, and campus residents. Recruitment can be done through

advertising, but reaching out through one's social network is typically a more efficient route. Diversity and redundancy should be built into participation, which is why recruitment in so important.

Documenting the history of and planning for the future of gardens ought to be done by keeping records to demonstrate impact, catalogue useful resources, and provide future gardeners with vital information for future strategic planning. The National Union of Students should continue to offer support for this through providing templates and guidance. These records should be used as part of a 'handover' between generations of gardeners. Planning for the future could be done through creating and regularly updating a shared vision; having to-do lists and guidance documents; and provision of general gardening advice. Documenting and planning were thought to contribute to building a narrative or a story of the gardens, helping participants to see that they are a part of something bigger.

To build the resilience of the student-led food gardens, they should be embedded within existing organisational infrastructure, such as student volunteering schemes, in university calendars/internal communications/webpages, the estates maintenance teams' schedule, the formal curriculum, staff members' role descriptions, and by becoming a student society. This can account for participation drop-offs because staff can 'kick-start' the group by advertising and recruiting new members. It also could create more incidental or serendipitous encounters with the initiative that might not have existed otherwise.

Connecting up with the students' union's current priorities, other student societies, the National Union of Students' Student Eats Network, and other Student Eats gardens was also thought to be helpful to break down the 'cultural barrier' and spread the word about the garden. Connecting to the National Union of Students' Student Eats network, and other Student Eats gardens was also thought to put gardeners in contact with resources to improve

gardeners' gardening knowledge and skills and help gardeners feel they were part of something bigger.

Although a less concrete strategy, focusing on value and creating vibrancy was equally as important. Focusing on value meant that gardening activities were not derailed by committee meetings, ensuring recruitment remained a secondary rather than primary purpose, continuing with tasks that need doing even if other people do not show up to gardening sessions, and focusing on activities that were fun and/or useful. Passionate people and having impressive harvests were thought to create vibrancy, resulting in a positive atmosphere people would return to. Appealing to extrinsic motivations to get and keep potential recruits involved may also be a useful strategy. Gardens should be funded and resourced adequately (including staff time). Some also thought paid student roles would be useful.

Learning played an important role in managing the impacts of transience. In particular, I found that there was a mutually reinforcing relationship between participation and the development of action competence. To further amplify this relationship and increase both participation and the development of action competence, I suggested that stakeholders of student-led food gardens should create opportunities for boundary interactions and embed opportunities for reflection-on-action in, for example, volunteering awards schemes or skills portfolio programmes.

I also found that while some strategies (such as running events and activities), had the potential to contribute to social-ecological memory over the short-term, over the long-term the most effective actions retain social-ecological memory were documenting activities in the garden and embedding the garden within wider organisational infrastructure, because these were strategies that did not require overlap between generations of gardeners. Ultimately, there is no silver bullet to address the impacts of transience and build resilience in student-

led food gardens. Rather, attending to as many of these strategies as possible creates space for prospective gardeners to engage in different ways, and to handle unpredictable or unexpected challenges and issues as they arise.

10.8 Methodological reflections

In Chapter 9, I offered some reflections on the methodology in order to be as candid, honest, authentic, and transparent as possible. I also hope that suggestions borne out of my methodological reflections will be help other action researchers navigate the confusing landscape of scholar-activism.

I found that keeping a research diary enhanced the rigour of my study, as did my unique positionality as a student-staff member. Rooted in this, I made the recommendation that this cross-over role would be beneficial for research into other student-focused campus initiatives. However, I found that conducting action research with transient participants came with considerable challenges. These were (1) a superficial understanding of issues by volunteers as a result of short term engagement, resulting in difficulties identifying or theorising the issue to research; (2) difficulties ensuring the implementation of 'actions' or 'interventions' given those involved in the 'planning' phase had often left by the 'action' phase; (3) a lack of capacity to engage in research given the ongoing challenges to maintain an adequate level of participation; and (4) that participants reported that the introduction of the researcher changed the group dynamics, prompted critical reflections that had not previously taken place, and improved continuity, thereby preventing a 'naturalistic' inquiry into transience as a phenomenon. Rooted in these reflections, I argued that, when conducting research (especially action research) with transient participants or partners, gathering perspectives from less transient stakeholders is a vital complement to perspectives from transient participants. Also, when conducting research with transient participants, it is worth

considering reciprocity not only on an individual basis, but also in a wider sense. That is, a researcher might not be able to 'give back' to the individual who took part in their research, but the researcher can give back to the community the individual is part of. Dealing with a lack of participant capacity to engage in research can be done by harmonising the data collection activities with activities participants need to do anyway, such as through go-along interviews. Researchers can also offer their time or efforts to return the time the research participant sacrificed for the researcher. I also suggest that first-person inquiry should be used to complement second- and third-person inquiry in order to attend to the researcher's own "thinking, valuing, way of learning, and behaving" to produce more authentic research (Coghlan, 2019, p. 191). Furthermore, researchers should also embrace their agency in their practitioner or activist role, as long as it is done with partners' blessings and best interests at heart, as they may be the actor with the most capacity to follow through the process from planning to taking action.

I also found that using an embedded case study approach within an action research study was both a strength and a weakness. I was able to develop more complete insights by capitalising on my different positionalities within the gardens. However, action research is a methodology that needs to be applied in context-specific ways. This meant that there was some inconsistency between the process between each of the three gardens that underwent more in-depth inquiry. This made the development of a coherent narrative for this thesis challenging.

I also reflected about an interaction with a staff member at the National Union of Students who expressed considerable concern about the focus on problems in my study and how I handled the feedback. Rooted in this, I said that 'failure' has stigma attached to it that would be good to break down. This was brought up as a future research direction later in Chapter 9.

Finally, I noted two limitations of this study. One is that I did not engage with or interview university or students' union staff in the three gardens that were the main focus of this study, although as a university staff member myself, I was able to reflect from this perspective in my research diary. The staff-student relationships in student-led sustainability initiatives in higher education would be an interesting future route for inquiry. The second limitation was the *ex-ante* causal-loop diagramming and use of the resilience principles. Because I had not planned to use causal loop diagramming or the resilience principles in the initial data collection (or during data collection at all, for the resilience principles), it meant that it is possible that I missed opportunities for probing and interrogating the connections between the different codes, meaning the causal loop diagram may be incomplete. Furthermore, it is also possible that the assessment of the vulnerability of student-led food gardens was not as complete as it could have been.

10.9 Future research directions

At the end of this thesis, I offered some potential research directions that were inspired by this study. I suggested that long-term implications of attitude and behaviour change initiatives in tertiary education, what and how students are learning in student-led initiatives, and critical perspectives on pedagogy in urban agriculture are needed. I also suggested that understandings of failure in the context of sustainability are currently limited, possibly due to stigma, and that this should be rectified. Given some gardeners' expressions of high levels of distress in my interviews and conversations, and the high proportion of international and exchange students who took part in the gardens, intersectional inquiry of student-led food gardens would be useful. These might consider mental health, (inter)national student status, ethnicity, (dis)ability, gender, or other axes of difference. Student-staff relationships in university sustainability initiatives/living labs would be worth

further inquiry to explore how to better maximise benefits to all stakholders. Further research applying Biggs et al.'s (2012, 2015c) resilience principles in different contexts should be undertaken to explore the extent of their applicability, and the extent to which enhancing the resilience of a system might be at odds with other aims (such as sustainability or learning). Finally, surprisingly little has been written about transience in sustainability science, although transience is very much a defining feature of our time. Further inquiry about the what could be learned from the scholarship about temporary organisations might help us to better understand how living in a more transient world affects student organising for sustainability.

10.10 Conclusion

Having studied impacts of transience in university student-led food gardens and how to manage them, it is clear that student-led food gardens operate in a perpetually vulnerable state. Students' transience impacts student-led food gardens in paradoxical manner, in that it both increases and decreases problematic participation. In some cases, there were power asymmetries between students and staff, underrepresentation of long-term stakeholders (like postgraduate students and university/students' union staff), slow variables were not monitored, and a lack of tolerance to ambiguity and uncertainty, all contributing to the vulnerability of the student-led food gardens studied. In spite of this vulnerability, there is evidence that the gardens provide a range of benefits, especially opportunities for learning, including learning that contributes to building sustainability competencies.

In addition to these findings, this study has practical outcomes. The action research process had participants deliberating and reflecting on how to address students' transience, and this not only contributed to answering the study's research questions, but also providing opportunities for learning for gardeners and staff at the National Union of Students alike. In the gardens at Keele and Warwick, gardeners took actions to address the impacts of

transience through this study although some of these were more impactful and long-lasting than others. There were also initial indications that the main learning outcomes of student-led food gardens were not 'converting' mainstream students into pro-sustainability advocates, but rather, helping pro-sustainability advocates develop their competencies to be better sustainability advocates. Knowing this will be useful to capture the full impacts of these projects in future evaluation of Student Eats and other pro-sustainability initiatives in tertiary education. The results of this action research study culminated in a practical set of recommendations for different stakeholders of the gardens.

