THE DEVELOPMENT, DIFFUSION AND ADOPTION OF THE REGIONALLY DEVELOPED JMB 'A' LEVEL COURSE IN ENVIRONMENTAL SCIENCE

by

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TABLE OF CONTENTS

ABSTRACT

This present study traces the origin, development, diffusion and adoption of a non-funded and regionally developed science syllabus - the JMB Environmental Science 'A' level - as a contrast to previous studies which were of national, and funded, Nuffield Science Teaching Projects.

Information was collected by questionnaires from teachers and students of the 'A' level, and from interested but non-adopting teachers; by interviewing persons involved in its development and having access to their files; and from examination data supplied by the examination board.

The origins of the syllabus are traced to people associated with Project Environment and arise from proposals submitted to the JMB by two teacher groups in different LEA's. It was approved by the Schools Council in April, 1975, and teaching commenced in September, 1975.

Data gathered on how teachers and students came to hear of this syllabus show that dissemination of information was mainly through JMB publications and the activities of two LEA advisers.

Characteristics of implementing, adopting and non-adopting establishments and their LEA's were collected. While many of the schools implementing and adopting Environmental Science, but not those rejecting it, had a tradition of CSE and 'O' level in Environmental Science, many of the establishments in each of the three categories

were colleges of further education in which there was no such tradition. Reasons offered by teachers for non-adoption show their decisions to be justified in part by their questioning the status of the Environmental Science syllabus with respect to the opportunities available for its students after 'A' level and in part on the basis of some degree of misinformation.

A number of factors affecting the continuance of the 'A' level in establishments were identified, with the subject having a "Rural Science image" frequently being associated with discontinuance.

While the findings about the diffusion of this regionally developed 'A' level contrast with those of earlier studies, the findings on the patterns of adoption and the rates of uptake are broadly similar to those of national projects.

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LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Many new Certificate of Secondary Education (CSE) and General Certificate of Education (GCE) science syllabuses have been made available to teachers and students by English examining boards in the last two decades, but only a few of these, principally those sponsored by the Nuffield Foundation, have been studied in detail by educational researchers. (See, for instance, Nuffield Advanced ('A') Level Biological Science - Kelly and Nicodemus 1973; Nuffield Ordinary ('O') Level Chemistry - Jenkins 1967, Jenkins 1971, Waring 1975). The science projects investigated to date have all been national projects, and no research has been conducted into the local and regional projects which have largely superseded the nationally developed science projects. At the present time, therefore, no studies have been conducted into science syllabuses not developed by national projects and funded either by the Schools Council or by private foundations, or by both jointly.

The last two decades have seen an unprecedented increase of interest in matters relating to the natural environment. Concern about conservation, pollution and other environmental matters have resulted in environmental studies being introduced into schools and colleges, initially as non-examination courses (Potter 1978), and, from 1964, at CSE level. (Potter 1978). The first 'O' level syllabus in environmental studies was offered in 1969 (Potter 1978) and the first 'A' level was approved by the Schools Council in 1972. (Colton and Morgan 1974).

Since 1965 there has also been an increased interest in the study of the diffusion and adoption of new curricula and syllabuses in England. (Harding, Kelly and Nicodemus 1976). Carlson (1965), one of the foremost researchers in the study of the diffusion and adoption of educational innovations, has stated that:

> An educational innovation has a natural history, and in a sense, a life cycle. The full account of the life cycle of an innovation is the story of its invention, development and promotion, adoption, diffusion and demise, along with an account of the problems encountered and situations developed in introducing and maintaining the innovation in specific settings, and the unanticipated consequences growing out of its use. (P. 4).

It was decided, therefore, to investigate the "natural history" of a less well known science syllabus which was not developed as the result of a funded project but, rather, as a regional or local project in response to regional or local needs. The new GCE 'A' level syllabus in Environmental Science, made available by the local examining board, the Joint Matriculation Board, (JMB), in 1977, was developed without funds from the Schools Council or from a private foundation. This syllabus was selected because it satisfied the above criteria for a regionally developed science syllabus which was not the result of a funded project, and also because it was recent enough for its full history to be traceable.

This new 'A' level is like other "minority" science subjects (e.g. physical science, engineering science) in that the numbers of candidates entered for its final examinations (106 in 1978, 62 in 1979, 103 in 1980) were much smaller than the well-established science subjects such as biology, chemistry and physics (all with 10,000 or more candidates in the JMB area) and also geology (with around 2000 candidates in the JMB area). It was expected, therefore, that the findings of this research would also be applicable to other minority 'A' level syllabuses.

The purpose of the present study is to describe the development (including invention), the diffusion (including promotion), and the adoption of the new JMB Environmental Science 'A' level. It is anticipated that the findings of this study will add to our present knowledge of the diffusion and adoption of educational innovations in general, and will help to formulate generalities which apply to the introduction of other new science syllabuses in England.

1.2 THE DEVELOPMENT OF ENVIRONMENTAL EDUCATION IN ENGLAND

1.2.1 THE BEGINNINGS

A report prepared by the Department of Education and Science (DES) for the 1977 intergovernmental conference on environmental education held in Tbilisi states that:

> Environmental education in the United Kingdom has evolved over the past ninety years through the efforts of a great number of individuals, the campaigning of voluntary organisations and the development of government policy. It is only in the last ten years or so, however, that the implementation of environmental education has taken on a new urgency in response to the critical problems that are becoming apparent. (DES 1977, Document 2, History of Development, p. 1).

The history of environmental education in England, then, can be traced back to the end of the nineteenth century, and various individuals and groups have been credited with its early development.

Several authors (DES 1977, Wheeler 1970) consider Sir Patrick Geddes (1864-1932) as the "father of environmental education" because of the ideas he demonstrated through civic and regional surveys which he conducted from the Outlook Tower in Edinburgh, and because he was the first thinker to connect the quality of the environment closely with the quality of education.

Carson (1971) states that the study of the environment in British schools is not a new phenomenon for some teachers have probably always been engaged in this type of activity and certainly since the beginning of the century. He considers, however, that environmental education has evolved out of the rural studies courses developed in country schools around 1910.

In fact, the study of the environment may have started much earlier than suggested by the DES conference document, for Wise (1973) has stated that the study of the environment was practised by geography teachers in experimental schools in England as early as the nineteenth century. In fact, the first recorded geographical field course was held in Aberdeen in 1887. (Hammersley 1976). It would appear, then, that geographers may have been using the environment in their teaching for well over 100 years, and indeed, according to the DES, the Geographical Association was an important influence on the early development of environmental education.

Biologists have long incorporated field studies and studies of the natural environment into their teaching, and the founding of the School Nature Study Union in 1903 attests to the long tradition of the study of natural history in schools. (DES 1977).

Several teaching groups would, therefore, appear to have legitimate claims to the incorporation of environmental study in the teaching of their own disciplines.

1.2.2 THE EVOLUTION OF ENVIRONMENTAL EDUCATION

According to the DES report (1977), mounting concern expressed over the deterioration of the countryside, caused by the uncontrolled urban sprawl and the decline of farming, led the Council for the Preservation of Rural England (formed in 1926) to become the first organisation to call for educational activity on a national scale to protect the countryside. At the same time, the rural education movement of the 1920's, based on the 1926 Hadow Report - a movement aimed at providing in the countryside an education designed to encourage country children to stay on the land and to use the rural environment as a basis for their general education - led to the development of rural studies courses in schools (e.g. Hertfordshire county syllabus of 1929, Carson 1971). This period also saw an increased use of the rural environment for recreational purposes which led to the foundation of organisations such as the Youth Hostels Association in 1930. (DES 1977, Hammersley 1976).

In 1943, the Council for the Promotion of Field Studies (now the Field Studies Council) was formed to encourage field-work by setting up residential centres to accommodate school and college parties. (DES 1977, Hammersley 1976). The work of this Council and the influence of advisory reports such as the Schools and Countryside Report of 1958, and the report of the Study Group on Education and Field Biology in 1963, all contributed to the introduction of a more concrete and relevant education in primary and secondary schools in this period. (DES, 1977).

In May, 1963 the Observer newspaper and the Council for Nature organised a wildlife exhibition which, according to the DES report of 1977, highlighted the lack of collaboration among the countryside amenity and conservation organisations. This event had far reaching repercussions for environmental education, and probably did more to advance the course of the subject than any other single event, since it persuaded HRH the Duke of Edinburgh, the patron of the Council for Nature, to improve collaboration among environmental organisations by starting a series of "Countryside in 1970" conferences.

In 1965, conservationists and educationalists met together for the first time at the "Countryside in 1970" Conference on Education held at Keele University, Staffordshire, to discuss education in relation to the environment. (Carson 1971, DES 1977, Hammersley 1976, Park 1977). According to Park (1977) this conference led to a crystallisation of the concepts and objectives for environmental education. The recommendations of this conference led, in July 1968, to the setting up of the Council for Environmental Education which provided a coordinating role for environmental education groups and facilitated the growth of environmental education in England. (DES 1977, Hammersley 1976). It also led to the formation of the Society for Environmental Education, the first national association for teachers involved in environmental education. (Park 1977). This society fostered the progress of environmental education through its annual conferences and through its annual journal. In 1970, the National Rural Studies Association (originally formed in 1960) became the National Environmental and Rural Studies Association. In 1971, it was renamed as the National Association for Environmental Education, in this way reflecting the change in emphasis among its members from the study of just the rural environment to the study of both the rural and the urban environments, and has become a major force in the shaping of environmental education. (Hopkinson 1978).

The DES (1977) report also states that the development of environmental education was further assisted by the establishment, in 1966, of the Education Section of the Conservation Trust, and by the Conservation Project set up by Chelsea College's Centre for Science Education. Also at this time, the Town and Country Planning Association set up an Education Unit to campaign for the introduction of urban studies in schools, mainly through the publication of the monthly Bulletin of Environmental Education. (DES 1977).

By the 1960's, then, environmental education had become firmly established in the English educational system and was supported by several subject teaching associations, by several teaching journals, and by other organisations such as the Council for Environmental Education. From 1966 onwards, environmental education was further developed through projects such as the Conservation Project, the Education Unit of the Town and Country Planning Association, and the Education Section of the Conservation Trust.

1.3 DEVELOPMENT OF ENVIRONMENTAL COURSES AT THE PRIMARY, SECONDARY AND HIGHER LEVELS OF EDUCATION

According to Perrott (1977), the period 1967-1977 saw an increasing interest in the place of environmental studies in the schools. Perrott has identified the factors causing this trend of increased interest to be the reformation of science curricula in secondary schools (especially the environmentally biased American Biological Sciences Curriculum Study's High School Biology - Green Version, and the Nuffield 'O' level Biology project), the production of texts suitable for environmental courses and other related materials, the creation of a working partnership between the schools and such information services as the Field Studies Council, the local museums and the Naturalist's Trusts, and the development of areas by Local Education Authorities (LEA) and organisations such as National Parks which give facilities to schools and colleges for environmental studies. Each of these factors has led to an upsurge in the amount of environmental studies in schools and colleges.

In primary schools, where examinations have largely been abolished, the use of the environment was already accepted practice by the 1960's (DES 1977) and environmental studies have become even more firmly entrenched as a result of the Plowden Report (Plowden 1967), confirming the value of such studies. The funding of the Environmental Studies 5-13 Project by the Schools Council from 1968 to 1971 further stressed the value of environmental studies at the primary level. (Crossland and Moore 1971).

At the secondary level, environmental education grew only slowly in importance in the period 1967-1977 (Potter 1978) because, according to Potter, the impetus for this growth was derived from the enlightened teacher rather than through initiation or motivation from the Department of Education and Science. Even though associations of teachers interested in environmental matters were formed in the late 1950's and early 1960's, it was not until 1965, when the CSE was introduced, with its extensive teacher participation in the preparation of syllabuses, that interested teachers were able to establish environmental studies as a subject for examination. The first CSE (Mode 3) examination in 1966 was taken by just eleven students (Potter 1978), but by 1978, with one exception, each of the fourteen English regional examining boards offered both Environmental Studies and Environmental Science syllabuses, (the exception was the Northern Board whose regulations permit only the use of "Environmental Studies" as the title for all environmental syllabuses), (Scott 1979), and these were taken by over sixteen thousand students. Of these, 74.1% of the candidates followed Mode 3 syllabuses. (Potter 1978).

At the level of the Certificate of Extended Education, (CEE), the first environmental syllabus was examined in 1974, and by 1978 over one thousand followed the syllabuses offered by four boards. (Potter 1978). By 1979, six of the fourteen English and Welsh boards were offering either an Environmental Science or an Environmental Studies syllabus, and by this time there were more than a thousand candidates. (Scott 1979).

The first Environmental Science/Studies syllabus at the GCE 'O' level was offered in 1971, and by 1979 there were four syllabuses taken by over two thousand candidates. There are also two Alternative 'O' level syllabuses. (Potter 1978, Scott 1979).

Even though the first submission for an 'A' level syllabus was made by a Hertfordshire teacher in 1966, (Carson 1971), it was not until 1973 that the Schools Council finally approved, on a trial basis, the Environmental Studies syllabus devised by a consortium of Wiltshire teachers in cooperation with the Associated Examining Board (AEB) with the examinations restricted to candidates from the schools which had originally devised the syllabus. (AEB 1978, Colton and Morgan 1974). This syllabus became available nationally in 1977. In 1974, a second 'A' level syllabus, developed by Hertfordshire teachers and examined by the University of London Schools Examination Board, was approved by the Schools Council, also on a trial basis, as a Mode 2 syllabus. (Brown 1975, Potter 1978). This syllabus became nationally available in 1977.

The Environmental Science syllabus developed by the Northern Universities Joint Matriculation Board, (JMB), was first approved in 1975, making three 'A' level syllabuses available nationwide from 1979 onwards. In that year there was a total of 330 candidates for the examinations for these three syllabuses. (Data from the Associated, London and Joint Matriculation Boards 1979).

Even though Scott (1979) has used the numbers of schools entering candidates for external Environmental Science/Studies examinations, as well as the numbers of candidates for these examinations, as a measure of the growth of environmental education in secondary schools, this still does not present an adequate picture of the growth of environmental education in secondary schools for it fails to take account of comparable developments within such traditional subjects as biology, geography, geology and rural studies/science. (Potter 1978). For instance, biology syllabuses such as the Nuffield 'O' level and the (American) Biological Sciences Curriculum (Green Version) exhibit an increased environmental content in relation to traditional biology syllabuses. (Nicholson 1977).

In a survey of sixty-five Mode 1 CSE syllabuses, each described as containing some environmental topics, Eden et al (1974) found that only two were officially entitled Environmental Science/Studies. The official titles of the sixty-five syllabuses surveyed were:

Biology	16
Geography	12
Rural Studies	10
History	10
General Studies	9
Civics	6
Environmental Science/Studies	2

So, many of the students not following a syllabus entitled Environmental Science/Studies are nevertheless studying environmental topics in a range of other subject syllabuses, and, therefore, the numbers of students taking environmental courses is many times larger than the numbers entered for syllabuses entitled Environmental Science/Studies.

Williams (1978), in a study of the school departments involved in environmental education in secondary schools, found that only 22% of the schools which he surveyed had named environmental science/studies departments, whereas 82% of these schools named their biology and geography departments. This study also revealed that at least fourteen school departments other than environmental science/studies, biology and geography were named as being involved in environmental education, including history and art.

Together, these studies show clearly that the use of numbers of candidates (and schools) entered in environmental science/studies examinations is an inadequate measure of the growth of environmental education in English secondary schools, for more students receive environmental science/studies education than these numbers indicate.

In addition to the growth of environmental science/studies syllabuses and the increasing incorporation of environmental topics in traditional syllabuses, several examining boards now offer syllabuses with a complete or partial emphasis on environmental study. One such is the AEB's 'O' level Environmental Biology, another is the Cambridge Local's 'A' level Social Biology, (Scott 1979), and a third is the JMB's 'AO' level Energy Resources. (JMB 1979).

Williams (1978) estimated that even though only 36% of secondary school students were taking CSE or GCE environmental science/studies syllabuses as such, 80% or more of 14 to 16 year olds were involved in some form of environmental study.

None of the existing literature documents the growth of environmental education in the further education sector, but students from such establishments do take the examinations of the various 'O', 'AO' and 'A' level syllabuses in environmental science/studies, although these candidates constitute about 30% of the total candidate numbers for these examinations. In 1979, for instance, 402 candidates sat for the three environmental 'A' levels, of which 133 were from the further education sector. (Data from Associated, London and Joint Matriculation Examining Boards 1979).

The author has found that various colleges of further education, in addition to offering environmental science/ studies courses as such, also offer environmental courses as component parts of such courses as those for Nursery Nurses and Technician Education. (See Chapter Five).

The 1960's witnessed an increase in the number of environmental courses offered at universities, polytechnics and colleges of higher education.

The number of environmental studies courses available at colleges of higher education almost doubled in the period 1968-1970, (Park 1977), and in 1975 Carson reported that 74 such courses were available. However, their number then diminished to only 30. (Carson 1977).

In 1973, Plymouth became the first polytechnic to offer an undergraduate Council for National Academic Awards (CNAA) degree in Environmental Science, and by 1979 there were six polytechnics offering degrees in environmental science/ studies. (See Chapter 11). In addition, there were 92 degree courses identified as being in environmental science/studies or related subjects. (Carson 1976).

The first universities to offer environmental science degrees in 1968 were East Anglia and Ulster, and now thirteen universities and university colleges offer degrees in environmental science/studies. (See Chapter Ten). In addition, Carson (1977) has identified 136 university first degree courses which have a major environmental focus.

Scott (1979) named ten institutions of higher education which offer Postgraduate Certificate of Education (PGCE) courses in this field; and the Council for Environmental Education has listed (no date) various master's degrees, diplomas and one-term certificate courses in the subject which are also available.

At the present time, therefore, there is a wide range of opportunities for students to take environmental studies at all levels within the formal education sector.

1.4 THE DIFFUSION AND ADOPTION OF EDUCATIONAL INNOVATIONS

Rogers and Shoemaker (1971) reviewed some 1500 studies on the diffusion and adoption of innovations but found that only 7% of these studies were in education. Most of these had been carried out by Mort and his students in the 1930's at Columbia Teachers' College, who investigated "adaptability", that is, the ability of schools to take on new practices and discard outmoded ones. The conclusions from those studies were that the rate of adoption of educational innovations was extremely slow, the pattern of adoption over time followed an S-shaped curve, the diffusion of educational innovations was much slower than that of agricultural and medical innovations, and finance was the dominant factor influencing adoption. Despite the fact that Mort and his students conducted over 200 studies, Rogers (1962) concluded that:

> The education diffusion tradition is one of the largest in number of studies, but this tradition is probably one of lesser significance in terms of its contributions to understanding of the diffusion of ideas. (P. 39).

Carlson's (1965) study of the adoption and diffusion of six educational innovations in Allegheny County, Pennsylvania, and in West Virginia, was a major advance in this field of research. Carlson found that adoption rates varied between innovations and school board areas, and that adoption over time followed an S-shaped curve, reinforcing Mort's (1964) earlier findings. He also found that there was a strong link between the social status of school board superintendents (whom Carlson defined as change agents) and the rate of adoption of innovations in their school districts. Finance, however, was not a powerful predictor of acceptance of new educational practices. Carlson also found a number of unexpected consequences of the adoption of innovations, such as, for instance, in the use of programmed instruction. Programmed instruction permits students to work at their own rate, but Carlson found that teachers evolved a whole host of practices designed to keep students working at similar rates. Teachers, for instance, "corrected" variation in the rates at which students progressed by consciously or unconsciously pacing students, and, therefore, restricted the output of students who were proceeding at the fastest rates. In addition, slow learners were allowed to work on materials at home while fast learners were not.

At the time of Carlson's research, according to Harding, Kelly and Nicodemus (1976), there had been no equivalent research into the diffusion and adoption of educational innovations in Britain.

Young (1965) was probably the first British researcher to write about innovation research, which he termed "the influence of fashion". In his book he quoted the work of Mort and Carlson. In 1969 Hoyle wrote two articles on curriculum change (1969a, 1969b), in which he reviewed the previous American research in the field and suggested various lines of research which should be conducted in Britain. In the same year, the Centre for Educational Research and Innovation (of the Organization for Economic Cooperation and Development) held a workshop on the management of innovation, in which it was suggested that dissemination strategies should be an integral part of a curriculum plan since it was there that many innovations broke down. (Centre for Educational Research and Innovation 1969).

Concern over the apparent failure of many Schools Council and Nuffield Foundation projects to leave an impact on schools prompted the Schools Council to set up a Working Group on Dissemination in 1972. In their final report (Schools Council 1974) the group outlined a comprehensive dissemination strategy for projects under the sponsorship of the Schools Council. The group concluded that the success of a project depends on the extent to which it had organised or encouraged a continuing training programme and a local support system. The group also suggested that the key to successful adoption was, therefore, a local one and whatever support is offered by a project, the Council or publishers, it is the extent to which the LEA's are prepared to foster the development which is likely to be crucial. The group also, however, stated that colleges of education and university departments of education had an important role in the provision of local support and training for teachers.

Shipman, one of the early investigators in the field of study of educational innovation, carried out a study of the Integrated Studies Project, organised from Keele University between 1968 and 1971. He found that the project had a major impact in 28 of the 38 field trial schools. He also found that the persisting influences of the project on the teachers involved and their schools was primarily determined by the amount of their own input into the project. He also found that the ideas of the project spread to other schools, partly through teachers moving from trial schools to take up posts in schools not participating in the trials, and partly by a lateral movement of ideas from trial schools to neighbouring schools. (Shipman 1973). Shipman also generalised about innovative schools and listed the characteristics of schools likely to introduce, and successfully implement, an innovation. Amongst the characteristics he identified were teachers who had volunteered knowing that they would be involved in a lot of work; schools which had re-organised the timetable to provide planning time for the teachers involved; a headteacher who supported innovation; and schools which had a low staff turnover and were free of any immediate need to re-organise. (Shipman 1973).

Jenkins was one of the first British researchers to investigate the adoption of a science project, in this case the Nuffield 'O' level chemistry project. He investigated teachers' usual sources of information on projects and education, sources of first information about the project and the problems associated with adoption. He found that teachers' main sources of knowledge of the project were publications of the Association for Science Education, other teachers, local conferences and meetings, and circulars from the LEA. The main obstacles to adoption included inadequate time for teacher preparation, inadequate timetable allowance, capital costs too high, running costs too high, and lack of laboratory accommodation and equipment. (Jenkins 1967).

In a later study, Jenkins (1971) compared the schools and teachers adopting and not adopting the Nuffield 'O' level chemistry project. He found that adopting teachers were more likely to have higher degrees than non-adopters, and that adopting schools had higher budgets for chemistry, were smaller, and had a larger percentage of science sixth formers than non-adopting schools.

Kelly and Nicodemus (1973) conducted a similar investigation of Nuffield 'A' level biology. They found that impersonal sources, especially the School Science Review, Education in Science, the Journal of Biological Education, the Times Educational Supplement, and Nufbiss, were more important for adopters as sources of information about the 'A' level than personal sources such as other teachers and university and college lecturers. They also found that the adoption decision was made by departments (of biology) as a whole rather than by heads of departments. Adopters cited apparent advantages of the course as their reasons for adopting, whereas non-adopters cited reasons not related to the course for not adopting. Re-organisation, lack of LEA approval, finance, and objections from colleagues were listed among the reasons for non-adoption. More adopters than non-adopters had professional training plus a first or higher degree. There were no differences in the proportions of department heads, length of teaching experience or information sources between adopters and non-adopters. There was also no difference between the sizes of adopting and non-adopting schools, and no difference in the types of schools.

Kelly and others then undertook a Curriculum Research Diffusion Project at Chelsea College funded by the Social Science Research Council between 1971 and 1974. This project investigated science teachers' and headteachers' familiarity with and use of twenty-five new Schools Council and Nuffield Foundation Projects (mostly the science projects), together with the factors which limited or facilitated the adoption of these projects and the levels of communication and support for these projects. (Nicodemus 1975, 1977a, 1977b, 1977c; Nicodemus and Marshall 1975; Nicodemus and Jenkins 1975; Nicodemus, Jenkins and Ingle 1976; Harding 1975; Harding and Kelly 1977a, 1977b; Waring 1975; Kelly 1975).

Nicodemus (1977d) in a review of the results obtained by the project concluded that few generalisations could be made about the dissemination and adoption of educational innovations either across subject or across national boundaries, and that generalisations often proved invalid in situations which were more specific to subject area, pupil selectivity or recency of innovations. While, for instance, adopters of Nuffield Secondary Science rated the effects of secondary re-organisation as facilitating, most teachers of biology rated re-organisation as a reason for not adopting Nuffield 'A' level biology. Again, according to accepted definitions, the rejecters of Nuffield Secondary Science, for instance, would be labelled as non-innovative, yet they exhibited characteristics of innovators in their more frequent use of mass media channels of information than the adopters of Nuffield Secondary Science. Therefore, Nicodemus concluded, generalisations such as "earlier adopters have greater exposure to mass media communication than later adopters" are often not verifiable.

Whereas the research at Chelsea College has relied mainly on the use of questionnaires, surveys and interviews, the researchers at the Centre for Advanced Research in Education at the University of East Anglia have relied mainly on the use of case studies in their investigations of curriculum innovations.

In their investigation of the Humanities Curriculum Project, MacDonald and Rudduck (1971) identified several barriers to the success of the project in schools, including problems of understanding of the objectives of the project by the LEA's, headteachers and teachers involved with the project. They suggested that an experiment settles well in a school where teachers are confronting a problem and contemplating action, and that an experiment is more likely to succeed against a background of stability rather than of flux. Humble and Rudduck (1972) concluded that the most effective immediate effort in in-service work is likely to be that of the LEA, with its advantages of control over resources, knowledge of, and access to, the schools, availability of local centres for teachers, and its team of advisory staff.

This early work of the Project led to the establishment of the SAFARI research programme at the University of East Anglia which initiated studies into the success of four development projects, namely, the Humanities Curriculum Project, Geography for the Young School Leaver, Nuffield Secondary Science, and Project Technology, in the period 1973 to 1976. (Rudduck 1973; Harding, Kelly and Nicodemus 1976).

CHAPTER TWO

THE DEVELOPMENT OF THE 'A' LEVEL

2.1 INTRODUCTION

The study of the natural environment in schools is not a new phenomenon which has come about because of recent concern about conservation and pollution. Some teachers have always been engaged in this sort of activity, and certainly since at least the beginning of this century. (Carson 1971). Courses called "Rural Science" have been developed in country schools since 1910, by teachers attempting to investigate natural phenomena in a scientific way and at a level which they thought suitable for the elementary education of the period. (Carson 1971). Besides purely educational studies, Carson (1971) states that utilitarian courses in animal husbandry and gardening were often linked to those rural science courses.

In rural counties such as Staffordshire, for example, the use of the local environment for specific learning activities has long been the practice of rural schools, stemming from a well supported policy of school gardening instituted by the Education Authority at the turn of the century. (Hopkinson 1978).

Whether these early rural science courses were purely educational, or were biased to more utilitarian aspects, seems to have depended to a great extent on local economic factors such as the need for rural families to grow their own food, or the teacher's own scientific interest. Gradually, and especially in the 1930's, educationists began to use rural science as the basis for improving pupils' general learning. They used these activities which children enjoyed and which also gave material rewards (growing and harvesting of crops, rearing of hens for egg laying, etc.) as incentives to encourage arithmetic, geography, history and expression of speech and writing. (Carson 1971). There were even a few schools in which the whole of the curriculum was integrated in this way. (Carson 1971). After the Second World War schools began to use the term "Rural Studies" to describe courses which made use of the environment. According to Carson (1971), in some of these schools the courses were widely based studies of the countryside, while in others they were straightforward horticultural or agricultural training courses.

During the 1950's many rural studies teachers formed themselves into County Associations of Rural Studies Teachers, and in the 1960's these county associations amalgamated to form the National Rural Studies Association (Carson 1971). This new national association soon expressed concern over the wide variation in courses which were called "Rural Studies", and approached the Schools Council in 1965 with a proposal to investigate the values of rural studies as a subject, including their nature, scope, application and future development, and their place in education. (Final Report, Rural Studies Working Party, Schools Council, 1969).

The Schools Council accepted the proposal and set up a Working Party in November, 1965 to examine rural studies in secondary schools. The Working Party carried out its work from 1965 to 1968, and produced its final report in June, 1968 (but published only in 1969). The Working Party concluded that:

> It is clear that rural studies forms a section, perhaps the most important section, of a larger group of studies which deals with the environment, and which, if effectively charted, could provide not only intellectual challenge at a high level but also be capable of making a particularly important contribution to the curricula of all schools, whether urban or rural in character. It is clear that a widened approach to rural studies offers a challenging educational medium, the limits of which have yet to be explored, in addition to the satisfaction of natural interests and an environmental understanding which is becoming essential in this overcrowded island of rapidly moving people. (Schools Council, 1969, pages 22-23).

The Working Party had concluded, therefore, that rural studies formed just one section of a larger group of studies dealing with the environment (i.e. environmental studies). It also suggested that this widened approach to rural studies offered a challenging medium for schools, and that this new area (environmental studies), which would include rural studies, was worthy of further study by the Schools Council.

In response to these recommendations, the Schools Council established Project Environment in 1970, to conduct research into the state of environmental education in England and Wales, and to develop materials for use in the environmental education of 8 to 18 year olds. (Colton and Morgan 1974). Project Environment was located at the University of Newcastle-upon-Tyne under Mr. W. Colton as Project Director, and it worked from April, 1970 to August, 1973. According to Morgan (personal interview 1979), the

Deputy-Director of the project, the Schools Council made a special point of locating Project Environment, not in the leading "Rural Studies" counties such as Hertfordshire, Kent, and Wiltshire, but in the obviously urban centre of Newcastle-upon-Tyne to stress the fact that the "environment" included both rural and urban environments.

The Project Team began its work with an investigation into the state of environmental education in England and Wales, and into the curriculum demands that the more progressive teachers were making on schools, LEA's and examining boards for more environmental education. They found that:

> There was a general dissatisfaction with the existing examination situation in the environmental field at all levels (in the school) and consequently pressure on the project team to do something about it. (Morgan, 1975, p. 3).

The response of the Project Team was not one that might have been expected, and has since been criticized. Their response is clearly shown by the following:

> However, the Team did not see its role to be that of examination syllabus designers for teachers but rather as initiators and supporters of developments by teachers themselves. (Morgan, 1975, p. 3).

As a result of their contact with teachers and others interested in the environment, the team decided that its first task was to examine how schools could answer the call for more environmental education to help remedy the present environmental problems and to create a future society more in tune with its environment. Their second task was to show how most subjects could contribute to environmental education and, in particular, how the knowledge and skills of rural studies could be redirected to this end, since one of the prescribed purposes of the project was to examine the future of rural studies within the context of environmental education. In both cases they decided that any materials produced would be developed in the schools with teachers rather than for them. In fact, the project team sometimes asked teachers who were doing interesting work to develop it further, while on occasion they used sympathetic teachers to take ideas and develop them with their pupils. (Colton and Morgan 1974).

One of the programmes which was developed in this way was the Ethics and Environment course for use in sixth form minority time studies, which was developed by rural studies teachers in a number of counties. (Colton and Morgan 1975a). Other programmes developed were "Use of the School Grounds", (published in 1975), and "Outdoor Trails", (published in 1975).

In addition to these development projects, the team was also concerned about the provision of examination syllabuses, for as Morgan (1975) has stated:

> The team's experience had led it to believe that many courses and examination developments in the (then) new comprehensive schools were, rightly or wrongly, strongly determined by their relevance to the ultimate school level, the sixth form. (P. 3).

The team, therefore, reasoned that a start should be made on the development of an 'A' level syllabus, since such a development would eventually have impact on work all the way down through the age ranges of the school system. (Morgan 1975). Morgan goes on to say that:

> Discussions with teachers, education officials and in particular, headteachers, had also shown a general wariness about examination syllabuses that

> went "across" the board and required a staff team drawn from more than one department to staff them. Frequently headteachers said that they could not timetable these inter-disciplinary approaches for their upper forms and advised that any examination syllabus which Project Environment initiated should be designed for teaching within one subject department. In addition, experience showed that examination boards and other approving bodies usually were structured upon subject panels and that inter-disciplinary syllabuses fall across two or more such panels. This often led to difficulties of acceptance. (P. 3).

The Project Team, although they had decided that it was not within their mandate to produce a syllabus, decided that a syllabus could be developed by teachers. The team believed that such an environmental syllabus should be developed from real environmental situations rather than being built up from basic facts and principles, and that any such syllabus should be capable of being taught within one school department, since inter-disciplinary syllabuses were difficult to timetable in schools and since such courses experienced difficulties of acceptance by the Schools Council. (Colton and Morgan 1974).

The team first examined two 'A' level syllabuses which were already being developed independently of each other and of the Project Environment. A group of teachers in Wiltshire was developing a syllabus entitled "Environmental Studies", while a consortium of Hertfordshire teachers was also developing a syllabus called "Environmental Studies". (The former, originally started in 1969, was accepted by the Schools Council in 1972, and was examined by the Associated Examining Board, while the latter, started in 1968, was accepted in 1973 and examined by the University of London Schools Examination Council). The Project Team decided, however, that neither of these syllabuses fitted their own objectives for an 'A' level syllabus, since they believed both were built up from basic facts and principles instead of being developed from real environmental situations (i.e. specific pollution, conservation problems, etc.). In addition, the team believed that both of these schemes required a team-teaching organisation, and headteachers had already warned the Project Environment team away from such inter-disciplinary courses on the grounds that timetabling of such courses was difficult. (Colton and Morgan 1974).

The Project Team believed that an 'A' level based within the science department was the most appropriate approach. Science, in their view, was the most logical choice since they believed that ecology was the basis of any environmental study, and ecology was most appropriately taught within the school science department. (Morgan, personal interview, 1979).

Morgan, the Deputy-Director of the Project, assumed the responsibility of approaching a group of teachers, through their advisers, with the idea of developing such a syllabus, (Morgan, personal interview, 1979), and, having personal interests in the scientific field, he believed that it would be sensible to initiate the development of an 'A' level with science teachers who had strong environmental interests. (Morgan 1975). In October, 1971, therefore, he contacted Mr. A. Taylor, (Rural Science Adviser for Cheshire), and Mr. J. Prince, (Rural Science Adviser for Manchester). Morgan knew both advisers well, and teachers in these two LEA's were already involved in the Ethics and Environment course being developed for Project Environment. Both advisers replied that they would be willing for their teachers to help in the development of an 'A' level syllabus. (Morgan, personal interview, 1979).

2.2 THE CHESHIRE STEERING COMMITTEE

Taylor, in response to Morgan's request, wrote to several teachers who had strong environmental interests, asking for their help in the development of an 'A' level syllabus. (Taylor, personal interview, 1979). He then arranged a meeting of these interested teachers with Morgan for January, 1972. This meeting, held on 21 January, 1972, was attended by Taylor, Morgan and five teachers, and the members present decided to become a Steering Committee to develop an 'A' level syllabus. This Committee met at regular intervals over a 15-month period, from January, 1972 until April, 1973. (Armitage et al 1973; Seppings 1976).

The Committee began its work on 11 February 1972, (Armitage et al 1973), by looking at the 16 topics developed by Project Environment in their Ethics and Environment course - which was developed for use with sixth formers in minority time studies - to see if these topics could provide a basis from which the Committee could develop a syllabus. (Armitage et al 1973; Seppings 1976). These sixteen topics from Ethics and Environment were:

1. Population situation
2. Food
3. Food quality
4. Factory farming
5. Planning the use of land
6. Land and leisure
7. Resource use and re-cycling
8. Water supply
9. Energy
10. Wildlife conservation

11. Natural beauty
12. Soil
13. Pollution and waste disposal
14. Pesticides and people
15. Environmental quality
16. Man in nature

(Ethics and Environment, Colton and Morgan, 1975a).

At the next meeting and after lengthy discussion, the Committee decided that, because the content of many of these topics overlapped, the number of topics should be reduced to six only, namely, population; food supply; land use; conservation of resources; pollution; and man and his environment. The Committee also distinguished five themes running through these six topics, namely:

a. Impact of human population
b. Man and other living things
c. Human needs in terms of space
d. Human needs in terms of resources
e. The human response to environmental action

(Armitage et al 1973; Seppings 1976).

The Committee also decided that the title for the proposed syllabus should be "Environmental Science" and established the aim for the syllabus which it stated as:

> To lead pupils to an informed concern for the quality of the environment through an understanding of the processes that maintain the dynamic equilibrium in the environment and of the effects of man's interference with them. (Armitage et al 1973; Seppings 1976, p. 24; Colton and Morgan 1974, p. 48).

The Committee also suggested a method for attaining this aim, namely:

> To achieve this aim, the syllabus is designed to illustrate man's ecological position in relation to his natural environment in the light of current environmental problems. The syllabus is based on an ecological approach to the study of man and the environment. This implies that the links between the various topics under discussion must be given continuous attention and thus are as important as (if not more important than) the

> topics. While the approach is scientific, in order to achieve the aim it is necessary to emphasize, not only scientific facts and concepts, but the role of science in human affairs. (Seppings 1976, p. 24).

Each of the Steering Committee teacher members was then asked by Taylor to recruit a Working Party with members teaching different subjects, with a view to each taking one of the five themes identified by the Steering Committee, and investigating the way in which the selected theme interacted with each of the six (content) topics. These Working Parties met during the summer of 1972 and produced masses of documents which the Steering Committee received in the autumn and discussed for the rest of the year.

According to Armitage et al (1973) and Seppings (1976), its Chairman, the Steering Committee reached its lowest ebb at the 30 January, 1974 meeting, as it appeared to be making no progress towards the development of the syllabus. It decided, therefore, to hold a session at which all the Working Groups could discuss their proposals. This session took place on 19 and 20 March, 1973, at the South Cheshire Teachers' Centre, Nantwich, (Armitage et al 1973), and, according to Seppings, proved to be a turning point, from which time the Steering Committee never looked back. This meeting decided that the syllabus should start from the experiences of the pupil and work from there, rather than start with definitions of content. It was also decided to put everything in the form of questions rather than statements of content. As a result, the Steering Committee decided to construct the syllabus around ten topics, namely:

1. Population and resources
2. Food supply and food quality

3. Energy
4. Intensive and factory farming
5. Resource use and re-cycling
6. Water
7. Pollution and waste disposal
8. Pesticides and people
9. Wildlife, natural beauty and environmental quality
10. Land use and leisure

(Armitage et al 1973, p. 6; Seppings 1976, p. 25).

The Steering Committee met again on 12 April and was ready to write an interim report by April, 1973 (Seppings 1976), for consideration at its next meeting on 4 May (Armitage et al 1973), and Morgan suggested that the time was now appropriate for the Committee to approach an examining board with their proposals. (Morgan, personal interview, 1979). The Committee decided at the 4 May meeting (Armitage et al 1973), therefore, to submit their proposals to the local examining board, the Joint Matriculation Board in Manchester, as a Mode 3 'A' level syllabus. (Taylor, personal interview, 1979).

2.3 THE MANCHESTER STEERING COMMITTEE

At the time Taylor was organising the first meeting of the Cheshire Steering Committee, Prince, the Adviser for Rural Studies in Manchester, was inviting Morgan to speak to interested teachers attending a Rural Studies in-service workshop. Most of the teachers attending this meeting were rural studies teachers (Prince, personal communication, 1980; Baggaley, personal interview, 1980), who had been involved in the development and testing of materials for the "Ethics and Environment" course which was developed by Project Environment for multi-disciplinary use during sixth form minority time studies. (Seaton, personal communication, 1980).

A Working Group of these interested Manchester teachers was formed to draw up a syllabus (Seaton, personal communication, 1980; Baggaley, personal interview, 1980), but Morgan was not a member of this Working Group, although he was in contact with several members of the Group during its work. (Morgan, personal interview, 1979).

The Manchester Working Group developed their proposals for a syllabus from some of the environmental topic material from the Ethics and Environment course which they had already been helping to develop with their own sixth form students. This material was issue-oriented (e.g. impact of a nuclear power station on a local environment, etc.), rather than subject-centred (e.g. land use, resources, food production, etc.), and was used by the group to explore the issue-centred approach to environmental science. (Morgan 1975).

The group met regularly (Seaton, personal communication, 1980) for a year until Spring, 1973, when Morgan suggested to Prince that the time was appropriate for the group to meet with the Joint Matriculation Board. (Morgan 1975). The Cheshire group had produced a final report (Morgan, personal interview, 1979), but the Manchester group had not.

2.4 THE BIRMINGHAM ENVIRONMENTAL STUDIES STUDY GROUP

In 1971, the Joint Matriculation Board, quite independently from Project Environment, but in association with the University of Birmingham, initiated the Joint Project for Advanced Level Syllabuses and Examinations to study the practical and theoretical aspects of syllabus development in subjects in the sixth form curriculum in general. (JMB/

University of Birmingham 1974). The project received financial support from the Schools Council, and the work was organised in consultation with the Central Examinations Research and Development Unit of the Schools Council. The project arose out of the concern of the Schools Council, universities and examination boards about likely changes in the curriculum of the sixth form, both at the syllabus level and the level of the curriculum as a whole. The objectives of the project were:

a. To examine the full range of possibilities for devising new styles of syllabuses and examinations, and

b. To investigate a variety of methods for arriving at specifications for syllabuses and examinations, especially methods involving practising teachers.

(JMB/University of Birmingham, 1974, p. 1).

Six different subject study groups, made up largely of practicing teachers, were set up, two in the North West and four in the Midlands. The JMB/University of Birmingham Joint Project requested each study group to consider the syllabus developments which it would like to see in its subject area, but also to take into consideration the possibility of changes in the sixth form curriculum and examinations involving an increase in the number of subjects studied and a corresponding reduction in the teaching time available for each subject. (JMB 1974).

The Environmental Studies Study Group was one of the four groups in the Midlands, and consisted of twelve members, the majority of whom were not practicing teachers. (Numbered among the members of this group were Mr. P. D. Neal, Chairman of the National Rural Studies Association, who was a headmaster in a Birmingham school, and Mr. P. Topham, the originator of the Hertfordshire syllabus, who was then the Rural Studies Adviser for Birmingham. (JMB/University of Birmingham 1974).

The first meeting of the Environmental Studies Group took place in October, 1972 (at a time when the Cheshire and Manchester groups were already meeting), at which time it defined its objective as:

> The production of a teaching syllabus ... and a specification for an examination in Environmental Studies at Advanced Level. (JMB/University of Birmingham, 1974, p. 3).

In December, 1972, the group met and elected Mr. J. Collins as its chairman. Collins (personal communication, 1980), states that he was elected chairman since he was the only member teaching in an ordinary school (i.e. comprehensive school) even though he taught biology and not environmental subjects. The other members of the group taught in colleges of further education, colleges of higher education, were headteachers, or were officials of LEA's.

Early meetings of the group were preoccupied with a definition of Environmental Studies, and members suggested that it differed from both environmental education, which was not a subject but rather a method using the environment as a starting point, and environmental science, which merely classified the sciences by excluding those without an environmental bias. (JMB/Birmingham 1974).

The group examined both the Hertfordshire and Wiltshire 'A' level "Environmental Studies" syllabuses, but neither commended itself to the group as they considered that both lacked a central core and covered so much subject matter and in such detail that the syllabuses made unreasonable demands on the time and effort of both teachers and candidates. In point of fact, both the Hertfordshire and Wiltshire syllabuses were accepted for examination by examining boards. The Wiltshire syllabus was accepted by the Associated Examining Board and was approved by the Schools Council in 1973. The Hertfordshire syllabus was approved a year later by the Schools Council and is examined by the London School Examination Board.

Various members of the Birmingham group, therefore, devised their own syllabuses with different biases, according to their own subject specialties, and these syllabuses were discussed at the 11 January, 1974 meeting. (JMB/ University of Birmingham, 1974).

Even though the group's original objective was to produce a syllabus for Environmental Studies at 'A' level, the members found it impossible to develop it in the time available (October, 1972 to April, 1974), (JMB 1974), and so the group's final report, published in April, 1974, included the various draft syllabuses with comments on each. (JMB/University of Birmingham 1974). The Environmental Studies Study Group was the only one of the six Joint Project study groups (the others studied other subjects, e.g. biology, chemistry, etc.) not to develop a single syllabus. (JMB 1974).

During the period 1971 to 1974, therefore, there were three separate groups developing syllabuses in Environmental Science/Studies which were destined to be submitted to the

JMB. Two groups, one in Cheshire and one in Manchester, were set up in 1971 at the instigation of the Schools Council Project Environment, and were developing environmental science syllabuses, while the third, the Birmingham group, set up as part of a JMB/University of Birmingham Joint Project in 1972, was developing an environmental studies syllabus.

During the same period, two other groups, one in Hertfordshire, (1968-1973), and one in Wiltshire, (1969-1972), were also developing environmental 'A' level syllabuses, both entitled Environmental Studies, which were approved by the Schools Council and examined by boards other than the JMB.

(Figure 2.1 shows the names and relevant dates of the groups involved in environmental 'A' level development).

2.5 THE JMB AND ENVIRONMENTAL EXAMINATIONS

2.5.1 INTRODUCTION

According to Morgan (1975) and Prince (personal communication, 1980), the JMB appointed an Environmental Science/Studies Sub-committee in 1974 as a direct result of the approach made to the JMB by the Cheshire and Manchester committees. However, as is shown in the following section (2.5.2), it is now clear that the JMB had already been thinking of providing an 'A' level in Environmental Science/ Studies even before the approach by the Cheshire and Manchester committees in 1974. The approach to the JMB by these two committees was, therefore, just one of a series of events which led to the formation of the Environmental Science/ Studies Sub-committee, and the purpose of the next section

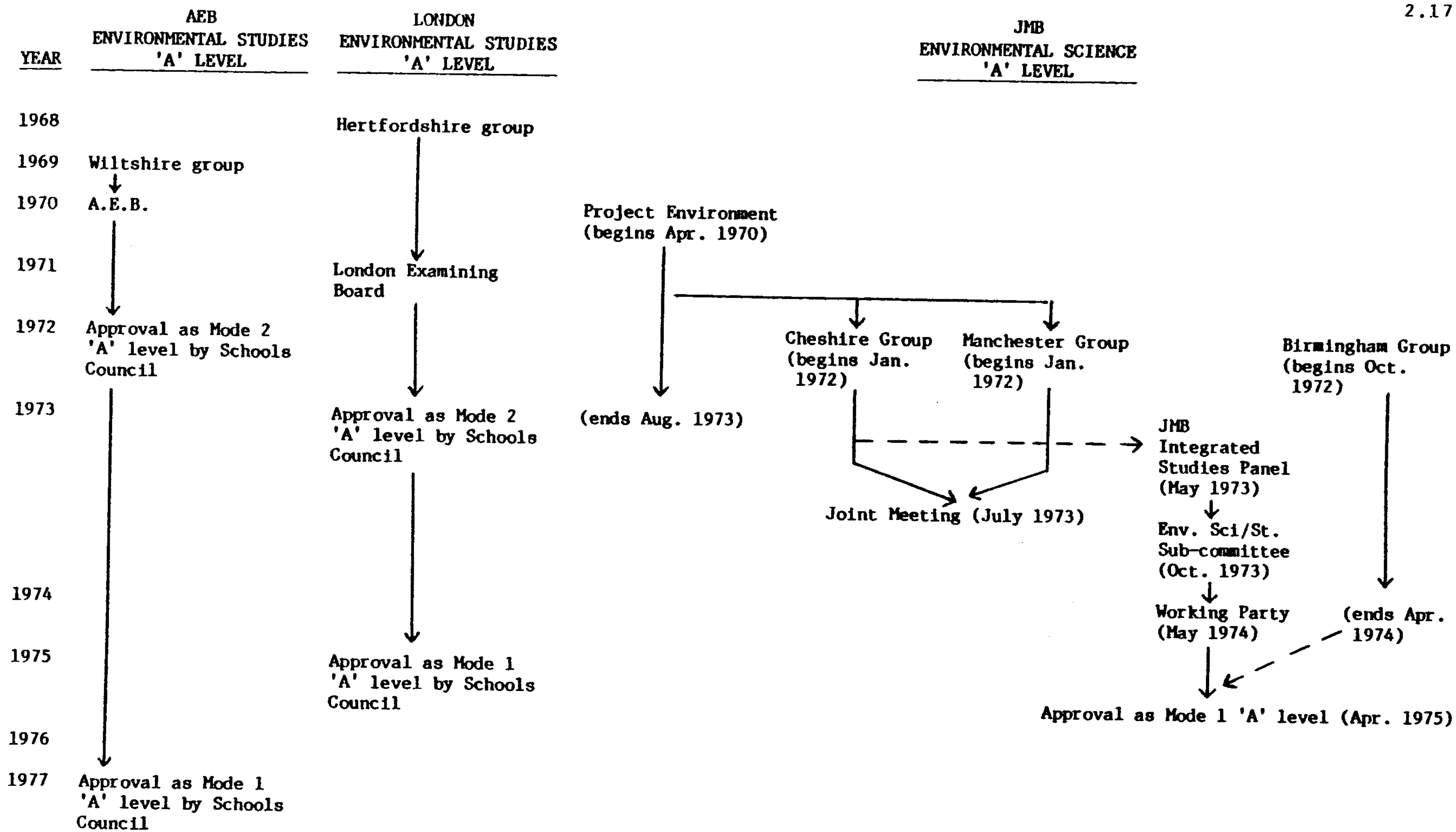


FIGURE 2.1

DIAGRAM SHOWING THE HISTORIES OF GROUPS INVOLVED IN THE DEVELOPMENT OF ENVIRONMENTAL 'A' LEVELS

(2.5.2) is to show all the events which occurred and which led the JMB to set up its Sub-committee.