However, there are outside pressures that may affect the extent to which these recommendations are taken up within universities, students' unions, student-led food gardens, and the National Union of Students. The higher education sector in England is increasingly subject to neoliberal agenda which is shaping how sustainability activity is manifesting in universities (Bessant, 2017). There do appear to be opportunities to harness this agenda for pro-sustainability activity. For example, the increasing importance of students-as-consumers can be leveraged for pro-sustainability aims by drawing out links between student-driven agendas (e.g., employability, internationalisation) and sustainability (Bessant & Robinson, 2015). One such opportunity that could be exploited is drawing out the mental health benefits of gardening, given the current focus on improving student mental health (Pereira et al., 2019). This opportunity could be harnessed by the National Union of Students when seeking out funding for Student Eats, or by supporters of student-led food gardens from universities or students' unions when advocating on their behalf. This said, it is not clear what the net impact student-led food gardens have on the mental health of their participants, as has been problematised in this study.

However, there are also considerable pressures from the neoliberal agenda that may impact or already be impacting student-led food gardens negatively. The pressure to be more

efficient with resources (including staff time) would likely limit staff support for such initiatives in both a quantitative and qualitative sense. The drive for efficiency may result in less staff time, quantitatively, allocated for such initiatives. This may be especially so for grounds staff, who are not typically expected to act in student-facing roles. Furthermore, the pressures of staff needing to do more with less may also negatively affect the quality of support they can offer to students. This might include staff lacking patience, reducing their capacities to guide student engagement and learning effectively. Moreover, the most important benefits of student-led food gardens are ones that are notoriously hard to measure. With the rise of audit culture associated with neoliberalism, it may be difficult to provide a compelling rationale for the continued support of such initiatives if their outcomes are not captured by league tables or other metrics. As such, it is not only the dynamics within student-led food gardens that have the capacity to undermine them, given that the activities taking place in the higher education sector at large also play into maintaining their longevity.

University student-led food gardens are a niche phenomenon, even within the world of sustainability in higher education. However, studying them has provided insights with much wider implications. I found that thinking about long-term and short-term stakeholders in organisations as having dual conceptions of time can help us to understand why friction emerges and how to address it. This study was also the first, to the best of my knowledge, to apply Biggs et al.'s (2012, 2015c) resilience principles to sustain something other than ecosystem services – that is, student-led food gardens. In doing so, I found that (1) the principles were indeed useful beyond their original intended context, and that (2) the stratification into 'the governed' and 'the governors' was less useful for application to social-ecological systems where the social system is in stronger focus. This is why I proposed a rephrasing of the principles for these sorts of contexts. Furthermore, I suggest that for social-ecological memory to be retained within social-ecological systems where 'generations' of

people do not overlap, physical forms/artefacts, and engagement from/embeddedness in external institutions or physical forms were the most effective strategies to use.

Using action research with transient stakeholders also provided some useful recommendations for future attempts to employ the methodology in the field of sustainability: action research with transient stakeholders should seek out less transient stakeholders to provide complementary perspectives; reciprocity can be thought of at a community-level rather than an individual level; and researcher agency and first-person inquiry should be embraced. I also suggested that sustainability scholars need to become more comfortable working with and reporting on failure so as not to create a one-sided picture of their research topic.

As the number and types of sustainability initiatives in universities increase, and universities work increasingly with sustainability and sustainable food through their campuses and education, the growing number and types of sustainability-focused initiatives, like student-led food gardens, can provide sites of learning and experimentation outside of the formal curriculum. These initiatives are meaningful contributors to sustainability education in the higher education sector. While vulnerable to their own participants' transience, students, university staff, students' union staff, and student sustainability organisations, like the National Union of Students sustainability team, all have the potential to contribute to ensuring the longevity of these sites of learning.

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Appendix A: Wiek et al.'s (2011) key competencies in sustainability

Table 28. Overview of core concepts and methods/methodologies as well as exemplary sources of the five key competencies in sustainability (Wiek et al., 2011, p. 213).

Competence	Concepts	Methods/methodologies	Sources
Systems-thinking competence	Variables/indicators, sub-systems, structures, functions	Qualitative and quantitative modeling	Porter and Córdoba 2009; Crofton 2000; Sterling 1996
	Feedback loops, complex cause-effect chains, cascading effects, inertia, tipping points, legacy, resilience, adaptation, structuration	Institutional, decision, governance, social systems analysis	
	Across/multiple scales: local to global	Systems multi-methodologies (e.g., "thick" description methodology)	
	Across/multiple/coupled domains: society, environment, economy, technology	Participatory systems approaches, including participatory modeling	
	People and social systems: values, preferences, needs, perceptions, (collective) actions, decisions, power, tactics, politics, institutions		
Anticipatory competence	Concepts of time including temporal phases (past, present, future), terms (short, long), states, continuity (dynamics, paths), non-linearity	Scenario methodology	Major et al. 2001; Withycombe and Wiek 2010; de Haan, 2006; Grunwald 2007
	Concept of uncertainty and epistemic status including possibility, probability, desirability of future developments (predictions, scenarios, visions)	Forecasting from statistical and simulation models	
	Concepts of inertia, path dependency, non-interventions	Backcasting and envisioning methods	
	Concepts of consistency and plausibility of future developments	Anticipatory multi-methodologies	
	Concepts of risk, intergenerational equity, precaution	Participatory anticipatory approaches, including Delphi and future workshop	
Normative competence	(Un-)sustainability of current or future states	Multi-criteria assessment methods (including Life-Cycle Assessment, Multi-Attribute Utility Theory, etc.)	Gibson 2006; Sterling 1996; Grunwald 2004
	Sustainability principles, goals, targets, thresholds (tipping points)	Risk analysis	
	Concepts of justice, fairness, responsibility, safety, happiness, etc.	Sustainability efficiency analysis	
	Concept of risk, harm, damage		
	Concept of reinforcing gains ("win–win") and tradeoffs	Envisioning methods (e.g., backcasting)	
	Ethical concepts	Participatory normative methods, including negotiation methods and consensus conference	
Strategic competence	Intentionality	Methods to design governance arrangements, policies, institutions	Bammer 2005; de Haan, 2006; Grunwald 2007
	Transitions and transformation	Planning methodologies	
	Strategies, action programs, (systemic) intervention, transformative governance	Decision support methodologies	
	Success factors, viability, feasibility, effectiveness, efficiency	Transition management methodology	
	Adaptation and mitigation	Methods to support behavioral change	
	Obstacles (resistance, reluctance, path dependency, habits) and synergies	Organizational (change) management	
	Instrumentalization and alliances		
	Social learning	Methods to support learning and reflexivity	
	Social movements		
Interpersonal competence	Functions, types, and dynamics of collaboration (within and beyond academia)	Participatory methods, including negotiation, mediation, deliberation, constructive conflict methodology	Crofton 2000; Kearins and Springett 2003; de Haan 2006
	Strengths, weaknesses, success, and failure in teams	Teamwork methods	
	Concepts of leadership		
	Limits of cooperation and empathy		
	Concepts of solidarity and ethnocentrism		

Appendix B: Student Eats funding

The National Union of Students' sustainability team was awarded £315 000 through the Big Lottery's Local Food scheme. A portion of this funding was subsequently distributed to universities, colleges, and their students' unions. The requirement for the funding was that the project must have been student-led or at least have had substantial student engagement given that the funding was provided through the National Union of Students. Approximately £10 000 was given to each of the eighteen sites funded.

Some institutions already had gardens with considerable existing infrastructure, while others were setting up a garden from scratch. As such, each garden spent funding by mixing-and-matching different items according to their needs. For example, all sites received funding for improving access, paths, and/or raised beds, however, only six sites received funding to set up greenhouses. Most of the gardens' expenditures were expected to be spent on capital costs. The items that the National Union of Students sustainability team expected to fund are in Table 29.

Table 29. Items funded by Student Eats' Local Food funding.

	Items	Approx. cost
Capital costs	Improving access/paths/raised beds	£1500
	Polytunnels including fitting	£3500
	Greenhouses including delivery/base	£1400
	Cold frames including delivery	£950
	Staging (shelving)	£1000
	Seeds, plants, fruit trees	£750
	Compost - one load, including delivery	£100
	Growing trays and herb pots	£75
	Canes, string, labels, pens, books	£40
	Water installation - mains	£1,250
	Water installation - rainwater harvesting including 2 x butts, hose, watering cans	£150
	Composting infrastructure	£150
	Boundaries - protective fencing and gates	£800
	Biodiversity enhancements - hedging, bird boxes, ponds	£350
	Bee hive - two at each, including protective equipment	£600
Revenue costs	Fixed branded interpretation boards at each site, including delivery and installation	£1300
	Recruitment of volunteers - posters, adverts in student newspaper, windowsill taster growing kits for freshers	
	Box scheme set up - leaflets, bags, boxes	
	On campus and off-campus outreach events (cooking, school visits, etc.)	
	Volunteer insurance (extension of current policy to cover new volunteers)	

Appendix C: Reflective diary prompts

In my reflective diary, I would use the following 'Learning Window' from Coghlan and Brannick (2005, p. 43) to structure how certain I felt about what I thought I knew and to figure out what ideas I might want to explore further or test out.

What I *know* I know •	What I *think* I know •
What I *know* I don't know •	What I *don't know* I don't know

I would also use the following reflective prompts I wrote for myself based on a journaling exercise created by Coghlan and Brannick (2005).

Context

What stage of the research am I at?
What are the recent events that have taken place?
Have we reached any milestones?
Has there been any conflict?
What are the challenges I've been struggling?
Have there been any unexpected outcomes?

Reflecting on Recent Happenings

How did recent activity make me feel? Why?
What judgements did I make?
Would I have done anything differently? Why?
What is within my control, and what is out of my control?
How did I deal with unpredicted outcomes? Did this work?
Can I see any trends or patterns emerging?

Moving Forward

What am I expecting to happen next?
What steps am I taking next?
Can I foresee any challenges or conflict? If so, what? And how can I prepare myself to deal with these?
Can I test any of the conclusions I've come up with in my reflections? How?

Appendix D: Ethical approval letters

Keele University

RESEARCH AND ENTERPRISE SERVICES

Ref: ERP1202

26th August 2014

Rebecca Laycock
Room 1.25
William Smith Building

Dear Rebecca, ***[insert name]***

Re: Cultivating social and environmental sustainability in community gardens: an action research approach to developing indicators

Thank you for submitting your revised application for review. I am pleased to inform you that your application has been approved by the Ethics Review Panel.

The following documents have been reviewed and approved by the panel as follows:

Document	Version	Date
Summary Proposal	2	01.08.14
Letter of invitation for case study participants	2	01.08.14
Letter of invitation for administrative participants	2	01.08.14
Information Sheet for case study participants	2	01.08.14
Information Sheet for administrative participants	2	01.08.14
Consent Form for case study participants	2	01.08.14
Consent Form for administrative participants	2	01.08.14
Consent Form for case study participants for the use of quotes	2	01.08.14
Consent Form for administrative participants for the use of quotes	2	01.08.14
Consent Form for case study participants use of media	2	01.08.14
Consent Form for administrative participants for use of media	2	01.08.14
Passive Consent Form Template	2	01.08.14
Interview Topic Guide	1	16.06.14
Future Workshop/Participatory Rural Appraisal Outline	1	16.06.14
Group Level Assessment Topic Guide	1	16.06.14
Conference Outline	2	01.08.14
Structured Ethical Reflection	1	16.06.14

If the fieldwork goes beyond the date stated in your application, you must notify the Ethical Review Panel via the ERP administrator at uso.erps@keele.ac.uk stating ERP1 in the subject line of the e-mail.

If there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator stating ERP1 in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

Research and Enterprise Services, Keele University, Staffordshire, ST5 5BG, UK
Telephone: + 44 (0)1782 734466 Fax: + 44 (0)1782 733740

If you have any queries, please do not hesitate to contact me via the ERP administrator on research.erps@keele.ac.uk stating **ERP1** in the subject line of the e-mail.

Yours sincerely

pp C H Bonnerman

Dr Jackie Waterfield
Chair – Ethical Review Panel

CC RI Manager
Supervisor

Keele University

Ref: ERP1202

19th May 2016

Rebecca Laycock
William Smith Building, 1.15
Keele University

Dear Rebecca,

Re: Cultivating sustainable participation in Student-led Food Growing Initiatives with transient participants using action research

Thank you for submitting your application to amend study. I am pleased to inform you that your application has been approved by the Ethical Review Panel. The following documents have been reviewed and approved by the Panel as follows:-

Document	Version	Date
Summary Proposal	3	04-05-2016
Invitation Letter – Case Study Participants	3	04-05-2016
Information Sheet – Case Study Participants	3	04-05-2016
Consent Form	3	04-05-2016
Consent Form (for the use of video, photo and audio recordings)	3	04-05-2016
Photovoice Information Sheet	1	04-05-2016

If the fieldwork goes beyond the date stated in your application **31st January 2017**, you must notify the Ethical Review Panel via the ERP administrator at research.erps@keele.ac.uk stating **ERP1** in the subject line of the e-mail.

If there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator stating **ERP1** in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

Directorate of Engagement & Partnerships
T: +44(0)1782 734467

Keele University, Staffordshire ST5 5BG, UK
www.keele.ac.uk +44 (0)1782 732000

If you have any queries, please do not hesitate to contact me via the ERP administrator on uso.erps@keele.ac.uk stating ERP1 in the subject line of the e-mail.

Yours sincerely,

pp

Dr Jackie Waterfield
Chair – Ethical Review Panel

CC RI Manager
Supervisor

Research and Enterprise Services, Keele University, Staffordshire, ST5 5BG, UK
Telephone: + 44 (0)1782 734466 Fax: + 44 (0)1782 733740

Ref: ERP1202

1st February 2017

Rebecca Laycock
William Smith Building 1.15
Keele University

Dear Rebecca,

Re: Cultivating social and environmental sustainability in community gardens: an action research approach to developing indicators

Thank you for submitting your third application to amend study. I am pleased to inform you that your application has been approved by the Ethical Review Panel. The following documents have been reviewed and approved by the Panel as follows:-

Document	Version	Date
Information Sheet and Consent form for Discussion Workshop	1	24-01-2017

If the fieldwork goes beyond the date stated in your application, **28th February 2017**, or there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator at research.governance@keele.ac.uk stating **ERP1** in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries, please do not hesitate to contact me via the ERP administrator on research.governance@keele.ac.uk stating **ERP1** in the subject line of the e-mail.

Yours sincerely,

pp C H Bonnerman

Dr Jackie Waterfield
Chair – Ethical Review Panel

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RI Manager

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Appendix E. Summary of findings from the 'constructing' phase

A Summary of Findings from the 'Diagnosing' Phase
from an Action Research project exploring Student-led Food Growing Initiatives

Rebecca Laycock
William Smith Building, 1.15
Keele University
Staffordshire
ST5 5BG
email: r.laycock@keele.ac.uk
telephone: +44 (0) 1782 734993

January 19, 2016

1

Background

In October 2014 I began fieldwork as part of my PhD project about Student-led Food Growing Initiatives (SFGIs), looking at three case studies that had been supported by the NUS' Student Eats food growing initiative. My PhD uses Action Research – an approach that combines research with taking 'actions' to address a problem. The process begins with a **'diagnosing' phase** to find a problem to address, followed by **planning an action** to address the problem, then **taking the planned action**, and finally **evaluating the action taken.**

Diagnosing	Planning Action	Taking Action	Evaluating
•Oct 2014 - Dec 2015	•Jan-Feb 2016	•Feb-Nov 2016	•Nov 2016-Feb 2017

The purpose of this document is to communicate the findings from the 'diagnosing' phase by reporting:

1. What the problem is that we want to address,
2. The factors that influence the problem,
3. The challenges the problem causes, and
4. What can be done to address the problem.

How to Read This Report

It's recommended that you interpret this report by first looking at the flow diagram on page 3. Then if you don't understand something, go to the section of the report that elaborates on the part you don't understand.

This diagram will be able to help us make some decisions about how to move forward with this Action Research project. However, I don't want to have missed out anything important or to have misinterpreted what was said by the people who were involved in providing this data. For this reason, **I'm asking that you look over this report, including the diagram, and let me know if you think they are an accurate representation of the issues, and if there are any changes that need to be made.** For more information on how to do this, please jump to page 7 under the heading of 'Next Steps & Suggestions'.

1. The Problem We Want To Address: Participation

There were a number of challenges identified during the 'diagnosing' phase. These included: a lack of funding, friction and disagreements among gardeners, a lack of transport, and a shortage of gardening space. However, the challenges that were unanimously agreed to be the biggest were participation, student transience and continuity of the SFGIs themselves.

There were two main participation issues that were identified:

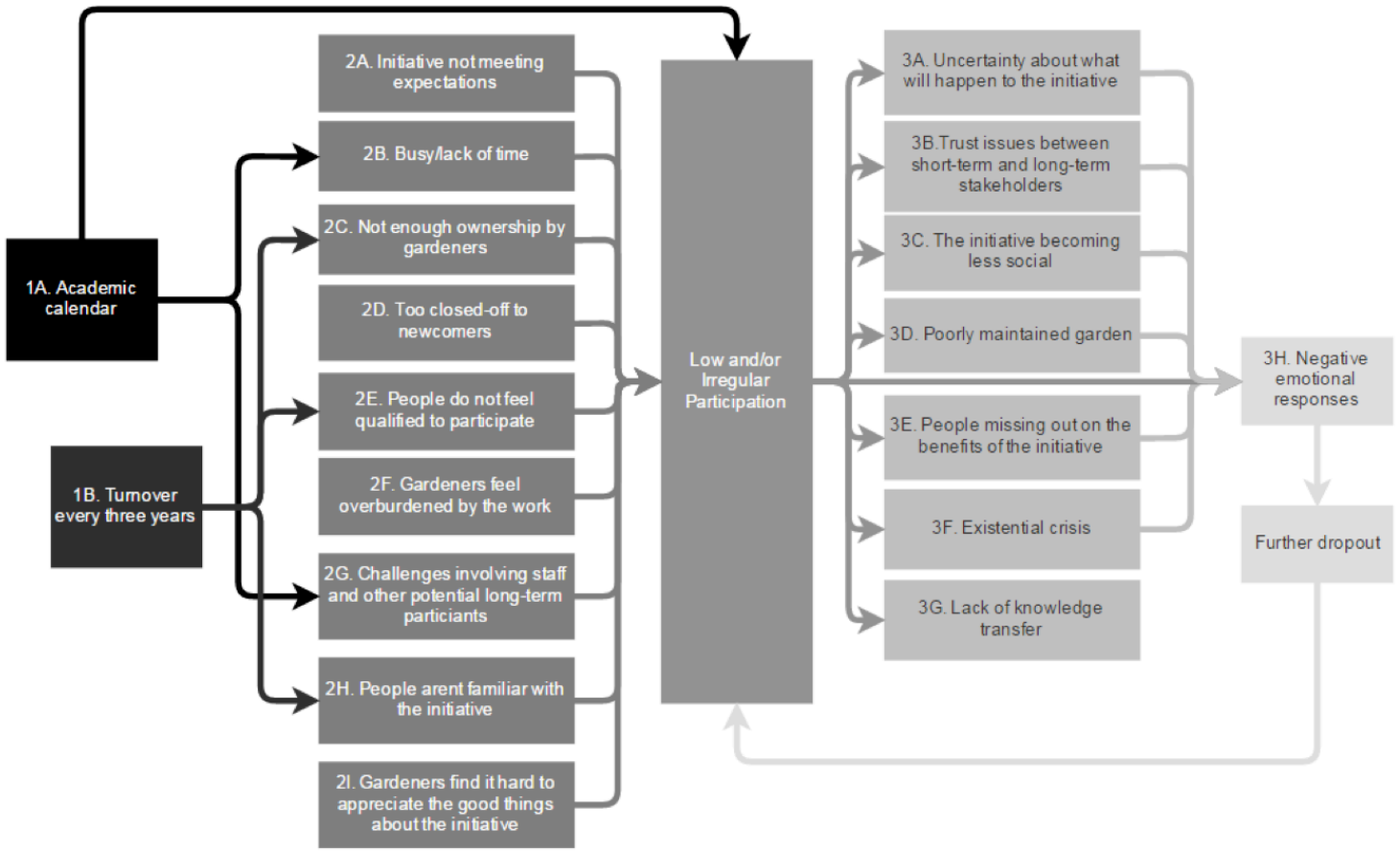
I think the garden is great at bringing people together, I just don't think there are enough people brought together to start with.