2.5.2 THE INVOLVEMENT OF THE JMB IN ENVIRONMENTAL SYLLABUSES AND EXAMINATIONS

The JMB had already become involved in the examination of environmental syllabuses (at 'O' level) well before the approach by the Cheshire and Manchester committees, as is shown by the following extract taken from a JMB document entitled "Proposals for the introduction of a syllabus in Environmental Science (Advanced)", published in 1975:

> The generation of concern over environmental problems in recent years is reflected in increasing interest in schools in the introduction of courses in Environmental Studies or Environmental Science as part of the school curriculum. The growing enthusiasm of schools for such courses appears to result not only from the publicity which has been given by the mass media and by organisations concerned with conservation and the economical use of resources but also from the conviction that syllabuses and examinations concerned with a study of the environment would enable schools to provide courses which pupils would find to be of much greater relevance and therefore of greater interest than the traditional subjects. This interest resulted in the Board [JMB] receiving enquiries as to the possibility of such syllabuses being provided and several schools submitted proposals for syllabuses under the arrangements for specially approved syllabuses. (JMB, 1975a, p. 2).

This interest of schools in such syllabuses being provided by the JMB is further shown by the following extract from an article by Johnson (1978) in the Annual Journal of the Staffordshire Rural and Environmental Studies Association.

> Stemming from an increasing public awareness of environmental issues, a number of individuals in a small but rapidly increasing number of schools saw a real need for Environmental Science/Studies within the school curriculum. At that time, as no suitable subject was offered by Examining Boards in the North West and West Midlands, these individuals prepared their own syllabuses at Ordinary

> level and submitted them to the Joint Matriculation Board. (P. 19).

In fact, teacher interest in environmental syllabuses was so great that by 1974 the JMB had already approved for examination some 30 specially approved 'O' level syllabuses. (Morgan, personal communication, 1979).

As regards environmental syllabuses at 'A' level, the JMB (1975a) document goes on to say that:

> The development of Advanced level syllabuses by groups of schools working under the auspices of Wiltshire County Council Education Committee and Hertfordshire County Council Education Committee stimulated interest in other parts of the country and the Board [JMB] received enquiries as to the possibility of an examination being made available by the Board. (JMB 1975a, p. 2).

As a result of these enquiries from teachers for a suitable 'A' level environmental examination, the Board set in motion the search for a suitable syllabus, as is shown by the following quotation from the same JMB document:

> For some time it was considered that an examination on the syllabus developed in Hertfordshire might be provided by one GCE examining board acting on behalf of all the boards as is the case with such schemes as the Nuffield Science Teaching Projects, and that the needs of schools could be met by some such arrangement although the Board was not convinced that the Hertfordshire syllabus was entirely a satisfactory approach to the subject. (JMB, 1975a, p. 2).

The JMB was represented by Mr. J. Whittaker at the 1970 Offley, Hertfordshire Conference on the Hertfordshire syllabus (Carson 1971) and the JMB was one of the examining boards approached in 1971 by the Hertfordshire group of teachers who were then seeking an examination board to examine their 'A' level syllabus. This syllabus was scrutinised by the JMB's Integrated Studies Panel but was not accepted. The syllabus was considered to be too wide, and the JMB was concerned about the taking over of a syllabus for teachers in a county that is outside its traditional area. (JMB, 1975a; Whittaker 1975).

In 1972, the University of London Schools Examination Council accepted the responsibility for the provision of the Hertfordshire syllabus, and in 1973 was given approval by the Schools Council to conduct the examination, provided that the entry of candidates was restricted to the group of named schools which had been involved in its development. It then became necessary for the JMB to consider what action it should take to meet the needs of those schools which entered candidates for its examinations and wished to develop courses on environmental matters leading to certification at 'A' level. (JMB 1975a).

The Board's interest in developing an 'A' level syllabus prompted it to find a group of dedicated and committed teachers to develop such a syllabus, instead of just selecting members of existing JMB subject committees. The JMB's Integrated Studies Panel had just begun the task of selecting the group when it received requests from the Manchester and Cheshire Steering Committees to talk about a possible 'A' level examination. (Whittaker 1975).

2.6 THE JMB ENVIRONMENTAL SCIENCE/STUDIES SUB-COMMITTEE

In the spring of 1973, Morgan, the Deputy-Director of Project Environment, decided that the Cheshire Steering Committee, of which he was also a member, had progressed sufficiently and that it was time to seek the assistance of an examination board. (Morgan 1975; Anon. 1976). Morgan also contacted Mr. J. Prince, the Manchester Rural Studies

Adviser and member of the Manchester Steering Committee, with the suggestion that each group contact an examining board with a view to requesting the provision of an environmental 'A' level syllabus. (Morgan, personal interview, 1979).

As a result, both the Cheshire and the Manchester Steering Committees, through Mr. A. Taylor, the Rural Science Adviser for Cheshire, and Mr. J. Prince, the Rural Studies Adviser for Manchester, respectively, each contacted the JMB requesting a meeting with them to discuss the offering of an environmental 'A' level. (Morgan, personal interview, 1979; Prince, personal communication, 1980; Taylor, personal interview, 1979).

A meeting took place on 19 May, 1973 and was attended by Mr. R. Whittaker, (Secretary to the JMB), Professor Jevons, (Chairman of the Integrated Studies Panel), Mr. Taylor, Mr. Prince, and members of both the Cheshire and Manchester teacher groups. Mr. G. Hopkinson, the Staffordshire Adviser for Environmental Studies, was also invited to this meeting because of his county's involvement in environmental options for sixth form minority time studies. (Seppings 1976; Taylor, personal interview, 1979). Mr. R. Morgan, the Deputy-Director of Project Environment, also attended this meeting. (Morgan, personal interview, 1979).

The Cheshire group presented their Interim Report (Armitage et al 1973) to the JMB at this meeting as a proposal for an externally moderated (Mode 3) syllabus in 'A' level Environmental Science for the use of Cheshire teachers. (Taylor, personal interview, 1979). Taylor also states that the JMB representatives told those present that the JMB had been thinking not necessarily of environmental science but of environmental studies because they were receiving an increasing number of queries from individual schools and individual teachers who wanted such a syllabus. It appeared to Taylor that the Cheshire and Manchester groups had contacted the JMB at a most opportune time. Taylor, the Cheshire Rural Science Adviser, says that the JMB were so pleased with the Cheshire syllabus proposals that they said they would promote it as a Mode 1 'A' level syllabus which could be used by all teachers in the JMB area. On the other hand, Seppings (1976), another member of the Cheshire group who attended this meeting, and Morgan, the Deputy-Director of Project Environment, (Personal interview, 1979), both felt that the meeting was inconclusive, and left the meeting wondering whether or not the JMB were at all interested in the Cheshire proposals. Seppings (1976) considered that one important gain from the meeting was the contact with the Manchester group, and the two groups arranged to have a joint meeting to decide whether or not to cooperate with the JMB in the production of an 'A' level syllabus. (Anon. 1976).

This joint meeting of the Cheshire and Manchester groups was held at Marple, Stockport, on 9 July, 1973 and, according to Seppings (1976), was another milestone in the development of the 'A' level in that the Manchester Steering Committee decided that further development of their scheme would produce a syllabus similar to the Cheshire one and agreed at this 9 July, 1973 meeting to accept the Cheshire proposals as the basis for further development. The Manchester Committee, however, recommended that the original ten Cheshire topics should be rearranged under just five headings, namely:

1. Energy resources

2. Food supply and food production

3. Pollution, waste disposal and pesticides

4. Land use and leisure, wildlife, natural beauty and environmental quality

5. Pollution, physical and ecological environment, ecosystems and related statistics (Seppings, 1976, p. 26).

This joint meeting resulted in a final draft of a single syllabus which was submitted to the JMB with the brief, "This is for you, to do with as you wish." (Anon. 1978, p. 39).

In October, 1973 the JMB's Integrated Studies Panel set up a Sub-committee to advise on all matters regarding syallabuses and examinations in environmental studies and environmental science. This Sub-committee was made up of members of the JMB's various subject committees, and representatives from schools which had expressed interest in environmental syllabuses. The panel decided that the Sub-committee's first task would be to develop an 'A' level syllabus and then an 'O' level syllabus. (JMB 1975a).

At its first meeting, held on 10 December, 1973, the Sub-committee decided to develop the joint Cheshire/Manchester proposals into an 'A' level Environmental Science/Studies syllabus. (Seppings 1976). The same meeting decided that:

1. The subject be entitled Environmental Science.

2. The work prepared by the Cheshire and Manchester teachers form the basis of discussion; and

3. The Sub-committee act primarily in an advisory capacity to the teachers who were to be asked to work together across the whole region. (Johnson, 1978, p. 19).

The Sub-committee requested the Cheshire and Manchester groups to meet to clarify certain aspects of their joint proposals, specifically to:

1. Identify overlapping topics in the syllabus.
2. Identify those portions of the syllabus which were non-scientific and should, therefore, be omitted from the syllabus.
3. Consider which first-hand approaches to use in the teaching of the syllabus and which scientific tools would be best to use with these approaches.
4. Clarify other points in the syllabus which were considered by Sub-committee members to be unclear. (Seppings 1976).

As a result, the joint Steering Committee of the Cheshire and Manchester groups met and drew up answers to these requests from the Sub-committee. (Seppings 1976).

An enlarged JMB Sub-committee for Environmental Science/Studies of twenty members was then set up to develop these proposals. The Sub-committee was enlarged to allow more representation from the Cheshire and Manchester groups and to involve teachers who had previously submitted 'O' level syllabuses in Environmental Science/Studies for special approval by the JMB, (Taylor, personal interview, 1979; Johnson 1978) as well as other interested parties from a number of the Board's constituent universities and colleges. (Johnson 1978). This enlarged Sub-committee had two members each from the Cheshire and Manchester groups; the Rural/ Environmental Science/Studies Advisers from Cheshire, Manchester and Staffordshire; four members of the JMB's other subject committees; three lecturers from interested JMB constituent universities and colleges; Mr. R. Morgan, the Deputy-Director of Project Environment; and five teachers who had previously submitted Environmental Science/Studies 'O' level syllabuses to the JMB. (JMB 1975a). At the time this enlarged Sub-committee was formed, the Birmingham-based Environmental Studies Study Group was not invited to be represented. (See 2.4). (Collins, J., personal communication, 1980; Barrow, personal interview, 1980).

On 4 May, 1974, the Sub-committee of the Integrated Studies Panel set up a Working Party of nine members (all members of the Sub-committee) who subsequently co-opted another three members to serve. (Morgan 1975; Seppings 1976). These twelve included four from Cheshire, three from Manchester, Mr. R. Morgan, one university representative, one college of education representative, and two other teachers, one from Staffordshire (who had been involved in the Project Environment sixth form minority time courses), and one from Yorkshire (who had developed the first specially approved 'O' level Environmental Science/Studies syllabus to be examined by the JMB). (JMB 1975a). Again there was no representation from the Birmingham group on this Working Party.

At a later date, and after the formation of this Working Party, two other members were added to the Sub-committee, giving it twenty-two members in all. One, Dr. Lee from Manchester University, was invited to join to give advice on economic aspects of the syllabus, and the other was Mr. J. Collins, the Chairman of the Birmingham-based Environmental Studies Study Group which had been jointly set up by the JMB and the University of Birmingham in 1972.

According to Collins (1980, personal communication) who was the Chairman of the Birmingham Study Group, the members of the group had only become aware of the formation of the JMB Environmental Science/Studies Sub-committee towards the end of their work in January, 1974. The group, therefore, decided at their final meeting on 11 January, 1974, that it would be appropriate for a member or members of the group to be included in the JMB Sub-committee. As a consequence of sending a copy of their final report, published in April, 1974, to the JMB, the Chairman of the group was invited to become a member of the JMB Sub-committee in mid-1974, some eight months after the Sub-committee (which first met on 10 December, 1973) had been formed, and two months after the members of the Working Party had been selected. Even though the Birmingham group had been working on the development of an environmental studies 'A' level syllabus for the JMB, its work had little effect on the final development of the environmental science 'A' level, for, by the time Collins was invited to join the Sub-committee, the title for the new 'A' level (Environmental Science) had been agreed upon, as had the decision to use the Cheshire/Manchester proposals as the basis for the new JMB 'A' level. According to Collins:

> We [the Birmingham group] were under the impression that the work we did would be considered when the JMB syllabus was put together. Unfortunately, when the work was submitted (April, 1974) the JMB told us it was too late to be of use. (Collins, J., personal communication, 1980).

Although the Chairman of the Birmingham group was invited to join the Integrated Studies Panel Sub-committee on Environmental Science/Studies, there was virtually no input into the final JMB Environmental Science 'A' level from the deliberations of the Birmingham group.

2.7 THE JMB WORKING PARTY

The Sub-committee provided the Working Party with the initial brief to develop an environmental science 'A' level syllabus. This brief stated that the emphasis should be placed on environmental science, and that it should be possible for students to offer the subject for examination at the same sitting as any other subject in the Board's schedule. The brief also stated that it would be necessary to specify the detailed requirements of each part of the syllabus in such a way that ambiguities would be avoided and widely different interpretations of these requirements from centre to centre avoided. (JMB 1975a).

The Working Party took into consideration the following material:

1. The draft proposals prepared by the Cheshire and Manchester Steering Committees, and the reports of the Joint Committee of the two groups.

2. Syllabuses in environmental studies and environmental science submitted to the Board by individual centres for consideration as specially approved syllabuses.

3. Existing syllabuses in the environmental studies and environmental science areas of the curriculum, provided by other GCE boards (including the syllabuses developed in Hertfordshire and Wiltshire).

4. Syllabus developments in other subjects (i.e. biology and geography) completed by the JMB in recent years.

5. A paper from the Secretary (Mr. R. Whittaker) prepared for the Committee on Integrated

Studies on the background of the development of environmental studies and environmental science syllabuses.

6. The report of the Environmental Studies Study Group of the JMB/University of Birmingham Joint Project for Advanced Level Syllabuses and Examinations. (JMB, 1975a, p. 5).

The first meeting of this JMB Working Party was held 17 May, 1974. (Seppings 1976). After five meetings, the Working Party was agreed that the draft syllabus was ready for comment and scrutiny from a wider audience. In July, 1974, therefore, this draft syllabus was circulated to all members of the Board's Subject Committees for geography, social studies, physics, chemistry, general physical sciences, biological sciences and geology, and also to each of the schools known to have an interest in the development of the syllabus. They were asked to study the draft and comment on its content under the following headings:

a. Is the area of study defined by the syllabus an appropriate prescription of Environmental Science?

b. Are there any aspects of Environmental Science excluded from the draft which you would wish to see included in the syllabus?

c. Are there any aspects of Environmental Science which are included in the draft which you would like to see excluded?

d. Do you regard the style of presentation to be appropriate to an examination syllabus, i.e., the use of topics in the form of major questions and the association of the concepts involved in exploring the questions?

e. Do you regard the specification of the content of the syllabus to be sufficiently clear for the syllabus to be used by teachers as the basis for the construction of teaching courses and by examiners for the construction of examination papers?

f. Are there areas of the draft syllabus which you would wish to see specified in more detail in an examination syllabus?

g. If a syllabus is developed along these lines, and receives approval, do you consider that the overlap between it and any of the Board's existing syllabuses is such that the Environmental Science (Advanced) syllabus could not be offered at the same sitting of the examinations as other syllabuses which would be specified? (JMB 1975a).

In addition, the members of the Subject Committees were invited to annotate their copies of the draft syllabus indicating specific amendments, additions or exclusions they would wish to see made. (JMB 1975a).

Early in October, 1974, the Working Party members received the collected comments on the syllabus, amounting to 131 pages. These comments were considered at the meeting held on 12 October, to which all members of the Environmental Science/Studies Sub-committee were invited, and it was agreed that in general the comments were in favour of the proposed syllabus. (Seppings 1976). In addition, the Subject Committees had decided that it would not be necessary to prohibit candidates from taking the subject at the same sitting as any other subject on the Board's schedule. (Seppings 1976).

The Working Party then held a three-day meeting at which the whole of the subject matter of the syllabus was reviewed in the light of comments received, and the general framework of an appropriate scheme of assessment was agreed. (JMB 1975a).

At the next meeting, agreement was reached on the form that the examination should take, and on a scheme for the internal assessment by teachers of their students' practical skills. Specific tasks were also allocated to individual group members for the production of further specimen examination questions. (JMB 1975a).

The Working Party completed the final revision of the syllabus in November, 1974, and in December the Secretary prepared a statement of the aims and objectives of this 'A' level. Three members of the group prepared the statements of background knowledge required in biology, chemistry and physics, and the background knowledge in mathematics and statistics was taken directly from the 'A' level biology syllabus. (Seppings 1976).

The detailed proposals for the syllabus, notes for the guidance of teachers concerning the internal assessment of practical skills, specimen examination questions, and a draft report of the development of the proposals were then circulated to all members of the Environmental Science/ Studies Sub-committee. The Sub-committee and the Working Party, at a joint meeting in February, 1975, agreed that the material be circulated for comment. It was also agreed at this meeting that if the proposals received the approval of the Schools Council, the Board should then be asked to approve the introduction of the syllabus at the earliest opportunity. (JMB 1975a).

On 18 April, 1975, Professor Jennings (Chairman of the Sub-Committee) and Mr. Prince (Chairman of the Working Group) attended a meeting of the ad hoc Committee on Environmental Science/Studies of the Schools Council, as representatives of the JMB. (Seppings 1976). The Schools Council duly gave approval for the introduction of the new syllabus at this meeting. (Morgan 1975; Seppings 1976). The offering of the syllabus was not restricted to the schools involved in its development, as had occurred with both the Hertfordshire and Wiltshire "Environmental Studies" syllabuses.

On 14 May, 1975, the Environmental Science/Studies Sub-committee recommended to the JMB Examinations Committee that the new syllabus be introduced, and this recommendation was accepted at the meeting held on 5 June, 1975. (Seppings 1976). The JMB offered the syllabus for examination from 1977. (Morgan 1975).

Three establishments, one each in Lancashire, Sandwell and Staffordshire, started the teaching of the syllabus in September, 1975, and in June, 1977, eight candidates sat the first examination. (JMB Examinations Data, 1977).

CHAPTER THREE

CHOICE OF RESEARCH METHODOLOGY AND THE DEVELOPMENT OF QUESTIONNAIRES

3.1 INTRODUCTION

In a review of the types of methods used to collect data in social science research, Denzin (1970) suggests:

> ... that no single method is free from flaws - that no single method will adequately handle all the problems of causal analysis - and no single method will yield all the data necessary. (P. 3).

Mindful of the problems involved in data collection, the Curriculum Diffusion Research Project (Kelly 1975) used a variety of methods including questionnaires, interviews and case studies to gather information, and this, according to Harding (1975), enabled the research to exploit the strengths of each method.

In common with the Curriculum Diffusion Research Project, it was decided to use a variety of methods to gather information on this occasion, and these methods, with the exception of the questionnaires, are each described in the introductions to the relevant chapters. Four survey questionnaires were developed for this present study and they are described here because they were developed using the same guidelines, and because the information derived from each questionnaire was used in more than one chapter.

3.2 THE QUESTIONNAIRES

Four questionnaires were developed to gather information about the diffusion and adoption of the JMB 'A' level, about the LEA's in which there were adopter and/or non-adopter establishments, about the adopting and non-adopting teachers, and about the students taking the 'A' level.

Each questionnaire was constructed taking account of the guidelines suggested by Hoinville (1978), Moser and Kalton (1971), the Open University (1973), Oppenheim (1966), and Youngman (1978). The steps involved in the development of each questionnaire included discussions with members of the target audience, submission of the early drafts to specialists in both science education and in questionnaire development, and field trials. Each of the drafts was modified in the light of the feedback obtained from these sources of information and was used to produce the final questionnaires. The various steps involved in the development of each questionnaire helped to ensure that the instruments developed were both valid and reliable.

3.3 THE IMPLEMENTER SURVEY QUESTIONNAIRE

3.3.1 INTRODUCTION

The purpose of the questionnaire was to gather information concerning the context of the Environmental Science 'A' level, from those who were teaching the 'A' level at the time the survey was taken (January to March, 1979). The questionnaire sent to these teachers is called the Implementer Questionnaire. It was devised to gather information concerning:

a. Characteristics of the LEA in which the respondent worked.

b. Characteristics of the establishment in which the respondent taught.

c. Characteristics of the respondent.

d. The respondent's first source of information about the 'A' level.

e. The adoption process in the respondent's establishment and the factors which affected it.

f. The sources of help available to the respondent in the offering and teaching of the 'A' level.

g. The organisation and teaching of the 'A' level in the respondent's establishment.

and h. The respondent's opinion of the 'A' level.

A review of the literature on environmental syllabuses, of diffusion and of adoption of educational innovations was conducted and suitable questions were developed for the first draft of this instrument. This first draft was discussed separately with each of four teachers of the JMB 'A' level. This allowed the researcher (who is from a North American establishment) to familiarise himself with the 'A' level itself and with the relevant terminology used and understood by teachers in British schools and colleges.

This first draft was adjusted in the light of these discussions and was then submitted independently to a specialist in science education and another in questionnaire construction, and the instrument was further revised as a result of their comments. This version was then re-submitted to these same specialists, and more adjustments, this time of a minor nature, were made as a result. By this time, it was agreed that the questionnaire was ready for piloting.

This pilot instrument was then used as an interview schedule with each of two teachers of the 'A' level to see which, if any, of the questions were ambiguous and to check on the length of the instrument. As a result of these interviews (both of them tape recorded) several questions were reworded and others omitted to shorten the instrument.

The instrument now revised and almost in its final form was, as a questionnaire, mailed out to each of two further teachers of the 'A' level as a final field trial of the questionnaire, and in the light of this feedback only minor changes were needed. It was decided that once these had been incorporated, the instrument was suitably prepared both for its purposes and for its use. A copy of this instrument is given in Appendix A.

3.2 THE SAMPLE POPULATION

A list of all 18 schools and colleges which had entered candidates for the JMB Environmental Science 'A' level examinations in 1977 and 1978 was obtained from the JMB. Letters requesting the names of schools, colleges and teachers involved in the teaching of the 'A' level were also sent to those LEA's which were represented, either by advisers or by teachers, at the 1976 Parrs Wood, Manchester Conference on this 'A' level, and to all LEA's in the JMB area. The replies from the LEA's revealed that seven establishments, not included in the JMB list of centres entering candidates for the 'A' level, had begun to teach the 'A' level in 1977 or 1978, so had not, at the time of the survey, submitted candidates for examination.

Permission was obtained, either from the relevant LEA adviser or from the headteacher of the school if the LEA failed to reply, to approach the teachers in all these schools and colleges and make enquiries about the adoption and teaching of the 'A' level. Permission was given in all but three cases and these three establishments were omitted from the survey.

Copies of the questionnaire, together with a covering letter (see Appendix C.1) and stamped, addressed envelope, were mailed to teachers in 22 schools and colleges in March, 1979. When a returned questionnaire indicated the presence of more than one teacher of the 'A' level in an establishment, further copies of the questionnaire were mailed out to these other teachers.

Reminders (see Appendix C.2), together with another copy of the questionnaire and another stamped, addressed return envelope, were mailed in May, 1979 to teachers who had not by that time returned the completed questionnaire. In all, 39 teachers received copies of the Implementer Questionnaire.

3.3.2 THE RESPONSE

Thirty-one of the thirty-nine questionnaires mailed out were completed and returned, a higher than usual response rate (80%) according to Oppenheim (1966). These 31 responses caused each of the nine LEA's involved in the survey to be represented and 21 of the 22 establishments (96%) of those that were circulated. If account is taken of all the LEA's, establishments and teachers known to be involved in the teaching of the 'A' level at the time of the survey, then these 31 returned questionnaires represented 71% of all the people involved in teaching the 'A' level, 88% of all (the 25) schools and colleges offering the 'A' level, and 82% of all (the 11) LEA's in which the 'A' level was taught.

3.4 THE NON-IMPLEMENTER QUESTIONNAIRE

3.4.1 INTRODUCTION

The development of the non-implementer questionnaire was begun after the analysis of the returned implementer questionnaires had been completed. The purpose of the non-implementer questionnaire was to collect, from teachers who had not begun to teach the 'A' level by March, 1979, (see section 3.4.2 for an account of how the non-implementer was identified) the date of the implementer questionnaire survey, information on the following:

a. Characteristics of the LEA's in which respondents worked.

b. Characteristics of the establishments in which respondents taught.

c. Characteristics of the respondent.

d. The respondent's first source of information about the 'A' level.

e. The reasons for the 'A' level not being adopted by the establishment and/or teacher.

f. The respondent's opinions of the 'A' level.

It was also intended to compare the answers of the respondents in this survey with those given by respondents to the implementer survey in an attempt to identify significant differences between the implementers and non-implementers.

The first draft of this questionnaire was an abbreviated form of the implementer questionnaire, since by using the same questions, it would be possible to make a direct comparison of the responses in the two surveys. The questionnaire was shortened to four pages from the implementer questionnaire's twelve, to elicit a good response from an audience presumed to have less interest in the 'A' level since they were not teaching it. Most of the questions omitted dealt with the implementation and teaching at the 'A' level, topics not relevant to non-implementers.

This draft was scrutinized by a specialist in science education and also by a specialist in questionnaire construction, and their criticisms were used to make the first revision of the instrument.

This revised instrument was then field tested by mailing out copies, together with an accompanying letter of explanation and a stamped, addressed envelope, to six randomly selected non-implementers representing a 10% sample of the non-implementer population. It was decided to use six non-implementers for this field trial instead of two as in the comparative stage of development of the implementer questionnaire, since it was expected that the response rate from non-implementers would be much lower than for implementers, and because the population of non-implementers (60) was much larger than the implementer population (39). Four of these six questionnaires were completed and returned and the instrument was found to need only minor adjustment and gave rise to the final form of the non-implementer questionnaire. (For copy see Appendix A.2).

3.4.2 THE SAMPLE POPULATION

The choice of what constituted the population of non-implementers of this JMB 'A' level posed a major problem. In each of the separate science subjects, such as biology and chemistry, it is clear for whom any new syllabus is intended. But in the case of environmental science it is not clear, for few establishments have designated teachers of environmental science/studies and lists of such establishments are not readily available.

Colton and Morgan (1974) had suggested that this 'A' level should be designed for use by rural scientists and environmental biologists, when all rural scientists and biologists in the JMB area could have been considered to be potential adopters. However, the results of the Implementer Survey Questionnaire revealed that not only rural scientists and biologists, but also chemists, geographers and geologists, also taught the syllabus and it was not feasible to send questionnaires to all biologists, rural scientists, chemists, geographers and geologists in the JMB area, nor was it possible to identify a random sample of them. It was necessary, therefore, to identify suitable criteria by which to define the sample population to which the Non-Implementer Questionnaire was to be circulated.

Rogers and Shoemaker (1971) had identified four stages in the process by which an individual decides to adopt (or reject) an innovation, namely, awareness, knowledge, persuasion, and finally adoption. These four stages in the adoption process suggested that a person is in a position to consider adoption (or rejection) of an innovation (i.e., is in Rogers' and Shoemaker's third stage of persuasion), only if that person is aware of the innovation and possesses sufficient knowledge of it to make a decision regarding its adoption.

It was decided, therefore, that a suitable non-implementer population would be composed of those teachers who had knowledge of the 'A' level. These were identified as teachers not then teaching the course who were either involved in its development or had attended a conference about the 'A' level, or were currently teaching the JMB 'O' level environmental science syllabus in an establishment which offered 'A' levels. In this way, the non-implementer population became all those teachers involved in its development (the Cheshire, Manchester and Birmingham groups, the members of the JMB Environmental Science/Studies Sub-Committee and Working Party), together with those who had attended at least one of the two conferences on the 'A' level (Keele 1975, Manchester 1976), and those teaching the 'O' level environmental science syllabus in establishments which offered 'A' levels, but excluding those who were not involved in teaching the 'A' level at the time of the Implementer Survey (January to March, 1979). (The names of the schools and colleges entering candidates for the JMB 'O' level environmental science examinations were obtained from the JMB). The total number of teachers in the non-implementer population amounted to some 60 teachers in all.

Copies of the questionnaire, together with an accompanying letter of explanation (see Appendix A.2 and C.3) and a stamped, addressed return envelope were mailed out to 60 teachers in 55 schools and colleges in November, 1979. Reminders (see Appendix C.4) with another copy of the questionnaire and another stamped, addressed envelope were sent in January, 1980 to teachers who had not by that time returned the completed questionnaire.

3.4.3 THE RESPONSE

Forty of the sixty questionnaires mailed out in November, 1979 and January, 1980 were returned, a response rate of 66.7% which is above the average for social science surveys according to Oppenheim (1966).

One cannot tell how many of the questionnaires reached the intended recipients for the addresses of most of the teachers surveyed were obtained from conference attendance lists drawn up in 1975 and 1976, and it can be assumed that some of the teachers had moved in the meanwhile. In addition, a number of the schools listed had been re-organised and the questionnaires were sent to the appropriate post-reorganisation establishment even though it was recognised that the teachers in question were not necessarily then employed in that establishment.

Table 3.1 shows the percentages of teachers responding to the Non-Implementer Questionnaire and the percentages of establishments and LEA's involved in the response.

TABLE 3.1

THE PERCENTAGE RESPONSE RATES OF TEACHERS, ESTABLISHMENTS, AND LEA'S IN THE NON-IMPLEMENTER SURVEY

	NUMBER* IN SURVEY	NUMBER* RESPONDING	% RESPONSE
A. TEACHERS	60	40	67
B. ESTABLISHMENTS			
Comprehensives	41	28	71
Grammar Schools	4	3	75
Sixth form colleges	2	0	0
Colleges of further education	8	8	100
C. LEA'S	20	17	85

*The 60 teachers circulated with this questionnaire were in 55 establishments. Of the 40 who responded, only two were from the same establishment, so the total number of responding establishments was 39.

The results in the table show that all of the colleges of further education, most (71%) of the comprehensive schools, and most of the grammar schools (75%) were covered in the responses, but no response was received from either of the two sixth form colleges involved in the survey. The table also shows that a high proportion (85%) of the LEA's covered in the survey had teachers responding to the questionnaire.

3.5 THE STUDENT INFORMATION QUESTIONNAIRE

3.5.1 INTRODUCTION

The purpose of the Student Information Questionnaire was to collect information on the following:

a. The 'O' level/CSE background of the students.

b. The subjects taken at 'A' level with environmental science.

c. Students' first source of information about the 'A' level.

d. Students' reasons for taking the 'A' level.

e. Students' future plans after completing the 'A' level.

Interviews were conducted with students of this 'A' level in two schools to gather information which could be used to formulate suitable questions concerning how students first came to know of the 'A' level, their reasons for choosing it and their plans for the future after the completion of the 'A' level. A first draft of the instrument was then prepared and submitted separately to two specialists, one in science education and the other in questionnaire construction, for their independent comments. The instrument was then revised to incorporate these specialists' comments, and the changes checked by them. The questionnaire was then field tested with eight students of the 'A' level in a local establishment and showed that only minor changes were needed. These were made and the questionnaire which resulted (for copy see Appendix A.3) was used to collect the student information.

3.5.2 THE SAMPLE POPULATION

It was decided to take the sample from the population of students who began their 'A' level studies in September, 1979, and that not less than two-thirds of this population would be sampled.

A list of the establishments entering candidates for the JMB 'A' level environmental science examinations in 1978 and 1979 was prepared, in all some 20 establishments. Of these, 13 accounted for 90% (154) of all 174 candidates entered for the examinations. Three of these thirteen establishments had already discontinued teaching the 'A' level, and a fourth was one in which the headteacher had not allowed his teachers to take part in the Implementer Questionnaire Survey. Students in the remaining 9 of these 13 establishments received the Student Questionnaire. In addition, students in two establishments just commencing to teach the 'A' level were included. In each case, permission to give the questionnaire to students who began the 'A' level in September, 1979 was received from the teachers involved. By this means, Student Questionnaires were distributed to each of 11 establishments.

3.5.3 THE RESPONSE

Copies of this questionnaire were mailed to the teachers in these eleven establishments at the end of August, 1979, with instructions to give them to the students beginning the 'A' level in September, 1979, as soon as possible after the beginning of the autumn term.

Questionnaires were completed by 80 students in nine establishments. Two establishments did not return questionnaires, in the one case because the 'A' level could not be taught through there being too few students for it to run, and in the other because the teacher with whom the arrangements had been made left to take up a position (as Head of Biology) in another school.

3.6 STUDENT OPINION SURVEY

3.6.1 INTRODUCTION

While the Student Information Questionnaire gave information about first-year 'A' level students, other information could be gleaned only from those in the second year of the 'A' level. The purpose of the Student Opinion Survey was to find out from students who were completing the second year of the 'A' level the following:

a. Their opinions of the 'A' level.

b. Their plans for the future after completion of the 'A' level.

c. Whether or not they had changed their future plans because of the 'A' level.

d. Whether or not they intended to look for an environmental career or study for a degree in an environmental subject.

This information would give some indications about whether or not students thought that the 'A' level was one they liked and would recommend to their friends, and the number of students intending to use the 'A' level as a qualification for entry into environmental degrees, courses and careers.

A first draft of this questionnaire, prepared using information gained during the interview with students of the 'A' level mentioned in 3.5.1, was submitted separately to a specialist in science education and another specialist in questionnaire construction for their comments. Their comments necessitated only minor revision of the instrument which was then field tested with nine students in a local school. The results of this field trial indicated that no further revision of the instrument was needed. (For copy, see Appendix A.4).

Originally it had been intended to give this opinion questionnaire in 1981 to the same students who had, two years earlier (September, 1979), completed the Student Information Questionnaire, but this proved not to be possible, so this Opinion Questionnaire was given instead to students who would be completing the 'A' level in summer, 1980.

Arrangements were made, therefore, with teachers in seven establishments to administer the questionnaires to their second-year 'A' level environmental science classes in April, 1980. In all, 60 questionnaires were sent out through the teachers, a figure which it was hoped would represent at least two-thirds of the total population of students in their second year of the 'A' level, as had been accomplished with the Student Information Questionnaire, (see 3.5.2), though the size of this population was unknown at that time.

3.6.2 THE RESPONSE

The questionnaires were completed by 46 students from these seven establishments, although 60 replies had been expected. The disappointing return was due to students in some establishments absenting themselves from schools and colleges in their final term. Since only 68 students had sat the 'A' level environmental science examinations in the previous year (1979) it was felt that a sample size of 60 would be sufficient to obtain a two-thirds sample of students intending to sit the examinations in June, 1980. However, it subsequently turned out that 103 candidates sat this examination in 1980, so the 46 questionnaires completed represented a 45% sample of the total of 103 candidates entered for the final examination in 'A' level environmental science in June, 1980.

CHAPTER FOUR

DIFFUSION OF THE 'A' LEVEL

4.1 INTRODUCTION

Diffusion, according to Rogers (1962), is the spread of knowledge about an innovation, and part of this present study was to find out how knowledge of this 'A' level was diffused among potential adopters. Rogers (1962), Carlson (1965) and Havelock (1973) have all noted the importance of change agents in the diffusion of knowledge about innovations. Rogers (1962), for instance, has defined change agents as:

> ...usually local level bureaucrats whose purpose is to inject a cosmopolite influence to innovate into a client social system. (P. 255).

He says further that change agents are the link between professionals and clients.

Another part of the present study was, therefore, concerned to identify change agents who had been involved in the diffusion of knowledge about this 'A' level and to identify their roles in this process.

There are, in addition to persons who can be identified as change agents, organisations which also have a role in the diffusion of knowledge about innovations. Those identified by Hoyle (1969a) were taken as a starting point, though the present study was not confined to an investigation of the eleven change agencies identified by Hoyle. The agencies which Hoyle has identified as agencies involved in the process of diffusion of educational innovations in England are:

1. Schools Councils
2. Private Foundations
3. Commercial agencies
4. Research units
5. Teacher training institutions
6. In-service training institutions
7. Professional (teaching) organisations
8. H.M. Inspectorate
9. LEA inspectors and advisors
10. Examining boards
11. Teachers' unions

Besides identifying the roles of the change agents and of change agencies in the diffusion of knowledge about the 'A' level, this study was also to ask both teachers and students of this 'A' level how they had originally come to hear of it. In this way, the agents and agencies for change and the effective publicity relating to this 'A' level were reviewed and in this way its diffusion monitored.

4.2 RESEARCH METHODS

Hagerstrand (1968), working in Scandinavia, and one of the early pioneers of diffusion studies, insisted that the data used in such studies needed to be both complete and available, and that systematic records of relevant data are invaluable. In spite of this, however, Harding (1975) found that few innovations in the curriculum are systematically recorded, and diffusion researchers must seek information indirectly by means of questionnaire, interview and case study.

One of the features of this present study is that most of the original records have been traced and information has been obtained from contacts with nearly all the main initiators, as both are available and, in this case, independently gained. This not only gives both kinds of sources of information, namely that advocated by Hagerstrand and that found necessary by Harding, but it also allows the two accounts to be compared and the reliability of rememberances recorded in questionnaires, interviews and case studies to be checked.

The key figures who had been involved in the development of the 'A' level were identified and interviewed and their statements concerning agencies of change and change agents collected. Questions seeking the names of agencies of change and change agents were included in both the Implementer and Non-Implementer Questionnaires sent respectively to persons teaching the 'A' level and to those identified as being potential implementers of the 'A' level. (See Chapter Three for information on these questionnaires). Questions relating to teachers' and students' first sources of information about the 'A' level were included in the Implementer, Non-Implementer, and Student Information Questionnaires. (See Chapter Three). These were the sources of information concerning diffusion of the JMB Environmental Science 'A' level.

4.3 THE AGENCIES INVOLVED IN THE DIFFUSION OF THE 'A' LEVEL

4.3.1 THE JOINT MATRICULATION EXAMINING BOARD

The first mention of environmental science in JMB Annual Reports appears in the report for the year 1973/74, where there is mention of the formation of the Environmental Science/Studies Sub-committee. (JMB 1974). A year later, in the report of 1974/75 there is mention of the acceptance of the syllabus by the Schools Council and the decision of the JMB to offer the syllabus for examination in its centres from 1977. (JMB 1975b).

The first full account of the syllabus appeared in the Regulations and Syllabuses for the year 1976. It has appeared in each annual copy of the Regulations and Syllabuses since that time. However, the Schools Council approved the syllabus on 18 April, 1975, too late for inclusion in the Regulations and Syllabuses for 1975, so the JMB sent out the information to all JMB centres in a circular. (Morgan, personal interview, 1979). Details of the 'A' level Environmental Science syllabus first became available during the summer of 1975 in this circular, but were not included in the document, "Regulations and Syllabuses", which is circulated to all centres, until 1976.

4.3.2 THE MANCHESTER REGIONAL CENTRE FOR SCIENCE AND TECHNOLOGY EDUCATION.

In 1975, Morgan (Deputy-Director of Project Environment), asked the JMB to provide help and guidance for the teachers implementing the new Environmental Science 'A' level, but was informed that the Board had no responsibility for helping teachers of the 'A' level. Morgan, keen to obtain help for such teachers, approached Pam Goode, Joint Coordinator of the Regional Centre for Science and Technology Education in Manchester, and the Centre agreed to organise a conference on the 'A' level. (Morgan, personal interview, 1979).

Invitations were sent out to all teachers who had already started to teach the 'A' level in September, 1975, as well as to each of the relevant advisers (of environmental studies, rural studies, science) in the LEA's adjoining the Greater Manchester area. (Goode, personal communication, 1980). Forty-seven teachers, nine advisers and four lecturers from polytechnics and colleges of education from 21 different LEA's attended the conference which was entitled "Environmental Science (Advanced) Syllabus - the JMB Approach". (Goode, letter to advisers, 1976; List of conference attendees, Manchester Regional Centre, 1976). It was held at Parr's Wood High School in Manchester on 27 March, 1976. (Anonymous conference report in REED, 1976). Amongst those who contributed to the conference were the following:

R. F. Morgan (Deputy-Director of Project Environment)
P. Goode (Joint Coordinator, Regional Centre for Science and Technology Education, Manchester)
J. Whittaker (Secretary to the JMB)
P. Laycock (Manchester teacher)
R. Baggaley (Manchester teacher)
R. Prince (Rural Studies Adviser, Manchester)
G. Hopkinson (Environmental Studies Adviser, Staffordshire)

(Anonymous Conference Report, REED, 1976).

According to Morgan (personal interview, 1979), this conference was a turning point in the 'A' level's development for it brought the attention of so many teachers to its existence.

In addition to organising the conference, the Regional Centre, according to Pam Goode (personal communication, 1980), also planned to encourage the development of the 'A' level by arranging contact between interested teachers. To this end, a letter sent by the Centre to all conference participants also asked teachers to inform the Centre of any other teachers who would be interested in the 'A' level, so that they could be added to the mailing list and sent information. (Letter, dated April, 1976, from Pam Goode to teachers attending the conference). The Centre also had plans to publish a newsletter, but the Centre's role in the diffusion of information about the 'A' level came to an abrupt end when it was closed down through insufficient funding in August/September 1976, (Goode, personal communication, 1980), and the newsletter was never published. No other organisation has since assumed the role of the Centre in the diffusion of information about the 'A' level.

4.3.3 THE LEA'S

Implementer Survey questionnaires were sent to 39 teachers of the 'A' level, and Non-Implementer questionnaires were sent to 60 potential adopters in 29 LEA's in the JMB area. The replies, received from 31 teachers of the 'A' level and 40 potential implementers in 23 of these LEA's, indicated that only two (Cheshire and Staffordshire) of these 23 LEA's had organised conferences or talks on the 'A' level.

In Staffordshire, the Environmental Studies Adviser, who was a member of the JMB's Sub-committee for Environmental Science/Studies at the time, organised a one-day conference on the 'A' level, in cooperation with Keele University's Department of Education. Circulars advertising it were sent by the Adviser to the Headteacher of every school in Staffordshire in which there was a sixth form, and to each college of further education. (Hopkinson, personal interview, 1979; Conference Report, 1975). This conference, held at Keele University on 13 November, 1975, was attended by 23 teachers representing 18 schools and 4 colleges of further education. They were addressed by Mr. G. Hopkinson (the Environmental Studies Adviser), and also by Mr. R. Whittaker (JMB) and Professor R. F. Kempa (Keele University). (Conference Report, 1975).

During Easter 1976, 30 teachers attended a one-week workshop on 'A' level, 'O' level and CSE Environmental Science which was held at Madeley College of Education, and again organised by the Environmental Studies Adviser of Staffordshire. (Hopkinson, personal interview, 1980).

The Staffordshire Association for Environmental Education has also held meetings on the 'A' level and two articles featuring the 'A' level have been published in the Association's annual journal. (Hopkinson 1978; Johnson 1978).

The Keele Science and Technology Education Centre, a teachers' centre, set up an Environmental Science Group in 1976 and has held frequent meetings on the 'A' level since that time. (Hopkinson, personal interview, 1980).

The other LEA to have held meetings was Cheshire, neighbouring on Staffordshire. In Cheshire the Environmental Education Adviser (also a member of the JMB Sub-committee for Environmental Science/Studies) has organised two meetings of interested teachers, and has visited many of the county's secondary school headteachers to acquaint them with the new 'A' level. (Taylor, personal interview, 1979). Several teachers from the county officially attended the Madeley (Staffordshire) one-week workshop and have attended meetings of the Keele University Environmental Science Group. Keele, while being in Staffordshire, is near its border with Cheshire and hence conveniently placed for Cheshire's teachers. (Taylor, personal interview, 1979; Hopkinson, personal interview, 1979; Walley, personal interview, 1979).

Cheshire's role in the development of the 'A' level has been documented in an article published in the county's education journal "Education in Cheshire", (Seppings, 1976) and many teachers in the county may have become aware of the 'A' level either through this article or through personal involvement in one of the Working Parties set up in 1973 by the Cheshire Steering Committee.

According to the information derived from the answers to the questionnaires given by implementers, as well as by non-implementers, and from interviews with key figures in the development of the 'A' level, none of the other LEA's have organised talks or conferences on the 'A' level. It is interesting to note that of the 32 establishments involved with the 'A' level up to 1980, 15 (47%) are in LEA's other than Cheshire and Staffordshire, and of the 24 still teaching the 'A' level in 1980, 9 (36%) were in these other LEA's.

4.3.4 OTHER ORGANISATIONS

The information derived from the completed Implementer and Non-Implementer Questionnaires, and from interviews with key persons (those whose names were frequently mentioned in interviews with teachers and others involved with the 'A' level, as having played key roles in its development and diffusion), showed that the only other organisations besides the Regional Centre for Science and Technology Education, Manchester, to have helped in the diffusion of knowledge about the 'A' level were within the county boundaries of Staffordshire. These organisations, as mentioned in Chapter 3, Section 3.3, were the Department of Education, Keele University (which sponsored the one-day conference and housed the Environmental Science Teachers' Group of the Science and and Technology Education Centre), Madeley College of Education (which put on the one-week workshop), and the

Staffordshire Association for Environmental Education (through its meetings and its annual journal).

4.3.5 JOURNAL ARTICLES

A search of the literature showed that five articles have been published about the 'A' level in the four years of its existence up to the end of 1979. These articles are listed below:

1. Summer, 1975

   Review of Environmental Education Developments.
   "The Development of an 'A' Level Syllabus in Environmental Science".
   R. F. Morgan.

2. Summer, 1976

   Review of Environmental Education Developments.
   "Environmental Science (Advanced) Syllabus - The JMB Approach".
   Anonymous.

3. Summer, 1976

   Education in Cheshire.
   "'A' Level Environmental Science".
   E. Seppings.

4. Autumn, 1978

   Review of Environmental Education Developments.
   "Environmental Science - 'A' Level Development".
   Anonymous.

5. 1978
   Staffordshire Rural and Environmental Education Association Journal.
   "Environmental Science and the Joint Matriculation Board".
   R. C. Johnson.

These five articles involve only three journals; indeed three of them were published in one journal, though it does have a national distribution (Review of Environmental Education Developments). The two remaining articles were published in county journals whose distribution is limited to the counties involved. No other articles were found in the four other journals considered to have an interest in environmental science.

4.4 TEACHERS' FIRST SOURCE OF KNOWLEDGE OF THIS 'A' LEVEL.

4.4.1 INTRODUCTION

The information concerning teachers' first knowledge of this new 'A' level was obtained from the answers given on the Implementer Questionnaire (31 responses) and Non-Implementer Questionnaire (40 responses). In each case, teachers were asked to indicate how they first came to hear of the new 'A' level. (Question Part C.i.5. on the Implementer Questionnaire, Appendix A.1; and Question A.1. on the Non-Implementer Questionnaire, Appendix A.2). Their responses are shown in Table 4.1.

TABLE 4.1

TEACHERS' FIRST SOURCE OF KNOWLEDGE ABOUT THE JMB ENVIRONMENTAL SCIENCE 'A' LEVEL
(n = 71)

	NUMBER OF RESPONSES	% OF TOTAL
Involved in its development	11	16
Read about it in a journal	3	5
Told about it by LEA adviser	10	15
Told about it by another teacher	18	27
Read about it in conference circular	3	5
Read about it in JMB publication	14	21
Heard of it in a JMB committee	2	3
Heard of it during degree/diploma course	2	3
Other responses*	4	6
TOTAL	67	
No response	4	-

* These gave more than one source, viz. Journal (1), another teacher (2), LEA adviser (2), Manchester conference circular (2).

About one-sixth of the teachers (11 of 67) were directly involved in the development of the 'A' level itself, as members of one or more of the following:

Cheshire Steering Committee
Manchester Steering Committee
JMB-University of Birmingham Joint Project
Environmental Studies Study Group
JMB Environmental Science/Studies Sub-committee

The teachers who knew about the 'A' level from their involvement in developing it are self-evidently special cases, knowing about it from direct experience of serving on one or more of the above-named groups of committees. Teachers not involved directly in the development of a curriculum must learn about it indirectly. As far as this 'A' level is concerned, most of the 56 teachers not directly involved in its development were told of its existence by other teachers (27%), or by reading about it in JMB documents (21%), or were told about it by the LEA adviser (15%). This latter figure indicates that about one in five teachers learned about the syllabus from their LEA adviser.