Low participation, which is when there are few people involved or the people involved can only take part for a limited time. While there may be lots of time spent on garden activities on a single day, the initiative may suffer from low participation if this happens irregularly.

Irregular participation is the other issue identified, and is when involvement in the garden is inconsistent. For example, regular participation might be a gardener spending an hour in the garden on a weekly basis over the course of the year, and irregular participation might be a gardener spending two hours at the garden five occasions over the course of the year.

There are also a dual set of tasks involved in SFGIs that gardeners can participate in. One of these tasks is the actual gardening, including activities as diverse as creating sowing calendars, weeding, composting, and harvesting produce. The other task is to maintain the project in an administrative sense, including equally diverse activities like maintaining a society status and structure within the Students' Union, recruiting participants, applying for funding, and liaising with University and Students' Union staff. Both of these sets of tasks are essential for SFGIs to sustain themselves.

The dynamics of low/irregular participation in Student-led Food Growing Initiatives (SFGIs)



2. Factors that Contribute to Low/Irregular Participation

There are a variety of factors that contribute to low and/or irregular participation, and the transience of the gardeners in SFGIs can also exacerbate some of these factors. There were two ways in which students were found to be transient: 1) they were absent for periods of time during the year as a result of the **academic calendar** (1A) (ie. summer holidays, Easter holidays, winter break), and 2) every three years there is an entirely new group of volunteers because students typically take **three years to graduate** (1B) from their course.

Some of the factors that contribute to low and/or irregular participation were found to be:

The initiative doesn't meet participants' expectations (2A). Some people who get involved with SFGIs have a romanticised notion of what community gardens are or can be, and once they get involved the gardens don't live up to their expectations. This may be in part because of the 'messiness' of the initiatives and the gardeners' expectation that the project should be well-managed, should be producing more food, or better contributing to a pro-environmental agenda.

Gardeners are busy or lack time (2B). When gardeners are busy or lack time there can be low and/or irregular participation. A number of research participants mentioned their reluctance to commit to a formal role in the committee or society they were involved with because of this.

Not enough ownership by gardeners (2C). Some participants mentioned the need for gardeners to have a more personal connection to the garden to make them feel accountable and encourage them to keep coming back. The difficulties developing ownership of the initiative may be compounded by the fact the students typically only stay at university for three years and therefore know their participation is time-bounded.

It needs to be cohesive enough to keep people in, but not so cohesive that it leaves people out.

However, there were also issues of some gardeners claiming more ownership that it was perceived they were due. Common examples were participants who claimed committee roles without doing gardening tasks and participants acting like an authority on the project without actually having invested time or efforts in the groundwork of the project.

Too closed-off to newcomers (2D). If the group is too closed off, newcomers may not feel welcome to participate. One way this can happen is by a group being too close-knit that it becomes alienating for others. An example of how this alienation can occur is having meetings or social events at someone's home. However, another possible reason for the garden being closed off is because the existing gardeners feel that bringing in more people is a threat to their ownership and authority in the garden, and that newcomers may direct the initiative in an unwanted direction.

People don't feel qualified to participate (2E). Some participants felt that food growing was too unfamiliar and far out of students' comfort zones, which is why student gardeners may lack the confidence or not feel qualified to participate. This may also be due to or compounded by the 'messiness' inherent in the projects, and the trial-and-error approach to gardening and project management.

Participants mentioned that these challenges are mitigated when there is someone more experienced involved in the initiative to take leadership (either someone who has experience from other projects, or someone who has already gained experience through the initiative). It can also be mitigated by running hands-on workshops which can feel more inviting to people who aren't as confident.

[What annoys me most about the garden is] a lack of independent decision making.

Participants also reported that some gardeners had a lack of initiative or lacked the ability to make decisions independently. This may be caused by a lack of confidence, but also could be because students' inexperience with volunteer-run projects – and they therefore struggle to understand the level of initiative and independent decision-making needed for such projects to run effectively.

It seems like, in my experience, they get fed up after a year, because it's too much responsibility. And then they never come again, after they're no longer on the committee. Even though they did it all the time before. Sort of, like, overload. It goes both ways. You can get too much, like, involvement, just out of, like necessity, and get just not involvement because people won't come back.

Gardeners feeling overwhelmed or overburdened by the work (2F) was very common. Those that were regularly involved in the initiatives tended to get burdened with more responsibilities than they'd like, and also tended to be people with a sense of stick-to-itiveness. Therefore, it was common for these participants to be highly involved for a year and then drop out. In other words, burnout accelerates the already high turnover rate.

Because those that are more involved in the initiative know that overburdening newcomers can lead to dropout, they can be reluctant to delegate responsibilities. Inadvertently, this can also reduce the ability of newcomers to develop a sense of ownership over the initiative, another factor which inhibits participation.

Challenges involving staff and other potential long-term participants (2G). Staff were challenging to involve in the SFGIs because it was difficult to accommodate their work schedules (for example, meetings couldn't be arranged after 5pm because it would be dark out). Another challenge identified was that undergraduate students and potential long-term participants, such as postgraduate students, don't usually mix so it can be hard to involve them.

At the fair I had a lot of people coming to me, being like, 'Oh yeah, I found your garden' and if they're really interested then there's this link and they can find it. But if they're not, and they don't know anything about it, it's true that it's hard to find it because it's so hidden.

People aren't familiar with the initiative (2H). There is a lack of awareness about the SFGIs, but this is also compounded by the fact that the gardens themselves can be hard to find and there is limited advertising.

In the middle of winter it's hard to appreciate [what the initiative achieves] sometimes.

Gardeners find it hard to appreciate the good things about the initiative (2I). Because those involved with the initiative are constantly dealing with urgent problems, it can be hard for them to see the positive aspects of the project.

3. Issues Caused by Low/Irregular Participation

The issues found to be caused by low and/or irregular participation were:

Uncertainty about what will happen to the initiative (3A). Low or irregular participation can lead gardeners to worry about the future of their SFGI. This response is notable in people who have been involved with the initiative for longer, while newcomers tend to not experience these worries or may not even be aware that their fellow gardeners are having them.

…every session I'm wondering how many people are going to turn up. Did I make a good enough effort remind people that there is a session on today? Is the weather going to stop people from turning up? And then, also, the more general thing that has to do with that is who's going to run it over the summer when the students that are going home are gone? Who's going to run it when the most amount of people… and also who's going to run it next year? Is it going to dissolve?

Trust issues between short-term and long-term stakeholders (3B). Another issue caused by low or irregular participation is the development of trust issues between long-term (ie. university staff) and short-term stakeholders (ie. undergraduate students). Because students are involved in the initiative for a limited period of time, it can be difficult for university staff and the initiative's other long term stakeholders (ie. postgraduate students, local residents) to begin to trust them. If the long-term stakeholders feel past students haven't been trustworthy, they may be reluctant to trust new students. This problem is reinforced by stereotypes about students, as one gardener pointed out, saying that university staff think students are lazy.

…just going up the chain of command is a pretty difficult skill, and it's quite intimidating to approach people who are in supposed positions of power [ie. university staff]. And with, like, new students coming in who have no idea who these people are, like, that in itself is hours and hours of work of trying to figure out of who do I go to talk to? How do I make a proposal? It's basically the issue of consistency again. There's no consistency, so it'll always be difficult when there's no consistency. Because when, I guess, the previous year's group of students have made, like, a good relationship with the people in the chain of command, then it makes it that much more difficult to re-establish that new relationship with a new bunch of people.