The other first sources of information (journals, conference circulars, JMB meetings, and other sources) together accounted for a quarter of the responses of those teachers not directly involved in the development of the 'A' level. Other teachers, JMB publications and LEA advisers are, therefore, the three main sources of first knowledge about this 'A' level and account for 75% of the responses of teachers not themselves involved in the development of the 'A' level.

4.4.2 THE SCIENTIFIC, GEOGRAPHICAL AND EDUCATIONAL PERIODICALS MOST FREQUENTLY READ BY TEACHERS

Teachers responding to the Implementer Questionnaire were asked to name the scientific, geographical and educational periodicals which they read frequently. The answers obtained are summarised in Table 4.2.

TABLE 4.2

PERIODICALS FREQUENTLY READ BY TEACHERS OF THIS JMB 'A' LEVEL

PERIODICAL	NUMBER OF TEACHERS NAMING THAT JOURNAL *	% OF TEACHERS NAMING THAT JOURNAL
New Scientist	24	77
Scientific American	10	32
School Science Review	7	23
The Ecologist	7	23
Geographical Magazine	5	16
Biologist	4	13
Teaching Geography	3	10
Vole	2	7
Geography	2	7
Environmental Education	2	7
Bulletin of Environmental Education	1	3
Others (only named once)	21	0
Review of Environmental Education Developments	0	0
TOTAL	88	

* Number of teachers = 31

The two most frequently read periodicals, New Scientist and Scientific American, are science journals, neither of which carries articles about new syllabuses. The School Science Review, the most often named science education journal, was read by only 23% of the respondents, but no articles about the 'A' level have yet appeared in it. Environmental magazines such as Vole and The Ecologist were read by a minority of the respondents (13%). Only three teachers (10%) frequently read an environmental education periodical, but neither of the periodicals mentioned has published articles on the 'A' level. (See Chapter 4.3.5). Review of Environmental Education Developments, which has published the three articles on the 'A' level mentioned earlier (see 4.3.5) was not read regularly by any of the respondents in the survey.

Those journals most frequently read by respondents in this survey have not published articles on the 'A' level, and, therefore, periodicals could not have acted as an important means of diffusing information in this instance. This is given further support from the fact that of 71 teachers responding to the Implementer and Non-Implementer Surveys, only three stated that their source of knowledge of the 'A' level came from reading about it in a journal.

4.4 STUDENTS' FIRST SOURCES OF KNOWLEDGE OF THE 'A' LEVEL

4.4.1 INTRODUCTION

The information on how students first came to know of this 'A' level was obtained from the answers given on the Student Information Survey questionnaire (see Chapter 3) completed by 80 students who began the 'A' level in September, 1979.

Table 4.3. summarises the results, though it is interesting to note that many students treated "first source" uncritically, for 38 of the 80 students quoted more than one source. Logically, of course, there can only be one first source, but, nevertheless, the information is useful as it shows the sources of information which students used to gain knowledge of the 'A' level.

The most commonly chosen response was the third one indicating that more than one-half of the students (58%) in the sample had remembered seeing the 'A' level on a list of 'A' levels offered by their school or college, so this must have been an important source of information to the students.

TABLE 4.3

STUDENTS' FIRST SOURCES OF KNOWLEDGE
OF THE ENVIRONMENTAL SCIENCE 'A' LEVEL
(80 Students)

SOURCE OF FIRST KNOWLEDGE	NUMBER OF* RESPONSES	% OF TOTAL RESPONSES	% OF STUDENTS
1. 'O' level/CSE Environmental/Rural Science teacher told me	17	12	21
2. A friend told me	10	8	14
3. I saw it on a list of 'A' levels offered by the school/college	46	33	58
4. I saw it in an advert in a local newspaper	0	0	0
5. I heard about it in a talk given by a lecturer from the local sixth form/F.E. college	8	6	10
6. I was told about it in an interview with the 'A' level tutor	31	22	39
7. I read about it in materials distributed by the local sixth form/F.E. college	21	15	26
8. Others	6	4	8
TOTALS	n = 139		n = 80

* 38 of the total of 80 students gave two or more responses

Another important source would appear to be interviews with 'A' level tutors in the school or college, since over one-third (39%) claim they learned about it in this way. Approximately one-quarter (26%) of the students recall reading about the 'A' level in materials distributed either by the local sixth form college or by the local further education college (even though they were not attending either at the time), and approximately one-fifth (21%) stated that they had been told about the 'A' level by their teacher when they were taking the 'O' level or CSE syllabus in environmental or rural science.

When these results for schools, sixth form colleges, and colleges of further education were analysed separately, the means by which students first heard of the 'A' level varied between the establishments at which the students were taking the 'A' level at the time they answered the questionnaire. The results of this analysis are shown in Table 4.4.

TABLE 4.4

SOURCES OF KNOWLEDGE OF 'A' LEVEL
NAMED BY STUDENTS IN EACH ESTABLISHMENT

ESTAB-LISHMENT	NO. OF STUDENTS	NO. OF RESPONSES	NUMBER OF STUDENTS IN EACH ESTABLISHMENT NAMING THAT SOURCE							
A. SCHOOLS (n = 3)			TEACHER	FRIEND	LIST	ADVERT	TALK	MATERIALS	INTER.	OTHER
M	5	12	1	2	4	0	2	2	1	0
W	8	12	4	1	3	0	2	0	1	1
G	7	16	5	2	4	0	0	1	3	1
SUBTOTALS	20	40	10	5	11	0	4	3	5	2
B. SIXTH FORM COLLEGES (n = 2)										
W	8	16	1	0	6	0	1	4	3	1
R	17	31	1	2	13	0	1	8	5	1
SUBTOTALS	25	47	2	2	19	0	2	12	8	2
C. COLLEGES OF FURTHER EDUCATION (n = 4)										
L	10	16	0	0	6	0	1	3	5	1
B	6	11	2	0	4	0	0	1	3	1
M	7	7	2	0	0	0	0	0	5	0
S	12	18	1	3	6	0	1	2	5	0
SUBTOTALS	35	52	5	3	16	0	2	6	18	2
TOTALS	80	139	17	10	46	0	8	21	31	6

4.4.2 SCHOOLS

Students who remained at school to take their 'A' levels most frequently mentioned "the school list of 'A' levels" (28%) and their "'O' level/CSE Environmental/Rural Science teacher" (25%) as their first sources of knowledge about the 'A' level. Sources extraneous to the schools, such as "a talk by a lecturer from a local college" (10%) and "materials from a local college" (8%) accounted for only 7 of the total of 40 responses.

There were, however, differences between the three schools surveyed as the 'O' level/CSE teacher and the school list of 'A' levels were most frequently named by students in schools W and G, while in school M the school list was most frequently named, but only one of the five students in school M mentioned the CSE/'O' level teacher as the source of information about the 'A' level.

Exposure to the subject before the 'A' level is taken (at either CSE or 'O' level) within the school is an important influence in many cases, and it follows that as more students take the subject at CSE or 'O' level, a larger number of students will choose to take the 'A' level. As the number of students taking the subject at CSE or 'O' level or 'A' level increases, more students will inevitably learn of the 'A' level from their friends. The school list of 'A' levels appears to be an important source of knowledge of this 'A' level for those students who have not taken the subject previously.

4.4.3 SIXTH FORM COLLEGES

Students taking the 'A' level at the two sixth form colleges in the survey, overall named "the college list of

'A' levels" (40%), "materials distributed to the school by the college" (26%), and "interviews with the college 'A' level tutor" (17%) as the most frequent sources of knowledge about the 'A' level. All other responses totalled only 8 (17%).

The relative importance of the sources most frequently mentioned was similar in both colleges, with the college list being named most frequently, then materials distributed by the college and thirdly interviews with the college tutor.

These responses indicate that just over one-third of these students (38%) became aware of the 'A' level during their school fifth form, while the majority only became aware of the 'A' level when they decided to study at the college.

4.4.4 COLLEGES OF FURTHER EDUCATION

Students taking the 'A' level at the four colleges of further education in the survey, overall most frequently named "the interview with the college 'A' level tutor" and "the college list of 'A' levels" (35% and 31% of responses respectively) as their first sources of information about the 'A' level. "Materials distributed to the school by the college" (12%), "the CSE/'O' level teacher" (10%), "friends" (6%), and "a talk by a lecturer from a local college (4%), were less frequently mentioned.

There were differences, however, in the responses from the students in the four colleges. "The college list" was most frequently mentioned by students in three colleges, with "the interview with the college 'A' level tutor" next most frequently mentioned. In the other college (M), however, the interview accounted for 71% of all the responses.

For students attending colleges of further education, "the college list of 'A' levels" and "the interview with the college 'A' level tutor" are the most important methods of disseminating knowledge of the 'A' level to potential students. It appears, therefore, that, as with students at sixth form colleges, most of the students at colleges of further education are unaware of the 'A' level until they are about to enter the colleges.

4.5 DISCUSSION

Previous studies of how teachers came to know of new science syllabuses have shown the importance of non-personal sources of information. Kelly and Nicodemus (1973) found that 71% of the teachers in their study named written sources as their first source of information about the Nuffield Biological Sciences 'A' level, while Jenkins (1967) found that teachers most often mentioned publications (30%) of the ASE/SMA as their first source of information about the Nuffield 'O' level chemistry syllabus. The respondents in Jenkins' study also named locally-held conferences and meetings (24%) and the LEA (13%) as other non-personal sources of first information. Personal sources of information were named by only 29% of the respondents in Kelly and Nicodemus' study and by only 24% of respondents in Jenkins' study.

In this present study, however, respondents most often mentioned other teachers (32%) as their first source of information about the JMB Environmental Science 'A' level. Examining Board publications (in this case the JMB) were also important sources of information about this 'A' level (25%) but were not mentioned in the other two studies.

Eighteen percent of the teachers in this study mentioned the LEA as a first source of information about this 'A' level, a figure broadly comparable to the 13% mentioned in Jenkins' study.

This survey has also demonstrated that the teachers of this 'A' level regularly read more scientific periodicals than was found to be the case in a previous study of the adopters of Nuffield 'A' level Biological Science. (Kelly and Nicodemus, 1973). Over three-quarters (77%) of the teachers of 'A' level Environmental Science regularly read New Scientist and 32% regularly read Scientific American, whereas in Kelly and Nicodemus' study, only 12% read New Scientist and 16% read Scientific American. Unlike the findings of both Jenkins (1967) and Kelly and Nicodemus (1973), journal articles are not an important source of information about this 'A' level since only five articles have been published about it, and these have been published in periodicals read by only 13% of the teachers of the 'A' level.

There is presently no other known research into the ways in which students came to hear of 'A' levels. This present study has shown that sources of information about the JMB Environmental Science 'A' level vary between schools, sixth form colleges and colleges of further education. For schools, the school list of 'A' levels and the CSE/'O' level teacher are the most important sources, while in both sixth form colleges and colleges of further education, the college list of 'A' levels and interviews with college 'A' level tutors were most important. Materials distributed to schools by local colleges were also important in the sixth form colleges, but not in colleges of further education.

4.6 CONCLUSIONS

The terms "diffusion" and "dissemination" have both been used in the literature to describe the spread of knowledge about an innovation. Diffusion has been described as:

> The spread of ideas in a relatively unstructured fashion. (Schools Council, 1974, p. 9).

and as

> ... a completely haphazard, wind-blown process. (Rudduck, 1973, p. 145).

while dissemination has been defined as:

> A conscious strategy on the part of a project or a central agency to effect change. (Schools Council, 1974, p. 9).

and as

> The systematic organisation of opportunities for the understanding of and involvement in an innovation. (Rudduck, 1973, p. 145).

Diffusion, therefore, is seen as the passive, unplanned spread of knowledge of an innovation, and dissemination is an active, structured promotion of an innovation by an agency. The results of this research suggest that the spread of knowledge about 'A' level Environmental Science would be better termed "diffusion" rather than "dissemination" since there has been an active and planned promotion of the 'A' level only in one LEA, and no central agency, other than the Manchester Regional Science and Technology Education Centre, for a short period in 1976, has actively promoted the 'A' level.

Even though the Schools Council Working Party on Dissemination (Schools Council, 1974) has laid down clear guidelines for a dissemination strategy, it is obvious that the spread of knowledge about this JMB 'A' level has not followed these guidelines.

The Schools Council Working Party has suggested that there are three stages in the development of a project (or a syllabus), which they identified as:

a. General awareness and interest
b. Trial and evaluation
and c. Adoption (or rejection).

The Working Party suggested that in the first stage, general awareness and interest, the target audience should be made aware of the following:

i. Project aims and philosophy
ii. Methods
iii. Context: where it fits in the curriculum and the pupils for whom it is intended
iv. Its limitations
v. Proposed phasing
vi. Where further information is available
vii. Where materials may be seen in use
and viii. The implications of the project in terms of money, staff time, accommodation, etc.

The Working Party also suggested that communications between the project team and the target audience should be through personal contact (at meetings, conferences, teacher study groups), and through impersonal contact (through circulars, periodical articles, etc.).

It is clear that in this case the only attempts to actively disseminate such information about the 'A' level to potential adopters were made by the JMB, through its publications, by the Manchester Regional Science and Technology Education Centre, through the conference it sponsored in 1976 at Parr's Wood High School in Manchester, and by the Staffordshire Environmental Studies Adviser, who organised the one-day conference on the 'A' level in 1975 at Keele

University. In addition, the Manchester Centre had intended to circulate information to other interested teachers but this did not occur because of the closing down of the Centre in August/September, 1976.

The Schools Council Working Party suggested that during the second stage of the dissemination strategy, trial and evaluation, teachers involved in the development would try out project materials. During this stage, these teachers would receive informal support from the Project, and an equal degree of support from the LEA adviser, tutor from a local area training organisation, or teachers' centre leader. In this case, however, there was no such opportunity for the field testing of project materials, since the only project material developed was the complete 'A' level syllabus, which had then to be either implemented in its entirety or rejected. The Manchester Regional Centre had intended to offer support to teachers implementing the 'A' level, but was unable to fulfill its objectives due to its closure in 1976. In only one LEA was support given to teachers adopting the 'A' level, and this was organised by the Environmental Studies Adviser in Staffordshire, where a one-day conference, a one-week workshop, and an Environmental Science Study Group of the local Science and Technology Education Centre were organised.

The Working Party suggested that in this second stage dissemination would normally depend on the existence of a well-organised and consistently supported network of teachers' group leaders who would maintain effective channels of communication inward to the project and outward to individual teachers. In the case of Environmental Science, there were no such teacher groups, and, consequently, there was no systematic communication between the developer of the syllabus (in this case, the JMB) and the implementing teachers.

In the third stage of dissemination, the Working Party suggested that teacher requirements (for help, advice, etc.), could be met by a network of local support which could recognise and respond to the needs of each group. It was also stated that successful adoption would depend on the extent to which the project has organised or encouraged a continuing training programme and local support systems. In this case, the JMB had stated that it had no responsibility for the provision of help to teachers, and so no specific lines of communication were set up between the JMB and adopting teachers. Similarly, the JMB did not organise or encourage continuing training programmes and local support systems. The Manchester Regional Centre would have fulfilled part of this role if it had not been closed down. The only provision of continuing training programmes and local support was in one LEA, and that because of the interest of the adviser in the new 'A' level. In this LEA, the local Science and Technology Education Centre has organised meetings for teachers of this 'A' level, and the adviser organised a one-week workshop for teachers in the LEA and a one-day conference for teachers of the 'A' level which was attended by a number of teachers from other LEA's.

Even though Hoyle (1969a) has identified some eleven types of agencies which are involved in the process of diffusion of knowledge about educational innovations in England, this study has shown that very few of these eleven have been involved in the diffusion of knowledge about 'A' level Environmental Science for the Schools Council, private foundations, commercial agencies , research units, professional teaching organisations, HM Inspectorate and teachers' unions have not been involved. Of other agencies termed "agencies of diffusion" by Hoyle, only one university department of education and one college of education, both in the same county, have been involved in the diffusion of this 'A' level. Only two LEA's of the 22 covered in this survey have actively disseminated knowledge of the 'A' level. This research has shown that very few of the possible agencies of diffusion have participated in the process of diffusion of knowledge about the Environmental Science 'A' level, possibly because the 'A' level was a regional development restricted to a small number of potential adopters in one region, as, say, compared with nationally developed projects such as the Nuffield Science Teaching Projects which had large numbers of potential adopters, and in which many agencies helped in the process of diffusion.

This study has identified three individuals who functioned as change agents, whose activities have spread knowledge of the 'A' level. The first is Mr. R. F. Morgan (Deputy-Director of Project Environment), who has written articles on the 'A' level and who, in 1976, persuaded the Manchester Regional Centre to become involved in the diffusion of knowledge about the 'A' level.

The other two change agents identified in this study are the advisers in Cheshire and Staffordshire who have actively promoted the 'A' level among teachers in their counties.

According to Rogers (1962):

> Extent of promotional efforts by change agents is directly related to the rate of adoption. (p. 254)

and this statement would appear to be confirmed by this study which has shown that the two LEA's with the greatest number of implementing establishments are those in which the advisers (= change agents) have been most active in disseminating knowledge about the 'A' level, and the LEA with the greatest number of implementing establishments (Staffordshire) is the one in which the adviser has been most actively promoting the 'A' level.

Even though other studies (Jenkins 1967; Kelly and Nicodemus 1973) have shown that the publications of the ASE and other publications are important first sources of knowledge about new projects and syllabuses, in this study such publications have not acted as important sources of such information, even though the teachers of the 'A' level frequently read more periodicals than did the respondents in the other surveys. This is because few articles have been published about the 'A' level and those which have been published appeared in periodicals not regularly read by these teachers. The examination board (in this case the JMB) is a frequently quoted first source of information about the 'A' level, even though examination boards are not mentioned as sources in other studies. Other teachers were the most frequently quoted sources of information about the 'A' level, and LEA advisers were also frequently mentioned.

One cannot but conclude that many potential students of this 'A' level must be unaware of its existence for many students learn of it so very late. In this survey, most of the students entering colleges came from schools in which the subject is not taught at any level. In fact, only one of the seven colleges involved in the Student Information Survey had a catchment area which included at least one school which taught environmental science at CSE or 'O' level. In such circumstances, environmental science cannot be judged to have become established in the secondary school curriculum.

Students who remain at school for their 'A' levels learn of this 'A' level subject earlier than do those who are taking it in the colleges. For these students, the school list of 'A' levels and CSE/'O' level teachers of Environmental/Rural Science are the important sources of knowledge about the 'A' level. Conversely, most students entering sixth form colleges and colleges of further education have not heard of the 'A' level until they apply to enter these colleges. College lists of 'A' levels and interviews with college tutors were claimed to be the important sources of information for students taking the 'A' level at both sixth form and further education colleges and, in the case of sixth form college students, also materials distributed to the schools by the college were important.

Each of the colleges in this survey used a range of methods of advertising the 'A' level (materials distributed by the colleges, advertisements in local newspapers, and talks by college lecturers to schools). These methods, however, with the exception of materials distributed by sixth form colleges, do not appear as being effective methods of disseminating information about the 'A' level, since they are mentioned by so few students.

CHAPTER FIVE

THE IMPLEMENTATION OF THE 'A' LEVEL

5.1 DEFINITIONS

The literature on the adoption of innovations contains a number of terms relating to adopters and non-adopters, and, since the definitions of these terms are conflicting, and in other cases different terms are used to describe the same phenomenon, it has been decided to review these definitions and select and define those which are used throughout this research.

5.1.1 ADOPTION, IMPLEMENTATION AND UPTAKE

The term "adoption" has been variously defined. In the 1960's it was used very differently by authors as the following definitions of the term show:

> The full-scale implementation of the practice into the on-going operation. (Lionberger, 1960, p. 4).
>
> Adoption is a decision to continue full use of an innovation. (Rogers, 1962, p. 17).
>
> Acceptance, over time, of some specific item - an idea or a practice - by individuals, groups or other adopting units, linked to specific channels of communication to a social structure, and to a given system of values or culture. (Katz, Levin and Hamilton, 1963, p. 240).
>
> Decision of a person to make full use of an innovation. (Woods, 1967, p. 10).
>
> Adaptation of a development to the local situation and its installation therein. (Guba, 1968, p. 43).

Later authors, however, have used two terms, namely "implementation" and "adoption" to describe the process described by earlier authors as adoption.

Kelly (1971), for instance, suggests that,

> ... adoption is best conceived as the interphase between diffusion and implementation. (P. 89).

Fullan and Pomfret (1975) state that,

> Implementation, as we use it, refers to the actual use of an innovation. (PP. 4-5).

and Cooper (1978) has stated that,

> Implementation - the actual use of an innovation - is the stage after adoption. (P. 7).

A further qualification of the term "implementation" has been suggested by Kelly and Nicodemus (1973), namely, that,

> By implementation, we refer to the difference between a teacher's use of the ideas and methods of a scheme ... before attending a briefing course and one year later (P. 18).

while Waring (1979) has stated that,

> Successful realisation in the classroom of the approach and content advocated by a project constitutes "implementation". (P. 20).

The syllabus for this JMB 'A' level does not advocate a particular approach or method to be used in the teaching of the 'A' level, so it is not possible here to use "implementers" in the sense that Kelly and Nicodemus (1973), and Waring (1979), use it.

The term "uptake" has also been used (Waring 1979), as an equivalent term for implementation as defined by Fullan and Pomfret (1975) and Cooper (1978).

These definitions suggest that if "implementation" refers to the actual use of an innovation, then "adoption" should best be considered as the decision to use an innovation, as suggested by Wood's (1967) definition, and these definitions of the terms are the ones used in this research. In this study, therefore, "adoption" will be used to describe the intention of a school, college or teacher to use an innovation. "Implementation" will refer to those schools, colleges or teachers who have taken up the 'A' level and have taught it. Individuals or establishments who have decided to use the JMB 'A' level will, therefore, be described as "adopters", and those actually teaching it as "implementers".

5.1.2 REJECTION AND DISCONTINUANCE

"Rejection", according to Rogers (1962), can occur at any time between knowledge of an innovation and its possible adoption, when this term is reserved for those instances when rejection occurs before the implementation of an innovation. In cases where a teacher or establishment abandons an innovation after having originally implemented it, Rogers (1962) describes this action as "discontinuance".

In this research, "rejection" and "discontinuance" are used in the ways described by Rogers. An establishment or teacher who decides to reject the JMB 'A' level before implementation will be described as a "rejecter", while an establishment or teacher who abandons the 'A' level after implementation will be termed a "discontinuer".

5.1.3 NON-ADOPTERS

Jenkins (1971), Carlson (1965) and Nicodemus (1975) have all applied the term "non-adopter" to teachers not using the innovation under study, and Harding (1975) has used the term to refer to LEA's within which no school has entered candidates for any Nuffield 'O' level examination.

The term "non-adopter", therefore, is a broad term which can include establishments, LEA's or teachers who have rejected the innovation, as well as those who have not yet considered its introduction. The term "non-adopter" will be used in this research in the way it is used by Jenkins (1971), Carlson (1965), and Nicodemus (1975), referring to teachers not using the innovation. The use of the term "rejecter" will be confined to any non-adopting LEA, establishment or teacher who has actively considered adoption of the 'A' level but has decided not to pursue it.

5.2 LEA'S WHICH HAVE IMPLEMENTING ESTABLISHMENTS

Table 5.1 names the 11 LEA's which had establishments teaching the 'A' level in the period 1975-1979, together with the numbers of each type of establishment teaching it. Also shown are the overall percentages of establishments in each LEA which have taught the 'A' level, expressed as percentages of the total number of establishments with sixth forms in that LEA. The type of LEA (county or metropolitan borough) and whether or not each of these 11 LEA's had an adviser with special responsibility for environmental subjects are also shown.

TABLE 5.1

SOME CHARACTERISTICS OF THE ELEVEN LEA'S IN WHICH THERE WERE ESTABLISHMENTS TEACHING THE 'A' LEVEL IN THE PERIOD 1975-1979

		[1] ADVISER FOR ENVIRONMENTAL SUBJECTS	TYPE OF ESTABLISHMENT* COMP. A	COMP. TOTAL	GRAM. A	GRAM. TOTAL	SEC. MOD. A	SEC. MOD. TOTAL	6TH A	6TH TOTAL	FE A	FE TOTAL	TOTAL	% OF ESTAB-LISHMENTS TEACHING A LEVEL
Cheshire	County	Yes	2	45	+1	3	0	0	0	1	1	8	4	7.1
Cumbria	County	Rur. St.	2	21	0	8	0	0	0	0	0	4	2	6.0
Doncaster	Borough	No	1	13	0	2	0	0	0	0	0	1	1	6.3
Lancashire	County	Rur. St.	0	22	0	10	0	2	1	1	2	9	3	7.0
Leicestershire	County	No	0	24	0	0	0	0	1	4	0	7	1	3.9
Manchester	Borough	Rur. St.	1	29	0	0	0	0	0	2	0	6	1	2.7
Salop	County	No	1	15	0	7	0	0	0	0	0	4	1	3.9
Sandwell	Borough	Geog/E. St.	0	8	0	0	0	0	1	2	0	2	1	8.3
Staffordshire	County	Yes	8	52	0	3	0	0	0	1	1	8	9	14.1
Stockport	Borough	No	1	17	0	0	0	0	0	0	0	1	1	5.6
Wigan	Borough	No	0	3	0	0	0	0	0	2	1	2	1	14.3
	TOTALS		16	269	1	33	0	2	3	13	5	52	25	

[1]Rur. St. = Rural Studies; Geog/E. St. = Geography and Environmental Studies.

*A = number of that type of establishment teaching 'A' level Environmental Science.
Total = total number of that type of establishment teaching 'A' levels in that LEA.

+Re-organised to an 11-16 comprehensive in September, 1979.

There are 51 LEA's in the Midlands and the North, the area in which schools and colleges enter candidates for JMB examinations. At the time of the Implementer Survey (see Chapter Three) the JMB Environmental Science 'A' level was being taught in 11 of them.

At the time the survey was taken, namely in October/ November 1979, a total of 25 establishments located in 11 different LEA's had taught the JMB Environmental Science 'A' level, though seven of these LEA's had only one establishment teaching it.

Six of the eleven LEA's were counties, and four of those six had two or more establishments teaching the 'A' level, the remaining two counties each having only one establishment teaching the 'A' level. The other five LEA's were metropolitan boroughs and each had only one establishment teaching the 'A' level.

Only two LEA's, both of them counties (Cheshire and Staffordshire) had a named adviser for environmental education/studies, but three further LEA's did have an adviser for rural studies, while another had an adviser with responsibility for geography and environmental studies. The five LEA's which had no adviser for environmental subjects each had only one establishment teaching the 'A' level. Of the six LEA's with an adviser for environmental subjects, four had more than one establishment teaching the 'A' level.

The percentage of establishments in each LEA teaching the 'A' level varied from 2.7% (one establishment) in Manchester, to 14.3% (one establishment) in Wigan, and 14.1% (nine establishments) in Staffordshire, the latter county having nine (36%) of all 25 establishments teaching the 'A' level.

5.3 COLLEGES AND SCHOOLS TEACHING THE 'A' LEVEL

5.3.1 TYPES OF ESTABLISHMENT TEACHING THE 'A' LEVEL

Table 5.2 shows the numbers of schools and colleges which taught the 'A' level during the period 1975-79, and how the incidence of each type of establishment in which it was being taught compares with the incidence of these establishments nationally.

TABLE 5.2

THE TYPES OF ESTABLISHMENTS TEACHING THE 'A' LEVEL IN THE PERIOD 1975-79 COMPARED WITH THE NUMBERS OF THESE ESTABLISHMENTS* IN ENGLAND IN 1979

TYPE OF ESTABLISHMENT	ESTABLISHMENTS TEACHING THE JMB 'A' LEVEL		ESTABLISHMENTS* IN ENGLAND	
	No.	%	No.	%
Comprehensive schools	16	64	3600	62.1
Grammar schools	1	4	320	5.5
Secondary modern schools	0	0	671	11.6
Public schools	0	0	460	7.9
Sixth form colleges	3	12	119	2.1
Colleges of further education	5	20	624	10.8

*Information from Central Office of Information (1979); Department of Education and Science (1979); and Standing Conference of Sixth Form and Tertiary College Principals (1978).

The table shows that the distribution of the JMB 'A' level amongst comprehensive schools and grammar schools is similar to their incidence nationally. Secondary modern and public schools, which together make up 19.5% of establishments nationally, are not represented among the establishments teaching the 'A' level. Sixth form colleges and colleges of further education comprise disproportionately higher percentages of the establishments teaching the 'A' level than their frequency nationally would lead one to expect.

5.3.2 SIZE OF ESTABLISHMENTS TEACHING THE 'A' level

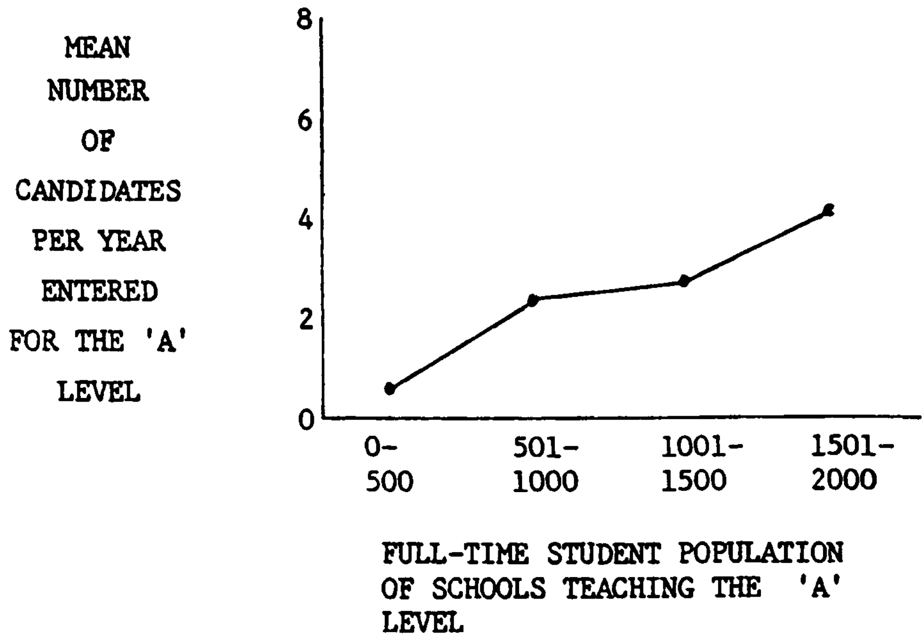
Table 5.3 shows the numbers of full-time students in the colleges and schools which taught the 'A' level during the period 1975-79.

TABLE 5.3

NUMBERS AND SIZES OF SCHOOLS AND COLLEGES TEACHING THE 'A' LEVEL

TYPE OF ESTABLISHMENT	NUMBER OF FULL-TIME STUDENTS IN ESTABLISHMENTS				
	0-500	501-1000	1001-1500	1501-2000	TOTALS
Schools	1	5	6	5	17
Colleges	1	4	1	2	8
TOTALS	2	9	7	7	25

All but one of the seventeen schools had full-time student populations of more than 500, and all but one of the eight colleges had full-time student populations of more than 500. These figures might suggest that there is a relation between the size of the establishment and its ability to offer (and teach) the 'A' level, when the larger schools and colleges could be expected to have larger numbers of candidates for the 'A' level. However, the following figures showing the range and mean numbers of candidates entered for the 1977, 1978 and 1979 examinations for this 'A' level for each school and college, do not bear this out.



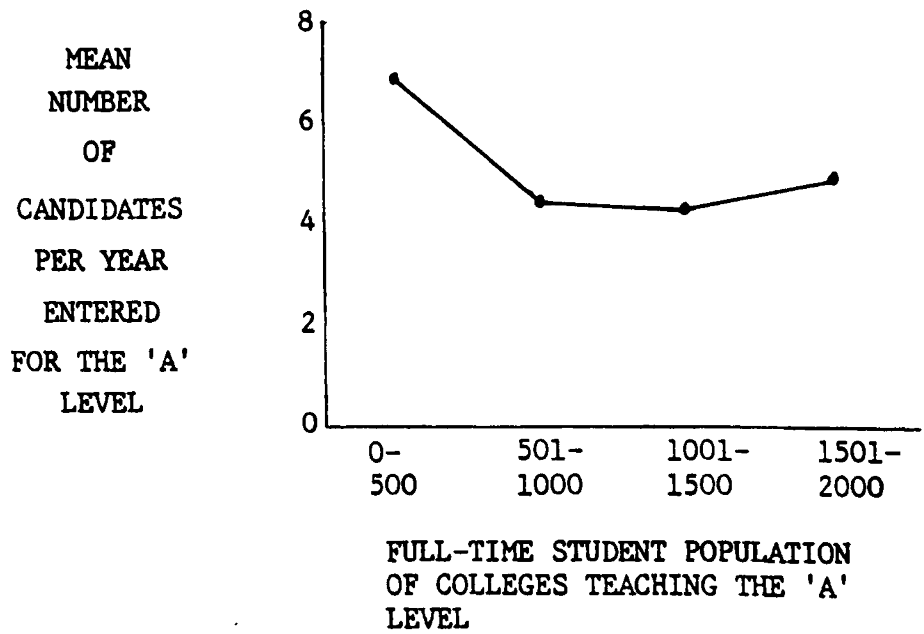
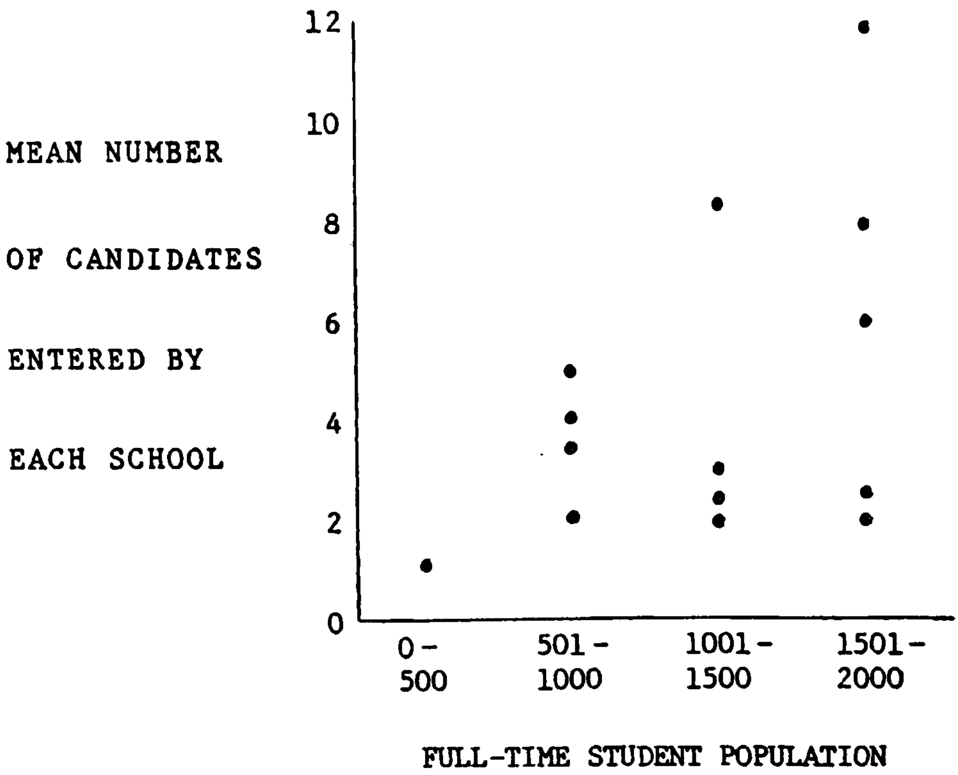


FIGURE 5.1. MEAN NUMBER OF CANDIDATES ENTERED BY SCHOOLS AND COLLEGES EACH YEAR FOR 'A' LEVEL ENVIRONMENTAL SCIENCE IN THE PERIOD 1977-1979 IN RELATION TO THE FULL-TIME STUDENT POPULATION OF THESE ESTABLISHMENTS.



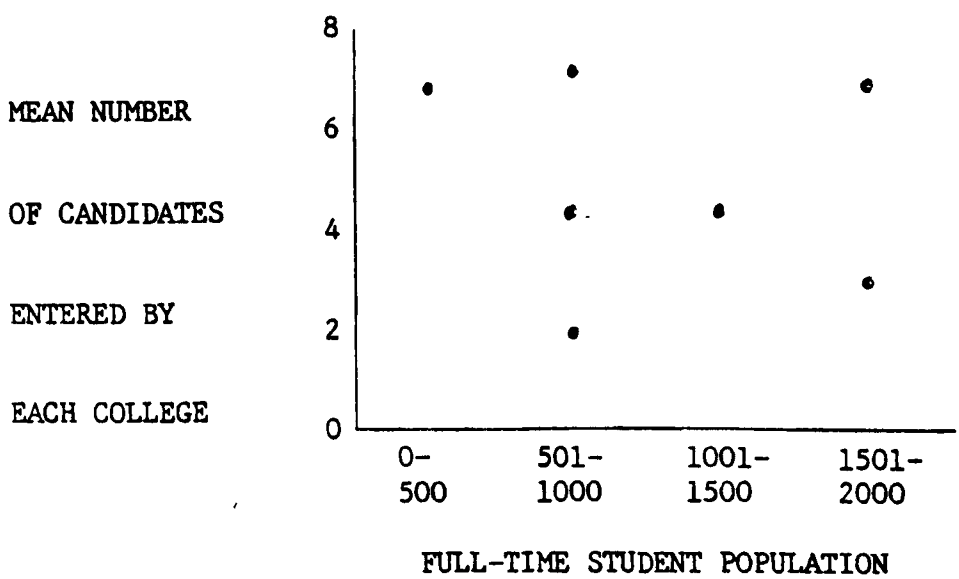


FIGURE 5.2. SCATTER GRAPHS SHOWING RELATIONSHIPS BETWEEN MEAN NUMBERS OF CANDIDATES ENTERED FOR JMB ENVIRONMENTAL SCIENCE 'A' LEVEL EXAMINATIONS BY SCHOOLS AND COLLEGES DURING THE PERIOD 1977-1979.

5.3.3 ENVIRONMENTAL SYLLABUSES OFFERED BY ESTABLISHMENTS PRIOR TO THE TEACHING OF THE 'A' LEVEL

The information in this section was obtained from the replies received to the Implementer Questionnaires, and concerns 21 of the total of 25 different schools and colleges which taught the 'A' level in the period 1975-79.

TABLE 5.4

THE ENVIRONMENTAL SYLLABUSES TAUGHT BY SCHOOLS AND COLLEGES BEFORE THE JMB 'A' LEVEL WAS ADOPTED

A. DETAILS OF ESTABLISHMENT AND TYPE OF ENVIRONMENTAL SYLLABUSES TAUGHT BEFORE THE 'A' LEVEL WAS IMPLEMENTED

	TYPE OF ESTABLISHMENT			
PREVIOUS SYLLABUS	SCHOOL	6TH FORM COLLEGE	COLLEGE OF F.E.	TOTALS
Environmental science/studies	3	2	5	10
Rural science/studies	7	0	0	7
None	3	1	0	4
TOTALS	13	3	5	21

B. DETAILS OF SYLLABUSES TAUGHT BEFORE IMPLEMENTING THE JMB 'A' LEVEL

EXAMINATION BOARD	SYLLABUS	LEVEL*	NUMBER OF ESTABLISHMENTS
AEB	Environmental Studies	AO	7
AEB	Environmental Studies	A	0
London	Environmental Studies	O	1
London	Environmental Studies	A	1
Cambridge	Environmental Science	O	1
Oxford Local	Environmental Science	O	0
Oxford and Cambridge	Environmental Science	O	0
NWREB	Environmental Science	CEE	1
***	Rural science/studies	CSE	7
		NUMBER OF ESTABLISHMENTS =	17**

* A = Advanced level; AO = Alternative Ordinary level; O = Ordinary level; CEE = Certificate of Extended Education; CSE = Certificate of Secondary Education.

** One college taught both AEB 'AO' and London 'A' level Environmental Studies syllabuses.

*** No board named.

Nearly half of the establishments (10 of 21) had taught an environmental science/studies syllabus before teaching the JMB 'A' level, 80% having taught the AEB 'AO' level syllabus which was, in 1970, the first nationally available environmental GCE syllabus. In only one establishment (a college) was the JMB 'A' level a replacement for another environmental 'A' level, in this case the London Environmental Studies syllabus.

In addition to these 10 establishments, another 7 (all schools) had previously taught Rural Science/Studies CSE syllabuses prior to the teaching of the JMB 'A' level. In every case the CSE Rural Science/Studies syllabus had been taught in the Rural Science/Studies Department, but at the time of the survey six of these departments had been renamed as Environmental Science Departments while the remaining one had been renamed as the Rural and Environmental Science Department.

In total, therefore, 17 of the 21 schools and colleges (81%) had taught an environmental-type syllabus prior to the introduction of the JMB 'A' level, while only 4 of these 21 establishments (19%) had taken up the 'A' level without having offered a previous environmental syllabus.

Seven of the eight colleges had previously taught an Environmental Science/Studies syllabus prior to their teaching of the 'A' level, and at the time of the survey each of these seven colleges had discontinued the teaching of these syllabuses.

It seems, then, that establishments with some type of environmental study tradition take up the 'A' level more readily than those without.

5.3.4 OTHER ENVIRONMENTAL SYLLABUSES TAUGHT IN ADDITION TO THE JMB 'A' LEVEL

The information on the other environmental syllabuses taught by schools and colleges, other than the JMB 'A' level, was derived from answers given in the Implementer Questionnaires. The results are shown in Table 5.5.

TABLE 5.5

OTHER ENVIRONMENTAL SYLLABUSES TAUGHT BY SCHOOLS AND COLLEGES ALSO TEACHING THE JMB 'A' LEVEL ENVIRONMENTAL SCIENCE

BOARD	SYLLABUS	LEVEL*	NUMBER OF ESTABLISHMENTS
JMB	Environmental Science	AO	1
JMB	Environmental Science	O	15
JMB	Energy Resources	AO	1
-	Environmental Science	CEE	1
-	Environmental Science	CSE	10
-	Environmental Studies	CSE	2
-	Rural Science/Studies	CSE	5
-	Environmental/Social Biology	O	2
-	Horticultural Biology	O	2
-	Non-examination syllabuses	-	4
		TOTAL	43

(NUMBER OF ESTABLISHMENTS = 21)

* Key as for Table 5.4

When the survey was taken, fifteen of the establishments taught the 'O' level in addition to the 'A' level, and ten taught a CSE syllabus. (Nine of these schools taught both 'O' level and CSE). Five still taught Rural Science/Studies at CSE level, and other environmental syllabuses included Environmental Studies (CSE), Environmental Biology ('O' level), Social Biology ('O' level), Horticultural Biology ('O' level), Energy Resources ('AO' level), as well as non-examination syllabuses for those not taking the subject to either CSE or 'O' level standard.

The fact that most of the establishments surveyed offer two other environmental syllabuses in addition to the JMB 'A' level usually determines the nature of the tradition for environmental syllabuses already existing in those establishments which were amongst the first to teach the JMB 'A' level. It further shows that the 'A' level complemented the pre-existing courses by allowing the students to pursue environmental work into the sixth form. Only two sixth form colleges and two schools offered the 'A' level as their only environmental syllabus, and in each case there is no Environmental Science Department. The 'A' level is taught by members of the separate Biology, Chemistry or Geography departments and is administered by these same departments.

5.3.5 ADMINISTRATION, FACILITIES AND NUMBER OF TEACHERS OF THE JMB 'A' LEVEL

TABLE 5.6

THE TITLES OF DEPARTMENTS ADMINISTERING THE 'A' LEVEL

TITLE OF DEPARTMENT	NUMBERS		% OF ESTABLISHMENTS	
	School	College	School	College
Science	7	6	54	75
Science/Geography	1	2	8	25
Environmental Science	5	0	38	0
TOTALS	13	8	100	100

At the time of the survey, the 'A' level was administered by the Environmental Science or Environmental and Rural Science Department in five schools. In thirteen of the twenty-one schools and colleges the 'A' level was administered by the Science Department, and in the three remaining establishments the 'A' level was administered jointly by the Science and Geography Departments.

TABLE 5.7

THE FACILITIES IN WHICH THE 'A' LEVEL IS TAUGHT

FACILITIES USED	NUMBERS		%	
	School	College	School	College
Environmental Science	10	4	77	50
Biology	1	4	8	50
Others*	2	0	15	0
TOTALS	13	8	100	100

* One Chemistry laboratory and one General Science laboratory

In two-thirds (14 of 21) of the establishments, the 'A' level was taught using the facilities of the Environmental or Environmental and Rural Science Department, while those of Biology were used in five cases, mostly in colleges. Of the remaining two establishments, the 'A' level was taught using the facilities of the Chemistry Department in the one, and the General Science laboratory (used for all the sciences) of the Science Department in the other.

TABLE 5.8

THE NUMBER OF TEACHERS OF THIS JMB 'A' LEVEL IN EACH ESTABLISHMENT

NUMBER OF TEACHERS	NUMBERS		%	
	School	College	School	College
3	1	4	8	50
2	5	1	38	12.5
1	7	3	54	37.5
TOTALS	13	8	100	100.0

In seven of the thirteen schools, and three of the eight colleges, a single teacher was involved in the teaching of the 'A' level. In a further five schools, two teachers shared the teaching of the 'A' level, but in only one school did three teachers participate in the teaching of the 'A' level. (This last school was most unusual in that it had taught the 'A' level just once, and then to one student. This one student sat the examination in 1979). However, in colleges it is not uncommon for three teachers to be involved in its teaching, for that occurred in four of the eight colleges surveyed.

5.3.6 THE TEACHING OF THE 'A' LEVEL AND OTHER VARIABLES.

5.3.6.1 NUMBER OF ENVIRONMENTAL SYLLABUSES TAUGHT.

Analysis of the data showed no significant differences between establishments offering one, two or three environmental syllabuses in addition to the 'A' level, when compared with respectively, the title of department administering the 'A' level, the number of persons teaching the 'A' level, the possession of separate facilities for the teaching of the 'A' level, and the average number of candidates entered for the 'A' level.

5.3.6.2 ADMINISTRATION OF THE 'A' LEVEL

In each of the three establishments in which the 'A' level was jointly administered by both geography and science departments, there were three teachers of the 'A' level, whereas four of the five establishments in which the 'A' level was administered by the Environmental or Environmental and Rural Science Department had only one teacher of the 'A' level. Seven of the thirteen establishments in which the Science Department administered the 'A' level had two or more persons teaching the 'A' level. These results are shown in Table 5.9.

TABLE 5.9

ADMINISTRATION OF THE 'A' LEVEL
AND THE NUMBER OF PERSONS TEACHING THE 'A' LEVEL

	DEPARTMENT ADMINISTERING THE 'A' LEVEL			
NUMBER OF TEACHERS	Science	Science and Geography	Environmental Science	TOTALS
3	2	3	0	5
2	5	0	1	6
1	6	0	4	10
TOTALS	13	3	5	21

No differences were detected between the department administering the 'A' level and the number of candidates entered by the establishment for the final examinations of the 'A' level, since at the time of the survey three of the five establishments in which the 'A' level was administered by the Environmental Science Department had not entered candidates for the examinations of the 'A' level.

5.3.6.3 NUMBER OF TEACHERS OF THE 'A' LEVEL

Table 5.10 shows that establishments were more likely to have separate facilities for the teaching of the 'A' level when there was only one person teaching it, and less likely to have separate facilities when three persons were teaching the 'A' level.

TABLE 5.10

FACILITIES USED TO TEACH THE 'A' LEVEL
AND THE NUMBER OF TEACHERS OF THE 'A' LEVEL

FACILITIES USED TO TEACH THE 'A' LEVEL	NUMBER OF PERSONS TEACHING THE 'A' LEVEL			TOTAL
	1	2	3	
Environmental Science	8	4	1	13
Other facilities	2	2	4	8
TOTALS	10	6	5	21

It was surprising to find that in eight of the ten establishments which had only one person teaching the 'A' level, there were separate facilities for its teaching. This can, in part, be explained by the fact that of these eight establishments with separate facilities for the 'A' level, six were originally Rural Science facilities, and the 'A' level was taught by the single teacher who had previously taught Rural

Science in the school. Of the other two establishments with separate facilities and only one person teaching the 'A' level, one was a college of further education and one was a sixth form college.

In four of the five establishments with three persons teaching the 'A' level, only one, a sixth form college, had separate facilities for teaching the 'A' level. In the other four cases, the three persons teaching the 'A' level were from different departments and taught other subjects in addition to the 'A' level, and used the facilities of one of these departments to teach the 'A' level.

5.4 TEACHERS OF THE 'A' LEVEL

Information on the teachers of this 'A' level was obtained to find out if these teachers possessed different characteristics from other teachers (by way of age, qualifications, etc.), which would then allow identification of other potential adopters of this 'A' level. It was also intended to see if the adopters of this 'A' level had the same characteristics as Rogers (1962) stated that early adopters of innovations had. This information was obtained from replies to the Implementer Questionnaire. Table 5.11 shows some of the characteristics of these teachers of the 'A' level as compared with characteristics of teachers nationally.

TABLE 5.11

COMPARISON OF SOME CHARACTERISTICS OF TEACHERS OF THIS 'A' LEVEL AND TEACHERS NATIONALLY

CHARACTERISTIC	TEACHERS OF 'A' LEVEL ENV. SCI.		TEACHERS NATIONALLY
1. AGE (in years)	Numbers	%	%
51-60	4	13	17
41-50	6	20	23
31-40	10	33	25
21-30	10	33	36
2. TEACHING EXPERIENCE (in years)			
30+	2	6	
21-30	7	23	No information available
11-20	4	13	
< 11	18	58	
3. QUALIFICATIONS			
Doctorate	1	3	)
Master's	3	10	) 50%
Bachelor's	20	64	)
Certificate	7	23	50%
4. GRADED POSTS*			
Higher	2	9	9
4	3	13	11
3	9	40	21
2	5	22	30
1	4	18	30

* (Higher graded posts = Headteacher; Senior teacher; Department Head)

The figure shows that respondents varied in age from the 21-30 to the 51-60 age groups, though most (66%) were below 40 years of age. This age distribution is similar to that of teachers nationally.

Teaching experience varied from 3 to nearly 40 years with about one-half of the teachers (58%) having less than 11 years' teaching experience.

Three-quarters of the teachers were graduates (77%), the remainder holding either a two or a three-year teaching certificate. The percentage of teachers who were graduates is higher than the national percentage for secondary teachers, (50%), due, no doubt, to the fact that in many schools, 'A' level teachers are expected to have a degree in their teaching subject.

The whole range of scaled posts is found amongst those who teach this 'A' level, with most (60%) holding at least a Scale 3 post. This situation is different from the national situation in secondary schools where only 40% hold such a position.

TABLE 5.12

TEACHING POSTS HELD BY TEACHERS OF JMB 'A' LEVEL ENVIRONMENTAL SCIENCE

TEACHING POST	NUMBER OF TEACHERS
A. NAMED ENVIRONMENTAL SCIENCE POSTS	
Head, Environmental Science	11
Teacher, Environmental Science	3
Teacher, Environmental Science and Biology	3
Lecturer, Environmental Science, Biology and Health	1
TOTAL	18
B. OTHER POSTS	
Head, Science	3
Head, Geography	1
Head, Rural and Environmental Science	1
Head, Physical Science	1
Head, Biology	1
Senior Master	1
Senior Master, Modern Studies	1
Senior Master, Biology	1
Senior Master, Geology and Geography	1
Teacher, Science	2
TOTAL	13

Just over one-half (19 of 31) of the teachers in the survey held a named Environmental Science post, with 12 of these 19 being Head of the subject. In total, 19 of the 31 respondents held a head of subject post.

TABLE 5.13

SUBJECTS WHICH TEACHERS OF THIS 'A' LEVEL WERE ORIGINALLY APPOINTED TO TEACH IN THEIR PRESENT ESTABLISHMENTS

SUBJECT	NUMBER	
Environmental Science	2	)
Environmental Science, Biology	6	) 9
Environmental Science, Geology	1	)
Biology	3	)
Chemistry	2	)
Biology, Chemistry	1	)
Biology, Chemistry, Physics	1	)
Physical Science	2	)
Science	1	) 22
Geography, Economics	1	)
Geography, Geology	1	)
Rural Science	7	)
Rural Science, Biology	1	)
Geography	2	)
TOTAL	31	

Table 5.13 shows that 22 of the 31 teachers were originally appointed to teach subjects other than Environmental Science. Since Table 5.12 shows that 19 teachers were holding a named Environmental Science post, then there must have been a movement into Environmental Science posts. Indeed, a close study of the data shows that 10 of the 22 teachers appointed to teach other subjects now hold a named Environmental Science post, of which six were from Rural Science positions, two were from Biology, and one each from

Chemistry, and Biology and Chemistry. There is, therefore, evidence of a buildup in the number of Environmental Science teaching posts.

TABLE 5.14

SUBJECT SPECIALTY BACKGROUNDS OF THE IMPLEMENTING TEACHERS BASED ON THEIR FIRST DEGREE/CERTIFICATE MAJOR SUBJECTS

SUBJECT SPECIALTY		NUMBER OF TEACHERS	% OF TOTAL
Biology		11	36
Rural Science		7	23
Physical Science*		4	13
Geography/Geology		5	16
Environmental Science		0	0
Mixed subjects**		4	13
	TOTAL	31	

* Includes Chemistry and Physics
** Each combination included Biology

Almost 60% of the teachers in the survey had qualified initially in either Biology or Rural Science, with another 29% having qualified in Physical Science, Geography or Geology. Another 13% had taken two or three major subjects in their first degree or certificate with Biology as one of them.

TABLE 5.15

ENVIRONMENTAL ORGANISATIONS TO WHICH TEACHERS OF THIS 'A' LEVEL BELONG AND THE ENVIRONMENTAL JOURNALS THEY READ

	Number	%
Natural history/Conservation/ Environmental organisations belonged to	10	32
Environmental journals regularly read	11	36
Natural environmental education organisations belonged to <u>or</u> journals regularly read	3	10
Local environmental education societies belonged to	5	16
Numbers reading an environmental or environmental education periodical or belonging to a natural history/ conservation/environmental organisation	22	71

(Number of teachers = 31)

Less than one-third (32%) of the teachers in the survey belonged to an environmental organisation and only eleven (36%) regularly read an environmental periodical such as 'Vole' or 'Ecologist'. Only three of the thirty one teachers (10%) regularly read a national environmental education periodical, with another five belonging to a county environmental education society.

Twenty-two of the respondents (71%) either belonged to an environmental organisation, a local or national environmental education society or regularly read an environmental or environmental education periodical.

5.5 THE STUDENTS

5.5.1 ESTABLISHMENTS ATTENDED AND SEX OF STUDENTS

The information on the students taking this JMB 'A' level was obtained from the responses to the Student Information Questionnaire which was completed by 80 students in 9 establishments who started the 'A' level in September, 1979.

The sex of the students in this survey, and the type of establishment attended by them, are shown in the following table.

TABLE 5.16

THE SEX OF STUDENTS AND TYPES OF ESTABLISHMENT AT WHICH THEY WERE TAKING THIS 'A' LEVEL

ESTABLISHMENT	SEX			NUMBERS IN TYPE OF ESTABLISHMENT AS % OF TOTAL STUDENTS
	MALES	FEMALES	TOTALS	
College of F.E.	15	20	35	44
Sixth Form College	14	11	25	31
Comprehensive Schools	11	9	20	25
TOTALS	40	40	80	

Forty-four per cent of the students in the survey attended colleges of further education, 31% attended sixth form colleges and the remaining 25% attended comprehensive schools. The percentage of students attending colleges of further education in the survey is somewhat higher than the percentage of such students who sat the final examinations for the 'A' level in 1978 and 1979, (21% and 23% respectively), and the percentage of students attending schools (the JMB data includes sixth form colleges as schools) in this survey (56%) is somewhat lower than the proportion of such candidates entered for the 1978 and 1979 final examinations.

The percentages of male and female students in the survey

(50%) in each case) are similar to the percentages of each sex taking the 1978 and 1979 final examinations, (1978 - 55% males, 45% females; 1979 - 48% males, 52% females). This situation, in which the numbers of male and female students of this 'A' level are approximately equal, is similar to that for 'A' level Geography, and is also similar to Biology at 'A' level, but most unlike other science 'A' levels as is demonstrated in the table below.

TABLE 5.17

PERCENTAGES OF MALE AND FEMALE STUDENTS TAKING JMB SCIENCE 'A' LEVELS IN 1978 AND 1979

SUBJECT	TOTAL NUMBER OF CANDIDATES (1978, 1979)*	% MALES	% FEMALES
Biology	21,553	47.3	52.7
Chemistry	24,172	68.3	31.7
Engineering Science	453	95.8	4.2
Environmental Science	168	52.4	47.6
Geography	20,459	57.6	42.4
Geology	2,411	74.2	25.8
Physical Science	201	74.1	25.9
Physics	25,451	79.3	20.7

*Data from JMB 1978-79 Seventy-sixth Annual Report (JMB 1979)
Data from JMB 1977-78 Seventy-fifth Annual Report (JMB 1978)

Table 5.17 shows that a slightly greater percentage of female students take environmental science than in the physical sciences and geology. The situation in environmental science is most closely similar to biology and geography, and the percentages of male and female students in environmental science happens to fall midway between the relevant percentages for biology and geography, the two 'A' levels which environmental science most closely resembles in content.

TABLE 5.18

PERCENTAGES OF STUDENTS TAKING JMB 'A' LEVELS
IN SCHOOLS* AND IN COLLEGES OF FURTHER EDUCATION

SUBJECT	CANDIDATE NUMBERS**	% IN SCHOOLS	% IN COLLEGES
Biology	21,389	91.1	8.9
Chemistry	24,015	91.6	8.4
Engineering Science	452	88.5	11.5
Environmental Science	166	78.3	21.7
Geography	20,273	90.7	9.3
Geology	2,371	88.2	11.8
Physical Science	199	100.0	0.0
Physics	25,271	91.2	8.8

* Includes sixth form colleges

** Excludes external candidates who take the 'A' level privately, and not in a school or college.

Of the subjects listed in the table, environmental science has the lowest percentage of students in schools, and the highest percentage in colleges of further education, and also has the lowest number of candidates for the two years for which the data was collected (1978,1979). It will be interesting to see if this 'A' level continues to have the smallest number of candidates among the sciences in the future, and whether or not the 'A' level will still attract the highest percentage of further education college students of all the sciences in the future.

5.5.2 CSE AND 'O' LEVEL BACKGROUNDS OF THE JMB ENVIRONMENTAL SCIENCE STUDENTS

The information in this section was obtained from two sources. In the case of students who had started the 'A' level in September, 1979, the data were collected from the same Student Information Questionnaires mentioned earlier. In the case of students who had started the 'A' level in 1976, and had sat the final examinations in 1978, the information on these students was supplied by the environmental science teachers who had taught them.

Responses were obtained from 80 students in 9 establishments who had started the 'A' level in September, 1979, and data were collected on 42 students who had started the 'A' level in September, 1976.

The number of passes in both science subjects and all subjects at CSE or 'O' level are shown in Table 5.19.

TABLE 5.19

NUMBER OF CSE, 'O' LEVEL AND SCIENCE PASSES OF STUDENTS STARTING 'A' LEVEL IN 1976 AND IN 1979

	STUDENTS STARTING IN 1976		STUDENTS STARTING IN 1979	
	Mean	S.D.	Mean	S.D.
CSE's (excluding CSE 1)*	0.6	1.0	1.5	1.9
'O' level (including CSE 1)**	6.5	2.0	5.1	2.2
Science passes***	1.9	1.0	1.4	1.1
	(n = 42)		(n = 80)	

* Differences between 1976 and 1979 students statistically significant at $p = 0.001$ level of probability.

** Differences between 1976 and 1979 students statistically significant at $p = 0.001$ level of probability.

*** Differences between 1976 and 1979 students statistically significant at $p < 0.05$ level of probability.

The table clearly shows that students who started the 'A' level in 1976 achieved significantly more 'O' level passes (6.5) and more 'O' level science passes (1.9) than students who started in 1979 (5.1 and 1.4 respectively). (The differences were statistically significant at the $p = 0.001$ and $p < 0.05$ levels of probability). Students who started the 'A' level in September, 1979 had taken significantly more CSE's (1.5) than those who started in 1976 (0.6). (This difference was significantly different at the $p = 0.001$ level of probability). These differences indicate that the students who started the 'A' level in 1979 were weaker students than those who began in 1976.

5.5.3 OTHER SUBJECTS TAKEN IN COMBINATION WITH THE ENVIRONMENTAL SCIENCE 'A' LEVEL

The information in this section was obtained from the same sources as previously mentioned in 5.5.2. The table below shows the numbers of subjects taken by students of the Environmental Science 'A' level.

TABLE 5.20

NUMBERS OF 'A' LEVELS TAKEN BY STUDENTS STARTING THE 'A' LEVEL IN 1976 AND 1979

	1976		1979	
NUMBER OF 'A' LEVELS	NUMBER	%	NUMBER	%
1	1	2.3	10	12.5
2	9	20.5	20	25.0
3	16	36.4	44	55.0
4	17	38.6	6	7.5
5	1	2.3	0	0.0
TOTALS	44		80	
MEAN NO. 'A' LEVELS	3.2* (SD = 0.9)		2.6* (SD = 0.8)	

* Differences in means statistically significant at the $p = 0.0001$ level of probability, using t-test.

The data in Table 5.20 show that the students who started the 'A' level in 1976 took, on average, more 'A' levels (mean = 3.2) than the students who started in 1979 (mean 2.6), a situation which again suggests that the students who started the 'A' level in 1979 were weaker students than those who started in 1976. This finding is consistent with the earlier finding that the 1976 students on average passed more 'O' levels and took fewer CSE's than those starting in 1979.

The survey of students who started the 'A' level in 1976 shows that over 40% (40.9%) of these students (n = 44) were taking four or five 'A' levels, and this compares with only 7.5% of students who started the 'A' level in 1979. In addition, a greater percentage of the 1979 students (12.5%) than 1976 students (2.3%) were taking JMB Environmental Science as their only 'A' level. This information also indicates that on average the 1976 students were of a higher calibre than the 1979 students.

The data on these 1976 and 1979 students were then analysed to see whether there were any differences in the categories of students taking the 'A' level in these two years. The students were categorised as arts, social science, science or mixed subject students, based on the 'A' levels they were taking, and the results are shown in Table 5.21.

TABLE 5.21

ENVIRONMENTAL SCIENCE STUDENTS WHO BEGAN THE 'A' LEVEL IN 1976 AND 1979 CLASSIFIED AS ARTS, SOCIAL SCIENCE, SCIENCE OR MIXED SUBJECT STUDENTS

	1976		1979	
CATEGORY*	NUMBER	%	NUMBER	%
Arts	15	34.1	3	3.8
Social Science	0	0.0	3	3.8
Science	19	43.2	44	55.0
Mixed subjects	9	20.5	20	25.0
Environmental Science only	1	2.3	10	12.5
TOTALS	44		80	

* Students were assigned to a category based on the majority of their 'A' levels after the omission of General Studies and Mathematics, which are taken by students of all categories. Students for whom there was no such majority were placed in the Mixed subjects category, that is, they had an equal number of arts and science <u>or</u> social science and science courses.

The table shows clearly that there has been an increase in the percentage of students who can be classified as science students, from 43% in 1976 to 55% in 1979. The percentage of arts students has declined dramatically from 34% in 1976 to only 4% in 1979. There has also been an increase in the percentage of students taking environmental science as their only 'A' level.

5.6 CONCLUSIONS

The LEA's with the greatest numbers of implementing establishments are large counties with a named Environmental Education/Studies Adviser. At the time of the survey, only 11 of the 51 LEA's within the JMB area had one or more implementing establishments. The highest rate of implementation among establishments in any one LEA was just over 14%.

Almost two-thirds of the implementing establishments are comprehensive schools. Sixth form colleges and colleges of further education also number among the implementing establishments, and are over-represented by comparison with the national percentages of these establishments. Even though public schools and secondary modern comprise almost 20% of establishments nationally, none was an implementer of this 'A' level.

All but two of the implementing establishments had more than 500 full-time students. Even though there was a small positive correlation between the size of implementing schools and the mean annual number of candidates entered for the 'A' level, factors other than size must have an effect on the number of candidates entered by schools. There was a negative correlation between the size of implementing colleges and their mean annual number of candidates, so, clearly, factors other than size determine the number of candidates entered by colleges.

Nearly all of the colleges and most of the schools had a tradition of offering environmental courses before the implementation of the 'A' level, most of the colleges having taught an Environmental Studies syllabus (usually the 'AO' AEB syllabus), and a majority of the schools having taught either Environmental Studies or Rural Science before implementation of the 'A' level.

Most implementing establishments teach two other environmental syllabuses (usually CSE and 'O' level Environmental Science) so the implementation of the 'A' level complements other courses offered and allows students to continue environmental studies into the sixth form.

In most implementing establishments the Science Department administers the 'A' level, and it is taught using the facilities of Environmental Science or Biology. Three persons commonly teach the 'A' level in establishments with a tradition of offering environmental syllabuses, and these establishments usually also tend to enter more candidates for the 'A' level than establishments which have a rural science tradition or no environmental tradition.

Separate Environmental Science Departments are usually found in schools with a rural science tradition, where the name of the Rural Science Department has been changed to Environmental Science, and the 'A' level is taught by the teacher who was formerly the Rural Science teacher. There is usually only one such teacher in these establishments and the date suggests that these schools with a separate Environmental Science Department usually have smaller numbers of students for the 'A' level than schools in which the 'A' level is administered by the Science Department.

Most of the teachers of this 'A' level are between 20 and 40 years of age, and had less than 10 years' teaching experience. Seventy per cent held at least a Bachelor's degree and a greater percentage held a Scale 3 post or higher than secondary school teachers nationally.

Over half of the teachers held a named Environmental Science position, even though only one-third were originally appointed to teach the subject. This indicates a build-up in the number of Environmental Science posts.

Sixty per cent of the teachers had qualified in Biology or Rural Science, but others had qualified in Chemistry, Geography and Geology.

The teachers of this 'A' level cannot be classified as dedicated environmentalists since only a minority belonged to a conservation society or subscribed to environmental periodicals. Only a small minority regularly read an environmental education periodical, although most read 'New Scientist' and/or 'Scientific American'.

Equal percentages of male and female students take this 'A' level, a situation similar to Biology and Geography, but quite unlike the physical sciences and Geology which are taken predominantly by male students. A greater percentage of the students take the 'A' level at colleges of further education than in the other 'A' level sciences.

Surveys show that students starting the 'A' level in 1976 had passed on average more 'O' levels, and had taken fewer CSE's than students starting the 'A' level in 1979. The 1976 students had also taken more 'A' levels than those starting in 1979. Whereas a minority of the students starting in 1976 were science students, a majority of those starting in 1979 were scientists. Over one-third of the students in 1976 were arts students, but in 1979 only 3% were arts students. In 1979, there was also an increase in the percentage of students taking Environmental Science as their only 'A' level. At present it is not clear whether the data collected from the 1976 and 1979 students show a clear trend in changes of the types of students taking the 'A' level.

The survey does suggest, however, that the types of students taking this JMB Environmental Science 'A' level are different from those taking the London Environmental Studies 'A' level, since the majority of students taking the JMB 'A' level are scientists while Barber (1977) has shown that students taking the London 'A' level are distributed among the Arts, Sciences, Humanities and mixed subjects.

CHAPTER SIX

THE NON-IMPLEMENTERS

6.1 INTRODUCTION

Non-implementers, for the purpose of the present study, are defined as those establishments and teachers in the JMB region who were known to be aware of the JMB Environmental Science 'A' level through participation in its development or by attendance at conferences on this 'A' level, but had not begun to teach it by August, 1979, the school year in which the Implementer Questionnaires were mailed out and completed. The information on the Non-implementers was obtained from the returned Non-Implementer Questionnaires. Forty of the sixty questionnaires mailed out in November, 1979 were returned, a response rate of 66.7%. (See Chapter Three).

It had been hypothesised that most of the non-implementing teachers in this sample had made the decision not to teach the new 'A' level, but the responses to the questionnaire showed that most of the respondents had already made the decision to teach it if the opportunity arose for them to do so.

Each of the respondents, therefore, could be placed in one of three categories: firstly, those who had already made the decision to teach the syllabus if the opportunity arose, and could, therefore, be considered as "adopters" according to the definition of the term used in this account (see Chapter 5, Section 5.1.1); secondly, those who had considered teaching it but had decided not to and could, therefore, be regarded as "rejecters" (for definition see Chapter 5, Section 5.1.2); and finally, those who at the time of the survey had not made a decision whether to adopt or to reject the 'A' level and, therefore, belonged by definition to the group of "non-adopters" (see Chapter 5, Section 5.1.3 for definition).

The responses to the survey also indicated that a number of establishments in which the respondents were teaching had already made a decision whether or not the new 'A' level should be included in their curriculum offerings in future. Such establishments were classified as "adopters" if they had decided to offer it, and "rejecters" if they had decided not to offer it. Establishments in which no decisions had been made at the time of the survey were then classified as "non-adopters".

In this research study, therefore, it is possible to classify the respondents to this survey, and also the establishments in which these respondents taught, as adopters, rejecters or non-adopters, according to whether a decision had been made (by the respondent and also by the establishment) to adopt or reject the 'A' level. It should be noted that, according to this method of classification, it is possible for a respondent (teacher) to be classified as an adopter (i.e. had decided to teach the 'A' level if the opportunity arose) even though the establishment in which the respondent taught is classified as a rejecter (i.e. had decided not to include the 'A' level in the establishment's offerings), or even as a non-adopter (i.e. had not made a decision to adopt or reject at the time of the survey. In fact, a number of respondent teachers are classified as adopters even though their establishments are classified as rejecters or non-adopters, but none of the respondents from adopting establishments was classified as a rejecter. These three categories of respondents and establishments, in addition to the implementers, dealt with in the previous chapter, are outlined below:

1. Implementers - either respondents or establishments teaching the 'A' level by August, 1979.

2. Non-implementers - either respondents or establishments not teaching the 'A' level by August, 1979.

   (a) Adopters - either respondents or establishments which had decided to teach the 'A' level if the opportunity arose.

   (b) Rejecters - either respondents or establishments which had decided not to teach the 'A' level.

   (c) Non-adopters - either respondents or establishments which had not decided to adopt or reject the 'A' level at the time of the survey.

Throughout the following discussion, the results of the Implementer Survey are shown for comparison with the adopters in the search for similarities between these two groups.

6.2 THE LEA'S

6.2.1 THE LEA'S INVOLVED IN THE SURVEYS IN COMPARISON WITH ALL THE LEA'S IN THE JMB REGION

The Implementer and Non-Implementer surveys on which the information in this chapter is based covered a total of 23 LEA's, representing a 45% sample of all of the 51 LEA's in the JMB region. Table 6.1 shows the types and sizes of the 23 LEA's in the sample as compared with the types and sizes of all 51 LEA's in the JMB region.

TABLE 6.1

A COMPARISON OF THE TYPES AND SIZES* OF LEA'S IN THE SURVEY AND IN THE WHOLE OF THE JMB AREA

TYPE AND SIZE OF LEA	JMB REGION	SAMPLE LEA'S	SAMPLE AS % OF JMB REGION
A. COUNTIES			
Very large	1	1	100
Large	5	5	100
Medium	4	2	50
Small	4	3	75
Very Small	1	1	100
TOTALS	15	12	80
B. METROPOLITAN BOROUGHS			
Very large	0	0	-
Large	1	1	100
Medium	0	0	-
Small	15	6	40
Very small	20	4	20
TOTALS	36	11	31
OVERALL TOTALS	51	23	

* SIZES - Very large > 100,000 secondary school students
Large 75,001-100,000 secondary school students
Medium 50,001-75,000 secondary school students
Small 25,001-50,000 secondary school students
Very small < 25,001 secondary school students

(Data from Department of Education and Science, 1978).

This table shows that the sample includes 12 of the 15 county LEA's, an 80% sample. All the very large, large and very small, and three of the four small-sized county LEA's are included in the sample. The medium-sized LEA's are slightly under-represented as only 2 of those 4 LEA's are involved in the sample.

Only 11 of the 36 metropolitan boroughs in the JMB region are included in the survey, a 31% sample. Forty per cent of the small and 20% of the very small boroughs in the JMB region are included in the survey.

In general, then, the county LEA's are very well represented in the sample, but the metropolitan boroughs are under-represented, most especially the very small ones.

6.2.2 LEA SIZE AND ADOPTION

Table 6.2 shows the number of implementing, adopting, rejecting and non-adopting establishments according to LEA size in the 23 LEA's in the sample.

TABLE 6.2

LEA SIZE AND NUMBERS OF ESTABLISHMENTS
IN EACH ADOPTION CATEGORY

LEA SIZE	NUMBER OF ESTABLISHMENTS				
	Implementer	Adopter	Rejecter	Non-adopter	Totals
Very large, large	17	5	5	6	33
Medium to very small	8	9	7	4	28
TOTALS	25*	14**	12	10	61+

* Includes 4 implementer establishments not involved in Implementer Survey

** Includes 1 establishment not involved in Non-Implementer Survey

\+ Four Non-Implementer respondents did not respond to this item.

Table 6.2 shows that there is a tendency for very large and large LEA's to have most of the implementing (17 of 25) but fewer of the adopting (5 of 14) establishments. A χ^2 test of the Null Hypothesis that the total number of implementing and adopting establishments is not related to LEA size shows a value (of 0.66) less than the critical value ($\chi^2 > 0.7$), so, on the evidence, the Null Hypothesis cannot be rejected. Hence, even though there is a trend for larger numbers of implementing and adopting establishments to be found in large and very large LEA's, the trend is not statistically significant. There is also no relationship between the size of an LEA and the presence of rejecting and non-adopting establishments.

Table 6.3 shows the number of establishments in each adoption category in relationship to LEA type.

TABLE 6.3

LEA TYPE AND NUMBERS OF ESTABLISHMENTS IN EACH ADOPTION CATEGORY

LEA TYPE	NUMBER OF ESTABLISHMENTS				
	Implementer	Adopter	Rejecter	Non-adopter	Totals
County	20	6	8	6	40
Borough	5	8	4	4	21
TOTALS	25	14	12	10	61*

*Four of the Non-Implementer respondents did not respond.

The table shows that a majority of implementing and adopting establishments (26 of 39) are located in county LEA's. A χ^2 test of the Null Hypothesis that the number of implementing plus adopting establishments are in county LEA's shows a value (χ^2 = 4.33) greater than the critical level ($p < 0.05$), so on the evidence the Null Hypothesis has to be rejected. There is, therefore, a statistically significant trend for adopting and implementing establishments to be in county authorities. There is also a tendency for both rejecter and non-adopter establishments to be located in county authorities, in all probability a reflection of the fact that these are larger authorities than metropolitan boroughs having more potential rejecting and non-adopting establishments.

Harding (1975), in her study of the adoption of Nuffield 'O' level science projects, classified LEA's as high adopters, low adopters or non-adopters on the basis of the number of schools or school departments adopting such projects. (LEA's with four or more adopting schools or school departments were classified by Harding as high adopters; LEA's with one to three schools or school departments were classified as low adopters; LEA's with no such schools or school departments were classified as non-adopters). Harding's method has been used here to search for possible relationships between the sizes and types of LEA's and the level of adoption of the JMB Environmental Science 'A' level. LEA's with four or more such adopting and implementing establishments have been classified as high adopters; LEA's with one to three adopting and implementing establishments have been classified as low adopters; and LEA's with no adopting or implementing establishments have been classified as non-adopters.

In her study, Harding found that high adopter LEA's were more often large ones, particularly county authorities, while very small authorities were more likely to be non-adopters.

TABLE 6.4

THE SIZES AND TYPES OF LEA'S AND THEIR LEVEL
OF ADOPTION OF THE JMB ENVIRONMENTAL SCIENCE 'A' LEVEL

LEA SIZE AND TYPE	LEVEL OF ADOPTION			
A. COUNTIES	HIGH	LOW	NONE	TOTALS
Very large	0	1	0	1
Large	2	3	0	5
Medium	0	1	1	2
Small	0	2	1	3
Very Small	0	0	1	1
TOTALS	2	7	3	12
B. BOROUGHS				
Very large	-	-	-	-
Large	0	0	1	1
Medium	-	-	-	-
Small	0	5	0	5
Very small	0	4	1	5
TOTALS	0	9	2	11
OVERALL TOTALS	2	16	5	23

The table shows that there is a relationship between the size and nature of LEA's and the level of adoption, since both of the high adopting LEA's are large counties, although one very large county in the study was classified as a low adopter as it had only three implementing and adopting establishments. There were five responding non-adopting LEA's in the study, one in each of the categories medium, small and very small counties, and large and very small boroughs. As with Harding's study, the high adopter LEA's are large county authorities. In this present study, however, all of the small and all but one (4 of 5) of the very small boroughs were low adopters whereas in Harding's study these were more often non-adopters.

Since both of the high adopting LEA's had an adviser for environmental subjects, it was decided to look more closely at the relationship, if any, between the level of adoption and the presence of such an adviser. The results of this analysis are shown in Table 6.5.

TABLE 6.5

PRESENCE OF AN ADVISER FOR ENVIRONMENTAL SUBJECTS AND THE LEVEL OF ADOPTION IN THESE LEA'S

	LEVEL OF ADOPTION		
ADVISER	SOME	NONE	TOTALS
Present	9	2	11
Absent	9	3	12
	18	5	23

The table shows that while half of the LEA's in which there were adopting establishments had an adviser for environmental subjects, the other half of the LEA's with adopting establishments had no such adviser. There is, therefore, no relationship between the presence of an adviser and the presence of adopting establishments in that LEA. It was next decided to see whether any relationship existed between the level of adoption in LEA's and the presence of an adviser for environmental subjects. Further analysis of the data displayed in Table 6.5 showed that whereas two of the nine adopting LEA's with such an adviser had a high level of adoption (4 or more adopting + implementing establishments), each of the nine adopting LEA's without such an adviser showed only low levels of adoption. This analysis suggests that high adoption of this 'A' level tends to occur only in those LEA's having an adviser for environmental subjects.

The fact that there were two LEA's which had advisers for environmental subjects but showed no adoption, shows that the presence of such an adviser is no guarantee that any of the establishments in such an LEA will adopt the 'A' level.

6.3 THE NON-IMPLEMENTING ESTABLISHMENTS OF THE SAMPLE

The responses to the Non-Implementer Questionnaire revealed that 25 of the 39 establishments involved in the survey had made the decision to adopt (13) or reject (12) the JMB 'A' level. A further 10 of these 39 establishments had not made such a decision at the time of the survey, and the final four returned questionnaires did not respond to this question. In each table in this section, the equivalent data on implementing establishments have been shown for comparison.

TABLE 6.6

THE TYPES OF ESTABLISHMENT INVOLVED
IN THE IMPLEMENTER AND NON-IMPLEMENTER SURVEYS*

	ADOPTION CATEGORY				
TYPE OF ESTABLISHMENT	Implementer	Adopter	Rejecter	Non-adopter	TOTALS
Comprehensive school	12	10	6	7	35
Grammar school	1	1	1	1	4
Technical school	0	1	0	0	1
Sixth form college	3	0	0	0	3
College of further education	5	1	5	2	13
TOTALS	21	13	12	10	56

* Four establishments in the Non-Implementer Survey did not supply a response to the question.

(21 establishments involved in Implementer and 39 establishments involved in Non-Implementer Survey).

According to the data in Table 6.6, comprehensive schools account for the great majority of both adopting (77%) and implementing (57%) establishments. They also comprise 70% of non-adopter and one-half of the rejecting establishments. Colleges of further education account for a greater percentage of rejecting (42%) than of implementing (24%) and of adopting (8%) establishments. There is one grammar school in each of the four adoption categories. Each of the three sixth form colleges in the survey was an implementer.

Table 6.7 shows the sizes of these establishments in relation to adoption category.

TABLE 6.7

SIZES OF ESTABLISHMENTS IN SAMPLE
AND CATEGORIES OF ADOPTION

TYPE OF ESTABLISHMENT AND SIZE	CATEGORY OF ADOPTION			
	Implementer	Adopter	Rejecter	Non-Adopter
A. COMPREHENSIVE SCHOOLS (n = 35)				
2000 +	0	1	0	0
1501-2000	3	1	0	1
1001-1500	4	7	2	4
501-1000	4	1	4	2
< 501	1	0	0	0
SUBTOTALS	12	10	6	7
B. GRAMMAR SCHOOLS (n = 4)				
501-1000	1	1	1	1
< 501	0	0	0	0
SUBTOTALS	1	1	1	1
C. TECHNICAL SCHOOLS (n = 1)				
501-1000	0	1	0	0
< 501	0	0	0	0
SUBTOTALS	0	1	0	0
D. SIXTH FORM COLLEGES (n = 3)				
501-1000	2	0	0	0
< 501	1	0	0	0
SUBTOTALS	3	0	0	0
E. COLLEGES OF FURTHER EDUCATION (n = 13)				
1501-2000	2	0	0	0
1001-1500	1	0	2	0
501-1000	2	1	2	2
< 501	0	0	1	0
SUBTOTALS	5	1	5	2
OVERALL TOTALS	21	13	12	10

The figures show that while 7 of 12 implementing and 9 of 10 adopting comprehensive schools had more than 1000 students, only 2 of the 6 rejecter comprehensive schools had more than 1000 students. There were no obvious differences between the sizes of implementing, adopting and non-adopting comprehensive schools.

There were too few grammar schools, sixth form colleges and colleges of further education in the sample to detect differences in the sizes of these establishments in relation to different adoption categories.

TABLE 6.8

THE NUMBERS OF TEACHERS OF ENVIRONMENTAL SUBJECTS IN ESTABLISHMENTS

NUMBER OF TEACHERS	TYPE OF ESTABLISHMENT			
	Implementer	Adopter	Rejecter	Non-adopter
4 or more	3	2	0	1
3	5	2	1	2
2	10	6	1	1
1	3	1	4	1
0	0	1	5	5

Most implementing (86%) and adopting (84%) establishments have two or more teachers involved in the teaching of environmental subjects throughout the establishment. The fact that 56% of rejecter establishments had one or more members of staff involved in teaching environmental subjects suggests that rejection of the JMB Environmental Science 'A' level is not necessarily a sign that the establishment has rejected

Environmental Science itself. The non-adopting establishments appear to have a mixture of the characteristics of the other groups, for 60% of these establishments had only one or fewer teachers of environmental subjects; the remaining 40% had two or more such teachers.

The numbers and the types of environmental subjects taught in each of these establishments at the time of the survey are shown in the following table.

TABLE 6.9

THE NUMBERS AND TYPES OF ENVIRONMENTAL COURSES TAUGHT IN ESTABLISHMENTS

COURSE	TYPE OF ESTABLISHMENT			
	Implementer	Adopter	Rejecter	Non-adopter
'O' level/CSE Env. Sci.	16	8	2	4
'O' level/CSE Rur. Sci.	4	7	4	1
Any environmental course	17*	11	5	4
No environmental course	4	1	6	6
TOTAL NUMBER OF ESTABLISHMENTS	21	12	11	10
No response	0	1	1	0

* Excluding JMB 'A' level Environmental Science

The data in the table show that environmental syllabuses are not confined to implementer and adopter establishments, though these are inevitably more likely to teach environmental syllabuses than rejecter and non-adopter establishments. While 17 of 21 implementing and 11 of 12 adopting establishments taught environmental syllabuses (in addition to the JMB 'A' level in the case of implementers), only 5 of 11 rejecting and 4 of 10 non-adopting establishments taught environmental subjects.

The biggest differences between the courses offered by establishments are noticed in the teaching of 'O' level/CSE Environmental Science. While 16 of the 21 implementing, and 8 of 12 adopting establishments offered such a syllabus, only 2 of the 11 rejecting establishments did so. Rural science is offered by a greater proportion of adopting establishments (7 of 12) than of implementing establishments (4 of 19), which might mean that establishments often abandon the teaching of Rural Science after implementation of the Environmental Science 'A' level.

Ten of the 39 establishments in the Non-Implementer Survey were so classified because, at the time of the survey, they had not yet considered the introduction of this 'A' level, even though they had sixth forms and offered 'A' levels. Four of the respondents in these non-adopting establishments stated that they were not interested in teaching the 'A' level, and three stated that they were unsure whether or not they wished to teach it. Only three of the ten establishments stated that they wished to teach the 'A' level. It would seem, therefore, as if only those three of the sample of ten non-adopting establishments are likely to consider the introduction of the 'A' level in the future. Of these three establishments, two had more than 1000 students, had two or more teachers of environmental subjects, and had previously taught environmental syllabuses, features common to establishments which had either implemented or adopted the JMB 'A' level. It seems likely, therefore, that only two of the ten non-adopting establishments surveyed would be potential adopters of this 'A' level.

6.4 THE TEACHERS

6.4.1 INTRODUCTION

The information on the teachers was obtained from the completed Non-Implementer Questionnaire. Information on the respondents to the Implementer Questionnaires is included for comparison with the adopting teachers. Thirty-six of the forty respondents to the Non-Implementer Questionnaire responded to the question asking whether or not they were interested in teaching the 'A' level if the opportunity arose. Twenty-six of these 36 respondents stated that they wished to teach the 'A' level, and according to the definitions in Chapter Five, these are considered to be adopters (i.e. had made the decision to teach the 'A' level) in the following analysis. Six of the 36 respondents stated that they were unsure whether or not they wished to teach the 'A' level and are considered to be non-adopters. The remaining four of these 36 respondents stated that they did not wish to teach the 'A' level and are considered, therefore, to be rejecters.

A scrutiny of the responses of the rejecter and the non-adopter groups indicated that these groups were similar in that they both displayed similar characteristics (such as qualifications, subject specialties, posts held and scaled posts held). For this reason, these two groups were re-classified under the heading rejecter/non-adopters, and, as a group, contrasted with implementers and adopters.

6.4.2 CHARACTERISTICS OF TEACHERS INVOLVED IN SURVEYS

TABLE 6.10

QUALIFICATIONS OF THOSE WHO COMPLETED THE IMPLEMENTER AND NON-IMPLEMENTER QUESTIONNAIRES
(n = 67)

QUALIFICATION	ADOPTION CATEGORY OF TEACHER		
	Implementer	Adopter	Non-adopter/Rejecter
Doctorate	1	0	3
Master's	3	2	1
Bachelor's	19	14	4
Certificate	8	7	1
Diploma	0	2	0
TOTALS	31	25	9
No response	0	1	1

Table 6.10 shows that there was a higher proportion of graduates amongst the non-adopters/rejecters than amongst the implementers and adopters. Whereas 88% of the non-adopters/rejecters held at least a Bachelor's degree, only 74% of implementers and 64% of adopters had a degree. In addition, 44% of the non-adopters/rejecters had a higher degree, whereas only 13% of implementers, and 8% of adopters, had a higher degree.

TABLE 6.11

THE SUBJECT SPECIALTIES* OF THE TEACHERS

SUBJECT SPECIALTY	ADOPTION CATEGORY OF TEACHER		
	Implementer	Adopter	Non-adopter/ Rejecter
Biology	11	9	5
Rural science	7	7	1
Physical science	4	2	2
Geography/Geology	5	3	0
Environmental science	0	1	0
Mixed subjects	4	4	2
TOTALS	31	26	10

* Classified according to major subject(s) taken in first degree, teaching certificate or diploma.

Biologists comprised the largest specialty group for implementers (36%), adopters (35%) and non-adopters/rejecters (50%), with biologists comprising a greater percentage of non-adopters/rejecters (50%) than either the implementers (36%) or the adopters (35%). Rural scientists comprised the second largest subject group among both implementers (23%) and adopters (27%), but made up only 10% of the non-adopters/ rejecters. All the geographers and geologists were either implementers or adopters. Physical scientists and teachers of mixed subject specialties were distributed between the three adoption categories. It is interesting to note that only one of the sixty-seven respondents had a first degree in Environmental Science.

TABLE 6.12

TEACHING POSITIONS HELD BY THE RESPONDENTS

POSITION	ADOPTION CATEGORY OF TEACHER		
	Implementers	Adopters	Non-adopters/ Rejecters
Head/Senior Master	1	0	1
Head, Science	3	3	3
Head, Geography	1	2	0
Head, Biology	1	6	4
Head, Physical science	1	0	0
Head, Environmental Science	11	4	0
Head, Rural science	0	5	0
Head, Environmental and Rural science	1	1	0
Other Heads	0	0	0
Teacher, Environmental Science or Environmental Science and Biology	6	2	0
Other positions*	6	2	2
TOTALS	31	25	10
No response	0	1	0

* Other positions:

Implementers - Science teacher (2); Lecturer, Biology (1); Lecturer, Geology and Geography (1); Lecturer, Modern Studies (1); Lecturer, Environmental Science, Biology and Health (1).

Adopters - Teacher, Geography (1); Lecturer, Chemistry (1).

Non-adopters/Rejecters - Teacher, Biology (2).

A greater percentage of non-adopters/rejecters (40%) held posts of responsibility of head of department or above than of implementers (13%) or of adopters (12%). A greater percentage of implementers (39%) and adopters (38%) held a Head of Environmental and/or Rural Science position than non-adopters/rejecters (0%). Fifty-eight per cent of implementers and 27% of adopters held named Environmental Science positions.

The scaled posts held by teachers in schools involved in the surveys are shown in Table 6.13.

TABLE 6.13

SCALED POSTS HELD BY RESPONDENTS

SCALED POST	ADOPTION CATEGORY OF TEACHER		
	Implementer	Adopter	Non-adopter/ Rejecter
5	2	0	0
4	3	2	3
3	9	8	2
2	5	6	0
1	4	0	0
TOTALS	23	16	5
Not applicable/ No response	8	10	5

Whereas all the non-adopter/rejecter group held at least a Scale 3 post, only 63% of the adopters and 61% of the implementers held such a post. Sixty per cent of the non-adopters/rejecters held at least a Scale 4 post in comparison with only 13% of the adopters and 22% of implementers. The high percentage of Scale 3 and above posts held by non-adopters/rejecters is due to the fact that each of the five respondents for whom the information was available, held either a Head of Science or Head of Biology position.

Table 6.14 shows the numbers of responding teachers in each adoption category teaching in LEA's with advisers for environmental subjects, the numbers of respondents in LEA's which had organised meetings for teachers of the 'A' level, and whether or not the respondents had contact with teachers who were teaching the 'A' level.

TABLE 6.14

ADOPTION CATEGORIES OF TEACHERS AND ENVIRONMENTAL SCIENCE SUPPORT

	TEACHER ADOPTION CATEGORY		
	Implementer	Adopter	Non-Adopter/ Rejecter
A. ADVISER FOR ENVIRONMENTAL SUBJECTS?			
Yes	25	17	4
No	6	8	6
No response	0	1	0
TOTALS	31	26	10
B. DOES LEA ORGANISE MEETINGS FOR TEACHERS OF THIS 'A' LEVEL?			
Yes	12	6	1
No	17	19	8
No response	2	1	1
TOTALS	31	26	10
C. DOES RESPONDENT HAVE CONTACT WITH TEACHERS OF THE 'A' LEVEL?			
Yes	-	13	2
No	-	13	8
No response	-	0	0
TOTALS	-	26	10

Whereas most of the implementers (81%) and adopters (68%) taught in an LEA with an adviser for environmental subjects, a majority of the non-adopters/rejecters (60%) taught in LEA's without such an adviser.

The table also shows that 89% of non-adopters/rejecters taught in an LEA where no meetings were organised for teachers of this 'A' level, whereas 76% of adopters and 59% of implementers taught in such LEA's.

While one-half of the adopters had contact with other teachers of this 'A' level, 80% of the non-adopters had no such contact.

Table 6.15 shows whether or not the teachers in these surveys taught in establishments which offered environmental syllabuses, and whether or not the establishments in which they taught had teachers of environmental subjects.

TABLE 6.15

ADOPTION CATEGORIES OF THE TEACHERS AND FEATURES OF THE ESTABLISHMENTS IN WHICH THEY TAUGHT

	ADOPTION CATEGORY OF TEACHER	
	Adopters	Non-adopters/ Rejecters
A. ARE ENVIRONMENTAL SYLLABUSES OFFERED IN THE ESTABLISHMENT IN WHICH THE TEACHER TEACHES?		
Yes	18	2
No	7	8
No response	1	0
TOTALS	26	10
B. WHICH ENVIRONMENTAL SUBJECTS ARE OFFERED BY THE RESPONDENT'S ESTABLISHMENT?		
'O' level/CSE Env. Sci.	12	2
'O' level/CSE Rur. Sci.	11	1
None	7	8
C. HOW MANY TEACHERS OF ENVIRONMENTAL SUBJECTS ARE THERE IN THE RESPONDENT'S ESTABLISHMENT?		
3 or more	8	2
2	7	1
1	5	0
0	5	7
TOTALS	25	10
No response	1	0

Table 6.15 shows that 18 of the 26 adopting respondents taught in establishments which offered environmental syllabuses, whereas 8 of the 10 non-adopting and rejecting teachers taught in establishments which did not offer such syllabuses. The table also shows that 12 of the respondents taught in establishments which offered 'O' level/CSE Environmental Science

and 11 were in establishments which offered 'O' level/CSE Rural Science which contrasts markedly with 2 and 1 non-adopting and rejecting respondents who taught in establishments offering these syllabuses.

Eighty per cent of the adopting respondents taught in schools or colleges which had one or more teachers of environmental subjects on staff, whereas 70% of the non-adopting and rejecting respondents taught in establishments which had no environmental subject teachers.

There were no major differences between implementing, adopting, and non-adopting/rejecting teachers with respect to number of years of teaching experience, attendance at conferences on the 'A' level and types of establishment in which respondents taught, as is shown in Table 6.16.

TABLE 6.16

FURTHER CHARACTERISTICS OF THE RESPONDENTS

	ADOPTION CATEGORY OF TEACHER		
	Implementers	Adopters	Non-adopters
A. TEACHING EXPERIENCE (in years)			
0-5	6	2	1
6-10	12	8	3
11-20	4	12	4
21-30	7	3	1
31-40	2	0	0
TOTALS	31	25	9
No response	0	1	1
B. TYPE OF ESTABLISHMENT TAUGHT IN			
Comprehensive schools	15	18	6
Grammar schools	1	2	1
Technical schools	0	1	0
Sixth form colleges	6	0	0
Further education colleges	9	5	3
TOTALS	31	26	10
C. ATTENDANCE AT A CONFERENCE ON THE 'A' LEVEL			
Yes	15	17	6
No	15	9	4
TOTALS	30	26	10
No response	1	0	0

6.5 DISCUSSION

Harding (1975) found that high adopters of Nuffield projects tended to be large or very large LEA's, especially county authorities. This present study has similarly shown that high adopting LEA's of the JMB Environmental Science 'A' level tend to be large county authorities. Both studies have shown that no large metropolitan boroughs were high adopters, and that all large and very large LEA's in the surveys were adopters. The two studies differed in that Harding found that for Nuffield projects, small borough LEA's were evenly distributed throughout the adopter categories, whereas the small boroughs surveyed in this present study were all in the low adoption category.

Even though Rogers and Shoemaker (1971) and Jenkins (1971), among others, have shown that adopters are more likely than non-adopters to possess a higher degree, in this study it was the non-adopter group which tended to have higher degrees. Both this present study and that of Kelly and Nicodemus (1973) have noted that a greater percentage of early adopters have a degree and professional training than other adoption categories.

Since Jenkins (1971) found little difference in mean year of graduation between the adopters and non-adopters of Nuffield 'O' level Chemistry, and Kelly and Nicodemus (1973) found no difference in total years of teaching experience between intending early adopters and non-adopters of Nuffield 'A' level Biology, and this study showed no difference in the mean teaching experience of the adopters and non-adopters of this JMB 'A' level, it would appear that age, number of years of teaching experience or mean graduation year have no bearing on which teachers become adopters and which non-adopters of at least British science curricula. These results are quite contrary to the findings of Rogers (1962) and

Yegge et al (1971) in the U.S.A., where it appears that adopters tend to be younger than non-adopters.

Kelly and Nicodemus (1973) found no differences between the proportion of department heads among the early intending adopting teachers and the non-adopting teachers of Nuffield 'A' level Biology, whereas this study has shown that a greater proportion of the non-adopting teachers tend to hold a senior administrative position such as headteacher or head of science.

The results of this present study contrast directly with those of Yegge et al (1971) who found that the adopters of a High School Physics course in the U.S.A. were more likely than non-adopters to be heads of their science departments.

6.6 CONCLUSIONS

Adoption/implementation of this 'A' level by establishments is not related to the size of an LEA, although the high adopting LEA's were large counties. The presence of adopting/implementing establishments is, however, related to the nature of an LEA, with most of these establishments occurring in counties. There is no relationship between adoption/implementation and the presence of an adviser for environmental subjects, although the high adopting LEA's did have such an adviser.

The characteristics of implementing and adopting establishments are very similar to each other in that they both tend to have more than 1000 students if they are comprehensive schools, usually have two or more persons teaching the 'A' level, and offer a number of environmental-type examination syllabuses.

Nearly two-thirds of the comprehensive schools involved in the survey were in the implementer or adopter categories, while just over one-half of all the colleges of further education in the survey were in the rejecter or non-adopter categories. Implementing and adopting comprehensive schools were more likely to have more than 1000 students; rejecting establishments were more likely to have fewer than 1000 students. Colleges of further education accounted for only 15% of implementing and adopting establishments but accounted for almost one-half (5 of 11) of all rejecting establishments.

Implementing and adopting establishments are more likely to have two or more teachers of environmental subjects and are more likely to be teaching at least one environmental syllabus, while rejecter establishments usually have no teachers of environmental subjects and did not teach any environmental subjects. Adopter establishments, therefore, tend to be those which already teach environmental syllabuses, while rejecter establishments tend not to include environmental courses in their curriculum offerings. Table 6.17 summarises characteristics of adopting and rejecting establishments.