The initiative becoming less social (3C). Natural outcomes of having lower and more irregular participation are fewer opportunities for the initiative to facilitate socialization – a widely reported benefit of being part of the initiatives.

The garden being poorly maintained (3D). When there are participation issues, jobs in the garden don't get done. This results in the garden becoming overgrown and also being harder to maintain because the gardeners need to play catch up with the duties. It also means that there is wasted potential, which can be disappointing for the people involved and can mean they don't get as much out of the experience of growing something.

People missing out (3E). When participation is low or irregular gardeners don't get to experience the benefits of the initiative to their full. For example, they may miss out on the enjoyment of seeing the garden at its peak during the summer. One participant also spoke about how the short lifecycle of their participation in the project influenced their choice to not grow crops that take several years to reach maturity because by the time the crops were mature they would be gone. In this way, the short term nature of gardeners involvement with the project may cause future 'generations' of gardeners to miss out on some benefits.

I guess, sometimes I'm here in July and August and I'm just like, this is just so beautiful. Heart-achingly beautiful. […] And I think, everyone's missing out on this! Everyone's missing out on… I can take photos and put photos up and stuff, but people are missing out on it. But they don't know. They don't actually know. Like, their frame of reference in smaller so they don't know what they are missing. Literally. And they come back and they see it and it's vaguely… it's alright. So I think it more affects me, you know. It's disappointing that people can't enjoy it more.

How do you define this project? You know, like, where is it going? What's the goal and stuff? I don't know.

Existential crisis (3F). The SFGIs struggle so much with just trying to stay afloat (ie. maintaining the garden, recruiting and retaining participants) that it actually becomes their main focus. However, if the main aim of the initiative is to make sure it doesn't fold (ie. the initiative is successful if it continues to exist), it leads to questions about the value and the meaning of the SFGIs.

I get quite annoyed with the [others]. I don't say it to them, but inside I feel annoyed because we're supposed to be in it together, working as a team, and then they're always making excuses every [week] when they can't come. And I feel like I'm the only one who does all the work for the whole [initiative].

Lack of knowledge transfer (3G). Gardening is a knowledge intensive exercise, both in terms of transferable gardening skills and knowledge and in terms of site-specific knowledge (ie. the history of the crop rotation, knowing which areas flood in the spring). Low and irregular participation means that key pieces of knowledge can be lost over the 'generations' of gardeners. General knowledge can be recouped by reading gardening books or with skilled newcomers joining, however some site-specific knowledge cannot be recouped and may result in problems down the line (for example, growing potatoes in the same spot over several seasons means they are more likely to get blight).

I think it leads to a spiral of reducing participation each week, because if someone comes and it's only them and another person, then they're not going to come back again. Because it's like, they want to be part of a community garden and if it's not a community, then it's just gardening. […] So I don't know why they'd go to a random place to just do gardening. They want to be part of something that will end up being part of the project.

Negative emotional responses that may lead to further dropout (3H). It is apparent that one of the main outcomes of low or irregular participation are negative emotional responses. These took a variety of forms and included feeling worried, tired, sad, lonely, frustrated, disappointed, demotivated, and annoyed. Further dropout and more participation issues can be caused by the development of these negative emotional responses by participants.

4. Strategies to Address the Participation Problem

The strategies identified to address the participation problem were:

Maintaining a well-managed garden retaining an appearance of permanence. This can be done by growing early and late crops so gardeners that are away for the summer can eat the produce they grow, and acquiring more growing space to extend the scale of the project and the number of participants that can be involved.

Having regular meetings, events, and workshops (particularly catering to those newcomers who feel underqualified); meeting in a central location to lead people to the garden.

Recruiting new participants. People with gardening/project management experience can help the garden function more smoothly, and long-term participants (such as University or Students' Union staff, postgraduates, and local residents) help to maintain continuity over time. Embedding the initiative into a staff member's formal role was also suggested.

Developing a cohesive 'core' group with a sense of comradery without being becoming too closed-off through being personable and managing tensions and frictions within the group.

Fostering a sense of ownership of the garden in newcomers. This could be done by delegating responsibilities, assigning tasks, encouraging newcomers to take on a committee role, or even through a '*plant parenting scheme*' where gardeners have a plant that belongs to them. An important part of this is making sure

newcomers know what tasks need to be done in the garden – both the immediate tasks, but also ones that will crop up in the future.

Having a vision and building in a legacy into the project can help to give the project a better sense of continuity and a feeling that the gardeners are participating in something 'bigger' (giving relief to the 'existential crisis'). A vision can be set by outlining goals of the project, and continuity can be maintained by 'handing-over' information from the present committee to the incoming committee verbally or through a handbook. However, such handovers may benefit from a sense of ritual or use of creative methods to make them less instrumental and more fun, such as through developing a handover tradition (ie. past committee take the future committee out for dinner) or creating videos annually about what has been done in the garden each year. Monitoring progress (ie. measuring how much food is produced or amount of volunteer hours) could also be useful so that gardeners can be motivated by seeing their efforts contributing to a larger cause.

Because sustainability is about passing to future generations. As students, we are, in generations, coming and leaving and coming and leaving. So we have to have an action plan for the future to look at.

Enhancing communication can both raise awareness and increase the visibility of the initiative, and help people to better understand the benefits of being involved. Communications include:

- Regular **emails** and updates on **social media**
- **Using advertising platforms available** to student societies (like TV screens around campus)
- **Handing out promotional material**, such as produce or tote bags
- **Creating or improving signage**, including creating a mural in a prominent location, creating a new interpretive sign, adding the garden to existing interpretive signage, and getting footprint stickers to lead from a central location to the garden site.

Communications can also help dispel some of the misconceptions and romanticized ideas about what being part of a SFGI is like. For example, choosing to focus on the *'radical potential'* of the space, the social benefits, and the feel-good benefits (like feeling more relaxed and developing a sense of pride in the project), rather than reducing food miles or self-sufficiency.

Next Steps & Suggestions

If you are involved in one of the case study gardens or a part of the NUS sustainability team, you are invited to offer your feedback on these initial interpretations of the findings. If you have not participated yet and want to offer feedback, please contact me so that I can give you the information you need to know before taking part in the project. If you have already signed a consent form, **you are welcome to send your feedback in immediately by emailing me at r.laycock@keele.ac.uk. Feedback will be welcomed until February 14th**.

I will be running further workshops using the findings from this report and the feedback I receive. There will be one workshop at each case study garden. The focus of these workshops will be to come up with an action plan to meaningfully address the challenges outlined in this report. These actions will be delivered over the course of the following 9-10 months.

My suggestion that I would like to pose for your consideration is that it might make sense to **address both the transience issue and the participation issue** with the action(s) we choose to take. The reason for this is because it is easy for actions that address issues associated with transience (such as recruiting long-term participants) to be placed on the backburner when there are more urgent concerns nudging us at the present (such as recruiting participants in general), particularly since we might not reap the benefits while we are involved in the garden. I also welcome your feedback on this suggestion.

Appendix F: Action plans

XXXXX's Actions to Increase Participation

This is a list of actions to be taken by XXXXX to increase participation in their project. These actions form a part of a PhD research project about participation and transience in university food growing initiatives. The research has four main stages: **constructing** the problem, **planning action(s)** to address the problem, **taking action**, and **evaluating** the actions taken. This link will take you to the findings from the constructing stage. This google doc summarises the 'Planning Action' phase. First you will find a flow diagram mapping out the dynamics affecting participation in the project (which, based on feedback from gardeners involved in the research, has been adapted from the version in the 'Constructing' stage's findings report). This is followed by a table which lists the proposed actions. Some actions have a person responsible for seeing them through, however others do not. If you would like to sign yourself up to undertake any of the actions, just add your name under the 'Person Responsible' column, and set yourself a deadline to complete the said action. You don't need to have participated previously in the research to take part in these actions.

I (Bekki Laycock, PhD researcher) will be in touch on a regular basis to find out how the actions are progressing. If you have any questions or comments, you can also feel free to get in touch with me via email at r.laycock@keele.ac.uk.

Please feel free to add or adapt comments, details of the action, and the issue addressed by the action.

Figure 1. The dynamics of low/irregular participation in Student-led Food Growing Initiatives (SFGIs).