TABLE 6.17

A SUMMARY OF THE CHARACTERISTICS OF ADOPTING AND REJECTING ESTABLISHMENTS*

Establishments with the following characteristics are more likely to be adopters/implementers:	Establishments with the following characteristics are more likely to be rejecters:
1. Comprehensive schools (22/28) or sixth form colleges (3/3)	Colleges of further education (5/11)
2. More than 1000 students if comprehensive schools (16/22)	Fewer than 1000 students if comprehensive schools (4/6)
3. Have 2 or more teachers of environmental subjects (28/33)	Have fewer than 2 teachers of environmental subjects (9/11)
4. Teach environmental syllabuses especially JMB 'O' level (28/33)	Teach no environmental syllabuses (6/11)

* Does not include non-adopting establishments, i.e. those which had not made the decision to adopt or reject the 'A' level. Grammar and technical schools are not included since their numbers were so small.

The teachers who have decided to teach the 'A' level and, therefore, in this study are considered to be adopters, have similar characteristics to implementing teachers. Adopters and implementers are less well-qualified and have fewer higher degrees than non-adopters and rejecters, but are more likely to have received professional teacher training, as is shown in Table 6.18 following.

TABLE 6.18

SUMMARY OF TEACHER QUALIFICATIONS

QUALIFICATION		TEACHER ADOPTION CATEGORY	
		Implementer/ Adopter	Rejecter/ Non-adopter
A. HIGHER DEGREE			
Yes		6	4
No		50	5
	TOTALS	56	9
No response		1	1
B. DEGREE			
Yes		39	8
No		17	1
	TOTALS	56	9
No response		1	1
C. PROFESSIONAL TEACHER TRAINING			
Yes		50	5
No		5	4
	TOTALS	55	9
No response		2	1

Adopters and implementers are less likely to hold the senior administrative position (e.g. Head of Science) and are less likely to hold a scaled post higher than Scale 3. Rural scientists are much more likely to be adopters or implementers than rejecters or non-adopters, as is shown in Table 6.19.

TABLE 6.19

RESPONDENTS' TEACHING POSITIONS, SCALED POSTS AND SUBJECT SPECIALTIES

CHARACTERISTIC	TEACHER ADOPTION CATEGORY	
	Implementer/ Adopter	Rejecter/ Non-adopter
A. TEACHING POSITIONS		
Senior administrative post	7	4
Other posts	49	6
TOTALS	56	10
No response	1	0
B. SCALED POST		
3 and above	24	5
Less than 3	15	0
TOTALS	39	5
No response/not applicable	18	5
C. SUBJECT SPECIALTY		
Biology	20	5
Rural/Environmental Science	14	1
Others	23	4
TOTALS	57	10

Adopting and implementing teachers are more likely to work in LEA's which have an adviser for environmental subjects and are more likely to have contact with other teachers involved in the teaching of the 'A' level than rejecting and non-adopting teachers, as is shown in Table 6.20.

TABLE 6.20

TEACHER ADOPTION CATEGORY,
PRESENCE OF ENVIRONMENTAL SUBJECTS ADVISER
AND CONTACT WITH TEACHERS OF THIS 'A' LEVEL

	TEACHER ADOPTION CATEGORY	
	Implementer/ Adopter	Rejecter/ Non-adopter
A. PRESENCE OF AN ADVISER FOR ENVIRONMENTAL SUBJECTS		
Yes	42	4
No	14	6
TOTALS	56	10
No response	1	0
B. CONTACT WITH TEACHERS OF THIS 'A' LEVEL		
Yes	13	2
No	13	8
TOTALS	26	10
No response/not applicable	31	0

Adopting and implementing teachers are more likely to teach in establishments which offer environmental syllabuses and in which there are two or more teachers of environmental subjects, as is shown in Table 6.21.

TABLE 6.21

SOME CHARACTERISTICS OF ESTABLISHMENTS
IN WHICH RESPONDENTS TEACH

		TEACHER ADOPTION CATEGORY	
		Adopter	Rejecter/Non-adopter
A. ENVIRONMENTAL SYLLABUSES OFFERED?			
Yes		18	2
No		7	8
	TOTALS	25	10
No response		1	0
B. NUMBER OF TEACHERS OF ENVIRONMENTAL SUBJECTS?			
1 or more		20	3
None		5	7
	TOTALS	25	10
No response		1	0

There were no noticeable differences between adopters and non-adopters/rejecters as regards type of establishment in which they taught, years of teaching or attendance at conferences on the 'A' level.

A list of the characteristics of teachers likely to be adopters/implementers is shown below:

TEACHERS WITH THE FOLLOWING CHARACTERISTICS ARE MORE LIKELY TO BE ADOPTERS AND IMPLEMENTERS THAN REJECTERS OR NON-ADOPTERS:

1. Rural scientists (14/15), geographers and geologists (8/8), although biologists comprise over one-third of adopters.

2. Possess a teaching certificate (17/18), but are less likely to possess a higher degree (6/10).

3. Have received professional teacher training (50/55).

4. Are heads of environmental and/or rural science (23/23) but are less likely to hold a senior administrative position such as head of science (7/56).

5. Hold a scaled post below Scale 3 (15/15).

6. Teach in LEA's with an adviser for environmental subjects (42/46).

7. Have contact with other teachers of this 'A' level (13/15).

8. Teach in establishments which (a) already teach one or more environmental syllabuses (18/21); and (b) have one or more teachers of environmental subjects (20/25).

CHAPTER SEVEN

THE ADOPTION PROCESS AND OBSTACLES TO ADOPTION

7.1 INTRODUCTION

An investigation was conducted into how each establishment teaching the JMB Environmental Science 'A' level made its decision to adopt it, while seeking also any particular pattern to the way these decisions were made. Non-adopting establishments were also investigated to see how many of these had considered adopting the 'A' level and to find out what decisions had been reached and what was their basis.

Proclaimed obstacles to adoption of this 'A' level were identified in this manner, both in implementing and in non-implementing establishments.

The information relating to adoption was obtained from the responses to the completed Implementer and Non-Implementer Questionnaires.

7.2 THE ADOPTION PROCESS IN IMPLEMENTING ESTABLISHMENTS

The information in this section was obtained from the completed Implementer Questionnaires of which there were 31 completed by respondents in 21 different establishments, including 13 schools, 5 colleges of further education and 3 sixth form colleges. The questionnaire included questions asking whose idea it was to introduce the 'A' level into the establishment, and whether or not the respondent was directly involved in the adoption process. Questions were also asked as to whose was the final decision to introduce the 'A' level and, if it was not their idea to introduce the 'A' level into that establishment, how the respondent came to be teaching it. The analysis of these responses showed that the elements of the adoption process in schools were broadly similar, that the elements of the process in sixth form colleges were broadly similar, and that the elements of the process in colleges of further education were broadly similar, but that the elements of the process differed between schools, sixth form colleges and colleges of further education. The responses from these different types of establishment have, therefore, been indicated separately in the following sections.

7.2.1 INTRODUCTION OF THE IDEA OF TEACHING THE 'A' LEVEL INTO AN ESTABLISHMENT

Table 7.1 below shows the persons responsible for the original idea to introduce the 'A' level into each of the 21 establishments involved in the Implementer Survey.

TABLE 7.1

THE PERSONS NAMED AS HAVING HAD THE ORIGINAL IDEA TO INTRODUCE THE 'A' LEVEL INTO ESTABLISHMENTS

	TYPE OF ESTABLISHMENT			
PERSON WHOSE IDEA IT WAS TO INTRODUCE 'A' LEVEL	SCHOOL	COLLEGE OF FURTHER EDUCATION	SIXTH FORM COLLEGE	TOTALS
Respondent	10	4	3	17
LEA Adviser	1	0	0	1
Headteacher	1	0	0	1
Department Head	1	1	0	2
TOTALS	13	5	3	21

From Table 7.1 it would appear that usually it was the respondent's idea (17 out of 21), and that of either the LEA adviser, headteacher or department head in the remaining 4 establishments. In 17 of the 21 establishments, therefore, the idea to introduce the 'A' level was that of a teacher/lecturer currently teaching the 'A' level.

An analysis was then performed to see if there was any difference between the teaching posts of the respondents who stated that it was their idea to introduce the 'A' level, and those of the other respondents who stated that it was not their idea to introduce the 'A' level into their establishments. The results of this analysis are shown in Table 7.2 below.

TABLE 7.2

THE TEACHING POSITIONS OF THOSE EMPLOYED IN THE TEACHING ESTABLISHMENTS*

TEACHING POSITION OF RESPONDENT	RESPONDENTS WHOSE IDEA IT WAS TO INTRODUCE THE 'A' LEVEL	RESPONDENTS WHO STATED IT WAS NOT THEIR IDEA TO INTRODUCE THE 'A' LEVEL
Headteacher	1	0
Head, Science	3	0
Head, Environmental Science	8	1
Head, other subjects	2	2
None of the above	3	7
TOTALS	17	10

* Four teachers were not employed in their present schools when the decision to introduce the 'A' level was made.

In 17 of 21 establishments surveyed it was the respondent's own idea to introduce the 'A' level. Eight of these

17 respondents were Heads of Environmental Science or Environmental and Rural Science. Another six were Head-teachers, Heads of Science or Heads of a subject. By contrast, only three of these 17 teachers who said it was their own idea to introduce the 'A' level did not hold at least a head of subject position. These three teachers were, respectively, lecturer in environmental science, lecturer in biology and environmental science and lecturer in science.

Of the ten respondents who said that it was not their idea to introduce the 'A' level, one was a Head of Environmental Science, and two others were Heads of subjects.

As might be expected, 14 of the 17 respondents who were teaching the 'A' level said it was their idea to have it taught and were Head of at least a subject, eight being Head of Environmental Science, while only three of the ten who said it was not their idea to introduce it were in that position.

7.2.2 THE ADOPTION PROCESS IN IMPLEMENTING ESTABLISHMENTS

Table 7.3 shows the means by which the decision to introduce the 'A' level was accomplished by the establishments covered by the Implementer Survey.

TABLE 7.3

THE ADOPTION PROCESS IN IMPLEMENTING ESTABLISHMENTS

	TYPE OF ESTABLISHMENT			
	SCHOOL	COLLEGE	6TH FORM COLLEGE	TOTALS
1. Special committee set up to investigate adoption	3	1	0	4
2. School/college management committee discussed adoption	2	1	0	3
3. Head/Principal/Department Head asked respondent for advice	4	3	3	10
4. Head acted on respondent's suggestion	2	0	0	2
5. Other	1	0	0	1
TOTALS	12	5	3	20
No response	1	0	0	1

The information in Table 7.3 is based on the responses from the 27 respondents who were employed in their present establishments at the time of the adoption process. Where there were two or more respondents from the same establishment, their responses were pooled to give one response for that establishment. In such cases there was complete agreement on the way in which the adoption process in that particular establishment was carried out.

Table 7.3 shows that only a minority of schools and colleges set up special committees to investigate potential adoption of the 'A' level. In half of the establishments (10 of 20) the headteacher in schools, the principal in sixth form colleges, or the department head in colleges of further education, acted on the advice of respondents after the initial suggestion to teach the 'A' level had been made. In three other cases, the adoption of the 'A' level was discussed at a school/college Management Committee Meeting. In the other two cases the head, principal or department head made the decision to adopt solely on the basis of the suggestion to teach the 'A' level.

In some cases, therefore, a committee was set up especially to investigate possible adoption of the 'A' level, but such cases were relatively unusual (4 of the 20 establishments). This could have meant that the possibility was investigated by existing committees but this is rare (3 of the 20 establishments). In two-thirds of the cases (13 of 20) it seems that the decision was made by a single person, and without committees being involved, as a result of the respondent being asked for advice by the head or principal, or as the result of the head/principal's decision after the initial suggestion to teach the 'A' level was made.

7.2.3 THE FINAL DECISION ON ADOPTION OF THE 'A' LEVEL IN IMPLEMENTING ESTABLISHMENTS

Table 7.4 shows who made the final decision on adoption of the 'A' level in the 21 establishments in the Implementer Survey.

TABLE 7.4

THE PERSON WHO MADE THE FINAL DECISION ON ADOPTION OF THE 'A' LEVEL IN IMPLEMENTING ESTABLISHMENTS

	TYPE OF ESTABLISHMENT			
	SCHOOL	F.E. COLLEGE	SIXTH FORM COLLEGE	TOTALS
Headteacher/Principal	10	0	3	13
Director of Studies	2	0	0	2
Department Head	1	5	0	6
n =	13	5	3	21

In most of the schools (10 of 13) and in each of the three sixth form colleges, the final decision to offer the 'A' level was made by the headteacher/principal. In the other three schools the decision was made by either the director of studies or department head. The department head made the final decision on adoption in each of the five colleges of further education.

7.2.4 THE MEANS BY WHICH THE RESPONDENTS CAME TO TEACH THE 'A' LEVEL

The means by which each of the 31 respondents came to teach the 'A' level is shown in Figure 7.1. Also shown on this diagram is whether or not it was the respondent's idea to introduce the 'A' level, and the respondent's participation in the adoption process.

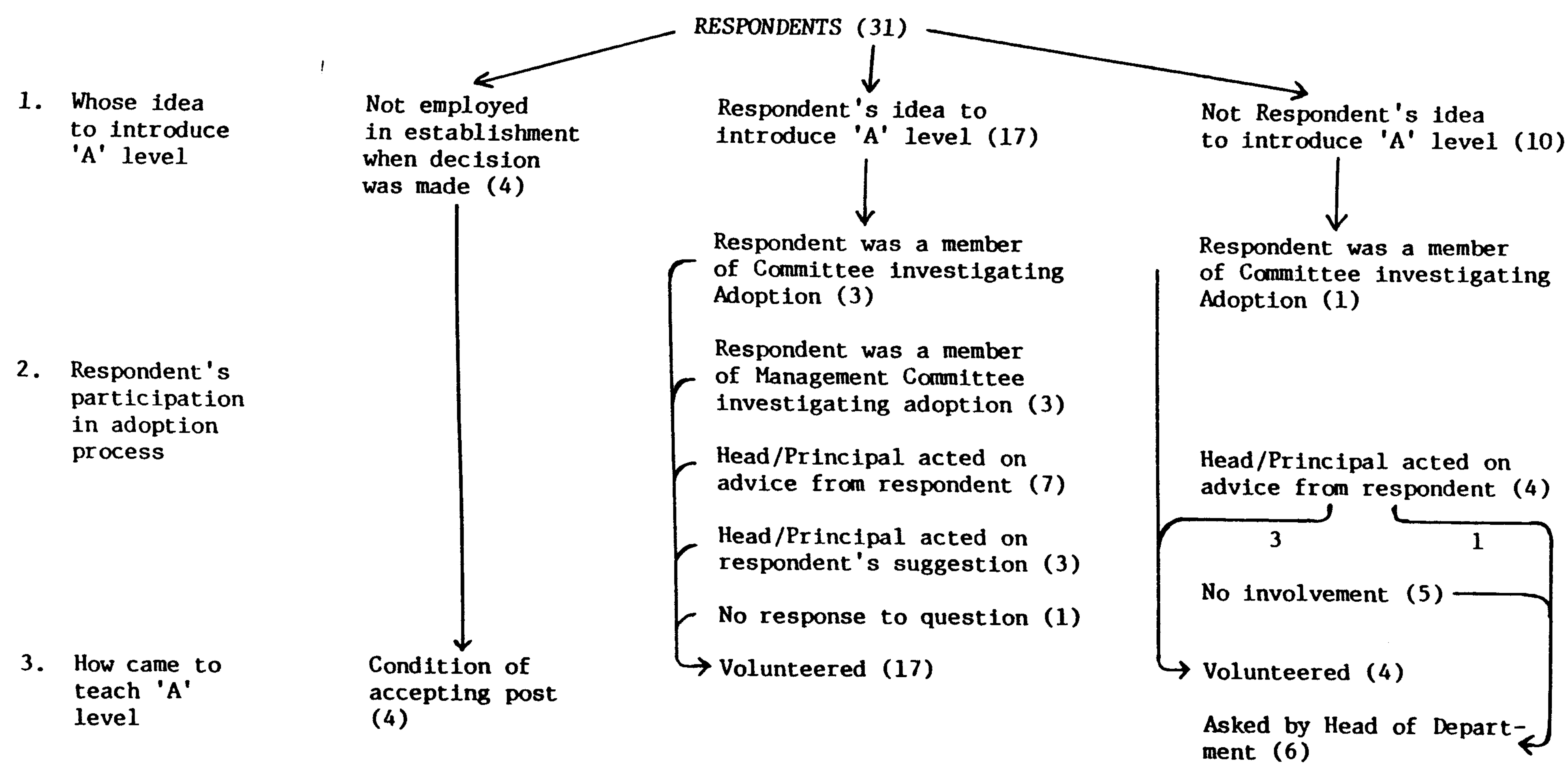


FIGURE 7.1

DIAGRAM SHOWING THE ROLES OF RESPONDENTS IN THE ADOPTION PROCESS AND THE MEANS BY WHICH THEY CAME TO TEACH THE 'A' LEVEL

Figure 7.1 shows that it had been the respondent's own idea to introduce the 'A' level into their own establishments in seventeen of the thirty-one cases. Each of these 17 respondents was involved in one way or another in the adoption process (one of the respondents did not answer this question on the Implementer Questionnaire), and each, not surprisingly, had volunteered to teach the 'A' level.

Ten of the thirty-one respondents had not introduced the idea of doing this 'A' level into their establishments, though they had been employed in their establishments at the time. In eight of these ten cases, the idea to introduce the 'A' level was that of another teacher/lecturer in that establishment (headteacher in one case, head of science in one case, head of a subject in five cases, and another teacher in one case), while in the remaining two cases, both from the same school, the idea had been that of the LEA Adviser for Environmental Studies. Only half (5 of 10) of these respondents was involved in the adoption process, and four of these five respondents subsequently volunteered to teach the 'A' level. The other of these five respondents, as well as the five respondents who were not involved in the adoption process, were asked to teach the 'A' level by their department head.

Four of the respondents stated that they were not employed in their present establishment at the time that the decision to adopt the 'A' level was made, and teaching the 'A' level was a condition of their accepting the post in their present establishment.

7.3 NON-IMPLEMENTER ESTABLISHMENTS AND THE ADOPTION OF THE 'A' LEVEL

The information in this section was obtained from the responses to the Non-Implementer Questionnaires. These 39 establishments were those from which teachers/lecturers had attended a conference on the JMB 'A' level, or had representatives on the JMB Environmental Science/Studies Sub-committee or Working Group, or which were teaching the Environmental Science 'O' level syllabus in 1979 but were not teaching the 'A' level at the time the Implementer Survey was circulated in November/December, 1979.

7.3.1 ADOPTION AND REJECTION OF THE 'A' LEVEL IN NON-IMPLEMENTING ESTABLISHMENTS

Figure 7.2 shows the situation with regard to adoption of the 'A' level in each of the 39 establishments involved in the Non-Implementer Survey.

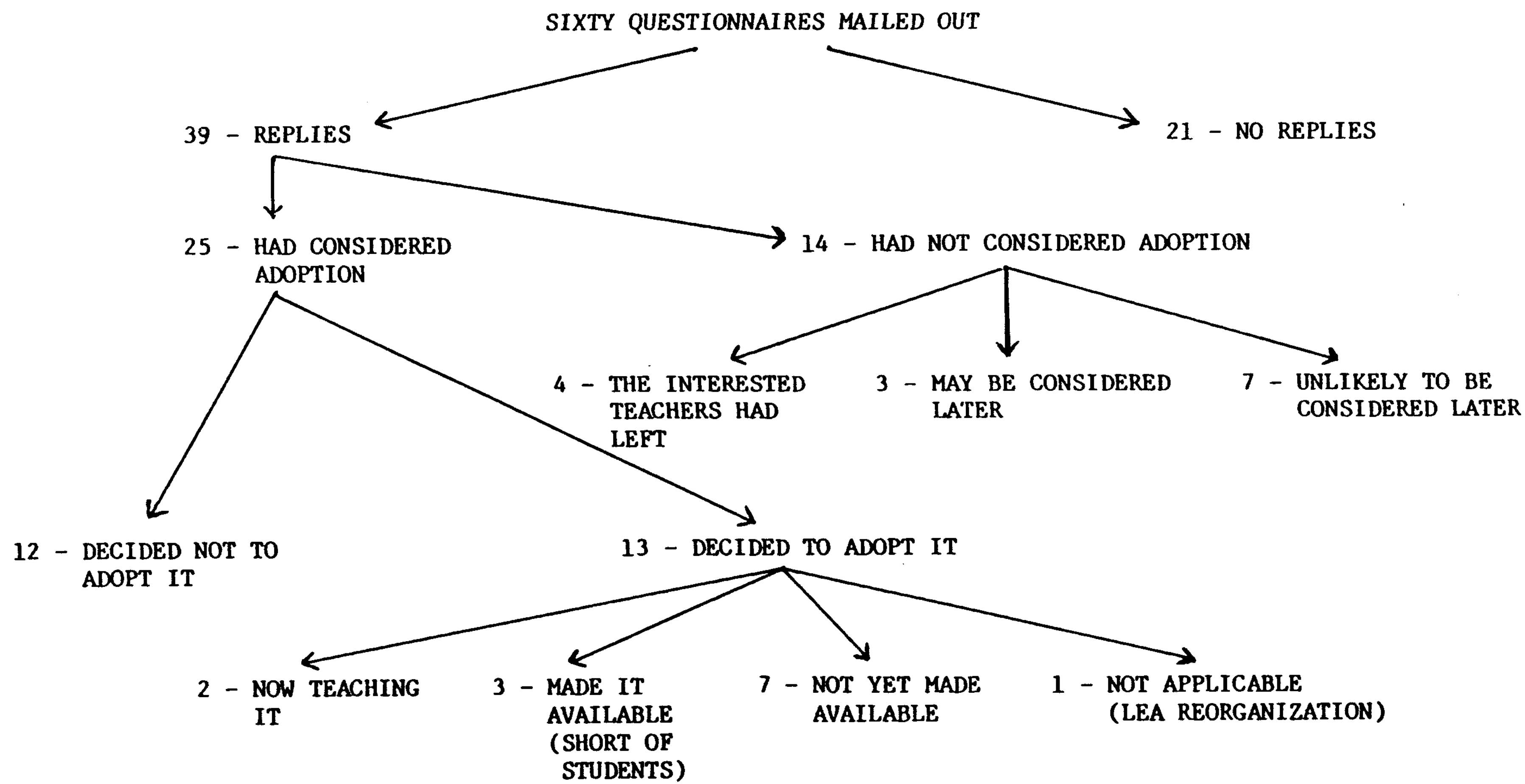


FIGURE 7.2

DIAGRAM SHOWING ADOPTION AND REJECTION OF THE 'A' LEVEL IN THE 60 SCHOOLS AND COLLEGES COVERED IN THE NON-IMPLEMENTER SURVEY

In all, 55 non-implementing establishments were sent the survey questionnaire and 39 completed and returned it. Of these 39 establishments, 25 had considered adoption of the 'A' level by the time of the survey (February, 1980), and 14 had not considered its adoption. This indicates that in the four years during which the JMB 'A' level had been made available, nearly two thirds (25 of 39) of the establishments which were deemed to have an interest in adopting it had actually considered adoption.

Thirteen of these 25 establishments which had considered its adoption had decided to adopt the 'A' level. Two of these thirteen establishments had begun to teach the 'A' level at the time of the survey, so are not, strictly speaking, "non-implementers", but as they had not begun to teach it by August, 1979, as the implementers had, they are still included in the analysis of non-implementing establishments. Another three had made it available but had not attracted sufficient students. A sixth establishment had abandoned plans to offer it when the LEA would have given the school a viable sixth form. At the time of the survey, the remaining seven of these establishments had not as yet offered the 'A' level.

Twelve of the twenty-five establishments which have considered the 'A' level have rejected its adoption. The reasons for their rejection are considered later on in this chapter.

Fourteen of the establishments had not considered adoption at the time of the survey. In four of these fourteen establishments, adoption had not been considered as the teacher interested in the 'A' level had left the establishment. Respondents in only three of the remaining ten establishments felt that their establishments would consider its adoption at a future date.

7.3.2 PERSONS RESPONSIBLE FOR THE IDEA OF INTRODUCING THE 'A' LEVEL INTO THOSE NON-IMPLEMENTER ESTABLISHMENTS WHICH HAVE MADE A DECISION ABOUT ADOPTION

Since 25 of the 39 non-implementer establishments had considered adoption of the 'A' level, the responses of the respondents from these 25 establishments were analysed to see who was responsible for the idea to introduce the 'A' level into each of these establishments. It was also decided to see what the relationship was between the decision reached and the teaching positions of the persons who introduced the suggestion that the establishment offer the JMB 'A' level. This relationship is explored in Table 7.5.

TABLE 7.5

THE PERSONS REPORTED AS RESPONSIBLE FOR THE IDEA OF INTRODUCING THE 'A' LEVEL IN ADOPTING AND REJECTING ESTABLISHMENTS

PERSON	ADOPTION DECISION		TOTALS
	Adoption	Rejection	
Respondent	13	5	18
Department head	0	2	2
Sixth form tutor	0	1	1
Another teacher	0	1	1
No response	0	3	3
TOTALS	13	12	25

In 18 of the establishments which have considered the introduction of the 'A' level, the respondents reported that it had been their own idea to introduce the 'A' level.

The responses in Table 7.5 also reveal that it was the idea of the respondent to introduce the 'A' level into each of the 13 establishments which decided to adopt it, whereas in the establishments which rejected it, only five of the nine respondents reported that it was their idea to introduce the 'A' level. None of the 21 establishments which failed to reply to the questionnaire is teaching the 'A' level, and since members of staff of these establishments had attended conferences on the 'A' level, there was at least an initial degree of interest in possibly teaching it. Since there were no responses from these 21 establishments, no information is available as to why they have not implemented the 'A' level.

Since most of the responses to the Implementer Questionnaire had also been from respondents who reported that it was their idea to introduce the 'A' level into their own establishment, and most of these held at least a head of subject post, it was decided to see if there was any relationship between the respondent's post and the decision to adopt or reject in the establishments involved in the Non-Implementer Survey. These results are summarised in Table 7.6.

TABLE 7.6

TEACHING POSITIONS OF PERSONS RESPONSIBLE FOR THE IDEA OF INTRODUCING THE 'A' LEVEL IN 13 ADOPTING AND 12 REJECTING ESTABLISHMENTS

	TEACHING POSITION			
ESTABLISHMENT	Head of Subject or higher	Below Head of subject	TOTALS	NO RESPONSE
Adopting	13	0	13	0
Rejecting	7	2	9	3
TOTALS	20	2	22	3

The table shows that while all of the persons responsible for the idea of introducing the 'A' level in adopting establishments held at least a head of subject position, two of the nine such persons in rejecting schools did not hold such a position. Overall, then, there were no major differences between adopting and rejecting establishments as to the teaching position of the person who was responsible for the idea of introducing the 'A' level into an establishment. Further analysis of the data showed that while seven of the eight Heads of Rural and/or Environmental Science responsible for the idea of the introduction were in adopting schools, and only one in rejecting, four of the six Heads of Biology so identified were in rejecting, and only two in adopting establishments.

7.4 REASONS GIVEN BY RESPONDENTS FOR THEIR ESTABLISHMENTS NOT CONSIDERING ADOPTION

Fourteen of the establishments covered in the Non-Implementer Survey had not considered adoption of the 'A' level at the time the survey was taken, and in four of these fourteen the interested teacher had left. The respondents from the other 10 of these 14 establishments (see Figure 7.2) were asked to state the reasons why they had not asked their establishments to consider the adoption of the 'A' level. Some 20 reasons were listed by the 11 respondents from these 10 establishments (two of the respondents coming from the same school). These reasons are listed below in Table 7.7.

TABLE 7.7

REASONS GIVEN BY RESPONDENTS FOR NOT REQUESTING THEIR ESTABLISHMENTS TO CONSIDER ADOPTION

REASON GIVEN	NUMBER OF RESPONSES
Re-organisation of the school	6
Timetable (i.e. school, teacher) too full)	4
Viability (i.e. insufficient student interest)	3
LEA policies	2
Headteacher policies	2
Not a JMB centre	1
Unsuitable for students	1
Unsuitable for subject specialty teachers	1
	20

(Number of respondents = 11)
(Number of establishments = 10)

The eleven respondents were from these ten different establishments and they listed some twenty reasons for not having requested their establishments to consider adoption of the 'A' level, with six of these respondents listing more than one reason.

Re-organisation of the school was the reason given most often and accounted for just over one-half of the respondents (6 of 11) not requesting their establishments to consider the 'A' level. Two respondents from the same school both listed re-organisation as their reason for not doing so, and taking this into account, re-organisation, therefore, was the reason given by respondents in half of these ten establishments. Full establishment or teacher timetables were listed as the reasons in four different establishments. Three respondents listed viability, although they did not explain what they meant by the term, and two each named LEA policies, such as an LEA not wanting more 'A' levels, or headteacher policies, such as the headteacher not being interested in non-traditional 'A' levels. One respondent gave the fact that the establishment was not a JMB center as the reason. Another stated that she had been looking for an alternative 'A' level Biology syllabus for less "scientific" students but having become acquainted with the JMB Environmental Science syllabus had decided that it was not appropriate for such students. Another teacher, also a biologist, stated that the content of the 'A' level prevented him from becoming further interested in the 'A' level, saying that a biologist would have trouble trying to cope with the more geographically-orientated aspects of the syllabus.

In total, therefore, only two of these eleven respondents cited reasons connected with the nature of the 'A' level as the reason for not having requested their establishments to consider adoption of the 'A' level. Three-quarters of the reasons given were ones not under the control of the individual respondent (headteacher policies, LEA policies, etc.), and only three of the responses concerned student interest.

7.5 OBSTACLES TO ADOPTION

The information in this section was obtained from both the completed Implementer and Non-Implementer Questionnaires. Each of the respondents in these two surveys was asked to rate each of fourteen problems/obstacles to adoption of the JMB 'A' level in their establishment as a major problem, minor problem, or no problem at all. Seven of the establishments covered in the Implementer Survey had two or more respondents. Analysis of the responses of these individuals showed that even though there was broad agreement on the rating of problems by the respondents from the same establishment, there was also a measure of divergence of the rating of problems. In only one of these seven establishments was there complete agreement on the obstacles facing the 'A' level's adoption. On average, there was 66% agreement between the responses of individuals from the same establishmentment, but the range of agreement varied from 35% to 100%. It was decided, therefore, to use all the individual responses in the Implementer Questionnaire and not to pool the responses to obtain an average response for each establishment. Responses to the Non-Implementer Questionnaire were all from individuals in different establishments, and have been separated into responses from individuals in establishments which have adopted, and responses from individuals in establishments which have rejected the 'A' level.

Table 7.8 shows the numbers of respondents naming obstacles to adoption as major or minor.

TABLE 7.8

NUMBERS OF RESPONDENTS FROM EACH TYPE OF ESTABLISHMENT NAMING AN OBSTACLE AS A MAJOR OR MINOR PROBLEM

	IMPLEMENTING ESTABLISHMENTS		ADOPTING ESTABLISHMENTS		REJECTING ESTABLISHMENTS	
	Major	Minor	Major	Minor	Major	Minor
Science staff resistance	2	7	0	2	0	1
Geography staff resistance	0	2	2	4	2	1
Timetable too full	4	9	3	5	5	4
Lack of student interest	12	12	8	3	6	5
No 'O' level/CSE	2	1	0	0	1	2
Laboratory/space	2	10	0	5	3	4
Finance	5	9	4	5	7	3
Re-organisation	0	3	1	4	2	0
Competition with other new courses	2	4	1	6	1	4
Fieldwork transport	0	7	0	5	1	7
Teaching experience	0	7	0	2	1	5
Teaching qualifications	0	7	3	2	1	0
LEA support	1	1	2	4	0	2
No other local establishments teaching it	1	4	1	5	0	1
	(n = 28)		(n = 13)		(n = 12)	

Nearly one-half of the respondents (12 of 28) in the implementing establishments cited lack of student interest as a major obstacle to the adoption of the 'A' level. None of the other obstacles was named as major by more than 5 of the 28 respondents. Almost another half (12 of 28) of these respondents from implementing establishments also named lack of student interest as a minor obstacle to adoption. Just over one-third of these respondents named laboratory/ space problems as a minor obstacle, and nine each named a too-full timetable and finance as minor problems. One-quarter of these respondents (7 of 28) named resistance from the science staff, transport for fieldwork, teacher qualifications and teaching experience as minor obstacles to adoption of the 'A' level.

Lack of student interest was also named as a major obstacle to adoption by nearly two-thirds (8 of 13) of the respondents from adopting establishments, and nearly one-third (4 of 13) named finance as a major problem. Nearly one-quarter (3 of 13) of these respondents named a too-full timetable and teacher qualifications as major obstacles to adoption. In addition, nearly one-half of the respondents from adopting establishments named competition with other new courses also being introduced (6 of 13), and five of thirteen each named a too-full timetable, laboratory/space problems, finance, transport for fieldwork and no other local establishments teaching the 'A' level as minor obstacles to adoption. Almost one-third (4 of 13) each mentioned resistance of the geography staff and lack of LEA support for the 'A' level as minor obstacles. None of the other problems was named as a minor obstacle to to adoption by more than one-quarter of the respondents from adopting establishments.

Finance was the major problem cited by over one-half (7 of 12) of the respondents from rejecting establishments. Lack of student interest was named as a major problem by half of these respondents, and just over 40% (5 of 12) named a too-full timetable as a major problem. One quarter of these respondents named laboratory/space problems as a major obstacle to adoption. Other major problems were named by less than one-quarter of these respondents. In addition, over one-half (7 of 12) named transport for field-work as a minor problem, and five of twelve each named lack of student interest and teaching experience as minor problems. One-third of these respondents each named a too-full timetable, laboratory/space problems and competition with other new courses also being introduced as minor obstacles to adoption. Other minor obstacles to adoption were named by less than one-third of the respondents from rejecting establishments.

While only one problem, namely, lack of student interest was named as a major obstacle to adoption by 25% or more of the respondents from implementing establishments, 25% or more of the respondents from adopting establishments named two major obstacles, namely, lack of student interest and finance, in comparison with four major obstacles named by respondents from rejecting establishments, namely, finance, lack of student interest, a too-full timetable and laboratory/space problems, as shown in Table 7.9.

TABLE 7.9

MAJOR PROBLEMS NAMED BY 25% OR MORE OF RESPONDENTS FROM DIFFERENT ESTABLISHMENTS

TYPE OF ESTABLISHMENT		
IMPLEMENTING	ADOPTING	REJECTING
1. Student lack of interest	1. Student lack of interest	1. Finance
	2. Finance	2. Student lack of interest
		3. Timetable too full
		4. Laboratory/space

Student lack of interest, then, was seen as a major problem by respondents from each type of establishment. Finance was seen as a major problem by 25% or more of the respondents from both adopting and rejecting establishments. Rejecting establishments differ from both implementing and adopting establishments in that while 25% or more of the respondents from rejecting establishments named a too-full timetable and laboratory/space problems as major obstacles to adoption, less than 25% of those from implementing and adopting establishments did so.

One method of analysing the relative importance of these fourteen obstacles to adoption, which takes account of obstacles being reported as major or minor problems, is to weight the responses. In this case a response naming a problem as major was scored 2, a response naming a problem as minor was scored 1, and a response stating the problem did not exist was scored 0. Table 7.10 shows the overall rating of each problem for respondents from the three different types of establishments.

TABLE 7.10

MEAN WEIGHTED SCORES FOR OBSTACLES TO ADOPTION IN IMPLEMENTING, ADOPTING AND REJECTING ESTABLISHMENTS

PROBLEM	MEAN SCORE* Implementers	Adopters	Rejecters
Science staff resistance	0.40	0.15	0.08
Geography staff resistance	0.06	0.62	0.42
Timetable too full	0.61	0.85	1.17
Lack of student interest	1.29	1.46	1.42
No 'O' level/CSE	0.18	0.00	0.33
Laboratory/space	0.50	0.39	0.83
Finance	0.68	1.00	1.42
Re-organisation	0.11	0.46	0.33
Competition	0.29	0.62	0.50
Fieldwork transport	0.25	0.39	0.75
Teacher qualifications	0.25	0.15	0.58
Teaching experience	0.25	0.62	0.16
LEA support	0.11	0.62	0.16
No other local establishments teaching it	0.21	0.54	0.08
	(n = 28)	(n = 13)	(n = 12)

*Maximum score = 2, minimum = 0.

This analysis shows that the three highest scoring problems for respondents from implementing, adopting and rejecting establishments were the same, namely, possible lack of student interest, financial problems and a too-full timetable. This suggests that the obstacles to adoption of this 'A' level in implementing, adopting and rejecting establishments are the same, but the difference between the different establishments is the severity of the problems, the problems being more serious (i.e. score higher) in rejecting establishments.

The data were also analysed to find if there was any difference between the number of major problems and minor problems given by each respondent in the different types of establishment.

TABLE 7.11

THE NUMBERS OF MAJOR AND MINOR PROBLEMS REPORTED BY EACH RESPONDENT IN THE DIFFERENT TYPES OF ESTABLISHMENT

	TYPE OF ESTABLISHMENT		
	Implementing	Adopting	Rejecting
A. NUMBER OF MAJOR PROBLEMS REPORTED			
0	11	1	1
1	6	4	1
2	9	6	3
More than 2	2	2	7
	28	13	12
(MEAN)	(1.1)	(1.9)	(2.6)
B. NUMBER OF MINOR PROBLEMS REPORTED			
0	2	1	1
1-2	9	4	5
3-4	13	2	4
More than 4	4	6	2
	28	13	12
(MEAN)	(2.9)	(4.0)	(3.3)

These figures show that almost one-half of the respondents from implementing establishments reported no major obstacles to adoption, while only one respondent from each of the adopting and implementing establishments reported no major problems.

Whereas the great majority of respondents from both implementing (26 of 28) and adopting establishments (11 of 13) reported two or fewer major obstacles to adoption, over one-half (7 of 12) of the respondents from rejecting establishments reported three or more major obstacles to adoption.

No such clear trend was obvious among the number of minor obstacles to adoption reported by respondents from the different types of establishment, since those from adopting establishments reported more minor problems on average than those from either rejecting or implementing establishments.

The difference between adoption and rejection of this 'A' level may not be a difference in the types of major obstacles adoption has to overcome, but rather the number of major obstacles which have to be overcome at the same time, since the data shows that the major problems named by respondents from the different establishments are similar, but the majority of respondents from rejecting establishments report more than two major obstacles to adoption, while the great majority of respondents from implementing and adopting establishments report two or fewer major obstacles. The number of minor obstacles to adoption does not appear to be a factor in the adoption decision, since the data show that respondents from adopting establishments reported more minor obstacles than those from rejecting establishments.

7.5 DISCUSSION

Kelly and Nicodemus (1973) found that the decision to adopt or try out Nuffield 'A' level Biology was made at the school biology or science department level. In this study, however, the decision to adopt the JMB Environmental Science

'A' level was usually made by the headteacher in schools and the principal in sixth form colleges. These differences might well be due to the fact that whereas Nuffield 'A' level Biology was a replacement for an existing 'A' level Biology syllabus, the JMB Environmental Science 'A' level is usually a new addition to the 'A' levels offered, and, therefore, poses timetable, accommodation and financial problems which have to be considered by the headteacher or principal rather than by just the head of science, as might be the case for a new syllabus in an existing subject.

In their survey, Kelly and Nicodemus (1973) found that only 3% of teachers referred to headteachers or LEA's, whereas in the present survey the decision to adopt was made by the headteacher or principal in 81% of the schools and sixth form colleges. In each of the colleges of further education involved in the survey, the final decision to adopt the JMB 'A' level was made by the head of the science department.

Kelly and Nicodemus (1973) found that most of their respondents who were not using the Nuffield 'A' level Biology syllabus gave reasons not directly related to the syllabus, such as school re-organisation, waiting for books or LEA approval, financial limitations or objections from colleagues. The majority of respondents not using the JMB Environmental Science 'A' level also gave reasons not directly related to the syllabus. Respondents who had not requested their establishments to consider introduction of the 'A' level named school re-organisation, timetable problems, lack of student interest, LEA policies and headteacher policies as the major reasons for not having done so.

Reasons related to the nature and suitability of the syllabus were given by only a minority (18%) of respondents. Respondents from establishments in which the decision not to adopt (i.e. to reject) the 'A' level most frequently gave financial problems, a too-full timetable, possible lack of student interest, and problems of accommodation as the major reasons for the decision.

Jenkins (1967) in a study of the adoption of Nuffield 'O' level Chemistry also found that financial difficulties and accommodation were major obstacles to adoption as they also were for the adoption of Environmental Science. Timetabling difficulties, however, were major obstacles to adoption of the Environmental Science 'A' level but not to adoption of Nuffield 'O' level Chemistry.

7.6 CONCLUSIONS

In most of the implementing establishments, it was usually the idea of the head of environmental science or the head of biology, physical science or science to introduce the JMB Environmental Science 'A' level. Most of these teachers were also involved in the actual adoption process, usually by serving on a committee or by being asked for an opinion. The final decision to adopt it was usually made by the headteacher in schools, the principal in sixth form colleges, and by the head of science in colleges of further education. The respondents in implementing establishments who stated that it was not their idea to introduce the 'A' level were not usually heads of subjects or departments, and only half were involved in the adoption process, usually having been asked for an opinion of the 'A' level. Of the latter respondents, those who were involved in the adoption process had usually volunteered to teach the 'A' level, while those not involved had been asked to teach the 'A' level by their headteacher or department head.

Twenty-five of the 39 establishments in the non-implementer survey had considered the introduction of the 'A' level with about half deciding to offer it.

In implementing and adopting establishments, most respondents said that they had been responsible for introducing the 'A' level into their establishment. In rejecting establishments more said that the idea to introduce it was made by someone other than themselves. It does appear, however, that adoption was most likely to occur when the idea to adopt the 'A' level was that of the head of environmental and/or rural science.

One obstacle to adoption, namely, possible lack of student interest, was seen by respondents from implementing establishments as being by far the greatest obstacle to adoption, and this problem and finance were the obstacles respondents from adopting establishments were most aware of. These same two problems, namely, possible lack of student interest and finance, and, in addition, timetable difficulties and laboratory/space accommodation, were the obstacles most often named by respondents from rejecting establishments. Analysis of the number of major obstacles to adoption named by respondents showed that, whereas nearly all of the respondents from both implementing and adopting establishments named two or fewer such obstacles, the majority of respondents from rejecting establishments named more than two major obstacles to adoption of the 'A' level. It may be, therefore, that the difference between adoption and rejection may not be due to the types of major obstacles to be overcome, but rather the number of major obstacles which have to be overcome at the same time.

The reasons most often given by respondents for not having requested their establishments to consider adoption of the 'A' level were institutional reasons, such as school re-organisation, timetable difficulties, viability, LEA policies, and headteacher policies. Few respondents listed reasons connected with the syllabus as their reason(s) for not having requested their establishment to consider the 'A' level, though some who offered institutional reasons were not now interested in teaching the syllabus and to that extent the institutional reasons may have been offered to justify what was essentially a personal choice.

CHAPTER EIGHT

TEACHERS' REASONS FOR ADOPTION, REJECTION AND DISCONTINUANCE

8.1 INTRODUCTION

Interviews were conducted separately with teachers of this 'A' level in twenty of the thirty establishments known to be teaching it, to find out their reasons for doing so. Interviews were also conducted with teachers in three of the four establishments known to have discontinued the teaching of the 'A' level, to find out the reasons for discontinuance. Respondents in the Non-Implementer Survey who had indicated that they were not interested in teaching the 'A' level (i.e. were rejecters of this syllabus) were asked to write their reasons for not being interested in the teaching of this 'A' level on the questionnaire they returned.

8.2 TEACHERS' REASONS FOR ADOPTION

The information in this section was obtained from the interviews conducted separately with 27 teachers of this 'A' level in 13 schools, 5 colleges of further education and 2 sixth form colleges during 1979 and 1980. This sample of teachers, from twenty of the thirty establishments known to be teaching the 'A' level (a 67% sample) was selected to cover both LEA's which have an adviser for environmental subjects and those which have not, the various types of establishments offering the 'A' level (comprehensive schools, grammar schools, sixth form colleges and colleges of further education) and teachers with different situations (differing subject backgrounds, qualifications, experience, etc.). The reasons given by these teachers in this sample is taken as being representative of the population of those teaching this 'A' level as a whole.

In the case of 20 of those 27 teachers, the question concerning their reason(s) for teaching the 'A' level was included in the interview schedule used to conduct interviews concerning the factors affecting the viability of the 'A' level (see Chapter 9), and in all but one case this interview was conducted with the person in charge of the teaching of the 'A' level. In 6 of the 20 establishments, the author also conducted brief interviews with the other teacher(s) involved in the teaching of the 'A' level. In each case, the respondent was asked why they were teaching the 'A' level and the response was taped with the respondent's permission.

The reasons given by the teachers in schools differed sufficiently from those given by teachers/lecturers in colleges for them to be treated separately. The reasons given by teachers in schools, together with certain characteristics of the LEA, school and teacher, are shown in Table 8.1.

TABLE 8.1

THE REASONS GIVEN BY TEACHERS IN SCHOOLS FOR ADOPTION OF THE 'A' LEVEL TOGETHER WITH CHARACTERISTICS OF THE LEA, SCHOOL AND TEACHER

TEACHER NO.	SCHOOL	LEA	ADVISER PRESENT	SCHOOL TYPE	PREV. ENV.* SYLLABUSES OFFERED	SEPARATE ENV. SCI. DEPT.	TEACHER SUBJECT BACKGROUND	REASON GIVEN**
1	LE	County 1	Yes	Gramm.	None	No	Biology	Env. Int
2	NS	County 2	Yes	Compr.	AEB 'AO'	Yes	Rural Science	Student/teacher
3	JT	County 2	Yes	Compr.	JMB 'O'	Yes	Rural Science	Teacher
4	KM	County 2	Yes	Compr.	Gen. Studies	Yes	Rural Science	Student/teacher
5	WO	County 2	Yes	Compr.	Cambridge 'O'(S)	Yes	Rural Science	Student
6	GW	County 2	Yes	Compr.	AEB 'AO'	Yes	Biology	Job
7	CA	County 2	Yes	Compr.	None	No	Chemistry	Student
8	CA	County 2	Yes	Compr.	None	No	Geography	Invited
9	CA	County 2	Yes	Compr.	None	No	Geography	Invited
10	BD	County 2	Yes	Compr.	London 'O'	Yes	Rural Science	Student
11	BD	County 2	Yes	Compr.	London 'O'	Yes	Rural Science	Invited
12	GB	County 2	Yes	Compr.	CSE 'ES'	Yes	Rural Science	Invited
13	WA	County 2	Yes	Compr.	JMB 'O'(S)	Yes	Rural Science	Job
14	WA	County 2	Yes	Compr.	JMB 'O'(S)	Yes	Biology	Job
15	HA	Borough 1	No	Compr.	CEE 'ES' JMB 'O'(S)	Yes	Biology	Student/teacher
16	MX	Borough 1	No	Compr.	JMB 'O'(S)	Yes	Rural Science	Teacher
17	BR	Borough 2	No	Compr.	CSE 'ES'	Yes	Rural Science	Status

Total Number of Teachers = 17
Total Number of Schools = 13

* Key to previous syllabuses offered:
1. AEB 'AO' = AEB 'AO' level Environmental Studies; 2. JMB 'O' = JMB 'O' level Environmental Science; 3. Gen. Studies = 6th Form General Studies; 4. Cambridge 'O'(S) = specially approved Cambridge 'O' level Environmental Science; 5. London 'O' = London 'O' level Rural and Environmental Studies; 6. CSE 'ES' = CSE Environmental Science; 7. CEE 'ES' = CEE Environmental Science; 8. JMB 'O'(S) = specially approved JMB 'O' level Environmental Science.

** For an explanation of these reasons see the following text.

The reasons given by these 17 teachers were classified under five headings as shown below:

1.	Student <u>Interest</u>	-	Students completing the 'O' level in the subject asked to continue the subject at 'A' level; students reading about the new syllabus asked if the 'A' level could be offered as they were interested in taking it.
2.	Teacher <u>Interest</u>	-	Teacher wanted to offer the 'A' level as a follow up to the 'O' level; teacher wanted to teach the 'A' level because he/she was an Environmental Scientist.
3.	Environ-mental <u>Interest</u>	-	Teacher was not an Environmental Science teacher but was interested in environmental matters.
4.	<u>Invited</u>	-	Teacher was asked to teach the 'A' level by the teacher who introduced the 'A' level into the school.
5.	<u>Job</u>	-	Teaching this 'A' level was a condition of accepting the post.
6.	<u>Status</u>	-	Teacher, who was originally Head of Rural Science, decided to teach the 'A' level to improve the status of the subject (Environmental Science) in the school.

In all, 13 of the 17 teachers interviewed were members of Environmental Science departments, and in each case this department (or the teacher involved) had taught an environmental syllabus before taking on the 'A' level. All the Environmental Science departments had previously been Rural Science departments. Four departments and the teachers involved had previously taught an 'O' level syllabus developed by these teachers in Environmental Science/Studies and specially approved by an examining board, (three approved by the JMB and one by the Cambridge board). In addition, four other of these departments and teachers had previously taught environmental syllabuses at CSE or 'O' level. One of these had taught the London Rural and Environmental Studies 'O' level syllabus, one the JMB Environmental Science 'O' level, and two a CSE (one Mode 1, one Mode 2) Environmental Science syllabus. In only four cases had departments prior experience of teaching the subject at the sixth form level, two having taught the AEB Environmental Studies 'AO' level, one having taught a CEE Environmental Science syllabus and another having offered Environmental Studies as part of the General Studies course.

Seven teachers from Environmental Science departments gave, as reasons for teaching the 'A' level, either students asking to take the 'A' level, or the teachers themselves deciding to teach it. Four others were invited to teach a syllabus, and another three stated that it was a condition of the job. Only one claimed that he wanted to improve the status of his department. However, eleven of the thirteen teachers of Environmental Science did say that they had wanted to teach the 'A' level at some time, and only two claimed that they had not really wanted to teach the 'A' level because of their lack of appropriate qualifications. (Both were certificated Rural Scientists and neither of them had previously taught at the sixth form level).

Only four teachers, in two schools, were not members of Environmental Science departments. In one school the teacher interviewed (Head of Science) decided to teach the 'A' level because of her interest in environmental matters (having a biological background) and had been involved in the development of the Cheshire proposals for the 'A' level. In the other school, 5th form students read about the new 'A' level in the JMB Regulations and Syllabuses and asked the Head of

Science whether or not it would be possible to take the 'A' level in the sixth form. This Head of Science (a chemist), who herself had an interest in biology, studied the syllabus and decided to teach it herself. She, in turn, asked a member of the Geography Department to teach the geographical aspects of the syllabus, and the geographer readily agreed since he had already been involved in the teaching of the environmentally-orientated Geography for Young School Leavers syllabus. Timetable difficulties prevented this geographer from teaching a second year of the 'A' level and he, therefore, asked another geographer, who readily agreed to take over. It was in this way that the two geography teachers in the sample came to be teaching the 'A' level.

The reasons given by lecturers in sixth form colleges and in colleges of further education are shown in Table 8.2, together with certain characteristics of the LEA, college and lecturers.

TABLE 8.2

THE REASONS GIVEN BY LECTURERS IN COLLEGES FOR ADOPTION OF THE 'A' LEVEL, TOGETHER WITH CHARACTERISTICS OF THE LEA, COLLEGE AND LECTURER

LECTURER	COLLEGE	LEA	ADVISER PRESENT	COLLEGE* TYPE	PREVIOUS** ENVIRON-MENTAL SYLLABUSES	DEPT. OFFERING 'A' LEVEL	TEACHER SUBJECT BACKGROUND	REASON*** GIVEN
18	NC	County 1	Yes	FE	London 'A'	Science	Chemistry	Preference
19	ST	County 1	Yes	FE	London 'A' AEB 'AO'	Science/ Geography	Biology	Preference
20	ST	County 1	Yes	FE	London 'A' AEB 'AO'	Science/ Geography	Biology	Preference
21	MC	County 2	Yes	FE	AEB 'AO'	Science	Chemistry	Preference
22	MC	County 2	Yes	FE	AEB 'AO'	Science	Biology	Job
23	WA	County 2	Yes	6th Form	-	Biology	Biology	Env. int.
24	WA	County 2	Yes	6th Form	-	Biology	Biology	Invited
25	BL	County 3	Yes	FE	AEB 'AO'	Phys. Sci.	Chemistry	Preference
26	LE	Borough 3	No	FE	AEB 'AO'	Science	Biology	Preference
27	SA	Borough 4	No	6th Form	AEB 'AO'	Env. Sci.	Biology	Preference

TOTAL NUMBER OF LECTURERS = 10
TOTAL NUMBER OF COLLEGES = 7

*College types: FE = College of Further Education
6th Form = Sixth Form College

**For key to syllabuses, see footnotes to table 8.1, except for London 'A', which is London 'A' level Environmental Studies.

***For key to reasons, see text.

Table 8.2 shows that each of the five colleges of further education had taught an environmental studies syllabus (at sixth form level) before implementing the JMB 'A' level. Two had taught the London 'A' level Environmental Studies syllabus, and three had taught the AEB 'AO' level Environmental Studies syllabus. One of the two sixth form colleges had also taught the AEB 'AO' level syllabus. The other sixth form college had opened only in September, 1979 and the JMB 'A' level was offered from the start. In each of the six establishments which previously offered an environmental syllabus, the decision to discontinue the Environmental Studies syllabuses and change to the JMB Environmental Science syllabus was made (by the lecturers concerned and the head of department) because of the breadth of content of the Environmental Studies syllabuses (which include social science studies), and because the lecturers concerned, all scientists, preferred the JMB syllabus which concentrated upon the scientific study of the environment.

In the second sixth form college, which opened in September, 1979, the Head of Biology was interested in environmental matters, had recently completed an M.Sc. in Environmental Science, and had decided to adopt and teach the 'A' level.

One lecturer (in college MC) stated that he was teaching the 'A' level because it was a condition of accepting the post, and another (in college WA) stated that he had been asked to teach it by the head of department.

A summary of the reasons given by the teachers and lecturers interviewed for being involved in teaching this 'A' level is set out in the following table.

TABLE 8.3

A SUMMARY OF THE REASONS GIVEN BY TEACHERS AND LECTURERS FOR TEACHING THIS 'A' LEVEL

REASON GIVEN	SCHOOL TEACHERS	SIXTH FORM COLLEGE LECTURERS	COLLEGE OF FURTHER EDUCATION LECTURERS
Student/teacher initiative	3	0	0
Student initiative	3	0	0
Teacher initiative	2	0	0
Invited	4	1	1
Job condition	3	0	0
Environmental interest	1	1	0
Preference for JMB	0	1	6
Improve status	1	0	0
TOTALS	17	3	7

Whereas most (6 of 7) of the lecturers in colleges of further education adopted the JMB syllabus because they preferred it to a previous syllabus, most school teachers either wished to teach it or agreed to teach it after students asked for the 'A' level to be taught (8 of 17). A further seven stated that they were invited to teach it, (4), or taught it because it was a condition of accepting their present position (3).

The data collected from the interviews suggests that while most (6 of 7) of the colleges were already teaching an environmental syllabus at either 'AO' or 'A' level and discontinued this syllabus in favour of the JMB 'A' level, most of the schools (9 of 13) had not previously offered an environmental syllabus at the sixth form level, and for these schools the JMB 'A' level was a new subject offering in the sixth form.

8.3 RESPONDENTS' REASONS FOR NOT ADOPTING (REJECTING) THE 'A' LEVEL

Ten of the respondents to the Non-Implementer Survey stated that they were either not interested in teaching the 'A' level or were at the time unsure as to whether they wished to teach it. Eight of these ten teachers, all from different establishments, wrote down their reasons for not being interested in teaching this syllabus, and these reasons are reproduced here in full:

A. SITUATIONAL REASONS:

1. "Commitment to my own subject, i.e. time."
2. "I teach Chemistry to 'A' level, ONC and HNC."
3. "No longer in an 11-18 school. I now teach exclusively in an 11-16 school."
4. "Following re-organisation when our comprehensive intake to the sixth form will drop and probably will only be able to offer around 12-14 courses (at 'A' level) and doubt if Environmental Science would, therefore, be considered as one of these."

B. REASONS RELATED TO THE JMB SYLLABUS

5. "A specialist in either (Biology and Geography) finds deficiency of knowledge in the other."
6. "The average biologist would need to learn much more geography and the geographer would have to have greater than usual knowledge of biology."
7. "Not appropriate for students' ability."
8. "We could not justify persuading students to take it because it would not be a substitute for pure science in University entrance."

The first four reasons listed above are situational insofar as each reason given is related to what prevents the respondent from teaching the 'A' level.

In the first two cases the respondents indicate their own teaching commitments did not allow them the time to teach another 'A' level. The third and fourth cases both claim to be casualties of re-organisation.

The last four reasons quoted are all related to the JMB syllabus itself rather than to a particular situation. Respondents 5 and 6 both refer to the need to have a greater knowledge base and saw this as justification for not teaching this 'A' level. Neither of these respondents, however, mentions the fact that team-teaching by teachers of differing subject backgrounds might overcome this problem.

Another biologist (respondent 7) stated that she had been looking for an alternative biology syllabus for weaker students who were non-scientists, but said that the JMB Environmental Science syllabus was not appropriate to the ability level of the students she had in mind.

The eighth respondent felt that universities would not accept the JMB 'A' level as a substitute for sciences such as biology, physics and chemistry and he, therefore, could not suggest this 'A' level to potential university students. This uncertainty about university acceptance is one which was shared by other respondents to the Non-Implementer Survey, and also by students completing the Student Opinion Survey as will be shown in later chapters.

In summary, therefore, the reasons given by respondents for non-adoption are as follows:

REASON GIVEN	NUMBER OF RESPONDENTS GIVING THAT REASON
Respondent's present timetable full	2
Re-organisation problems	2
Breadth of syllabus content	2
Not appropriate for weaker non-science based students	1
Question of university acceptance	1

8.4 DISCONTINUANCE

Cases where a teacher or establishment abandons an innovation after its adoption are described by Rogers (1962) as discontinuance. Responses to the Implementer Questionnaire and other enquiries showed that four of the twenty-five establishments which had taught the 'A' level in the period 1977-80 had discontinued its teaching. Interviews were conducted with teachers in three of four establishments, the fourth establishment not replying to three requests for an interview or information. Some information on the situation in this fourth establishment, however, was obtained indirectly from a teacher who taught Environmental Science in a neighbouring college.

The reasons given for discontinuance are listed below:

SCHOOL 1 (Girls' Grammar School)

The school was re-organised into an 11-16 comprehensive in September, 1979, and so there will be no more 'A' level classes.

SCHOOL 2 (Comprehensive School)

The local education authority had reduced by two the number of teaching positions in the school commencing in

September, 1979, and this was accommodated by a reduction in the number of subjects taught, especially at 'A' level. The school's management committee decided to reduce the number of 'A' level sciences offered by one. Environmental Science and Geology both had consistently low enrolments, but Geology was allowed to continue because it had a slightly larger enrolment than Environmental Science, so it was Environmental Science which was dropped from the sixth form curriculum. The head-teacher had also expressed concern about university acceptance of the 'A' level because one student who had completed it had been told on application to the university concerned that this 'A' level was not acceptable as one of the 'A' levels required for admission to their Environmental Science degree course.

SCHOOL 3 (Comprehensive School)

The 'A' level had been taught by one teacher, the Head of Rural Studies, who had to retire because of ill health. His replacement did not wish to teach the 'A' level so, with the permission of the headteacher and Head of Science, the 'A' level was dropped from the sixth form timetable.

SCHOOL 4 (Comprehensive School)

Even though it was not possible to obtain firsthand information on the situation in this particular school, another teacher of this 'A' level in a neighbouring college has indicated that this school now teaches an Environmental Studies 'A' level in place of the JMB 'A' level. A number of attempts were made to find out this information, including two letters to the teacher at the school and one letter sent to the teacher's home, but no response was ever received.

In addition to these four schools, two others have not taught this 'A' level since 1979 because of insufficient student interest, but it remained on offer and would run again when there were enough candidates to warrant it. The case of these two schools is dealt with in Chapter 9, where the reasons for the low numbers of candidates for the 'A' level is dealt with fully.

Where re-organisation occurs, as in the case of School 1, nothing can be done either by administrators or by teachers to re-institute the 'A' level. The teacher interviewed in this school, however, hopes that the newly-created local Sixth Form College will start to offer the JMB 'A' level to make up for the fact that the school itself can no longer do so. Since re-organisation, School 1 (now an 11-16 comprehensive) has been teaching both JMB 'O' level and CSE Environmental Science, so interest in the subject continues, both amongst the staff and the pupils.

The Implementer Survey showed that there are at least four other schools in which conditions similar to those in School No. 2 exist and which have small numbers of candidates taking the 'A' level. In the light of the experience in School No. 1, the 'A' level makes the subject vulnerable to exclusion from the school timetable. The other four schools, with conditions similar to School No. 2, are dealt with more fully in Chapter 9.

The situation in School No. 3 is also one which could occur in other schools and colleges where there is only one person teaching the 'A' level, of which there were found to be 10 of the 21 in this study. If such a teacher leaves the establishment and the replacement does not continue the teaching of the 'A' level, then it is dropped. Interviews with seven of these single unit teachers revealed that each was most pessimistic about the continuance of the 'A' level if they were to leave that establishment. To that extent, the place of the JMB 'A' level Environmental Science remains tenuous.

8.5 DISCUSSION

Kelly and Nicodemus (1973) found that schoolteachers who had adopted the Nuffield 'A' level Biological Science cited apparent advantages as their reasons for doing so. Just under one-half of the teachers (8 of 17) adopting the JMB Environmental Science 'A' level gave as their reasons either that students asked to take it, or that they themselves wished to offer it as it was a logical course for an environmental science department to offer, along with the JMB 'O' level and the CSE. Almost one-half of the teachers (7 of 17) stated that they had been asked to teach the 'A' level by their headteacher or department head, or that it had been a condition of accepting their present teaching position. None of the teachers adopting the Environmental Science 'A' level claimed to do so for its apparent advantages.

The reasons for adopting the Nuffield 'A' level Biological Science, on the one hand, and the JMB Environmental Science 'A' level, on the other, differ substantially. This difference may well be related to the fact that in the former case the Nuffield syllabus was a replacement for an existing Biology syllabus, while in the latter case it was not a replacement course.

While teachers in schools saw no singular advantage in teaching the 'A' level, lecturers in six of the seven colleges had previously taught an environmental syllabus and did cite apparent advantages of the JMB 'A' level over existing syllabuses.

Kelly and Nicodemus (1973) found that teachers who were not adopting the Nuffield Biological Science 'A' level gave reasons not directly related to the syllabus. For the JMB Environmental Science syllabus, however, as many as half of the non-adopters gave reasons which were directly related to the syllabus, so again the present findings contrast with those of Kelly and Nicodemus.

The Schools Council Impact and Takeup Project (Steadman et al 1980), reported that the majority of teachers discontinuing projects did so because either they had changed schools (30%), or they had changed either their post or the age range of the children they taught (20%), and a further 25% had discontinued a project because of their own evaluation of it. A further 10% had discontinued a project because there had been a change in school or departmental policy. This present study showed, however, that discontinuance of the Environmental Science 'A' level was not because teachers had changed schools, posts or age ranges of the children they taught, nor because of their own evaluation (and dissatisfaction) with it. Only one teacher (and school) in this study had discontinued the 'A' level for a reason which had been identified by the Impact and Takeup Project, namely a change in school policy. Reasons given by teachers for discontinuing this 'A' level, namely teacher retirement and school reorganisation were not identified as reasons often given for discontinuance among the projects investigated by the Impact and Takeup Project.

Several of the respondents to the Implementer Survey (see Chapter 5), and several of the students who responded to the Student Opinion Survey cited acceptance of the 'A' level as a suitable entrance requirement for universities as a major problem associated with the 'A' level. It is interesting to note that the credibility of Nuffield 'A' level Biology to universities was not a major problem when it was implemented.

This survey of the reasons why teachers decided not to adopt the 'A' level has also shown that acceptance of an 'A' level as a suitable university entrance requirement is a consideration which teachers take account of when considering adoption of an 'A' level. The fact that several universities and polytechnics stated that they were uncertain about acceptance of this 'A' level (see Chapter 11) suggests that teachers who decide not to adopt the 'A' level because of the uncertainty of universities' acceptance of it are right to take account of such a factor in their decision.

The number of teachers and establishments adopting this 'A' level may, therefore, be limited, on the one hand, by teachers' concern about the acceptability of the 'A' level by universities, and, on the other, by teachers' feelings that this particular 'A' level is not suitable for use with weaker science students.

CHAPTER NINE

FACTORS WHICH AFFECT THE CONTINUANCE OF THE JMB 'A' LEVEL IN SCHOOLS AND COLLEGES

9.1 INVESTMENT SCORES

9.1.1 INTRODUCTION

Shipman (1973) in his investigation of the impact of the Keele Integrated Studies Project on its trial schools, tried to assess the influence of different aspects of school organisation on the success or failure of the trial of curriculum materials and new teaching methods. Shipman tried to relate school organisational factors to "contractual success" which he defined as "fulfillment by the school of the contract to try out integrated studies", (p. 47), and also to relate these organisational factors to "curriculum impact" which he defined as, "the extent to which curriculum change had resulted from the trial experience", (p. 48).

The school organisational factors which Shipman used to relate to "contractual success" and "curriculum impact" were as follows:

1. The time and energy invested by teachers.
2. Investment by the school.
3. High level manpower involvement in the project.
4. Material resources.
5. The support of non-involved staff.
6. The basis of integrated studies (assessed by the existence in the school curriculum of ongoing work before the trial in this or similar areas of the humanities).

and 7. The climate of innovation in the school.

Since this present research was concerned with the adoption and continued existence of the JMB Environmental Science 'A' level, and not with the field trials of a new curriculum project, some of the factors which Shipman related to the success of the Integrated Studies Project were inappropriate for use in the present research. However, the following of Shipman's items were used:

1. Time and energy invested by the teacher.
2. Investment by the school.
3. High level manpower involvement in the project.
4. Material resources.

and 6. The basis for integrated studies.

Shipman's fifth item (support of non-involved staff), was not used in the present research because the necessary information could not be collected by a questionnaire. His seventh item (climate of innovation in the school) was also excluded as inappropriate since Shipman was concerned with implementing a project while the present research was concerned with adopting a syllabus.

These five items of Shipman's were then rephrased to make them directly applicable to the study of the JMB Environmental Science 'A' level.

9.1.2 THE FACTORS USED IN CALCULATING INVESTMENT SCORES

Several methods were used to estimate an establishment's investment in the JMB 'A' level. Firstly, the existence of environmental syllabuses (other than those currently offered) in an establishment prior to the JMB 'A' level, was used instead of Shipman's basis for integrated studies. This was based on the hypothesis that the 'A' level would have a more secure future in an establishment which already offered environmental syllabuses because it then possessed appropriate resources and qualified personnel, and had already established an environmental study tradition.

Secondly, it was decided that the number of different Environmental Science syllabuses offered at CSE/'O' level by the establishment would provide an assessment of investment in the 'A' level, since the provision of such syllabuses showed a commitment to the subject, and because the provision of both a CSE and an 'O' level syllabus in the subject would provide a pool of students who would choose to continue to study the subject at 'A' level.

A third method was whether or not the establishment had made appointments of teachers in this named subject (i.e. Teacher of Environmental Science) rather than having, as teachers of the subject, persons who had originally been appointed to teach another subject at 'A' level.

The presence of a separate Environmental Science Department or the designation of a teacher as Head of Environmental Science was used as another indicator of an establishment's investment.

The provision of separate laboratory facilities was used in place of Shipman's material resources, since it was not feasible to obtain a list of all the materials provided for the 'A' level, particularly as in many establishments it used the facilities and equipment in common with the other sciences. It was decided to use instead the provision of a laboratory for the subject (or the 'A' level) for this entailed the provision of equipment and materials for use in that laboratory.

It was hypothesised that the number of different Environmental Science examination syllabuses a teacher of the JMB 'A' level taught in any one year would give an indirect estimate of the time and energy invested by that teacher, since it was probable that a teacher who was involved in the teaching of a number of environmental syllabuses would have a greater commitment to the teaching of the subject than a teacher for whom Environmental Science was an additional subject, or a teacher who was not primarily an Environmental Science teacher.

Another factor used in calculating the investment score was the number of persons involved in teaching the 'A' level in an establishment since it was hypothesised that the 'A' level had a greater chance of being offered again in the future if a number of teachers were involved in teaching it, even if some of them are not primarily Environmental Science teachers. There are indications that if a single person is involved in the teaching of the 'A' level, there is the risk of the subject's being discontinued if that teacher leaves that establishment.

Shipman's factor on the involvement of high level manpower was retained since it was supposed that the subject had a better chance of survival in an establishment where senior members of staff (i.e. Head of Biology, Head of Science) were involved in its teaching, for that was taken to indicate a positive disposition to the subject at that level.

The following factors, therefore, were used to calculate the investment scores of establishments teaching the 'A' level. (If the answer was yes it was scored 1, and 0 if not).

1. Did the establishment offer other examination syllabuses in Environmental Science/Studies prior to the implementation of the 'A' level?

2. Does the establishment teach other environmental syllabuses, at CSE or 'O' level?

3. Does the establishment have named Environmental Science teaching positions?

4. Is there an Environmental Science Department or a teacher designated as Head of Environmental Science?

5. Does the 'A' level or the subject (Environmental Science) have its own laboratory facilities?

6. Are there two or more teachers involved in the teaching of the 'A' level?

7. Do the teachers of this 'A' level also teach other Environmental examination syllabuses (i.e. at 'O' level, CSE, CEE, etc.)?

8. Are high level staff members involved in the teaching of the 'A' level?

9.1.3 THE INVESTMENT SCORES FOR ESTABLISHMENTS

The 31 responses to the Implementer Questionnaires were used to supply the answers to each of the eight questions for each of the twenty-one establishments involved in the Implementer Survey. Each item was scored 1 if the answer was yes, and 0 if no.

In the case of seven of these 21 establishments, there were responses from two or more teachers in the same establishment. This opportunity was taken to check the consistency of replies from the same establishment. The responses were totally consistent for five of these establishments, each with two respondents, but there were minor inconsistencies in the responses from the other two of these seven establishments, (both colleges), each of which had three respondents.

In the case of College No. 11, two respondents stated that the 'A' level had its own facilities, while the third respondent stated that it did not. This inconsistency cannot be explained, and the response of the majority (2 of 3 respondents) has been used in the table. In the case of College No. 17, two respondents stated that there were other environmental syllabuses taught in the school in addition to the 'A' level, while the third respondent said there were none. However, in a later question this same respondent stated that he did teach other environmental syllabuses in the college, and it has been taken that this respondent clearly incorrectly answered the question on whether or not other environmental syllabuses were offered in the college in addition to the 'A' level.

The scoring for each of the eight factors and the total investment scores are displayed in Table 9.1.

TABLE 9.1

THE CALCULATION OF INVESTMENT SCORES
FOR THE 21 ESTABLISHMENTS IN THE IMPLEMENTER SURVEY

TYPE OF ESTABLISHMENT	CODE NO.	CODE NO. OF FACTORS FOR SCORING COMMITMENT TO E.S.								TOTAL SCORE
		1	2	3	4	5	6	7	8	
School	01	0	1	1	1	1	1	1	0	6
School	04	1	1	1	1	1	0	1	0	6
School	05	0	1	1	1	1	1	1	0	6
School	06	0	1	0	0	0	1	0	1	3
School	07	0	1	1	1	1	0	1	0	5
School	09	0	1	1	1	1	1	1	0	6
School	13	0	0	0	0	0	0	0	1	1
School	15	0	0	0	0	0	1	0	1	2
School	16	1	1	1	1	1	0	1	0	6
School	18	0	1	1	1	1	0	1	0	5
School	19	0	1	1	1	1	0	1	0	5
School	20	1	1	1	1	1	1	1	0	7
School	21	0	1	1	1	1	0	1	0	5
TOTAL (n = 12)		3	11	10	10	10	6	10	3	63
F.E. College	02	1	1	1	0	0	1	1	0	5
F.E. College	08	1	1	0	0	1	0	1	0	4
F.E. College	11	1	1	0	0	0	1	1	0	4
F.E. College	12	1	1	1	0	0	1	1	0	5
F.E. College	14	1	1	0	0	0	0	1	0	3
TOTAL (n = 5)		5	5	2	0	1	3	5	0	21
6th Form College	03	0	0	0	0	0	1	0	1	2
6th Form College	10	1	1	1	1	1	0	1	0	6
6th Form College	17	1	1	1	0	1	1	1	1	7
TOTAL (n = 3)		2	2	2	1	2	2	2	2	15
OVERALL TOTALS (n = 21)		10	18	14	11	13	11	17	5	99

This table shows that the calculated investment scores for the schools varied from a minimum of 1 (school No. 13) to a maximum of 7 (school No. 20). The scores for colleges of further education ranged from a high of 5 (college No.'s 2 and 12) to a low of 3 (college No. 14). The scores for sixth form colleges ranged from 7 (college No. 17) to a low of 2 (college No. 3). The overall mean investment score for all 21 establishments was 4.7, (maximum = 8).

A decision was then made to see what, if any relationship existed between the magnitude of the investment score and the "success" of the 'A' level in each establishment. In Shipman's case, "success" was reckoned as being the completion of the field trials of the Integrated Studies Project, but it was not appropriate to judge the success of the JMB 'A' level on this basis. It was decided that two different sets of criteria could be used to judge the success of the 'A' level in an implementing establishment, firstly, whether or not the 'A' level continued to be taught in an establishment, and secondly, the numbers of candidates entered by the establishment for the 'A' level Environmental Science examinations, "success" being rated by the number of students entering the examinations.

9.1.4 SUCCESS OF THE 'A' LEVEL IN RELATION TO THE INVESTMENT SCORES

An indication of the merits of the first of the two sets of criteria, that is, whether or not the 'A' level continued to be taught in an establishment, in measuring success of the 'A' level can be gleaned from the scores of the four establishments which had discontinued its teaching, since such establishments would be expected to have low scores.

However, the scores calculated for these four, all schools (code numbers 05, 13, 16 and 21), were, respectively, 6, 1, 6 and 5, (maximum possible score = 8). Only one of these four discontinuing schools, therefore, had a low investment score (1), but this school had discontinued the 'A' level because it had been re-organised into an 11-16 comprehensive school (from a grammar school) and not because the 'A' level was attracting only small, and therefore unviable, numbers of students. The other three schools, however, were discontinuing the 'A' level because of insufficient student numbers, even though their investment scores were among the highest recorded. There was, therefore, no simple relationship between the level of the investment score and the likelihood of a school discontinuing the teaching of the 'A' level.

Since this was the case, it was next decided to ascertain whether or not any relationship existed between the level of the investment score and the number of candidates entered by an establishment for the examinations in the subject.

Table 9.2 shows the numbers of candidates entered by each of the 21 establishments in the Implementer Survey for the final examinations in 'A' level Environmental Science for the period 1977-80, and the calculated investment score for each establishment.

TABLE 9.2

NUMBERS OF CANDIDATES ENTERED FOR THE JMB ENVIRONMENTAL SCIENCE FINAL EXAMINATIONS BY EACH ESTABLISHMENT AND THEIR CALCULATED INVESTMENT SCORES FOR THE PERIOD 1977-79

INVESTMENT SCORE	ESTABLISHMENT CODE NUMBER	ANNUAL NUMBER OF CANDIDATES ENTERED 1977	1978	1979	MEAN ANNUAL** NUMBER OF CANDIDATES
7	17	-	7	7	7.0
7	20	2	0	0	0.7
6	01	-	15	2	8.5
6	10	4	13	5	7.3
6	05	-	3	4	3.5
6	04	-	3	2	2.5
6	09*	-	-	-	-
6	19*	-	-	-	-
5	18	-	4	8	6.0
5	07	-	5	5	5.0
5	02	-	4	5	4.5
5	21	-	2	0	1.0
5	12*	-	-	-	-
5	16*	-	-	-	-
4	08	2	13	6	7.0
4	11	-	-	3	3.0
3	14	-	7	2	4.5
3	06	-	2	0	1.0
2	03	-	-	2	2.0
2	15	-	1	0	0.5
1	13	-	3	5	4.0

*Did not enter first candidates until 1980.
**Calculated to include all numbers of candidates entered after first submission of candidates.

The data in Table 9.2 were then analysed to see if there was any relationship between the mean number of candidates entered by an establishment and the calculated investment score for that establishment. A Spearman rank order correlation coefficient of $r_s = 0.24$ was calculated for the data, showing that there was a positive but low correlation between the investment score and the mean number of candidates entered by an establishment for the final examinations in 'A' level Environmental Science.

Success of the 'A' level in an establishment as measured by the mean number of candidates entered for the final examinations does not, therefore, correlate very highly with investment scores.

9.1.5 CONCLUSIONS ABOUT THE USE OF INVESTMENT SCORES IN MEASURING THE SUCCESS OF THE JMB 'A' LEVEL IN IMPLEMENTING ESTABLISHMENTS

It had been hoped that the calculation of investment scores for each of the implementing schools and colleges would enable a distinction to be made between those establishments in which the 'A' level had failed (i.e. had been discontinued and/or had only attracted small, unviable numbers of candidates) and establishments in which the offering of the 'A' level had been successful (i.e. was still being offered and/or had attracted viable numbers of candidates). However, the results show that there is only a very small positive correlation between the levels of investment scores and the success of the 'A' level in an establishment, whether success is measured in terms of the establishment continuing to offer the 'A' level or in terms of the average numbers of candidates entered per annum for the final examinations of the 'A' level.

Shipman (1973) in his research had earlier concluded that his method was not successful in determining the relationship between investment and both contractual success and curriculum impact:

> Often the important factors were not detected in advance, not adequately defined, or too elusive for the techniques used in measuring. (Shipman 1973, p. 47).

He concluded that,

> In retrospect, trying to detect the factors in schools that determine the success of curriculum innovation is like trying to repair a watch while wearing mittens. (P. 47).

Since the factors selected for the calculation of the investment scores in this present study did not lead to predictions of success in the establishments teaching this 'A' level, it was decided to search for those factors which affected the success of the 'A' level by undertaking a series of visits to those establishments and interviewing the persons teaching the JMB Environmental Science 'A' level.

9.2 THE IMPLEMENTER ESTABLISHMENT INTERVIEWS

9.2.1 INTRODUCTION

Since at this time the factors affecting the success of the 'A' level in establishments were unknown, the first step was to interview teachers of the 'A' level in several local establishments with the intention of drawing up a list of such possible factors. Interviews were held, therefore, with teachers in two local schools and one local college in early 1979. These interviews were of the open type, and tape-recordings were made of them with the permission of the teachers involved.

Analysis of these interviews revealed a number of factors which seemed to affect the success of the 'A' level in establishments and these factors were used to draw up an Interview Schedule for use in later interviews. The analysis also revealed that the factors affecting the success of the 'A' level in schools and colleges were sufficiently different for the results from these different types of establishment to be considered separately.

9.2.2 RESULTS OF THE INITIAL INTERVIEWS IN SCHOOLS

The information gathered in the initial interviews is shown in Table 9.3 following.

TABLE 9.3

SUMMARY OF THE INFORMATION GATHERED
IN THE PRELIMINARY SCHOOL INTERVIEWS

FACTORS AFFECTING SUCCESS OF 'A' LEVEL	SCHOOL 1	SCHOOL 2
1. Rural science image of Environmental Science	Yes	No
2. Environmental science taught prior to CSE/'O' level	No	Yes
3. Competition with local colleges for 'A' level students	Yes	No
Total number of candidates entered for JMB E.S. examinations	7	17
Years candidates entered	1978, 1979	1978-1979
Status of 'A' level	Discontinued	Continued

The two local schools selected for the preliminary interviews were a study in contrasts as regards the success of the 'A' level. In school No. 1, the 'A' level was being discontinued due to insufficient student interest, whereas in school No. 2 the 'A' level was continuing.

The teacher interviewed in school No. 1 stated that the small number of students electing to take the 'A' level was mostly due to the fact that the subject (environmental science) had a "rural science image". The Environmental Science Department which offered the 'A' level had originally been called the Rural Science Department, and the 'A' level was taught in the facilities originally belonging to the Rural Science Department. In addition, the two people teaching the 'A' level were both certificated Rural Scientists and had both originally taught in the old Rural Science Department. Since Rural Science was traditionally offered to academically weaker students, and Environmental Science was identified with Rural Science by both teachers and students, 'A' level Environmental Science was considered by other teachers and the students as, in reality, an 'A' level in Rural Science. Consequently, according to the teacher interviewed, the better students did not opt to take the 'O' level in the subject, and only less able students opted to take the subject, usually at CSE level. As a consequence, there were very few students who had the ability to pursue the subject at 'A' level, after they had completed the CSE or 'O' level, and the numbers taking the 'A' level were very small.

In school No. 2, by comparison, Environmental Science did not suffer from a Rural Science image. Here both of the teachers of the 'A' level were graduate biologists who had both been specifically employed to teach Environmental Science. Even though the facilities used to teach the subject had been inherited from the old Rural Science Department, Environmental Science, according to the teacher interviewed, did not suffer from a Rural Science image because the teachers were biologists and were not identified with the old Rural Science Department.

In addition, school No. 2 had made an attempt to put Environmental Science on an equal footing with the traditional sciences (biology, chemistry and physics) by including a unit on Environmental Science in the General Science course offered to all students in their third year, in addition to biology, chemistry and physics. Environmental Science had been purposely included in the General Science course to introduce all students to the subject prior to the time, at the end of the third year, when they would have to select subjects for study at CSE/'O' level in the fourth year. In this way, students selecting CSE's and/or 'O' levels were in a position to select Environmental Science because of their exposure to it. As a result of this policy, according to the teacher interviewed, many students opted to take the subject at CSE/'O' level who might not otherwise have done so, and many then continued their study of the subject at 'A' level. This situation is in marked contract to the situation in school No. 1 where no Environmental Science was included in the General Science course taught to all students in the third year, which only included the study of the three traditional sciences. Exposure to the subject prior to CSE/'O' level seems, therefore, to be an important factor in determining the viability of the 'A' level, since in both schools the great majority of candidates selecting 'A' level Environmental Science had completed the subject at 'O' level or CSE.

Competition for sixth form students with the local college of further education, according to the teacher interviewed, was another factor affecting the viability of the 'A' level in school No. 1, since many potential 'A' level students opted to take their 'A' levels at this local college rather than in the school's own sixth form. This was because the college offered a wider variety of 'A' levels than the school. School No. 2 did not suffer from such competition because, according to the teacher, the school was larger than school No. 1 and had a larger sixth form, enabling it to offer a wider variety of sixth form offerings.

9.2.3 RESULTS OF THE INITIAL INTERVIEW IN A COLLEGE

At the time of the initial interviews, only one local college (of further education) offered the 'A' level so this college was the only one involved in the initial interview programme.

The lecturer interviewed suggested a number of factors which might have an effect on the viability of the 'A' level in his, and other, colleges. These factors were:

1. Presence or absence of feeder schools which teach 'O' level/CSE Environmental Science.
2. Competition with local schools and colleges for potential 'A' level students.
3. Method of recruitment of potential students.
4. Attitude of Head of Science to the subject.

Several schools in the area served by this college taught CSE and 'O' level Environmental Science and there was, therefore, a pool of students aware of the existence of the 'A' level and interested in taking it. It seems reasonable to suppose, therefore, that colleges in areas where schools do offer the CSE or 'O' level in the subject would find it easier to attract viable numbers of students to take the 'A' level than colleges not situated in such areas.

This particular college was in competition with several local schools (which had sixth forms) for potential 'A' level students, and, in addition, several of these schools also offered 'A' level Environmental Science. Such competition tended to decrease the viability of the 'A' level in this college since many potential students stayed on in the sixth forms of their schools rather than transfer to the college to take their 'A' levels.

The lecturer interviewed stated that the viability of the 'A' level was probably also affected by the method the college used to "attract" potential students. This college relied exclusively on newspaper advertisements and brochures distributed to the local school fifth formers to attract students, whereas the lecturer considered that more active recruitment methods would attract more students to the college to take the 'A' levels (e.g. talks to schools, etc.).

The lecturer interviewed expressed the feeling that the attitude of the Head of Science to the subject was an important factor in deciding the viability of the 'A' level since it was this person who had control over the offering of the 'A' level. In this particular college, the Head of Science had a positive attitude to the subject and had even attended a conference on the 'A' level to find out more about it. These statements suggested that the attitude of the Head of Science to the 'A' level is very important since it is his decision which is the final one as to whether this or any other science subject will be offered by the college.

9.3.1 THE DEVELOPMENT OF THE INTERVIEW SCHEDULE

Since a number of factors which influenced the viability of the 'A' level had been identified as a result of the analysis of the data collected in the initial interviews in the two schools and the one college of further education, an interview schedule was drawn up and was used as the basis for collecting data in later interviews. The interview schedule was constructed taking account of the guidelines suggested by Hoinville (1978), Moser and Kalton (1971), and Wragg (1978). This schedule was revised on several occasions as the result of the identification of other factors affecting the viability of the 'A' level which had not been identified in previous interviews. The final revised form of the schedule is shown in Appendix B.

9.3.2 THE INTERVIEW PROGRAMME

It was decided to visit as many of those implementing establishments which had responded to the Implementer Questionnaire as was practically possible, to try to establish the factors which did influence the 'A' level's viability (= success), where success was reckoned as the establishment continuing to teach the 'A' level and continuing to attract viable student numbers. Requests for interviews were, therefore, addressed to each of the teachers who had responded to the Implementer Questionnaire Survey, and who were in charge of the 'A' level in their own establishment, and the requests were limited to those schools and colleges within a 70-mile radius of Keele. Positive responses were received from the persons in charge of the subject in seven schools, three colleges of further education and one sixth form college, making eleven establishments in all. Interviews were then conducted with these persons in each of these eleven establishments during the period May, 1979 to January, 1980, with the intention of trying to identify those factors which appeared to influence the viability of the 'A' level.

The results of these interviews are, for the sake of convenience, dealt with under separate headings, viz., discontinuing schools, schools in which the 'A' level is only taught intermittently, continuing schools, and, finally, colleges.

Since the total number of establishments involved under these different headings was so small, the results of the pilot interviews are also included in the discussion to gain as much insight into the factors affecting viability as possible.

9.4.1 SCHOOLS IN WHICH THE 'A' LEVEL IS BEING DISCONTINUED

Three schools, in addition to the one involved in the preliminary interviews (school No. 1) were discontinuing the teaching of this 'A' level so it was decided to see if these four schools shared common characteristics which contributed to the decision to discontinue the 'A' level. The data collected during the interviews are summarised in Table 9.4.

TABLE 9.4

SUMMARY OF DATA COLLECTED IN INTERVIEWS IN
THE FOUR SCHOOLS DISCONTINUING TEACHING OF THE 'A' LEVEL

FACTORS AFFECTING VIABILITY OF THE 'A' LEVEL	SCHOOL CODE NUMBER			
	1	3	4	5
1. Rural science image	Yes	Yes	Yes	No
2. Subject taught prior to 'O' level	No	Yes	Yes	No
3. Ability levels taught the subject prior to 'O' level	N/A	Middle Low	All	N/A
4. Ability levels of students allowed to select 'O' level	All	Middle Low	All	High
5. Restriction in number of 'O' level sciences which are taken	No	No	Yes	No
6. 'O' level/CSE classes combined	Yes	N/A	No	N/A
7. Competition with local colleges	Yes	No	No	No
8. Teacher in a position to dissuade students from taking Env. Sci.	No	Yes	No	No
Total No. of candidates entered for 'A' level	7	3	1	8
Years candidates entered for 'A' level (including projections for 1980	1978, 1979	1978, 1980	1980	1978, 1979

The 'A' level was being discontinued in school No. 5 because the school was being re-organised from a grammar school to an 11-16 comprehensive and will no longer offer any 'A' levels. This school is, therefore, omitted from this discussion since discontinuance was not due to factors operating within the school but only to re-organisation.

As has already been stated, in school No. 1 Environmental Science was identified with Rural Science for a number of reasons. (See 9.2.2). The subject also had a Rural Science image in schools 3 and 4, where the present Environmental Science teachers were Heads of the subject, but both were certificated Rural Scientists who had formerly been Heads of Rural Science in their schools before the departments were renamed Environmental Science departments. In both situations, these teachers considered that their colleagues still regarded them as Rural Scientists and that the subject (Environmental Science) was still being seen as Rural Science. In school No. 3 the Environmental Science teacher stated that he felt that he was still regarded as a "gardener" by his colleagues and that the subject was regarded as being "gardening for the thickies". It was also very noticeable during these interviews that each of these teachers laid great stress on the maintenance of vegetable gardens and the keeping of livestock, activities which no doubt contributed to the view that Environmental Science was simply a new name for Rural Science. The Rural Science image in school No. 3 was further reinforced by the fact that even though Environmental Science was taught to 2nd and 3rd year students, it was only the students of the middle and lower ability ranges who were allowed to take the subject in these years, and it was only the students of these same ability levels who were allowed to take the subject at CSE or 'O' level. The subject was perceived, therefore, as an inappropriate one for more able students.

The teacher in school No. 3 also stated that the viability of the 'O' level in his school was affected by the presence of a teacher in a position to influence students' choice of the subject. The third year tutor in this school regarded Environmental Science as a practical subject (i.e. as domestic science, cooking, woodwork), and advised the more able students not to take the subject at 'O' level. This led, in the teacher's opinion, to fewer students taking the 'O' level than otherwise might have done so, and thereby decreasing the pool of students interested in continuing on to take the 'A' level.

Another factor which in the opinion of the teacher in school No. 3 affected the viability of the 'A' level was that the CSE and 'O' level classes in Environmental Science could not be combined to make a viable joint CSE/'O' level class when the 'O' level class was too small to be separately viable. In school No. 1, the CSE and 'O' level classes could be combined since the CSE syllabus was similar to the JMB 'O' level syllabus, so it was possible to teach a combined CSE/'O' level class. In school No. 3, however, this was not possible because the CSE syllabus in that area was quite unlike the JMB 'O' level syllabus. The teacher in this school stated that when the number of students electing to take 'O' level Environmental Science was not sufficient to justify a separate class it had to be cancelled and students registered for it were given the opportunity instead to take the CSE. Since most potential 'O' level students did not wish to take a CSE, they dropped the subject in favour of taking another 'O' level. As a consequence only the less able students took the subject at CSE, and since very few of these were of the appropriate calibre to continue on to the 'A' level, the number of students taking the latter had been affected.

In school No. 4, another factor which, in the opinion of the teacher interviewed, affected the viability of the 'A' level was a restriction on the number of 'O' level sciences which a student could take in that school. Students here were only allowed to take a maximum of two science subjects at 'O' level. Since most students intending to pursue study of 'A' level sciences elected to take two of biology, chemistry and physics, as these were the established sciences in that school, nearly all the students who elected to take 'O' level Environmental Science were potential arts students who selected it as their only science, for every student had to take at least one science at 'O' level. In most years, none of these 'O' level students continued on to take the 'A' level.

The interviews with the teachers in the three schools which were discontinuing the 'A' level revealed six factors which, in the opinion of the teachers interviewed, affected the viability of the 'A' level. These are:

1. Environmental Science has a Rural Science image.

2. Teacher in a position to dissuade students from taking the subject.

3. Subject not taught to potential 'O' level students in the first three years of the secondary school.

4. Restriction in the number of 'O' level sciences a student can take.

5. 'O' level and CSE syllabuses too dissimilar for classes to be combined when necessary.

6. Competition with local colleges for potential 'A' level students.

Of these six factors, only one, Environmental Science having a Rural Science image, was identified in each of the three discontinuing schools, and would, therefore, appear to be a factor of major importance in schools. Each of the other five factors appeared in only one of the three discontinuing schools but were, nonetheless, seen to be major factors in those schools and were claimed to contribute (in combination with the Rural Science image) to the discontinuance of the 'A' level because of lack of student interest.

9.4.2 SCHOOLS IN WHICH THE 'A' LEVEL IS TAUGHT ONLY INTERMITTENTLY

The 'A' level was taught intermittently in two of the schools in which interviews were held, and it was decided to see if these schools shared any of the characteristics of the schools in which the 'A' level was being discontinued, or whether there were other factors which contributed to the 'A' level being taught only intermittently in these two schools. A summary of the data collected from the interviews in these two schools is shown in Table 9.5.

TABLE 9.5

SUMMARY OF DATA COLLECTED IN INTERVIEWS IN THE TWO SCHOOLS IN WHICH THE 'A' LEVEL IS TAUGHT ONLY INTERMITTENTLY

FACTORS AFFECTING VIABILITY OF 'A' LEVEL	SCHOOL REFERENCE NO.	
	6	7
1. Rural science image	No	No
2. Subject taught prior to 'O' level	Yes	No
3. Ability levels taught the subject prior to 'O' level	Middle, Low	N/A
4. Ability levels of students allowed to select 'O' level	All	All
5. Restriction in number of 'O' level sciences which are taken	No	No
6. CSE/'O' level classes combined	Yes	Yes
7. Competition with local colleges	No	Yes
8. Teacher in a position to dissuade students from taking Environmental Science	Yes	No
Total number of candidates entered for 'A' level	11	4
Years candidates entered for 'A' level	1977, 1980*	1978, 1981*

* Projected figures based on present (1979) class sizes.

According to the teachers interviewed in both schools, the subject did not have a Rural Science image. In school No. 6 both teachers were graduate Rural Scientists (B.Ed.), and the subject was taught in the old Rural Science facilities but the teacher interviewed stated that Environmental Science was not identified with Rural Science because the change in name from Rural to Environmental Science had taken place a long time previously so most of the students in the school were not aware that Rural Science had once been taught there. School No. 7 had never offered Rural Science as such.

Environmental Science was taught to students in the first three years in school No. 6, whereas students' first acquaintance with the subject in school No. 7 was at the stage when students made their CSE/'O' level choices.

In school No. 6, however, the subject was only taught to the less able students in the first three years. As a consequence, very few of the more able students, who took General Science in the first three years, chose to take Environmental Science at 'O' level, as it was perceived as being a subject for the less able students. This, in turn, affected the numbers electing to take the 'A' level.

Another factor which also helped to diminish the viability of the 'A' level in school No. 6, according to the teacher interviewed, was the presence of a teacher in a position to dissuade students from taking it. The 'A' level tutor in the school did not recommend this 'A' level to potential sixth formers because he did not think that this 'A' level was an acceptable matriculation subject for universities. (See Chapter 11 for universities' acceptance of the 'A' level).

A factor which had a major effect on the viability of the 'A' level in school No. 7 was competition for potential sixth formers with the local college of further education which drastically decreased the size of the school's sixth form. In this school, according to the teacher interviewed, the majority of potential sixth formers left the school at the end of the fifth year to attend the local college of further education to take their 'A' levels because this college offered a greater variety of 'A' levels than did the school (but not Environmental Science). At the time of the interview, the total number of sixth formers in the whole school (total student number = 750) was only 17, and this made it difficult to teach <u>any</u> 'A' level every year, and of this sixth form of 17, only two were taking Environmental Science.

Even though these two schools which taught the 'A' level only intermittently did not themselves share any characteristics which affected the viability of the 'A' level, each did share a number of characteristics with one or more of the schools which had discontinued the teaching of the 'A' level, namely:

1. Less able students take the subject before CSE/'O' level.
2. Teacher in a position to dissuade students from taking the subject.
3. Competition for potential sixth formers with a local college.

It would seem, therefore, that the factors which diminished the viability of the 'A' level in these two schools were not unlike those factors which contributed to the discontinuance of the 'A' level in other schools, except that Environmental Science did not have a Rural Science image in these two schools.

9.4.3 SCHOOLS IN WHICH THE 'A' LEVEL CONTINUES TO BE TAUGHT

Two schools involved in the main phase of the interviewing programme were continuing the teaching of the 'A' level. A summary of the data collected from the interviews in these two schools is shown in Table 9.6, along with the data from the one school (school No. 2) in the preliminary interviews which was also continuing to teach the 'A' level.

TABLE 9.6

SUMMARY OF DATA COLLECTED IN INTERVIEWS IN THE THREE SCHOOLS IN WHICH THE 'A' LEVEL CONTINUED TO BE TAUGHT

FACTORS AFFECTING VIABILITY OF THE 'A' LEVEL	SCHOOL REFERENCE NO.		
	2	8	9
1. Rural Science image	No	No	No
2. Subject taught prior to 'O' level	Yes	Yes	No
3. Ability levels taught the subject prior to 'O' level	All	High	N/A
4. Ability levels of students allowed to select 'O' level	All	High	High
5. Restriction in number of 'O' level sciences which are taken	No	No	No
6. CSE/'O' level classes combined	Yes	No	Yes
7. Competition with local colleges	No	No	No
8. Teacher in a position to dissuade students from taking subject	No	No	No
9. Other factors?	None	Combining of 1st/2nd year 'A' level	None
Number of candidates for 'A' level	25	15	15
Years candidates offered for 'A' level	1978, 1979, 1980	1978, 1979, 1980	1978, 1979, 1980

Even though Rural Science had been, or, in one case, was still being taught, in each of these three schools, and even though the Environmental Science Department used the facilities of the old Rural Science Department, the teachers interviewed stated that the subject (Environmental Science) did not have a Rural Science image. Several reasons were offered for this being the case. In school No. 2, the two teachers of the 'A' level were both graduate biologists who had gained employment in the school after Rural Science as a subject had been phased out, so neither they, nor the subject they were employed to teach, namely, Environmental Science, were identified with Rural Science. In school No. 8, Environmental Science was taught only to more able students in the first three years while Rural Science was taught to less able students, thereby enabling a distinction to be made between the two subjects, with Environmental Science clearly being identified with the more able students. In school No. 9, the changeover from Rural to Environmental Science had taken place early in the 1970's, and since Rural Science was no longer taught in the school Environmental Science was not identified with Rural Science.