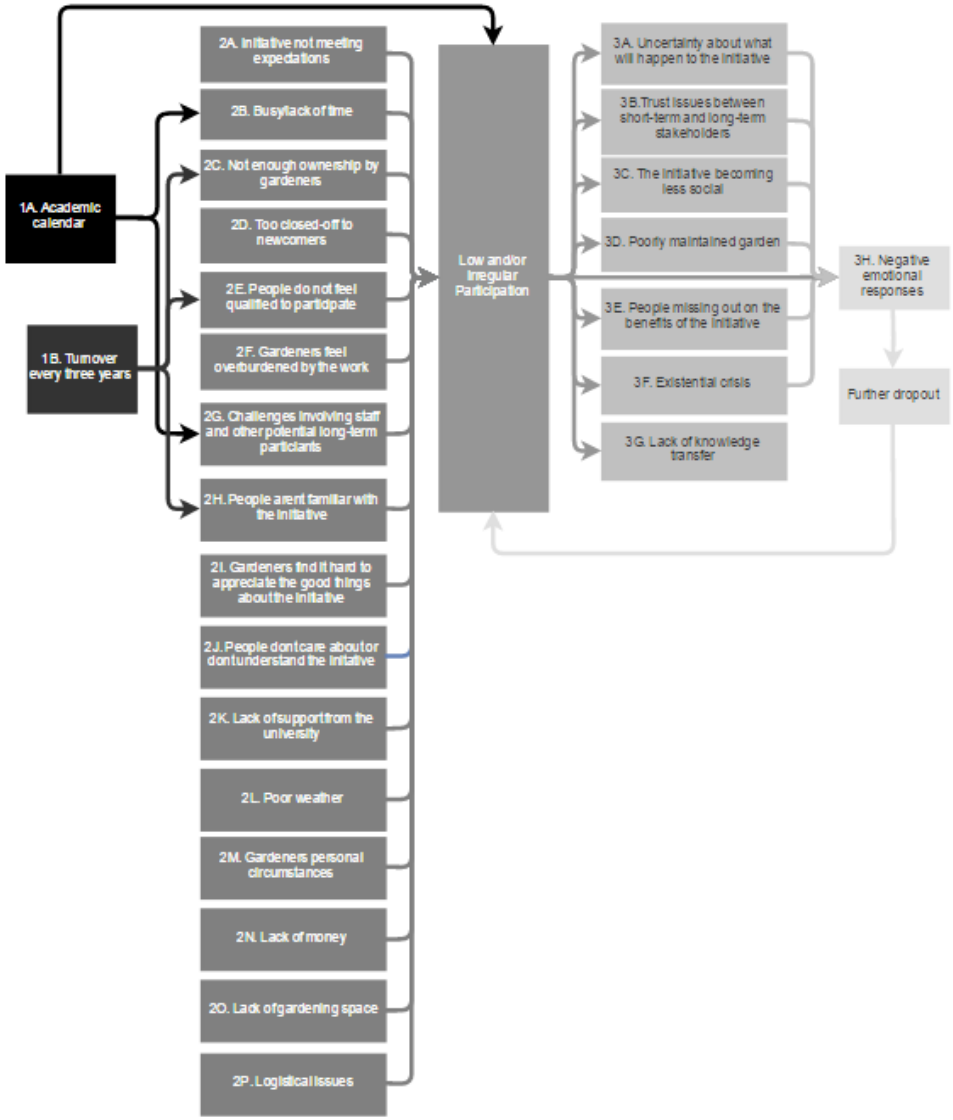


Table of Actions to Increase Participation

Action	Details of Action	Issue addressed by action	Date for action to be completed by	Person responsible
Create a recipe collection		•		
Introduce benefits in an attractive way (food, gardening)		• People don't care about or don't understand the initiative (2J)		
Updated summary of things done in the allotment and brief description of how it works		• People do not feel qualified to participate (2E)		
Hand out food made out of produce in public areas	Hand out food with a leaftlet including information about the food and how to get involved with the allotment	• People aren't familiar with the initiative (2H)		
Put fliers in different accommodations to spread awareness about the allotment and its events		• People aren't familiar with the initiative (2H) • People don't care about or don't understand the initiative (2J)		
Create a growing plan	Should have two parts: one saying what needs to be done, and the other reporting what has been done after each workshop	• Gardeners feel overburdened by the work (2F) • Not enough ownership by gardeners (2C) • People do not feel qualified to participate (2E)	Check in on a monthly basis	**XXXXX1 and XXXXX2**

Make tote bags		• People aren't familiar with the initiative (2H)		
Contact other societies to get involved	For example, the writing society to do an allotment themed session, eco therapy	• People aren't familiar with the initiative (2H) • People don't care about or don't understand the initiative (2J)		
Create packets/bouquets of dried herbs to give away		• People aren't familiar with the initiative (2H)		
Have a bonfire night in Week 10		• People aren't familiar with the initiative (2H) • Gardeners find it hard to appreciate the good things about the initiative (2I) • Too closed off to newcomers (2D)		**XXXXX1**
Organise a sowing workshop		• People do not feel qualified to participate (2E)	1st week of March	**XXXXX3**
Hosting interdisciplinary projects at the allotment	Such as an art installation or poetry reading	• People aren't familiar with the initiative (2H) • Too closed off to newcomers (2D) • People don't care about or don't understand the initiative (2J)		
Add to the blog	Put photos, poems, the growing plan/manual on the blog	• People aren't familiar with the initiative (2H) • People do not feel qualified to participate (2E) • People don't care about or don't understand the initiative (2J)		

Bring a new person to the garden		• People aren't familiar with the initiative (2H) • People do not feel qualified to participate (2E) • People don't care about or don't understand the initiative (2J)	By next term	**Everyone**
Post items of interest on the facebook page		• Gardeners feel overburdened by the work (2F) • Gardeners find it hard to appreciate the good things about the initiative • People aren't familiar with the initiative (2H) • People don't care about or don't understand the initiative (2J)	By next term	**Everyone**
Embed the garden in internal communications		• People aren't familiar with the initiative (2H) • People don't care about or don't understand the initiative (2J)	By April	**XXXXX3**
Embed the garden in campus map		• People aren't familiar with the initiative (2H)	By April	**XXXXX3**
Embed in the Food GRP		• People aren't familiar with the initiative (2H)	By April	**XXXXX3**
Update online pages/resources	Especially 'Why should I care?'	• People aren't familiar with the initiative (2H) • People don't care about or understand the initiative (2J)		

Challenge VC		•		
‘Low-level’ advertising	Consistent, free, non-invasive advertising, such as posts on Facebook	• People aren’t familiar with the initiative (2H) • People don’t care about or understand the initiative (2J)		

Actions to Increase Participation in YYYYY's Initiative

This is a list of actions to be taken by YYYYY to increase participation in their project. These actions form a part of a PhD research project about participation and transience in university food growing initiatives. The research has four main stages: **constructing** the problem, **planning action(s)** to address the problem, **taking action**, and **evaluating** the actions taken. This link will take you to the findings from the constructing stage. This google doc summarises the 'Planning Action' phase. First you will find a flow diagram mapping out the dynamics affecting participation in the project (which, based on feedback from gardeners involved in the research, has been adapted from the version in the 'Constructing' stage's findings report). This is followed by a table which lists the proposed actions. Some actions have a person responsible for seeing them through, however others do not. If you would like to sign yourself up to undertake any of the actions, just add your name under the 'Person Responsible' column, and set yourself a deadline to complete the said action. You don't need to have participated previously in the research to take part in these actions.

I (Bekki Laycock, PhD researcher) will be in touch on a regular basis to find out how the actions are progressing. If you have any questions or comments, you can also feel free to get in touch with me via email at r.laycock@keele.ac.uk.

Please feel free to add or adapt comments, details of the action, and the issue addressed by the action.

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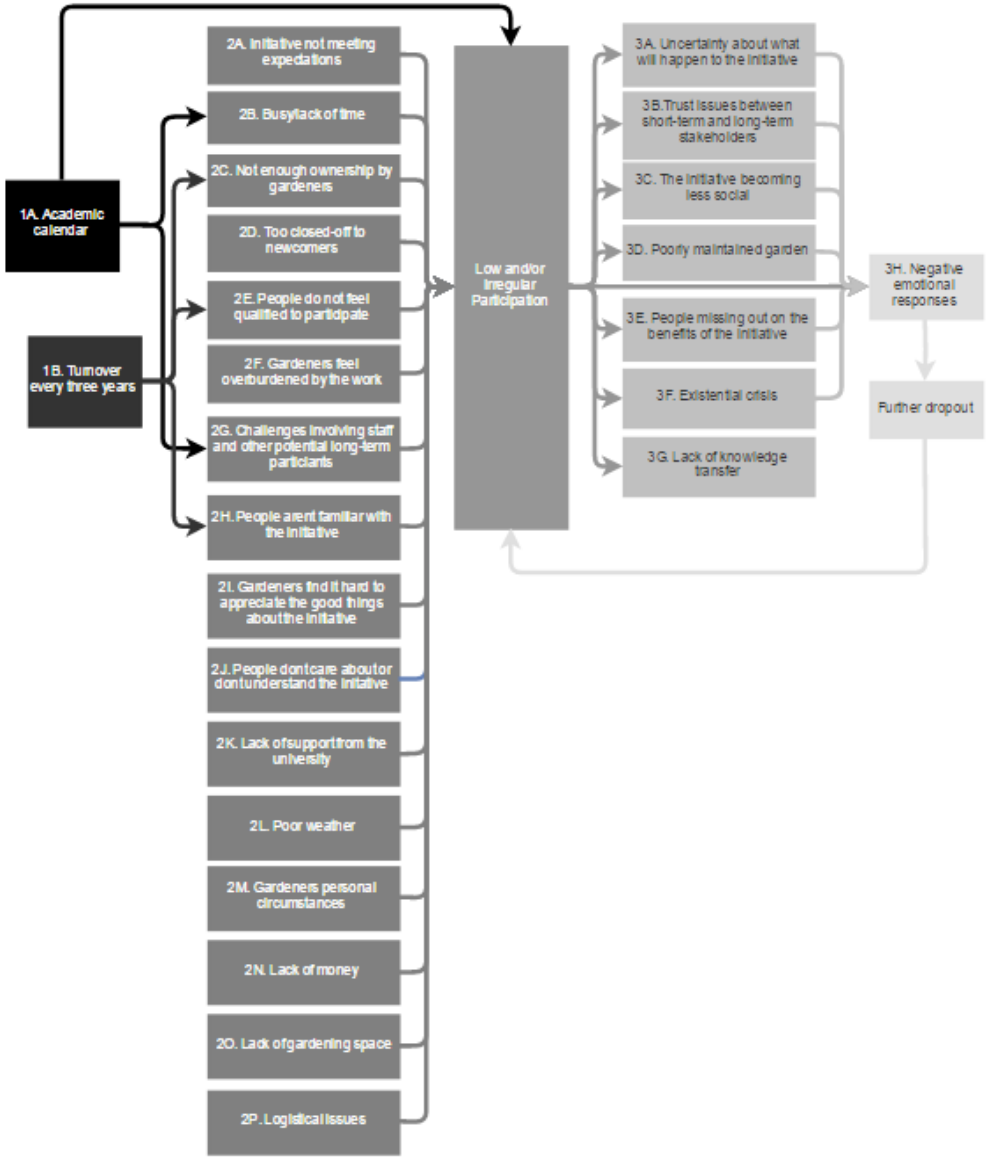