Environmental Science was taught to students before the fourth year in schools No. 2 and No. 8, so the subject was on an equal footing with the other sciences which were also taught in the first three years. Students in these two schools, therefore, could select 'O' level Environmental Science because of prior knowledge of the subject, so the subject was not at a disadvantage to other sciences as it was in school No. 9 where biology, chemistry and physics were taught to students before the fourth year but Environmental Science was not.

The teacher interviewed in school No. 9 considered that these circumstances affected Environmental Science numbers to its disadvantage, and had, therefore, forwarded a request to the Head of Science that the subject also be offered to students in their third year, before the time came when they were asked to select CSE's and 'O' levels.

None of these schools restricted the number of 'O' level sciences a student could take.

In schools No. 2 and No. 9 the CSE and 'O' level Environmental Science classes were taught together as the two syllabuses were very similar, but in school No. 8 this was not possible since the CSE syllabus in that area was quite different from the JMB 'O' level syllabus.

None of these schools was in competition with local colleges for potential sixth formers, and none of the schools reported teachers in a position to dissuade students from taking the subject.

For the most part, therefore, the factors which operated against the viability of the 'A' level in the "discontinuing" schools and "intermittent" schools were not detected in the three schools which were continuing to teach the 'A' level. In addition, one school, No. 8, reported a special strategy to ensure the continuance of the 'A' level in the short term in the case of small, unviable numbers of students wishing to take the 'A' level in any one year. In this school, the teacher had purposely combined the 1st and 2nd year 'A' level classes. In this way, even if no students wished to take the 'A' level in a particular year, the subject would still be taught to the second year group and the subject would remain in the school's timetable. The combining of the two years was also a device to help ensure viable class numbers. None of the other schools in the interview programme reported the formulation of special strategies for the continuance of the 'A' level.

9.4.4 CONCLUSIONS FROM THE SCHOOL INTERVIEW PROGRAMME

When the three schools in which the 'A' level continues to be taught are compared with the six in which the 'A' level was either being discontinued or was only taught intermittently, no one single factor appears to distinguish between these different groups of schools. There were, however, a number of factors which were identified as having positive or detrimental effects on the viability of the 'A' level in these different schools. The factors which seem to reinforce the viability of the 'A' level are:

1. The image of Environmental Science is distinct from that of Rural Science.

2. Potential students of CSE/'O' level Environmental Science are exposed to the subject before they select their CSE/'O' level subjects.

3. There is no restriction on the number of science 'O' levels a student can take.

4. There is no teacher in a position to dissuade students from taking the subject.

5. The CSE and 'O' level syllabuses are sufficiently similar for CSE and 'O' level Environmental Science classes to be combined, when the 'O' level class is by itself too small to be viable.

6. The school is not in competition for sixth formers with local colleges.

7. There are special strategies designed to ensure the continued offering of the 'A' level.

These seven different factors have been identified in this interview programme as promoting the viability of the 'A' level, although each of the seven factors may not operate in each school. These factors, when present, have been reported by one or more of the teachers interviewed to enhance the 'A' level's viability. The reverse of each of these factors as listed have been reported by one or more of the teachers interviewed as decreasing the 'A' level's viability.

9.4.5 INTERVIEWS WITH TEACHERS IN SCHOOLS IN WHICH THE TEACHING OF THE 'A' LEVEL HAD ONLY JUST BEGUN

Having conducted interviews with teachers in nine schools which had taught the 'A' level for a number of years and had entered candidates for the final examinations of this 'A' level, it was then decided to expand the interview programme to include a number of schools in the proximity of Keele which had only taught the 'A' level for one year.

This expansion of the interview programme included interviews with the Head of Environmental Science in each of the four schools known to have commenced teaching of the 'A' level in September, 1979 and which expected to enter candidates for the June, 1981 final examinations of the subject. A summary of the data collected from these four interviews is presented in Table 9.7.

TABLE 9.7

SUMMARY OF DATA COLLECTED IN INTERVIEWS IN THE FOUR SCHOOLS WHICH HAD BEGUN TO TEACH THE 'A' LEVEL IN SEPTEMBER, 1979

FACTORS AFFECTING VIABILITY OF THE 'A' LEVEL	SCHOOL REFERENCE NUMBER			
	10	11	12	13
1. Rural science image	No	No	No	No
2. Subject taught prior to 'O' level	Yes	Yes	Yes	Yes
3. Ability levels taught the subject prior to 'O' level	All	All	All	All
4. Ability levels of students allowed to select 'O' level	Upper	Upper	Upper	Upper
5. Restriction in number of 'O' levels which are taken	No	No	No	No
6. CSE/'O' level classes can be combined if necessary	No	N/A	N/A	Yes
7. Competition with local colleges	No	No	No	No
8. Teacher in a position to dissuade students from taking subject	No	No	No	No
9. Other factors?	CEE Publicity	-	-	Good 'O' level results

Each of the teachers interviewed in these four schools stated that the subject did not have a Rural Science image. In each of these schools the subject was taught to all students, irrespective of ability level, at some time in the first three years, so that all students were acquainted with the subject by the time that they had to select subjects for study at

CSE/'O' level at the end of the third year. There was no restriction on the number of 'O' level sciences which a student could take in these schools.

School No. 13 was the only one of these four schools in which the syllabus for the CSE and the 'O' level classes in Environmental Science was similar enough to allow the classes to be combined. In school No. 10, the CSE syllabus was quite different from the JMB 'O' level syllabus, so the two classes could not be taught together even if there should be small numbers for a separate 'O' level class. Neither school No. 11 or 12 offered a CSE in Environmental Science, since the less able students in these two schools took Rural Science instead.

Each of the teachers interviewed stated that, as far as they knew, there were no teachers who actively dissuaded students from taking the subject. They also stated that their schools were not in competition with local colleges for potential sixth formers.

Two of the teachers named factors which in their opinion enhanced the viability of the 'A' level within their own schools. In school No. 10, the teacher had devised his own Mode 3 CEE syllabus in Environmental Science and this had first been offered at the sixth form level to see if there would be a potential market for the 'A' level. This teacher, however, did not discontinue the teaching of the CEE syllabus when the 'A' level was introduced, but instead offered both syllabuses to sixth formers. Since the CEE syllabus was designed to be the same as the first year of the 'A' level syllabus, first year 'A' level students and CEE students were taught in the same class, and the second year 'A' level students then formed a separate class. This particular strategy also allowed successful CEE students to continue and complete the second year, and sit for the 'A' level if they wished. It also allowed 'A' level students to take the CEE examination at the end of the first year in the sixth form, and gain a qualification regardless of their final success with the 'A' level. The combination of first year 'A' level and CEE classes also ensured viable class numbers for the Environmental Science CEE/'A' level.

Another factor which the teacher in school No. 10 considered as influencing the viability of the 'A' level was that of favourable publicity for the subject within the school. In this school, students of this 'A' level won an Institute of Energy essay competition and their success was publicised in the local newspapers. This success had also resulted in favourable publicity for the subject within the school and had, according to the teacher interviewed, served to attract more students to take this subject than would otherwise have occurred.

In school No. 13, the pass rate in 'O' level Environmental Science was thought to enhance the viability of the 'A' level. In this school, the Environmental Science 'O' level had the best pass rates of any of the 'O' level sciences (usually 100%) and this, according to the teacher interviewed, encouraged many students to continue to study the subject at 'A' level. In most of the schools in this survey, students were allowed to take 'A' level Environmental Science even if they had not taken the 'O' level, provided that they had some 'O' level sciences, or in some cases, good CSE passes. In school

No. 13, however, students intending to take the 'A' level were required to have gained at least a B grade in 'O' level Environmental Science. Despite having the highest entrance criteria of any of the schools in this survey, the numbers of students taking the 'A' level in this school exceeded the numbers taking any of the other established science 'A' levels in this school.

Even though it is too soon to decide whether or not the 'A' level will be viable in these four schools, it does appear likely that it will be so, since these schools share many of the characteristics of "continuing" schools and few of the characteristics of "discontinuing" or "intermittent" schools. The interviews in these four schools also brought to light several factors which enhanced the 'A' level's viability and which had not been detected in the other schools in which interviews had been conducted. These factors were:

1. Offering the CEE along with the 'A' level to enhance viability of the joint CEE/'A' level class.
2. Good publicity for the subject.
3. 'O' level Environmental Science pass rates which were better than other science 'O' levels.

9.4.6 CONCLUSIONS FROM THE SCHOOL INTERVIEWS

As a result of this series of interviews, it has been possible to identify a number of factors which have been either beneficial or detrimental to the viability of the JMB Environmental Science 'A' level. It has also been possible to compare the situations which exist in schools in which the 'A' level has been discontinued or only intermittently taught, with the situations which exist in those schools in which it had been taught continuously and appeared to be viable.

From these interviews the most prominent characteristics of a school in which the teaching of the 'A' level is likely to continue emerge as:

1. The image of Environmental Science is distinct from that of Rural Science.

2. The subject is taught to potential CSE/'O' level candidates before the time at which they have to select subjects for study at CSE/'O' level.

3. There is no active discouragement of students from choosing the subject at 'O' or 'A' level.

4. There is no competition for potential sixth formers with local colleges.

A number of other factors were identified as diminishing the viability of the 'A' level in only one of each of some of the schools covered in the interview programme. These factors included the CSE and 'O' level syllabuses not being sufficiently similar to allow CSE and 'O' level classes to be combined, and restriction in the number of 'O' level sciences which a student can take. It can be hypothesised that a school in which the teaching of the 'A' level is likely to continue would not possess any of these characteristics.

In addition, a number of factors were identified as enhancing the viability of the 'A' level in only one of each of some of the schools covered in the interview programme. These included good publicity for the 'A' level, combining of first and second year 'A' level classes, offering of both CEE and 'A' level in combined classes, and good pass rates in the 'O' level. Since each of these factors tended to enhance the viability of the 'A' level, it is likely that the possession of such characteristics would be found in schools in which the teaching of the 'A' level is likely to continue, but would be unlikely to be found in schools in which the teaching of the 'A' level is being discontinued.

Having, therefore, identified a number of factors which appeared to affect the viability and, therefore, continuance of the 'A' level in schools, it was then possible to use the presence or absence of these factors in a school to calculate a score for each of the 13 schools in the survey. For the purpose of scoring, the four factors listed above (No.'s 1 to 4) and identified in a number of schools as enhancing the viability of the 'A' level, as well as a further three factors identified as probably enhancing the viability of the 'A' level were used, as listed below.

1. The image of Environmental Science is distinct from that of Rural Science.

2. The subject is taught to potential CSE/'O' level candidates before the time at which they have to select subjects for study at CSE/'O' level.

3. There is no active discouragement of students from choosing the subject at 'O' or 'A' level.

4. There is no competition for potential sixth formers with local colleges.

5. Both CSE and 'O' level Environmental Science are offered and are sufficiently similar to allow CSE/'O' level classes to be combined.

6. There are no other diminishing factors present (e.g. no restriction on the number of 'O' level sciences which can be taken).

7. Other factors enhancing viability (e.g. good publicity for 'A' level; combining of first and second year 'A' level classes; offering of both CEE and 'A' level in combined classes; good pass rates in 'O' level Environmental Science).

Each factor was scored 1 if it was present (and enhanced the viability of the 'A' level) and 0 if it was absent (and tended to diminish the viability of the 'A' level). The results of this scoring technique are shown in Table 9.8. The information gathered during the interviews was used to produce the score for each school.

TABLE 9.8

THE SCORING OF THE FACTORS WHICH AFFECTED THE VIABILITY OF THE 'A' LEVEL IN SCHOOLS NO. 1 TO NO. 13

FACTOR	SCHOOL REFERENCE NO.												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Image of Environmental Science is separate from Rural Science	0	1	0	0	1	1	1	1	1	1	1	1	1
2. Env. Sci. taught to potential 'O' level students before 'O' level	0	1	0	1	0	0	0	1	0	1	1	1	1
3. No active discouragement of students from choosing Env. Sci.	1	1	0	1	1	0	1	1	1	1	1	1	1
4. No competition with local colleges	0	1	1	1	1	1	0	1	1	1	1	1	1
5. CSE/'O' level Env. Sci. taught and can be combined	1	1	0	0	0	1	1	0	1	0	0	0	1
6. No other diminishing factors present	1	1	0	0	1	1	1	1	1	1	1	1	1
7. Presence of other enhancing factors	0	0	0	0	0	0	0	1	0	2	0	0	1
TOTALS	3	6	1	3	4	4	4	6	5	7	5	5	7

This table shows that the three schools (No.'s 1, 3 and 4) in which the 'A' level was being discontinued because of a lack of student interest had scores below 4, while the schools in which the 'A' level was continuing to be taught and was considered viable had scores of 5 or above. The two schools (No.'s 6 and 7) in which the 'A' level was intermittently taught both scored 4, a score which was higher than that of "discontinuing" schools, but lower than that of "continuing" schools. School 5, which had a score of 4, was the school discontinuing the teaching of the 'A' level because of re-organisation.

This method of scoring schools according to the presence of factors which affect the viability of the 'A' level does distinguish between those schools in which the 'A' level is viable and those in which it has been discontinued or is only intermittently taught. This method of assigning scores to schools would, therefore, seem to be a means of predicting the likely success or failure of this 'A' level in those schools which implement it.

9.5 THE COLLEGES OF FURTHER EDUCATION AND SIXTH FORM COLLEGES

Interviews have been conducted with the lecturers in charge of the teaching of Environmental Science 'A' level in five colleges of further education and two sixth form colleges, and in each the number of candidates taking the 'A' level was considered to be viable by those interviewed.

None of these colleges is intending to discontinue the teaching of the 'A' level, so this section is concerned only with identifying those factors operating in these colleges which tended either to promote or diminish the viability of the 'A' level.

The data collected from interviews in the colleges suggest that there are five factors which might influence the viability of the 'A' level in colleges, namely:

1. The attitude of the Head of Science to the 'A' level.
2. The presence/absence of feeder schools which teach CSE/'O' level Environmental Science.
3. The method used to recruit students.
4. Competition for 'A' level students with other schools and colleges in the area.
5. Who interviews prospective students.

9.5.1 COLLEGES OF FURTHER EDUCATION

The initial exploratory interview programme which was used to develop the Interview Schedule (see 9.3.1) involved only one college (No. 1), and the information gathered from this interview was used to formulate guidelines for later interviews with colleges No.'s 2, 3 and 4. The expanded programme to incorporate establishments which had only just begun to teach the 'A' level in September, 1979 involved only one college, No. 5. Since the total number of colleges (n = 5) was small, it was decided to consider the data collectively, although the data for one college was collected during the preliminary interview stage, for three colleges was collected during the main interview stage, and for the fifth college was collected during the final interview stage which involved establishments which had only just begun to teach the 'A' level.

The data collected from the interviews with the lecturers in these five colleges of further education are summarised in Table 9.9.

TABLE 9.9

SUMMARY OF THE INFORMATION COLLECTED DURING INTERVIEWS IN THE FIVE COLLEGES OF FURTHER EDUCATION

	COLLEGE REFERENCE NUMBER				
ITEM	1	2	3	4	5
1. Head of Science has a positive attitude to Env. Sci.	Yes	Yes	No	Yes	Yes
2. Competition for students with local establishments	Yes	Yes	No	Yes	Yes
3. Method of advertising the 'A' level in addition to brochures	Newspaper Adverts	None	Talks	Talks	Newspaper Adverts.; Talks
4. Who interviews potential applicants to Science Dept.?	Science Staff Member	E. Sci. Lecturer	Head Science	All Science Staff	All Science Staff
5. Presence of feeder schools teaching CSE/ 'O' level Env. Sci.	Yes	No	No	No	No
6. Other factors?	Combine 1st/ 2nd/'O'	Combine 1st/2nd	Combine 1st/2nd	Combine 1st/2nd	N/A
Total number of candidates entered for 'A' level	16	7	25	21	-
Years candidates offered for examination	1978 1979 1980	1980	1978 1979 1980	1977 1978 1979	-

In each of these five colleges the 'A' level is administered by the Science Department, so the attitude of the Head of Science is important to the continued offering of the Environmental Science 'A' level. In college No. 3, for instance, the Head of Science had a negative attitude to the 'A' level. According to the Environmental Science lecturer there, the Head of Science regarded the 'A' level as a "soft option - an easy 'A' level for boys", and as a "girls' physics", and as "a way of dragging more students into his department", and "if not clever enough to do physics [the Head of Science was a physicist] they do Environmental Science". As a consequence of his attitude to this 'A' level, according to the lecturer interviewed, the Head of Science did not mention the 'A' level in his talks to fifth formers at the local schools on the science offerings at the college, and the 'A' level is only mentioned to those students for whom it is thought suitable during the interviews of prospective students by the Head of Science. This has affected the number and types of students taking the 'A' level, such that most of them have been girls. In each of the other four colleges, the Head of Science had a positive attitude to the subject, according to the lecturers interviewed, so the 'A' level did not suffer from the problems which existed in college No. 3, and in each of the other colleges there were approximately equal numbers of male and female students.

Most of the colleges involved in the interview survey had to compete with other establishments (schools, sixth form colleges) for potential 'A' level students. However, college No. 3, although classified as a college of further education, is the only establishment in its area to offer 'A' levels, and all students in the area wishing to take 'A' levels attend this college. There was, therefore, no competition for potential 'A' level students between this college and other local establishments.

Competition for potential 'A' level students resulted in these colleges engaging in various methods of student recruitment. Each of the five colleges distributed prospectuses to fifth form students in local schools, and three advertised in local newspapers. The Head of Science in both college No. 3 and No. 5 visited local schools to inform fifth formers about the courses offered within their departments. The advertising of the 'A' level to potential candidates was an important factor in attracting students to take this particular 'A' level, since, unlike the traditional sciences, it was a new subject to most potential students. Even though, for instance, all the potential 'A' level students in the locality attended College No. 3, the number of candidates for this 'A' level could have been higher, for, according to the Environmental Science lecturer in this college, the Head of Science did not mention it in his talks to fifth formers in local schools, and many potential students were unaware of the 'A' level's existence.

In several of the colleges, according to those interviewed, the personnel interviewing potential students also affected the numbers of candidates selecting the 'A' level. In college No. 3, for example, the Head of Science interviewed all applicants interested in taking 'A' level sciences and, according to the lecturer involved, only mentioned 'A' level

Environmental Science to those for whom he thought it appropriate, in this case, female students and less able male students. As a result of this policy, the numbers taking the 'A' level were lower than they might otherwise have been and nearly all the students were female. Interviewing of potential science students in college No.'s 1, 4 and 5 was conducted by all members of the Science Department and, as far as could be judged by the Environmental Science lecturers in these colleges, the interviewers mentioned the Environmental Science 'A' level to all students interviewed, along with the other science 'A' levels offered, and did not try to dissuade students from taking this 'A' level. In College No. 2, Environmental Science seemingly had an advantage over other science 'A' levels since it was the lecturer in charge of the subject who also happened to be the 'A' level tutor and interviewed all potential students interested in taking science 'A' levels.

Only college No. 1 of the five colleges involved in the interview survey was in an area in which the feeder schools offered CSE and/or 'O' level Environmental Science, and a number of the students taking the 'A' level in this college had, according to the lecturer interviewed, previously taken the subject at CSE or 'O' level in their schools. It is to be expected that feeder schools teaching the subject at CSE or 'O' level would produce a potential pool of students interested in further study of the subject at 'A' level. However, even though this college was in an area in which some of the feeder schools taught the subject at CSE or 'O' level, this potential advantage which the 'A' level in this college had over other colleges in this survey was offset by the fact that the local schools which taught the CSE/'O' level also offered the 'A' level and, therefore, competed with the college for 'A' level Environmental Science students.

The offering of 'A' levels by colleges of further education is governed by regulations issued by the Department of Education and Science, which include the stipulation that, on average, a minimum of 12 students is necessary to run an 'A' level. In practice, the 'A' level (or any other 'A' level) is allowed to run with fewer than this number provided that the number of students taking all the science 'A' levels offered by the college averages out at 12 per course. However, the lecturers interviewed stated that if the numbers for Environmental Science were consistently below 12, the subject in all probability would be discontinued. In order to achieve the required minimum number of students for this 'A' level, three of the five colleges in the survey had combined their first and second year 'A' level classes, and in another college an Environmental Science 'A' level night class had been allowed to proceed by the Head of Science only because it had been combined with an 'O' level class to produce a viable size.

Even though only four of the five colleges in this survey had presented candidates for the final examination in 'A' level Environmental Science, an attempt was made to assess the relative importance of each of these five factors on the numbers of candidates entered by each college for the final examinations of the 'A' level. Each factor was scored 1 if present, and 0 if absent for each of colleges No.'s 1 to 4, and the score for each college is shown in Table 9.10.

TABLE 9.10

SCORING OF THE COLLEGES OF FURTHER EDUCATION BASED ON THE FACTORS IDENTIFIED AS POSSIBLY HAVING AN EFFECT ON THE NUMBER OF STUDENTS TAKING 'A' LEVEL ENVIRONMENTAL SCIENCE

FACTOR	COLLEGE REFERENCE NUMBER			
	1	2	3	4
1. Head of Science has a positive attitude to subject	1	1	0	1
2. No competition with local establishments for students	0	0	1	0
3, Method other than brochure used to advertise 'A' level	1	0	1	1
4. Env. Sci. lecturer interviews all prospective 'A' level science students	0	1	0	0
5. Feeder schools teach subject at CSE/'O' level	1	0	0	0
6. Other factors used to produce viable class size (i.e. combining 1st and 2nd year 'A' level classes)	1	1	1	1
TOTALS	4	3	3	3
Average number of candidates entered for 'A' level expressed as numbers/1000 full-time college students	4.1	7.4	4.5	3.5

The table does not show any direct relationship between the calculated score for a college and the average number of candidates for the 'A' level, expressed as a proportion of the total number of full-time students in that college. College No. 1 had the highest score but the third lowest number of candidates, while college No. 2 had the lowest score but the highest mean annual number of candidates. It is apparent, then, that equal weighting cannot be given to each of the factors used to calculate the score, as their effects on candidate numbers are not equal. Examination of the data for college No. 2, with the proportionately highest number of candidates, shows that it differs from each of the other three colleges in two respects. The first is that it does not advertise its courses, other than by brochure, and secondly, it is the lecturer in charge of Environmental Science who interviews all prospective 'A' level science students. Since the lack of advertising would not be expected to lead to an increase in student numbers, it is felt that the only factor identified in this study likely to be important is that science students are interviewed by the lecturer in charge of Environmental science which results in the higher number of candidates entered for the 'A' level. Since this conclusion is based on such a small sample of colleges, there may also be other factors which have an effect on student numbers, including factors which were not detected during the interviews.

9.5.2 THE SIXTH FORM COLLEGES

Interviews were conducted in only two sixth form colleges, one in the major phase of interviewing and the other in the expanded programme to cover local establishments which had only just begun to teach the 'A' level, and for this reason the data gathered from both interviews are dealt with together. Since no sixth form colleges were involved in the initial phase of interviewing to develop the interview schedule, it was originally hypothesised that the factors affecting the viability of the 'A' level in sixth form colleges would be similar to those operating in the colleges of further education. The summary of data collected from the interviews is shown in Table 9.11. The 'A' level in both colleges was taught within the Science Department, in one case within the Biology Department, and in the other in a separate Environmental Science Department. The most senior lecturer of the 'A' level in each case was the Head of the appropriate department.

TABLE 9.11

SUMMARY OF THE INFORMATION COLLECTED DURING INTERVIEWS IN THE TWO SIXTH FORM COLLEGES

ITEM	COLLEGE REFERENCE NUMBER	
	6	7
1. Principal/Head of Science has a positive attitude to subject	Yes	Yes
2. Competition for students with local establishments	Yes	Yes
3. Method of advertising 'A' level in addition to brochure	College exhibition	Talks to local schools
4. Who interviews prospective students?	Head of Science	Head of Science
5. Presence of feeder schools teaching subject at CSE/'O' level	No	No
6. Other factors used to produce viable class size	None	None
Total number of candidates for 'A' level	32	-
Years candidates entered	1977, 1978, 1979, 1980	-

In both colleges the Principal and Head of Science were reported as being positive in their attitudes to the 'A' level. The lecturers interviewed in both colleges stated that they were in severe competition for potential 'A' level students with local colleges of further education which had larger student enrolments and offered a greater variety of 'A' levels and other courses. College No. 6 also had to compete with another larger sixth form college. This competition for students led to a lower number of students entering the colleges than might otherwise have been, and this resulted in smaller numbers of candidates for 'A' level Environmental Science.

Both colleges distributed brochures describing their offerings to local school fifth formers. In college No. 7, lecturers from the college gave talks to the fifth formers at the local schools, but at the time none of the persons involved in the teaching of the 'A' level was involved in these talks, and the Head of Biology here stated that they would probably have to do so to attract more students to take Environmental Science at the college. College No. 6 had a special strategy to attract students to the college. Each year this college held an open day on which all fifth formers from local schools visited the college to view the facilities and to observe the demonstrations put on by each subject, and to listen to talks on each subject by lecturers of that subject. The Environmental Science lecturer in this college stated that his demonstration was usually the most visually attractive and seemed to attract most student interest during these open days. This lecturer had also prepared an attractive booklet on the Environmental Science courses which he distributed to each school in the area. This lecturer was certain that these strategies served to attract more students to take the 'A' level than there otherwise might have been. The Head of Science in both colleges interviewed prospective science applicants and those lecturers interviewed presumed that the 'A' level was mentioned to prospective students during the interviews.

Neither college was in an area where the 'O' level or CSE in the subject was taught in the feeder schools, and both lecturers interviewed felt that the 'A' level suffered from the fact that there was no pool of students who had been acquainted with the subject in schools, and who might have been interested in continuing further studies of the subject at 'A' level in their colleges.

The limited data collected from the interviews in these two colleges suggested that the factors which influenced the viability of the 'A' level were similar to those encountered in the colleges of further education. Competition for potential 'A' level students with local colleges and the absence of feeder schools teaching the subject were felt by those interviewed as being major problems, and the method of advertising the 'A' level to potential students was, consequently, of great import.

Since sixth form colleges, unlike colleges of further education, had no minimum number of students for 'A' level courses laid down by the Department of Education and Science, such criteria as existed were laid down by the college principal, and, therefore, the attitude of the principal was important to the continued offering of the 'A' level. At the time of the interviews, neither college had formulated special mechanisms to promote viability of the 'A' level as had been done in colleges of further education.

9.6 CONCLUSIONS

Shipman's (1973) method of calculating investment scores for those schools involved in project field trials of the Keele Integrated Studies Project, as a means of assessing the success of the project (measured in terms of contractual success and/or curriculum impact), was used as a basis in this present study to calculate implementing schools' investment in the Environmental Science 'A' level. It was then proposed to see what, if any, relationship existed between these investment scores and the success (measured as continued teaching of the 'A' level, and/or numbers of candidates entered by each establishment for the final 'A' level examinations) of the 'A' level in these colleges and schools. However, the magnitude of the investment scores showed only a small positive correlation with the success of the 'A' level in schools and colleges, where success was measured either in terms of the establishment continuing to offer the 'A' level or in terms of the average numbers of candidates per annum entered for the final examinations of this 'A' level.

Since this method had not been successful in measuring the success of the 'A' level in the 21 establishments involved in the Implementer Questionnaire Survey, a series of interviews was undertaken in an attempt to identify those factors which enhance or diminish the viability and continued teaching of the 'A' level in schools and colleges.

An analysis of the differences between the responses of teachers of this 'A' level in schools in which the 'A' level either has been discontinued or is taught intermittently and the responses from teachers in schools in which the 'A' level continues to be taught, suggests that the following factors affect the viability of the 'A' level. A school in which the 'A' level continues to be taught is more likely to display the following characteristics:

1. The image of Environmental Science is distinct from that of Rural Science.

2. The subject is taught to potential 'O' level students in the first three years of secondary school.

3. There is no active discouragement of students from choosing the subject at 'O' or 'A' level.

4. There is no competition for potential 'A' level students with local colleges.

5. There is no other factor likely to diminish the viability of the 'A' level (i.e. the CSE and 'O' level Environmental Science syllabuses are both offered but are not sufficiently similar that they can be taught together in one class if conditions dictate; restriction in number of science 'O' levels a student can take).

6. There are special circumstances/strategies available which enhance the viability of the 'A' level (i.e. combining first and second year 'A' level classes; combining first year 'A' level and CEE classes; good publicity for 'A' level; high 'O' level Environmental Science pass rates).

Having identified these factors, a new score was calculated for each of these schools in the survey, using the above-named factors. The level of these scores appears to relate well with the school's success with the 'A' level, both in terms of the continued teaching of the 'A' level and with the number of candidates entered annually for the final examinations of this 'A' level. This new scoring method could, therefore, be used to predict whether or not the teaching of this 'A' level can be expected to be continued in a school which had implemented it.

The data collected from interviews in a limited number of colleges of further education are less conclusive but suggest that the factors which affect the continued teaching and viability of the 'A' level differ from those operating in the schools. The factors identified were:

1. The attitude of the Head of Science to the 'A' level.

2. Competition for potential 'A' level students with local school sixth forms and/or sixth form colleges.

3. Method(s) by which knowledge of the 'A' level is brought to prospective students' attention.

4. Person who interviews prospective science 'A' level students.

5. Presence/absence of feeder schools which teach CSE/'O' level Environmental Science.

6. Other factors which enhance the viability of the 'A' level, e.g., combining of first and second year 'A' level classes.

A scoring technique for colleges of further education based on these factors did not relate to the number of candidates entered by the colleges for the final examinations of this 'A' level. Further analysis of the data shows that the college in which the person who interviews all prospective science 'A' level students is the lecturer in charge of Environmental Science, enters proportionately more candidates for the 'A' level than other colleges.

Interviews were conducted in only two sixth form colleges but the collected data suggested that the factors affecting the viability of the 'A' level in these colleges are not unlike those operating in colleges of further education. These are:

1. The attitude of the Principal to the 'A' level.

2. Competition for potential students with local colleges of further education.

3. Method by which knowledge of the 'A' level is brought to prospective students' attention.

4. Presence/absence of feeder schools which teach CSE/'O' level Environmental Science.

CHAPTER TEN

JMB ENVIRONMENTAL SCIENCE 'A' LEVEL UPTAKE RATE

10.1 INTRODUCTION

Carlson (1965), Rogers (1962) and Rogers and Shoemaker (1971) all have shown that the rates of adoption of educational innovations in the United States follow an S-shaped curve, and Petch (1953) has shown a similar pattern of adoption of new syllabuses in England.

Scott (1979) in a review of the growth of environmental education in secondary schools in England took into account both the numbers of candidates entered for these examinations and also the number of schools entering candidates for these examinations, since he found that these two figures taken together were more meaningful indicators of the existence and growth of this aspect of environmental education than either of them taken separately. It was decided, therefore, that the investigation of the uptake of this 'A' level would include both the number of examination centres and the number of candidates entered for this examination.

It was also decided to compare the numbers implementing this 'A' level over time with those of other comparable and longer-established 'A' levels, such as other environmental 'A' level syllabuses and other local JMB science 'A' level syllabuses, to see if the pattern of Environmental Science uptake was similar to that of similar 'A' levels.

It was also decided to find out the number of candidates taking the 'O' level in this and other related subjects, as well as the number of candidates taking the 'A' level in these subjects two years later. This provides a basis for predicting future numbers of 'A' level candidates.

As part of this investigation, it was also decided to establish what, if any, competition existed between the three environmental 'A' levels, since both the AEB and London syllabuses had been available in the region for several years prior to the introduction of the JMB 'A' level. All of this information could be used to shed light on the future numbers of centres entering candidates for this 'A' level.

10.2 UPTAKE OF THE JMB ENVIRONMENTAL SCIENCE AND THE AEB AND LONDON ENVIRONMENTAL STUDIES 'A' LEVEL SYLLABUSES

At the present time (1981) there are three environmental science/studies 'A' level syllabuses available in England, of which the JMB Environmental Science 'A' level is the most recent. The other two syllabuses, both entitled "Environmental Studies", are examined by the Associated and the London Schools Examining Boards, the former first having been examined in 1974, and the latter in 1975. Table 10.1 shows the total number of candidates who sat the examinations for these three syllabuses from 1974, the first year of the examination of the AEB syllabus, to the present time.

TABLE 10.1

NUMBERS OF CANDIDATES SITTING FOR THE
AEB, JMB AND LONDON ENVIRONMENTAL 'A' LEVELS

	NUMBER OF CANDIDATES SITTING THE EXAMINATION								
EXAMINATION BOARD	1974	1975	1976	1977	1978	1979	1980	1981	TOTALS
AEB	9	34	31	57	37	63	102	143	476
London	-	89	150	171	189	271	169	160	1199
JMB	-	-	-	8	106	68	103	132	417
YEARLY TOTAL OF ALL CANDIDATES	9	123	181	236	332	402	374	435	2092
ACCUMULATED YEARLY TOTAL OF ALL CANDIDATES	9	132	313	549	881	1283	1657	2092	

Figure 10.1 shows a graph of the candidate numbers entering the examinations for each board for each year, and the total accumulated number of candidates sitting for all three examinations for the period 1974 to 1981.

The graph shows that after an initial period of growth from 1975 to 1979, the rate of increase of numbers of candidates for the London examination has dropped, while the rate of increase in candidate numbers for both the AEB and JMB examinations has accelerated at a very similar rate since 1978 and shows no sign of levelling off at present.

The graph also shows that while there is no clear pattern evident in the numbers of candidates sitting for each of the separate examinations, the slope of the graph of

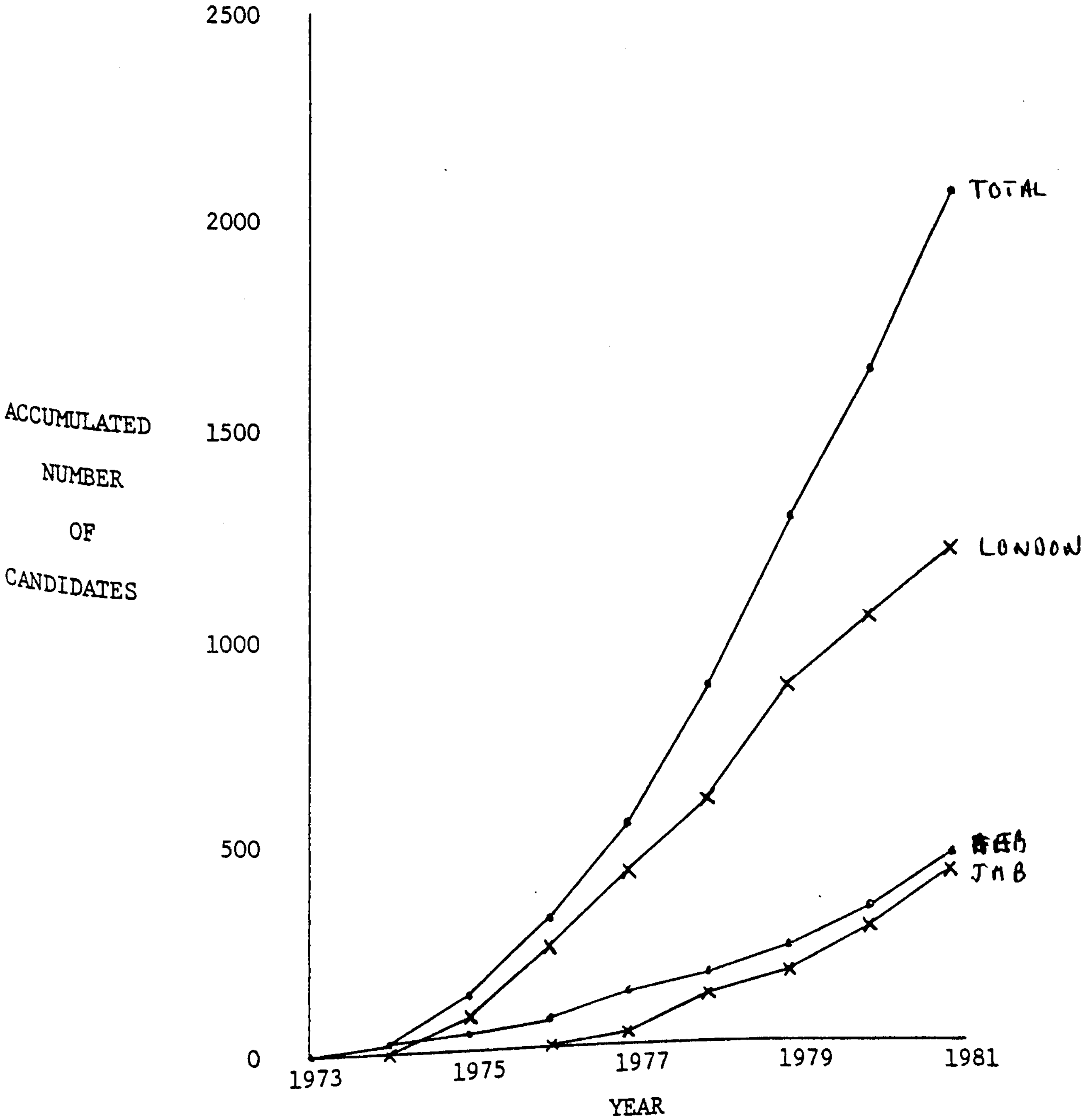


FIGURE 10.1

GRAPH SHOWING ACCUMULATED TOTAL NUMBER OF CANDIDATES SITTING FOR THE FINAL EXAMINATIONS OF THE AEB, JMB AND LONDON ENVIRONMENTAL 'A' LEVELS FOR THE PERIOD 1973 TO 1981 total accumulated candidate numbers for all examinations is approximately J-shaped and is similar to the lower half of an S-shaped curve. This shows that there is no evidence to date that the total numbers of candidates for these examinations has reached a plateau, for that would show the upper half of an S-shaped curve. The graph shows that the rate of increase in total numbers of all Environmental Science/Studies 'A' level candidates is not exponential but is linear. After initial increases in the slope of the graph from 1974 to 1978, the rate from 1979 on increases relatively constantly at just over 400 candidates per year. If this trend were to continue, therefore, it could be predicted that there will be approximately this same number of candidates (400) sitting these three examinations in future years.

The actual proportions of candidates sitting for each of these three different examinations over the period 1974 to 1981 has not, however, remained constant, as is shown in Table 10.2.

TABLE 10.2

PROPORTIONS OF CANDIDATES SITTING EACH ENVIRONMENTAL EXAMINATION, IN EACH YEAR, EXPRESSED AS A PERCENTAGE

EXAMINATION BOARD	YEAR 1974	1975	1976	1977	1978	1979	1980	1981
AEB	100	28	17	24	11	16	27	33
London	-	72	83	73	57	67	45	37
JMB	-	-	-	3	32	17	28	30

The table shows that in the years previous to the first examination of the JMB syllabus, the majority of candidates sat for the London examination (72% in 1975 and 83% in 1976). Since 1977, however, there has been a fall in the proportion of candidates sitting the London examination (from 83% in 1976 to only 37% in 1981). In 1977 the AEB syllabus became nationally available, and the first examination of this nationally available syllabus was in 1979. Since that date, there has been a steady rise in the proportion of candidates sitting the AEB examination (from 15% in 1979 to 33% in 1981), and during this same period the proportion sitting for the London examination has dropped from 67% to only 37%. The proportion of candidates sitting the JMB examination in the same period has risen from 17% to 30%.

At the present time, therefore, (1981), indications are that the proportion of candidates sitting for the AEB and JMB examinations is increasing while the proportion sitting the London examination is decreasing.

Taken together, therefore, the data in Tables 10.1 and 10.2 indicate that while the total number of candidates annually sitting for environmental 'A' level examinations is stable at about 400, the proportions of candidates sitting the AEB and JMB examinations have been increasing since 1977 and the proportion sitting the London examination has been decreasing.

The pattern which is evident in the numbers of centres entering candidates for these three examinations is similar to that already observed for the numbers of candidates sitting for these examinations. Table 10.3 shows the total number of centres entering candidates for these three environmental examinations.

TABLE 10.3

NUMBERS OF CENTRES ANNUALLY ENTERING CANDIDATES FOR THE AEB, LONDON AND JMB EXAMINATIONS

	YEAR							
EXAMINATION BOARD	1974	1975	1976	1977	1978	1979	1980	1981
AEB	2	5	7	9	9	17	26	29
London	-	20	24	31	35	42	30	26
JMB	-	-	-	3	17	16	19	21
TOTALS	2	25	31	43	61	75	75	76

The table shows that there has been a gradual and sustained increase in the number of centres submitting candidates for the three environmental examinations from just 2 in 1974 up to 75 in 1979. Since that time, the total number of centres has remained at about 75. This situation resembles that already seen for the total number of candidates which also showed an increase from 1974 to 1979 and has since remained stable at around 400 candidates.

The proportions of centres from each board submitting candidates for these examinations during the period 1974 to 1981 also shows a similar trend to that already seen for the proportions of candidates sitting each board's examination. Table 10.4 shows the proportions of centres submitting candidates for each of the three examinations.

TABLE 10.4

PROPORTIONS OF CENTRES ENTERING CANDIDATES FOR EACH BOARD'S EXAMINATIONS ANNUALLY, EXPRESSED AS PERCENTAGES

EXAMINATION BOARD	YEAR 1974	1975	1976	1977	1978	1979	1980	1981
AEB	100	20	23	21	15	23	35	38
London	-	80	77	72	57	56	40	34
JMB	-	-	-	7	28	21	25	28

The table shows that in 1975, 80% of all centres entering candidates for these examinations were from the London Board, and this figure has steadily diminished to only 34% in 1981. The proportion of AEB centres remained around 20% from 1975 to 1977. Since 1978, however, the proportion of AEB centres has climbed steadily to just over one-third (38%) of all centres in 1981. The proportion of JMB centres fluctuated during the period 1978 to 1980, although there was a slight increase between 1979 and 1981.

The trends observed in the proportions of centres entering candidates for the three examinations is similar to that already seen for proportions of candidates entered for the three examinations in that the proportions of AEB candidates and centres have been increasing since 1978, while the proportions of London candidates and centres has been decreasing since 1978. The data also show corresponding decreases in both proportions of JMB candidates and centres from 1978 to 1979, and then increases from that time.

Table 10.5 shows the mean annual number of candidates entered by each centre for each examination during the period 1974 to 1981.

TABLE 10.5

THE MEAN ANNUAL NUMBER OF CANDIDATES ENTERED BY CENTRES FOR THE THREE ENVIRONMENTAL EXAMINATIONS

	MEAN NUMBER OF CANDIDATES PER CENTRE		
YEAR	AEB	London	JMB
1974	4.5	-	-
1975	6.8	4.5	-
1976	4.4	6.3	-
1977	6.3	5.5	2.7
1978	4.1	5.4	6.2
1979	3.7	6.5	4.3
1980	3.9	5.6	5.4
1981	4.9	6.2	6.3
OVERALL MEANS	4.83	5.71	4.98
STANDARD DEVIATIONS	1.14	0.72	1.53

The overall mean number of candidates entered for these three environmental 'A' level examinations is higher for the London (5.71) than both the JMB (5.00) and AEB (4.83) examinations. A series of t-tests was performed on the data displayed in Table 10.5 to see if the differences between the mean annual number of candidates for each board were significant, and the results are shown below:

AEB and London $t = 1.68$; $df = 13$; $p > 0.05$

AEB and JMB $t = 0.21$; $df = 11$; $p > 0.40$

JMB and London $t = 1.05$; $df = 10$; $p > 0.15$

None of the differences in means was statistically significant, The data show that since 1979, the mean number of AEB and JMB candidates has been increasing, while the mean number of candidates entered for the London examinations has decreased. χ^2 tests were performed on each set of data in Table 10.5 to see if the differences in mean numbers sitting for the examinations of each board were significant. The results of these analyses are shown below:

AEB	$\chi^2 = 1.87$;	df = 7;	$p > 0.98$
London	$\chi^2 = 0.50$;	df = 6;	$p > 0.99$
JMB	$\chi^2 = 1.86$;	df = 4;	$p > 0.80$

None of the differences in mean numbers of candidates for each board was statistically significant and, therefore, the hypothesis that the differences were due to chance ~~significant had to be~~ remained ~~rejected~~. At the present time (1981) it is not possible to predict precisely the mean number of candidates sitting the examinations of each of the boards since the mean number of candidates has varied from year to year, and, in the case of both the AEB and JMB examinations, has increased during the period 1979 to 1981, while the mean number of candidates sitting the London examinations has actually decreased during the same period.

10.3 COMPETITION BETWEEN THE THREE ENVIRONMENTAL 'A' LEVELS

Since the JMB 'A' level was a relative late comer in the field of environmental syllabuses (introduced in 1975) as compared with the AEB and London 'A' levels, introduced in 1972 and 1973, respectively, it was decided to ascertain whether or not there was evidence of competition between the three syllabuses within the JMB catchment area, and whether or not the JMB syllabus had gained centres and candidates at the expense of one or both of the other two syllabuses.

Table 10.6 shows the LEA's in the JMB area in which there are or have been establishments which are teaching or have taught either the AEB or the London Environmental Studies syllabuses.

TABLE 10.6

THE LEA'S IN THE JMB AREA IN WHICH THE AEB OR LONDON 'A' LEVEL ENVIRONMENTAL STUDIES SYLLABUSES HAVE BEEN OR ARE BEING TAUGHT

LEA	NUMBER OF ESTABLISHMENTS TEACHING THE SYLLABUS	
	AEB	London
Cheshire	0	2
Cumbria	0	1
Durham	0	1
Humberside	1	0
Lancashire	1*	1
Leicestershire	0	2*
Nottinghamshire	0	1
Staffordshire	0	2*
Tyneside	1	0
West Midlands	3	2*
West Yorkshire	1	0
Wigan	1	0
TOTALS	8	12
(GRAND TOTAL 20)		

* Indicates an establishment did not enter candidates for that examination in 1980.

Though the AEB syllabus was originally approved by the Schools Council in 1972, for some years the syllabus was restricted to the consortium of schools which developed it and the syllabus became nationally available only in 1977. The London syllabus was approved on a restricted basis by the Schools Council in 1973 and became an open Mode 1 syllabus available to all centres in 1975.

The table shows that 20 centres in the North and Midlands, which is the JMB catchment area, have entered candidates for the AEB and London syllabuses, eight for the former and twelve for the latter. Nine of these twenty centres did not enter candidates for these syllabuses in 1980, and may, therefore, have discontinued the teaching of these syllabuses, but only two of these are known to have implemented the JMB 'A' level.

Since a dozen centres dropped the London 'A' level Environmental Studies syllabus in 1980 (see Table 10.3), and eight of these are in the JMB region, this might indicate a switch to the JMB 'A' level and hence suggests that there is evidence of direct competition between these two 'A' levels. However, in that year the number of JMB centres increased by only three (see Table 10.2) and so centres dropping the London 'A' level did not do so simply in favour of taking up the JMB 'A' level. On the other hand, it is interesting to note that at least two of the centres now teaching the JMB 'A' level had been teaching the London Environmental Studies syllabus immediately before the change was made to the JMB Environmental Science syllabus.

The Implementer Survey showed that 10 of the 21 establishments had taught an AEB syllabus prior to the introduction of the JMB 'A' level and had then dropped it in favour of the JMB syllabus. Subsequent interviews with the teachers in these ten establishments revealed that all these establishments had implemented the AEB 'AO' level originally because it was the first GCE environmental syllabus nationally available at the sixth form level.

In 1975, just before the introduction of the JMB 'A' level, 918 candidates were entered by 117 centres for the AEB 'AO' level examination, 48 of which were in the Midlands and the North. In 1979, however, only 564 candidates were entered by 56 centres, of which only 12 were in the Midlands and the North.

It was decided to test the null hypothesis that the proportion of centres in the Midlands and the North (the JMB area) entering candidates for the AEB 'AO' examination had not significantly changed between 1975 (48 of 117 centres) and 1979 (12 of 56 centres). The results of this analysis are shown in Table 10.7.