Table of Actions to Increase Participation

Action	Details of Action	Issue addressed by action	Date for action to be completed by	Person responsible
Create a Twitter account		• People aren't familiar with the initiative (2H) • People don't care about or don't understand the initiative (2J)		**YYYYY1**
Add Student Eats gardening sessions to Researcher's calendar and other university-wide calendars		• People aren't familiar with the initiative (2H)		**YYYYY1**
Create a blog for Student Eats		• People aren't familiar with the initiative (2H) • People do not feel qualified to participate (2E) • People don't care about or don't understand the initiative (2J)		**YYYYY2, YYYYY1**
Create plant protection		• Poorly maintained garden (3D)		**YYYYY1**
Set up elections for a new committee		• Not enough ownership by gardeners (2C)	Friday, February 26th	**YYYYY3**

Create leaflets for vegbox		• People aren't familiar with the initiative (2H) • People do not feel qualified to participate (2E)	Thursday, February 25th	**YYYYY4, YYYYY5**
Create member bios for the website		• People aren't familiar with the initiative (2H) • Too closed off to newcomers • Not enough ownership by gardeners (2C)		**YYYYY6**
Create Facebook events for gardening sessions		• People aren't familiar with the initiative (2H) • Too closed off to newcomers • People do not feel qualified to participate (2E)	Every week	**YYYYY7**
Organise weekly socials		• Too closed off to newcomers • People aren't familiar with the initiative (2H) • Gardeners find it hard to appreciate the good things about the initiative (2I)	Every week	**YYYYY7**
Create better signage for the garden		• People aren't familiar with the initiative (2H)		**YYYYY6**
Ask Adam to create a film about Student Eats	The film could be about communicating the larger vision of the garden	• People aren't familiar with the initiative (2H) • People don't care about or don't understand the initiative (2J)	1st week of March	**YYYYY6**

Create a blog post about Student Eats for Keele's main blog		● People aren't familiar with the initiative (2H) ● People don't care about or don't understand the initiative (2J)		
Have an impressive crop ready in september to inspire people	This means planting in June/July	● Poorly maintained garden (3D)	June/July	
Keele University Film Society host film screenings about growing food		● People aren't familiar with the initiative (2H) ● People do not feel qualified to participate (2E) ● People don't care about or don't understand the initiative (2J)		
Arrange a visit to the Staffordshire University allotment at the beginning of the semester to inspire people		● People do not feel qualified to participate (2E) ● People don't care about or don't understand the initiative (2J) ● Gardeners find it hard to appreciate the good things about the initiative (2I)		
Everyone invites a society to come to the garden on a different week	Creative writing society, photography society, media, psychology, etc	● People aren't familiar with the initiative (2H) ● People don't care about or don't understand the initiative (2J)		
Create a better media presence		● People aren't familiar with the initiative (2H) ● People don't care about or		**YYYYY8**

		don't understand the initiative (2J)		
Organise a workshop to bring students from the Staffs Uni growing project to Keele		•		
Create an annotated map of the Walled Garden	Detailing what is where, including a crop rotation	• People aren't familiar with the initiative (2H)		**YYYYY8**
Aesthetically improve the social space in the Walled Garden	Freecyle more 'furniture'	• Poorly maintained garden (3D)		**YYYYY5 (YYYYY8)**
Network with experienced growers	For example, the keen locals at Staffs	• People do not feel qualified to participate (2E)		
Have a set schedule of tasks through the winter to maintain participation	ie. tool maintenance, bird table maintenance, grafting, pot plants, trips, visitors	• People do not feel qualified to participate (2E)		
Making sure newcomers are aware they can borrow appropriate clothing/footwear	Posting on Facebook/blog	• People do not feel qualified to participate (2E)		
Everyone takes turns to post stuff on Facebook		• People aren't familiar with the initiative (2H) • Not enough ownership by gardeners (2C)		
Create an interpretive sign above the garden		• People aren't familiar with the initiative (2H)		**YYYYY8**
Improve signage to get inside the Walled Garden		• People aren't familiar with the initiative (2H)		**YYYYY8**

Set up a 'plant parenting scheme'		• Not enough ownership by gardeners (2C)		
Link up to mental health initiatives		• Gardeners find it hard to appreciate the good things about the initiative (2I) • Gardeners feel overburdened by work (2F)		**YYYYY8**
Offer cookery classes with people buying the vegbox		• People aren't familiar with the initiative (2H)		**YYYYY8**
Teach people how to replant veggies from the vegbox	Using leaflets for workshops at the garden	• People aren't familiar with the initiative (2H) • People do not feel qualified to participate (2E)		
Give away potted plants		• People aren't familiar with the initiative (2H)		

Appendix G: Photovoice information sheet

Photovoice Information Sheet

Document 18

Study Title: Cultivating sustainable participation in Student-led Food Growing Initiatives with transient participants using action research

Rebecca Laycock, r.laycock@keele.ac.uk

What does Photovoice involve?

In this Photovoice project, you will be asked to take photos considering the following questions:

- What does the gardening session look like in the [garden/allotment/initiative] this week?
- Is the participation (the quality/the amount) better than usual this week? Is it worse?
- What helps improve participation in the [garden/allotment/initiative]?
- What hampers participation in the [garden/allotment/initiative]?
- What do I want to tell other people about participation in the [garden/allotment/initiative]?

Between May 31st and November 30th 2016, you can send photos to r.laycock@keele.ac.uk. Please accompany it with the date it was taken and a short caption to make it clear what the photo is of and how it addresses one or more of the question(s) above. You can send in as many or a few photographs as you'd like – however you may be asked to choose a maximum of five to display.

The photos will be displayed at [Keele University's Sustainability Hub/Warwick Students' Union/Sheffield Students' Union/ other appropriate location] for a photo exhibition and celebration. You will be invited to come early to take part in a discussion for research purposes, and then after the discussion, other guests can arrive and hot drinks and nibbles will be served. Further information will be provided closer to the date.

To participate, you must have agreed to take part in the research project called *Cultivating sustainable participation in Student-led Food Growing Initiatives with transient participants using action research* undertaken by Rebecca Laycock from Keele University. If you have not yet been given an information sheet or signed a consent form but would like to take part, get in touch by emailing r.laycock@keele.ac.uk.

Some rules and tips for taking photos!

No experience needed! Owning a camera or having experience taking photographs is not necessary – all you need is a camera or a phone with a camera.

Photo quality is not necessarily important. Photovoice is not about the quality of your photographs. It is about taking pictures that mean something to you as a participant in a student-led food growing initiative.

Ask permission to take someone's photo. Always ask permission before you take someone's picture! If they say no, explain briefly what you are doing and why you want to take their picture. Your explanation can simply be: "I'm working on a photography project about participation in student-led food growing projects, would you mind being in one of the photos?" If they still say no, take a picture of something or someone else instead.

Permission isn't necessary when… In a public place like a park, you can take someone's photo without permission if they are far away and can't be recognized in the picture. But keep in mind that universities are small communities and people could be recognised more easily than in other locations (or example, someone could be recognised by their clothing or by the location they are standing in the [garden/allotment], even if their face is not visible).

Be respectful. If certain people don't their photo taken, respect their feelings.

Write captions from your heart. Write your captions as if you were talking to someone else about your photos. Speak from your heart. If you'd prefer, you can dictate your captions to someone else to write down for you.

Send your photos in as soon as possible. The sooner you send in your photos, the less likely you'll forget about them! The same goes for the captions – write them as soon as you can so you don't forget why you took the photo.

Some things to think about when creating good photographs:

- Try different angles
- Try different points of view
- Keep the sun to your back, or to the side
- Is your subject in the center of the photo?
- Does your subject fill the photo?
- Keep your finger away from the lens
- Don't cover the flash (if you are using it!)
- Stand about three to eight feet away from your subject
- To prevent blurry pictures, hold your elbows close to your sides, and hold your breath when you press the shutter (button).

Appendix H. Fishbowl discussion guidelines

The following guidelines were explained to participants verbally, with the use of a powerpoint presentation.

Introduction

Consent forms

If you want to participate in the discussion…

- You must read & fill out the consent form

If you only want to listen…

- You don't need to fill in the consent form, but you do need to wear a sticker

Please remember: if you don't fill in the consent form, you can't speak during the discussion!

How the Fishbowl works

The fishbowl isn't meant to offer concrete solutions or closure on a topic – Its purpose is an open-ended exploration of an issue.

Inner fishbowl rules

- There should always be one seat empty
- The focus of the discussion should be on the question(s) presented
- Strive to be an *active* listener
- You can leave the inner circle at any time by moving to the outer circle or 'tapping out'
- Encourage others to share their opinions

Outer fishbowl rules

- No one should speak when seated in the outer circle
- Strive to be an *active* listener
- You can join the inner circle at any time by occupying the spare seat or 'tapping' someone out

The fishbowl will end with a short debrief in one large circle.

Discussion

How can we maintain sustainable participation given…

- The typical undergraduate degree is only three years, after which most students leave
- Most student leave for the summer (and spring/winter) holidays
- The ebbs and flows of academic workloads, course work and exams

Remember, it's not just about increasing participation… it's about maintaining participation sustainably over the long-term.

- The typical undergraduate degree is only three years, after which most students leave
- Most student leave for the summer (and spring/winter) holidays
- The ebbs and flows of academic workloads, course work and exams

Debrief

As individuals and as a group, what are our biases limiting us from understanding the dynamics of participation?
What did you learn from this discussion (if anything)?
Will you be trying out anything new in your food-growing project based on this discussion?

Appendix I: Visualisations of the causal loop mapping using TheBrain software

TheBrain software was used to map the causal relationships between the different factors affecting and affected by problematic forms of participation. Note that these figures are only for illustrating how the software was used to map relationships. The causal loop diagram was further iterated and simplified using PowerPoint software to create the simplified versions in Chapter 6.

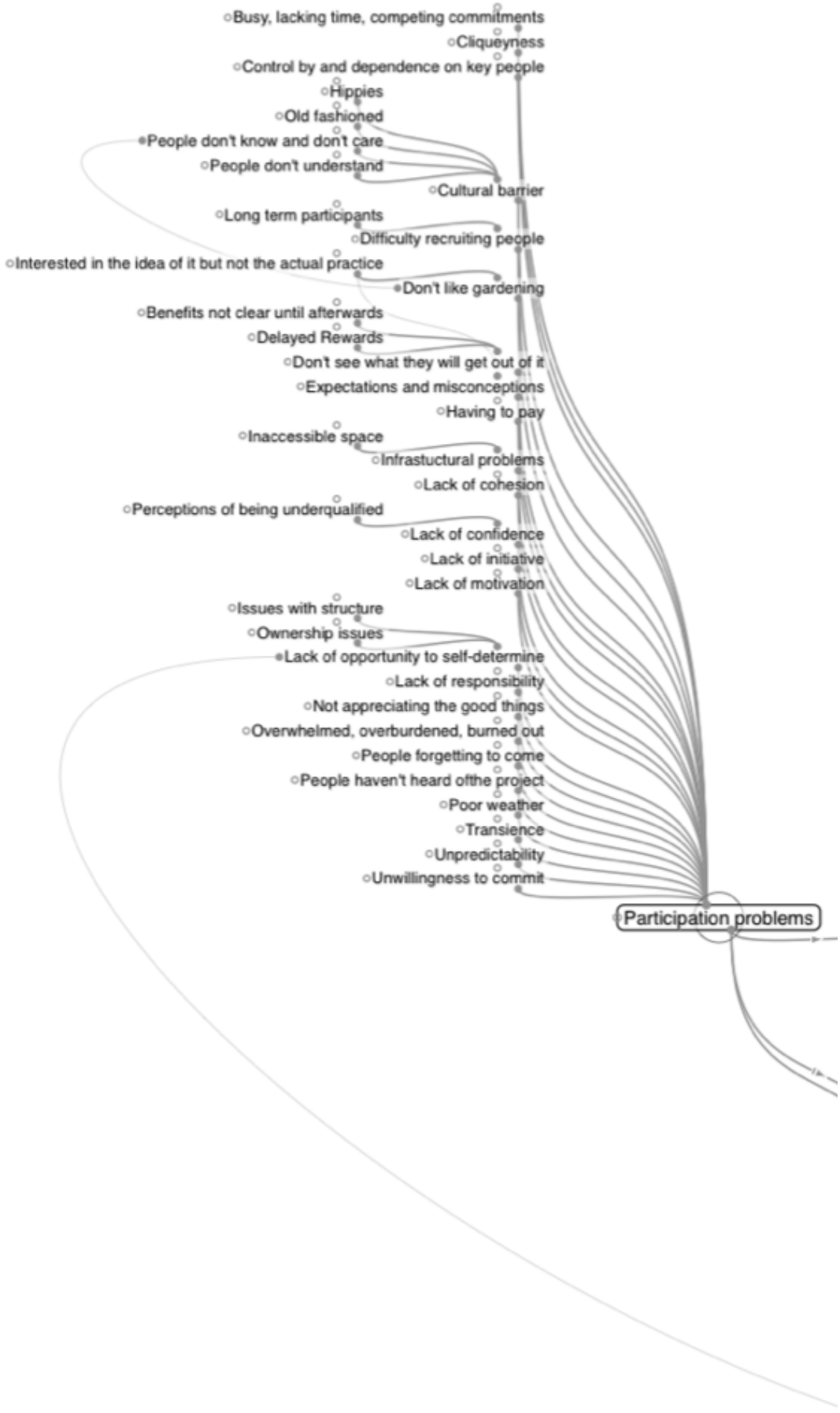

Figure 36a. An early iteration of the mapped causal relationships between the different factors affecting and affected by problematic forms of participation in student-led food gardens.

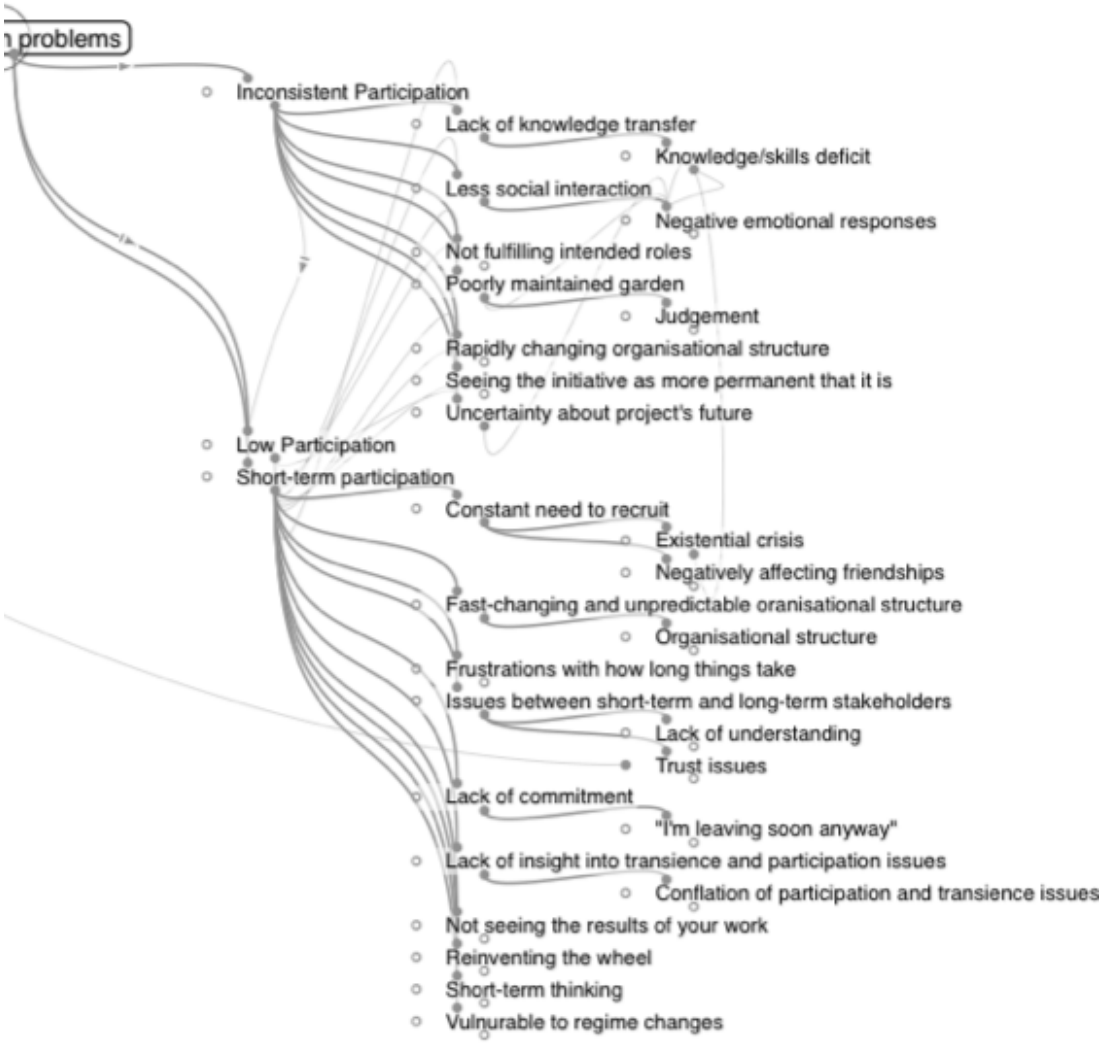

Figure 36b. An early iteration of the mapped causal relationships between the different factors affecting and affected by problematic forms of participation in student-led food gardens.