TABLE 10.7

TEST OF THE NULL HYPOTHESIS THAT PROPORTION OF CENTRES IN MIDLANDS AND NORTH ENTERING CANDIDATES FOR AEB 'AO' LEVEL DID NOT CHANGE BETWEEN 1975 AND 1979

REGION	NUMBER OF CENTRES		
	EXPECTED	OBSERVED	DIFFERENCE
Midlands and North	23	12	11
Others	33	44	11
TOTALS	56	56	

$\chi^2 = 8.93$ degrees of freedom = 1 $p < 0.01$

The table shows that the differences in proportions of centres from the Midlands and North in 1975 and 1979 are statistically significant (at the $p < 0.01$ level of significance) so the null hypothesis has to be rejected. The change in the proportion of centres from the Midlands and North entering candidates for the AEB 'AO' level in 1979 as compared with 1975 is significant. While the number of centres entering candidates nationally fell between 1975 and 1979 (from 117 to 56) the fall in the number of centres from the Midlands and the North during the same period (from 48 to 12) was a significantly greater fall than in the rest of the country. The results of the Implementer Survey suggest that at least part of this decline in the proportion of centres from the Midlands and the North was because a number of centres discontinued the teaching of the AEB syllabus in favour of the JMB 'A' level syllabus.

10.4 COMPARISON OF THE NUMBERS OF CENTRES ENTERING CANDIDATES AND NUMBERS OF CANDIDATES SITTING THE JMB ENVIRONMENTAL AND OTHER LESS WELL ESTABLISHED JMB SCIENCE 'A' LEVELS

Candidates from many parts of England and Wales are entered for the AEB examinations and for the London examinations, so both the AEB and London Environmental Studies 'A' levels recruit candidates nationally. In contrast, candidates for the JMB syllabus are entered only by colleges and schools in the JMB area, and in this respect the JMB Environmental Science 'A' level is essentially a regional syllabus. For this reason, it was decided to compare the uptake of the JMB Environmental Science with that of other science 'A' levels also examined by the JMB.

The JMB science 'A' levels which are well established and are taken by thousands of candidates, namely biology, chemistry, geology and physics, were excluded from this comparison since it was felt that it would be more appropriate to compare the Environmental Science 'A' level with other

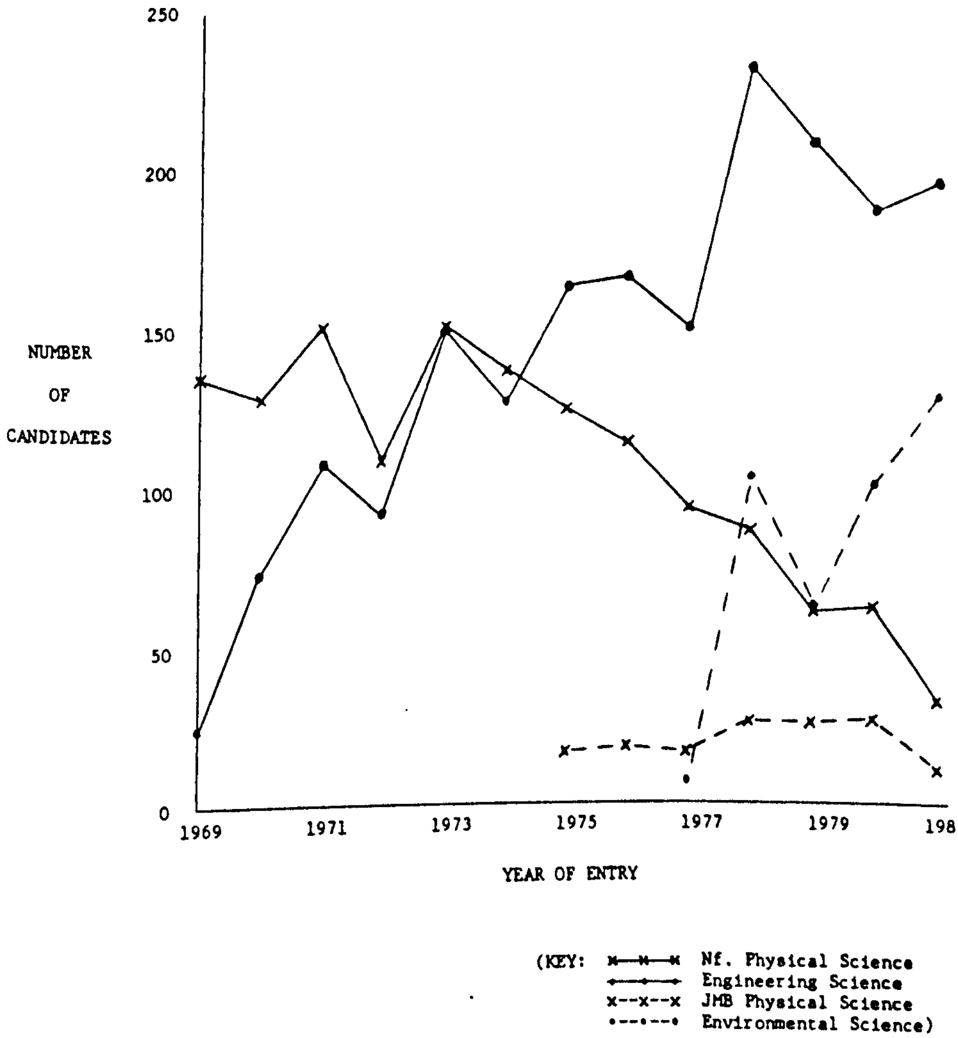
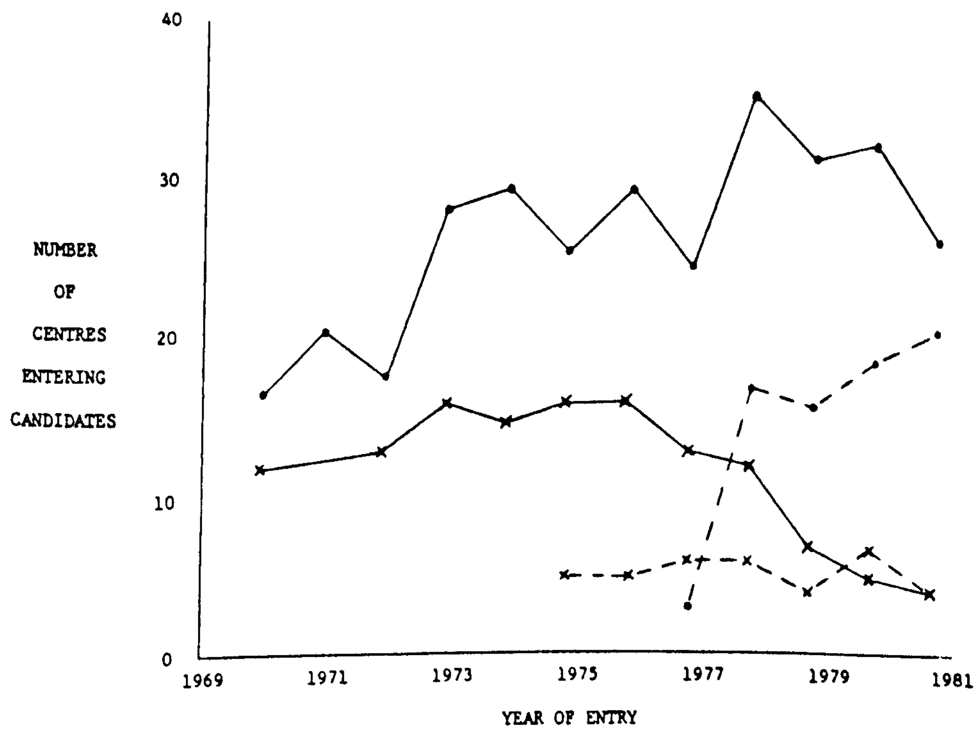


FIGURE 10.2

NUMBER OF CANDIDATES ENTERED ANNUALLY FOR VARIOUS JMB EXAMINATIONS



(KEY: x—x—x Nf. Physical Science
•——• Engineering Science
x--x--x JMB Physical Science
•--•--• Environmental Science)

FIGURE 10.3

NUMBERS OF CENTRES ENTERING CANDIDATES
ANNUALLY FOR VARIOUS JMB EXAMINATIONS

newer, less well established subjects with candidates numbering in the hundreds or less, than with the older, well-established sciences.

The 'A' levels chosen for inclusion in this comparison were Engineering Science, Nuffield Physical Science and JMB Physical Science which were all first examined in 1969 or later. The graphs (shown in Figure 10.1.) show the numbers of candidates entered for each of these three examinations and 'A' level Environmental Science from their first examination to 1981.

These graphs show that even though the numbers of candidates entered for Engineering Science have fluctuated from year to year, there has been a gradual increase in candidates from 27 in 1969 to a peak of 238 in 1978.

Nuffield Physical Science has also shown fluctuations in the numbers of candidates entered for the examinations since its inception in 1969, when 139 candidates sat the examination, but the overall trend has shown a drastic reduction in numbers from 1973 when 155 candidates were entered for the examination to only 33 in 1981.

Seventeen candidates sat for the first examination of the JMB's own Physical Science syllabus in 1975, and there have never been more than 26 candidates in any one year, and in 1981 only 11 candidates sat for this examination.

Each of these three syllabuses shows a different pattern in the growth of candidate numbers. The graph of candidate numbers in Environmental Science in its first five years is most similar to the graph for Engineering Science in its first five years, and is unlike those for Nuffield

Physical Science and JMB Physical Science. However, the available data for the Environmental Science 'A' level is presently insufficient to predict that the number of candidates entering the examinations in future years will continue to increase in a manner similar to Engineering Science and then fluctuate around 200 candidates.

The numbers of centres entering candidates for each of these syllabuses is shown in Figure 10.3. These graphs show similar patterns in the numbers of centres entering candidates for each examination to the graphs showing the numbers of candidates entered for each of these examinations.

The two sets of graphs taken together show an overall increase at first and then a stabilisation in numbers of candidates and centres for Engineering Science, a decrease in the numbers of Nuffield Physical Science centres and candidates (in the former case since 1973 and in the latter from 1976) and a slight increase followed by a decrease in both numbers of candidates and centres for the JMB Physical Science.

Table 10.8 shows the mean annual number of candidates entered for each of these 'A' levels and also Environmental Science.

TABLE 10.8

MEAN NUMBERS OF CANDIDATES ENTERED BY CENTRES FOR EACH OF THESE FOUR JMB 'A' LEVELS

	MEAN NUMBER OF CANDIDATES ENTERED BY CENTRES FOR EACH EXAMINATION			
YEAR	Nuffield Physical Science	JMB Physical Science	Engineering Science	Environmental Science
1969	12.6		1.8	
1970	N/A		4.5	
1971	11.9		5.1	
1972	8.6		5.2	
1973	9.7		5.3	
1974	9.3		4.3	
1975	8.0	3.4	6.5	
1976	7.4	3.8	5.7	
1977	7.2	2.8	6.2	2.7
1978	7.3	4.5	6.6	6.2
1979	8.7	6.5	6.7	4.3
1980	12.8	3.9	5.8	5.4
1981	8.3	2.8	7.4	6.3
OVERALL MEANS	9.3	4.0	5.5	5.0
S.D.	2.04	1.28	1.42	1.56

N/A = data not available from JMB

The table shows that the overall mean number of candidates per centre sitting for the Environmental Science examinations (5.0) most closely resembles the situation in Engineering Science (overall mean = 5.5). The mean number of candidates per centre sitting for Nuffield Physical Science (9.3) has been consistently higher, and the mean number of candidates per centre sitting the JMB Physical Science has been consistently lower (4.0) than that for both Engineering Science and Environmental Science.

The numbers of centres and candidates for Environmental Science in its first five years (up to 132 candidates and 21 centres) are similar to those for Engineering Science in its first five years (up to 154 candidates and 29 centres) and the mean number of candidates per centre for each of these two examinations is also very similar (5.0 for Environmental Science and 5.5 for Engineering Science). If, therefore, the Environmental Science 'A' level shows a similar rate of adoption in the future to that which Engineering Science has already shown, then both the number of centres submitting candidates, and the number of candidates sitting the examinations would continue to increase until there are about 200 candidates and about 30 centres, when both the numbers of candidates and centres will remain fairly constant.

10.5 A COMPARISON OF CANDIDATE NUMBERS FOR THE 'O' AND 'A' LEVELS IN SUBJECTS

Even though the Environmental Science 'A' level was first introduced in 1975 and was first examined in 1977, the 'O' level syllabus for this same subject was not introduced until 1976, and was first examined in 1978. Since the first 'A' level candidates with a pass in this subject at 'O' level sat their examinations for the latter as late as 1980, it is too early to determine whether or not there will be any definite relationship between the numbers of candidates entered for the 'O' level examination and the numbers of candidates entered for the 'A' level examination two years later. However, it is reasonable to expect some relationship to exist, and to be such that the availability of 'O' level Environmental Science candidates would boost the numbers of candidates taking 'A' level Environmental Science. On this basis, the relationship between 'O' and 'A' level subjects amongst candidates in JMB science subjects and geography are informative. These numbers, for the period 1977 to 1979, are set out in Table 10.9, along with the comparable figures for Environmental Science from 1978 to 1981.

TABLE 10.9

NUMBERS OF CANDIDATES SITTING THE 1977 'O' LEVEL AND 1979 'A' LEVEL EXAMINATIONS IN SOME JMB SUBJECTS

SUBJECT	NUMBER OF 'O' LEVEL CANDIDATES IN 1977	NUMBER OF 'A' LEVEL CANDIDATES IN 1979	1979 'A' LEVEL NUMBERS DIVIDED BY 1977 'O' LEVEL NUMBERS (Expressed as a percentage)
Biology	44,580	10,871	24.4
Chemistry	33,017	12,472	37.7
Geography	49,209	9,996	20.3
Geology	4,438	1,162	26.2
Physical Science	2,365	87	3.7
Physics	35,891	13,055	36.4
Environmental 1	259	103	39.8
Science 2	680	132	19.4

1 'O' level figures for 1978, 'A' level figures for 1980.

2 'O' level figures for 1979, 'A' level figures for 1981.

The number of candidates for 'A' level chemistry and physics is equivalent to between 36 and 38% of the number of candidates who had sat the 'O' level examinations in those subjects two years previously. The numbers sitting biology, geography and geology 'A' level examinations, however, are equivalent to between 20 and 27% of the numbers of candidates who sat for the 'O' levels in these subjects two years previously. The number of candidates for 'A' level physical science is equivalent to only 3.7% of the number of candidates who sat the final examinations at 'O' level two years previously, and it is the 'A' level in physical science that seems not to have become established.

The table shows that for 'A' level Environmental Science 103 candidates sat the examination in 1980, compared with 259 candidates who sat the 'O' level in 1978, the first year in which the 'O' level syllabus was examined. The number who sat for the 'A' level in 1980, therefore, is equivalent to 39.8% of the number of candidates who sat the 'O' level examination in 1978, a figure which is similar to that for chemistry and physics, but higher than the other four subjects studied. When, however, the 1981 'A' level and 1979 'O' level candidate numbers are analysed, the percentage taking the 'A' level in 1981 is equivalent to only 19.4% of the number of candidates who sat the 'O' level in 1979, a figure similar to geography and biology. If this figure were to remain stable for the next few years, one could predict with some degree of confidence the number of candidates for the 'A' level examination in any year from the number of candidates entered for the 'O' level examination two years previously.

It is important, however, to point out that the situations existing in biology, chemistry, geography, geology, physics and environmental science are not strictly comparable. For instance, students completing the 'O' level in biology, chemistry, geography, geology and physics can usually proceed to take the 'A' level in that subject (or subjects) in the sixth form of that same school or in the local sixth form college or college of further education. Data collected from the Implementer Survey (see Chapter Five) showed that in only fifteen of the twenty-one establishments surveyed could students who had completed the 'O' level proceed to take the 'A' level in either the same establishment or another establishment in the same area, so a relatively large proportion of them would have to change their educational establishment if they wished to continue Environmental Science to 'A' level. Further, while 29 centres entered candidates for the 1978 'O' level examination, only 15 of them were located in areas in which an establishment offered the 'A' level syllabus. This means that many students who had completed the 'O' level and might have wished to continue with the 'A' level were unable to do so.

At present (1981) the 'A' level attracts a large percentage of students who have not previously taken the subject at either CSE or 'O' level, a situation not found in other subjects where possession of the 'O' level is usually prerequisite to study of the 'A' level.

Only one examination board, the London Board, also offers an examination syllabus at both 'O' and 'A' level. The numbers of candidates entered for the 'O' and 'A' level examinations in London's Environmental Studies are shown in Table 10.10, together with the 'A' level/'O' level percentage. They are included here for comparison with the figures for the JMB Environmental Science 'A' level.

TABLE 10.10

NUMBERS OF CANDIDATES SITTING FOR THE LONDON ENVIRONMENTAL STUDIES 'O' AND 'A' LEVEL EXAMINATIONS DURING THE PERIOD 1975 TO 1980

YEAR	1974	1975	1976	1977	1978
'O' level candidates	811	937	1079	1181	1432
YEAR	1976	1977	1978	1979	1980
'A' level candidates	150	171	189	271	169
'A' level/'O' level %	18	18	18	23	12

In the period 1976 to 1978, the number of candidates who sat for the London Board's 'A' level examinations in Environmental Studies was about 18% of the number of candidates who sat for the 'O' level examination two years previously. This percentage rose to 23% in 1979, but then decreased to about half of that figure (12%) in 1980.

At present, therefore, the numbers of candidates taking the London Environmental Studies 'A' level examinations expressed as a percentage of the numbers of candidates taking the 'O' level examination in the subject two years previously (18%) is much lower than the comparative percentage (40%) for the JMB 'A' level in 1980, but is almost the same as the percentage (19%) recorded for the JMB 'A' level in 1981. At the present, therefore, it is too soon to be able to predict the numbers taking the JMB 'A' level in any year based on the numbers taking the 'O' level two years previously, but if the proportion of 'O' level to 'A' level candidates recorded in 1981 (19%) continues at that level, it will be almost identical to that already observed for the London Environmental Studies 'A' level.

10.6 CONCLUSIONS

The pattern of uptake for this JMB 'A' level, measured in terms of numbers of centres entering candidates for the final examinations, and in numbers of candidates sitting for these examinations, is similar to the pattern observed for the AEB Environmental Studies 'A' level since it became nationally available, but is different from the pattern observed for the London Environmental Studies 'A' level. While the total numbers of centres and numbers of candidates for these three examinations have been stable since 1979, the proportions of AEB and JMB centres and candidates have been increasing while the proportion of London centres and candidates has been decreasing.

At present there is little evidence of competition between the JMB syllabus and the AEB and London syllabuses, although two establishments have discontinued the London syllabus in favour of the JMB syllabus.

The pattern of uptake for the JMB Environmental Science 'A' level, measured in terms of numbers of centres, numbers of candidates and mean number of candidates per centre, is also very similar to the pattern observed for another JMB science 'A' level, in its first five years, Engineering Science.

At present, it is not possible to predict with any accuracy the numbers of candidates sitting for the JMB Environmental Science 'A' level examinations based on the numbers sitting for the 'O' level examinations in the subject two years previously, since the number of candidates sitting for the 'A' level examinations, expressed as a percentage of the numbers sitting for the 'O' level examination two years previously has varied from 40% in 1980 to only 19% in 1981. This latter figure is, however, very similar to the figure for the London Environmental Studies 'A' level (18%).

Harding (1975) in her analysis of the adoption of the Nuffield 'O' level Science Teaching Project, based on examination entries, suggested that dissemination strategies have tended to create an initial maximum period of interest and adoption and not the slow build-up to an S-shaped curve as earlier studies have shown. Rogers (1962) and Rogers and Shoemaker (1971) in the U.S.A. have shown that adoption of innovations by adopters approximates to an S-shaped curve when the total accumulated number of adopters is plotted against time, and approximates to a bell-shaped curve when the numbers of new adopters adopting an innovation each year are plotted against time. Carlson (1965), also in the U.S.A., has shown that the adoption of educational innovations by school systems also follows an S-shaped curve, and Petch (1953) in Britain has shown that the uptake of new syllabuses, as measured in terms of examination centres and numbers of candidates over time also follows an S-shaped curve. At present (1981) the uptake of the JMB Environmental Science 'A' level over time, as measured by the number of centres entering candidates for the final examinations each year, and also by the number of candidates sitting the examinations each year, does not resemble the slow build-up to an S-shaped curve, but resembles the adoption of the Nuffield Science Teaching Project.

It is not possible to accurately compare the uptake of the JMB Environmental Science 'A' level with the findings of Rogers (1962), Carlson (1965) and Rogers and Shoemaker (1971), since they plotted adoption by new adopters (or adopting units) over time, whereas in this study no attempt was made to see if the centres entering candidates for examination were doing so for the first time or had done so in the past.

It is too early as yet to say whether or not the adoption figures for this 'A' level will give support to Kelly's (1979) suggestion that the greatest amount of adoption is within the first five years with only minimal increases in later years, as this is only the fifth year that this 'A' level has been examined. If Kelly's suggestion is correct, then the future number of centres entering candidates for the final examinations of this 'A' level should only minimally increase from the present 21, and the number of candidates sitting for these examinations should only minimally increase from the present 132. If, however, future uptake of the Environmental Science 'A' level continues to resemble that already seen for Engineering Science, then the number of centres should increase to about 30, and the number of candidates to about 200.

CHAPTER ELEVEN

THE ACCEPTANCE OF THE JMB 'A' LEVEL BY ESTABLISHMENTS OF HIGHER EDUCATION AND PROSPECTIVE EMPLOYERS

11.1 INTRODUCTION

Carson (1971), in an article on the development of the Hertfordshire (later London) Environmental Studies 'A' level, has laid down six criteria which an 'A' level must fulfill in order to be successful. Two of these criteria were:

No. 1. The examination must be recognised as a qualification for entry to university.

No. 3. It must offer career opportunities at non-graduate level. (Pp. 76-77).

Kelly (1971) has also pointed out that universities, colleges and employers are potential consumers of schools' products and lay down the qualifications (i.e. 'A' levels, etc.) which candidates are expected to possess.

It was decided, therefore, to survey these various agencies which act as potential consumers of students who have successfully completed the JMB Environmental Science 'A' level and determine whether or not the 'A' level satisfied those criteria written above which are laid down by Carson.

The agencies selected for this survey were degree-granting establishments (universities, polytechnics and colleges/institutes of higher education) which offered degrees in Environmental Science/Studies for which the JMB 'A' level seemed to be an appropriate prerequisite, and environmentally-orientated organisations, both government and private, which might have positions available for candidates who had successfully completed the 'A' level. Its purpose was to identify which, if any, of these agencies would accept candidates offering the 'A' level in Environmental Science, for entrance into that educational establishment or career position.

11.2 UNIVERSITIES AND ACCEPTANCE OF THE JMB 'A' LEVEL

The 1980 Compendium of University Entrance Requirements (Committee of Principals and Vice-Chancellors of the Universities of the United Kingdom, 1978), and other sources (Carson, 1977b; CEE, no date; Segal, 1978; Heap, 1979, Boehm and Wellings, 1979) were used to identify what proved to be nine universities and four university colleges which offered first degrees in Environmental Science or Environmental Studies (UCCA number 3600) for which the JMB 'A' level seemed to be a natural prerequisite (i.e. biological and geographical in emphasis).

Degree courses which had a professional bias (Newcastle University's Agriculture and Environmental Science; Sheffield University's Natural Environmental Science with Landscape Architecture), or which were not primarily biological and geographical in nature (Kent University's Environmental Physical Science; Bedford College's Environmental Physical Sciences, and Sussex University's Environmental Science - offered in the Molecular Science Department) were excluded from this survey since these degree courses did not have the biological and/or geographical emphasis of the 'A' level, and were not, therefore, degree courses for which this 'A' level was a particularly appropriate prerequisite. In addition, degree courses in which Environmental Science/Studies was only part of the course or part of a joint honours course were also omitted. The nine universities and four university colleges which offered Environmental Science/Studies degrees commencing in October, 1980, are listed in Table 11.1, together with the title of the degree and the entrance requirements.

TABLE 11.1

THE UNIVERSITIES AND UNIVERSITY COLLEGES WHICH OFFERED ENVIRONMENTAL SCIENCE/STUDIES, TOGETHER WITH THE ENTRANCE REQUIREMENTS (1980)

UNIVERSITY/ COLLEGE	DEGREE	ENTRANCE REQUIREMENTS*
Aberystwyth	B.Sc. (Environmental Science)	2 A's; Geog. R, Bio. P
Bradford	B.Sc. (Environmental Science)	2 A's; Bio. P
East Anglia	B.Sc. (Environmental Science)	2 A's; 2 of Math, Phys., Chem., (or Econ., Env. St., Geog. or Geol.), Phys. Sci. or Bio.
Lancaster	B.Sc. (Environmental Science)	2 A's; 2 of Math, Phys., Chem., Phys. Sci. or Bio. (or Env. Sci.) or Eng. Sci.
London		
Bedford	B.Sc. (Environmental Earth Science)	2 A's, including 1 science
Bedford	B.Sc. (Environmental Life Science)	2 A's; Chem. P., Bio. R
King's	B.Sc. (Human Environmental Studies)	3 A's
Westfield	B.Sc. (Environmental Sciences)	2 A's
Wye	B.Sc. (Rural Environmental Studies)	2 A's (3 P); Bio. P, Geog. P
Salford	B.Sc. (Environmental Sciences)	2 A's, (3 P)
Sheffield	B.Sc. (Natural Environmental Sciences)	3 A's (including at least 2 sciences)
Southampton	B.Sc. (Natural Environmental Sciences)	2 A's, (3 P)
Warwick	B.Sc. (Natural Environmental Sciences)	3 A's, including Chem. or Phys. Sci.
Ulster	B.Sc. (Natural Environmental Sciences	2 A's; 2 of Math., Phys., Chem., Eng. Sci., Phys. Sci., Bio. (or Geog. or Env. Sci.)

*R = Required; P = Preferred

Enquiries were then addressed either to the Head of Department or to the Course Tutor where a Department of Environmental Science/Studies existed, or to the Registrar where no such department existed, to confirm the entrance requirements and to ask whether or not the JMB Environmental Science 'A' level would be accepted as part of these entrance requirements. Replies were received from each of the nine universities and four university colleges. The replies, as shown in Table 11.2, were assigned to three different categories, namely, accepting the 'A' level without reservations, accepting the 'A' level but with reservations, and not accepting the 'A' level.

TABLE 11.2

ACCEPTANCE OF THE JMB 'A' LEVEL BY UNIVERSITIES AND UNIVERSITY COLLEGES AS PART OF THE ENTRANCE REQUIREMENTS FOR AN ENVIRONMENTAL SCIENCE/STUDIES DEGREE (1980)

ACCEPTING 'A' LEVEL WITHOUT RESERVATIONS	ACCEPTING 'A' LEVEL WITH RESERVATIONS	NOT ACCEPTING THE 'A' LEVEL
Bradford	East Anglia	Aberystwyth
Lancaster	London (Bedford)	
London (Kings)	London (Wye)	
London (Westfield)	Sheffield	
Salford		
Southampton		
Warwick		
Ulster		

Only one university listed stated that it would not accept the JMB 'A' level as part of the entrance requirements for the degree. This establishment, at Aberystwyth, states that its degree requires a previous knowledge of both Biology and Geography up to GCE 'A' level standard, and this is why both 'A' levels are required. (Registrar, personal communication, 1979).

Each of the twelve remaining universities and university colleges stated that they would accept the JMB 'A' level as part of the entrance requirements for the degree course. Eight of these establishments wrote back stating that they would accept the JMB 'A' level, without any comment, but the remaining four expressed some concern about its acceptance.

Two of these four establishments (Bedford College, London, and East Anglia) had reservations about the acceptability of the 'A' level because of the possible overlap of its content with that of other 'A' levels (such as Biology and Geography) offered by potential candidates.

Bedford College, for instance, stated that:

> By its very nature the subject matter is a bit of a nuisance, because there is a minor overlap of ideas with Geography, Geology, Biology and perhaps even Sociology; so that even if these subjects are not expressly forbidden for minimum entrance qualifications together with Environmental Studies/Science, a student who did combine Environmental Studies/Science with one of these three subjects for 'A' level would be doing about 1 2/3 'A' levels in terms of general approach. A normal candidate who offered this with either Geography or Geology as two 'A' levels would be in trouble. (Registrar, Bedford College, personal communication, 1979).

East Anglia stated that:

> Combinations of 'A' level subjects which include Environmental Sciences/Studies will be considered on an individual basis because of the differing content of syllabuses and the possibility of duplicated material.
>
> Taken in combination with, for example, Economics, and Maths, Environmental Studies (Sciences) would be perfectly acceptable. We would, however, be rather more concerned if a candidate were to offer Geography, Biology and Environmental Science and in that case would try to ascertain how much overlap there might be in the content of the three subjects before deciding on the conditions to be set for entry. (Senior Administrative Assistant, School of Environmental Sciences, University of East Anglia, personal communication, 1979).

A third establishment, Sheffield, was concerned not only about the content of the 'A' level but also because the degree course was based on a strong foundation in pure science, and because integration of the basic disciplines was only attempted later on in their degree course, as the following quotation illustrates:

> Environmental Science 'A' level could be accepted for the Natural Environmental Science Degree course but a great deal would depend on the actual combination of subjects offered by a candidate. The Natural Environmental Science course here is based on a strong foundation in pure science. Integration of the basic disciplines is only attempted later on in the course after consolidation of the basic principles. Integration at 'A' level is sometimes considered undesirable for a potential Environmental Science student. Our selectors sometimes feel that this is likely to lead to a very superficial appreciation of factors and processes in the natural environment. In practical terms the selectors for the Natural Environmental Science course would be willing to accept a combination of, for example, Environmental Science, Chemistry and Physics, but would not be so happy about Environmental Science, Geology/Geography and Biology. (Administrative Assistant, Registrar's Department, Sheffield University, personal communication, 1979).

The fourth establishment, Wye College, stated that a student with 'A' level Environmental Science would certainly be accepted but advised that a student thinking of taking a degree in Environmental Studies/Science at Wye or anywhere else would really be better advised to take the basic subjects such as Biology and Geography rather than Environmental Science as they would provide a better background on which to build the degree.

11.3 POLYTECHNICS

Six polytechnics were found to be offering degrees in Environmental Science/Studies. (Carson, 1976; CEE, no date;

Segal, 1978; Heap, 1979; Committee of Directors of Polytechnics, 1976; CNAA, 1976; one was identified from a magazine advertisement). As with the university degrees, courses which had a professional bias were excluded from this survey. The Polytechnics offering these CNAA degrees are listed in Table 11.3, together with the entrance requirements for each degree.

TABLE 11.3

THE POLYTECHNICS OFFERING ENVIRONMENTAL SCIENCE/STUDIES DEGREES, TOGETHER WITH THE ENTRANCE REQUIREMENTS (1980)

POLYTECHNIC	DEGREE	ENTRANCE REQUIREMENTS
Hatfield	B.Sc. (Environmental Studies)	2 A's
Leicester	B.Sc. (Science and the Environment)	2 A's, including 1 science
Newcastle	B.Sc. (Environmental Studies)	2 A's, including 1 science
Plymouth	B.Sc. (Environmental Science)	2 A's, of differing demands
Sheffield	B.Sc. (Environmental Studies)	2 A's
Sunderland	B.Sc. (Environmental Studies)	2 A's

Enquiries were then addressed either to the Head of Department, or to the Course Tutor where a Department of Environmental Science/Studies existed, or to the Admissions Officer where no such department existed, to confirm the entrance requirements for the degree and to establish whether or not the JMB Environmental Science 'A' level would be accepted as one of the 'A' levels required for the degree.

The replies from each of these six polytechnics indicated that each accepted the JMB 'A' level as one of the two required 'A' levels, although two, Leicester and Plymouth, laid down specific requirements for the second 'A' level if the JMB 'A' level was offered as one of the two 'A' levels.

Leicester stipulated that one of the two 'A' levels offered by a candidate should be a science, but would not accept the JMB 'A' level as a science, as the quotation below shows:

> Currently we do not accept Environmental Science as the only 'A' level science subject. We do, however, accept it as a second 'A' level, i.e. in combination with Biology, Chemistry or Physics. The principal reasoning behind this attitude is that since our course is basically a broad-based science programme taught within the framework of environmental issues, rather than as an environmental science degree, we feel it is essential for course entrants to have a grasp of the fundamental principles of the basic science disciplines.... The students are exposed to these three [Biology, Chemistry and Physics] disciplines during our course and we provide some remedial/fundamental elements during the first year. Thus a student entering with 'A' level passes in Chemistry and Physics, but not Biology, would be requested to attend additional Biology classes. Those with 'A' level Biology but not Chemistry/Physics attend Physical Science classes. A student who enters with Environmental Science but no other science 'A' level would need to attend both remedial units - and this we feel would not be in the student's best interest. (Admissions Tutor, School of Life Sciences, Leicester Polytechnic, personal communication, 1979).

Plymouth, like Leicester, also laid down conditions for the second 'A' level:

> We are very concerned that student have at least two 'A' levels making different demands upon them, and would therefore regard combinations such as Chemistry and Environmental Science or Mathematics and Environmental Science, more favourably than, say, Geography and Environmental Science. (Head, School of Environmental Sciences, Plymouth Polytechnic, personal communication, 1979).

Both Leicester and Plymouth Polytechnics, therefore, laid down very specific requirements for the 'A' level offered with Environmental Science, but whereas Leicester would not accept the Environmental Science as a science, and therefore required the second 'A' level to be a science, Plymouth was concerned that the second 'A' level should not overlap with Environmental Science.

In Leicester's case, therefore, Environmental Science, because of its broad coverage of content from separate science disciplines, is not counted as a single science, while Plymouth is concerned that potential applicants' two 'A' levels do not overlap.

These two latter Polytechnics, therefore, express similar concerns, as did some of the universities, regarding suitability of this JMB 'A' level and other 'A' levels offered by candidates for the degree course (Leicester) and the overlapping of the content of the 'A' levels offered by candidates (Plymouth).

11.4 COLLEGES AND INSTITUTES OF HIGHER EDUCATION

Five colleges and institutes of higher education were identified as offering degrees in Environmental Science/Studies. (Carson, 1977a; CEE, no date; CNAA, 1976; N.A.T.F.H.E., 1978; two were identified from magazine advertisements and one by a personal communication). These five establishments and the degrees offered are listed in Table 11.4. Each of these five establishments required applicants to have two 'A' levels, and each accepted the JMB 'A' level as one of these.

TABLE 11.4

THE COLLEGES/INSTITUTES OF HIGHER EDU CATION OFFERING ENVIRONMENTAL SCIENCE/STUDIES DEGREES (1980)

COLLEGE/INSTITUTE*	DEGREE	DEGREE GRANTING ESTABLISHMENT
Bangor Normal, Bangor, N.Wales	B.Sc. (Environmental Studies)	CNAA
Crewe-Alsager, Cheshire	B.A. (Environmental Studies)	CNAA
	B.Ed. (Environmental Studies)	CNAA
Edge Hill, Ormskirk, Lancs.	B.A. (Environmental Studies)	Lancaster University
	B.Ed. (Environmental Studies)	Lancaster University
De La Salle, Manchester	B.Sc. (Environmental Science)	Manchester University
	B.Ed. (Environmental Science)	Manchester University
Trinity/All Saints, Leeds	B.A. (Environmental Studies)	Leeds University
	B.Sc. (Environmental Studies)	Leeds University
	B.Ed. (Environmental Studies)	Leeds University

*Full titles and addresses of establishments:

1. Bangor Normal College, Bangor, North Wales.
2. Crewe-Alsager College of Higher Education, Crewe, Cheshire.
3. Edge Hill College of Higher Education, Ormskirk, Lancashire.
4. De La Salle College, Hopwood Hall, Middleton, Manchester.
5. Trinity and All Saints' Colleges, Horsforth, Leeds.

The table shows that four of these establishments also offered a B.Ed. degree for those interested in becoming members of the teaching profession, in addition to the B.A./B.Sc. degree(s) in Environmental Science/Studies. None of these establishments expressed any reservations about acceptance of the JMB 'A' level.

11.5 PROSPECTIVE EMPLOYERS

The Student Questionnaires showed that nearly 19% of the students (15 of 80) intended to use their 'A' level qualifications to obtain a job, rather than use the 'A' level as an entrance qualification to a course in a higher degree establishment. Since, therefore, a number of students do use their 'A' level qualifications to obtain a job or start a career, it was decided to ascertain whether or not opportunities existed for such students, and whether or not candidates with the Environmental Science 'A' level could use this 'A' level to obtain a position which required aspiring applicants to have successfully completed one or more 'A' levels.

The Council for Environmental Education (1977) booklet, entitled "Careers for Environmentalists", lists fourteen different environmental career areas within which a person could follow a career. The booklet lists, for each of these fourteen areas, the opportunities available at 16+, (i.e. for those persons who have successfully completed CSE's and/or 'O' levels), at 18+, (i.e. for those persons who have successfully completed 'A' levels), and at graduate level. Since this present study is concerned with the acceptance of the JMB 'A' level by potential employers, the opportunities listed in this booklet for those in the 18+ age group were selected as the ones most appropriate for students successfully completing the JMB 'A' level. Enquiries were made of these potential employers listed in the CEE booklet, as to whether or not the JMB Environmental Science 'A' level would be accepted as part of the academic requirements for any such position.

The booklet lists opportunities for environmental careers at 18+ in twelve of the fourteen areas identified by the CEE and names several organisations where openings can be expected to occur. All the organisations under these twelve areas listed were contacted. A thirteenth career area was also included by the author, namely industry, since, although it was not mentioned in the CEE booklet, several industrial firms do have openings available for persons interested in an environmental career. Table 11.5 following lists both the thirteen environmental career areas and the organisations included in the survey.

TABLE 11.5

THE ENVIRONMENTAL CAREER AREAS AND PROSPECTIVE EMPLOYERS SELECTED FOR INCLUSION IN THE SURVEY

ENVIRONMENTAL CAREER AREA	PROSPECTIVE EMPLOYERS
1. Architecture	Royal Institute of British Architects
2. Civil Service	[1]Countryside Commission
3. Conservation and Natural History	National Trust Council for Nature Royal Society for the Protection of Birds Society for the Promotion of Nature Conservation Nature Conservancy Council
4. Environmental Health	Environmental Health Officers Education Board [2]Environmental Sciences Department Stoke-on-Trent City Council
5. Forestry/Arboriculture	Forestry Commission
6. Land and Estate Management	[1]Royal Institute of Chartered Surveyors
7. Landscape Architecture and the Landscape Industry	[1]The Institute of Parks and Recreation Administration
8. Parks and Recreation Services	[1]The Institute of Parks and Recreation Administration [1]Countryside Commission [2]Parks and Recreation Department, Stoke-on-Trent City Council Peak Park Planning Committee
9. Planning	The Royal Town Planning Institute
10. Surveying	[1]Royal Institute of Chartered Surveyors
11. Teaching	See Chapter 11.4.
12. Water Industry	North West Regional Water Board
13. Industry	Imperial Chemical Industries

[1]Also listed under other headings

[2]As a representative of Municipal Government

Letters (see Appendix C) were then addressed to each of the above organisations (with the exception of teaching which has already been dealt with earlier in this chapter).

The replies from organisations indicated that entry into seven of these twelve career areas listed in Table 11.5 is dependent on a prospective candidate being accepted into membership of the appropriate professional body. This made it necessary to first obtain from these professional bodies their academic entrance requirements for potential applicants, and establish whether or not the JMB Environmental Science 'A' level was acceptable as part of these entrance requirements to these professional bodies. The responses from the six professional bodies involved are shown in Table 11.6.

TABLE 11.6

ACADEMIC REQUIREMENTS OF THE PROFESSIONAL BODIES AND THEIR ACCEPTANCE OF THE JMB ENVIRONMENTAL SCIENCE 'A' LEVEL

PROFESSIONAL BODY	ACADEMIC REQUIREMENTS	ACCEPT JMB 'A' LEVEL
Royal Institute of British Architects	5 GCE's; 2 'A's	Yes
Environmental Health Officers Education Board	5 GCE's; 2 'A's	Yes
Royal Institute of Chartered Surveyors	5 GCE's; 2 'A's	Yes
The Royal Town Planning Institute	5 GCE's; 2 'A's	Yes
The Institute of Park and Recreation Administration	5 GCE's; 1 'A'	Yes
The Institute of Landscape Architects*	-	-

*No information was obtained from this professional body

Each of the five professional bodies which replied to the requests for information required candidates to have at least 5 GCE passes, with four also requiring passes in two 'A' levels, and the fifth requiring a pass in one 'A' level. Each of the five bodies stated that the JMB Environmental Science was acceptable to them as an 'A' level.

The responses from prospective employers in the survey are shown in Table 11.7. Three of the responses were received from central government departments, three from quasi-governmental organisations, two from municipal government departments, and four from private organisations. The table includes information on whether positions were available for persons possessing 'A' levels, what the positions were, the academic requirements for the positions, and whether or not the JMB Environmental Science 'A' level was accepted as part of those academic requirements.

TABLE 11.7

SUMMARY OF THE RESPONSES FROM POTENTIAL EMPLOYERS OF THE GRADUATES OF THE JMB ENVIRONMENTAL SCIENCE 'A' LEVEL

	POSITION AVAILABLE	ACADEMIC REQUIREMENTS	JMB 'A' LEVEL ACCEPTED
A. CENTRAL GOVERNMENT			
1. Countryside Commission	None[1]	-	-
2. Forestry Commission	Administrative Grades[2]	2 'A's	Yes
3. Nature Conservancy Council	Reserve Staff	None, but biological 'A' levels help	Yes
B. QUASI-GOVERNMENTAL AGENCIES			
4. Council for Nature[3]	-	-	-
5. National Water Council[4]	Trainees	2 'A's	Yes
6. Peak National Park[5]	Trainees	2 'A's	Yes
C. MUNICIPAL GOVERNMENT			
7. Environmental Services Dept., Stoke-on-Trent	Trainees	2 'A's	Yes
8. Parks and Recreation Dept. Stoke-on-Trent	None	-	-
D. PRIVATE ORGANISATIONS			
9. Imperial Chemical Industries	Science Technicians	2 'A's	Yes
10. National Trust	None	-	-
11. Royal Society for the Protection of Birds	Permanent Warden	2 'A's	Yes
12. Society for the Promotion of Nature Conservation	None	-	-

NOTES

1 No posts available, since the staff are civil servants and are seconded from the Department of the Environment.

2 Administrative and executive positions are available only to candidates who pass the annual Civil Service examinations.

3 No reply received.

4 This organisation stated that most regional water authorities were sufficiently large and had such a wide range of responsibilities that almost any qualification was likely to have some relevance to their work. A request was then addressed to one of these Regional Water Boards, the North West, and the information supplied by this Board is shown in the table.

5 This organisation requires its trainees to have qualifications acceptable either to the Royal Town Planning Institute, or the Royal Institute of Chartered Surveyors, both of which require 2 'A' levels, and will accept the JMB 'A' level as one of these two 'A' levels.

6 Trainees with this department must become student members of the Environmental Health Officers Association, and are required to have any two 'A' levels.

The table shows that seven of the eleven responding organisations did have positions for persons with one or more 'A' levels (two were usually required) and in each case the JMB 'A' level was acceptable as one of them.

The mere possession of the appropriate academic qualifications, however, was not in itself a guarantee of a position, since many of the organisations required potential applicants to have more than just the minimum academic requirements. Imperial Chemical Industries (Personnel Manager, I.C.I., personal communication, 1979), for example, stated that they selected for Science Technician positions those persons with the best 'A' level records, regardless of the nature of the 'A' levels possessed by these applicants.

Organisations such as the Royal Society for the Protection of Birds and the Nature Conservancy Council both required applicants to have had relevant practical experience and to have carried out previous unpaid volunteer work for the organisation concerned.

11.6 DISCUSSION

The Student Background Survey showed that a third (36%) of the students surveyed wished to take a degree course at a university, polytechnic or college/institute of higher education, and, of those, about one in four wished to take a degree in Environmental Science/Studies.

A survey of higher education establishments which offered degrees in Environmental Science/Studies showed that all but one of these establishments accepted the JMB Environmental Science 'A' level as part of the entry requirements for the degree, though six of them expressed reservations about its acceptance, and one university does not accept the 'A' level for entrance into their Environmental Science. At the present time, therefore, it seems that the Environmental Science 'A' level is not fully established as a suitable entry qualification to Environmental Science/Studies degree courses.

The influence on adoption of the 'A' level by universities and other higher education establishments' acceptance of the JMB 'A' level is demonstrated by the fact that four of the 40 respondents in the Non-Implementer Survey stated that, in their opinion, the 'A' level would not succeed until such time as universities accepted it as a separate subject for matriculation in the same way as the more traditional subjects such as biology, chemistry and physics.

The Non-Implementer Survey also revealed that 40% of the teachers not interested in teaching the 'A' level agreed with the statement that students wishing to take a degree in Environmental Science/Studies would be better off doing traditional 'A' levels such as biology and geography. Only 17% of those interested in teaching the JMB 'A' level agreed with this statement.

In addition, a majority of the respondents (24 of 34) in the Non-Implementer Survey agreed that the status of environmental science as a separate 'A' level was in doubt as it greatly overlapped with the traditional related subjects, an opinion shared with a number of universities, university colleges and polytechnics, which also expressed concern about the content overlap of this and other related 'A' levels. It would seem, then, that potential teachers of the 'A' level who do not wish to teach the 'A' level are correct in their view that establishments of higher education show a preference for potential candidates to have taken traditional 'A' levels, rather than the JMB 'A' level, for entry into Environmental Science/Studies degree courses.

Whereas Carson (1977b) and the CEE (no date) list only ten universities and university colleges which offer degrees in Environmental Science/Studies and the CEE (1977) lists only eleven such universities and university colleges, this study has shown that, as of October, 1980, thirteen different universities and university colleges offered such degrees. One of the establishments listed by both Carson (1977b) and the CEE (no date) no longer offers such a degree. This is the University College of Wales in Cardiff.

While Carson (1977b) states that Aberystwyth accepts 'A' level Environmental Science/Studies as part of the entrance requirements for their Environmental Science degree, this study has shown that it accepts the 'A' level only if it is the third in addition to biology and geography.

Carson (1976) and the CEE (no date) list only three, and the CEE (1977) lists only four polytechnics which offer degrees in Environmental Science/Studies, whereas the present study has identified six such polytechnics. There has, therefore, been an increase in the numbers of Environmental Science/Studies degrees offered at both universities and polytechnics since Carson and the CEE drew up their lists.

The present study was confined to a survey of the acceptability of the JMB 'A' level as an entrance requirement for degrees in Environmental Science/Studies. Carson (1977b), however, has listed 136 environmental-type first degree courses at universities listed under such headings as architecture, biology, chemistry, engineering, environmental health, environmental science/studies, geography and geology, and the majority of these courses (106 of 136) accepted an 'A' level in Environmental Science/Studies as part of their entrance requirements. Carson (1976) has also identified 92 first degree courses in polytechnics which were environmental-type degrees in areas such as architecture, building, engineering, environmental health, environmental science/studies, geography, geology, land administration, planning and surveying, and all but three of these courses accepted an 'A' level in Environmental Science/Studies as a suitable entrance qualification. It would seem then that a candidate possessing an 'A' level in the JMB Environmental Science has a large variety of environmental-type degrees to choose from, and which accept this 'A' level as part of their entrance requirements.

The Student Background Survey showed that one in five (19%) of the students surveyed wished to pursue some form of professional training, for which 'A' levels were not necessary but would be helpful. A similar proportion of the students surveyed wished to obtain a job or start a career after the completion of their 'A' levels rather than go on into an establishment of higher education or into professional training, with six of these fourteen students wishing to start an environmental career. In total, 30% (16 of 53) of the students who had decided on what they wanted to do on finishing their 'A' levels (27 of the 80 students surveyed had not decided what they wanted to do), were interested in an environmental career either directly after completing their 'A' levels or after completing a course at an establishment of higher education.

The survey of potential employers showed that seven of the eleven organisations surveyed did have positions available for such persons, and each of these organisations accepted the JMB Environmental Science 'A' level as part of the academic requirements required of potential candidates. In addition, each of the five professional bodies who responded accepted the JMB 'A' level as one of the two (or one) 'A' level(s) required for a person to become a student member.

The survey of potential employers, therefore, shows that seven of the eleven organisations did have positions for qualified applicants, and that such applicants would be accepted as student members of the five professional bodies which responded in the survey.

11.7 CONCLUSIONS

The survey of establishments of higher education has shown that there has been an increase in the number of universities and polytechnics offering degrees in Environmental Science/Studies since Carson (1976, 1977b) and the CEE (1977) conducted their surveys. There are now also a number of colleges/institutes of higher education offering such degrees.

However, there still remain some reservations among universities and polytechnics about the acceptability of the JMB 'A' level as part of the entrance requirements for these degrees. Each of the five colleges/institutes of higher education accepted the 'A' level as part of the entrance requirements for their Environmental Science/Studies degrees.

Even though, therefore, candidates taking the JMB 'A' level have a choice of 22 establishments which both offer a first degree in Environmental Science/Studies and also accept this 'A' level as part of the entrance requirements for these degrees, the candidates have, nevertheless, to be careful about the combination of 'A' levels they offer for acceptance into several of these establishments.

The survey of universities and polytechnics also showed that several of them make no distinction between Environmental <u>Science</u> and Environmental <u>Studies</u> (my underlining) 'A' levels as regards acceptance, even though the content of the different 'A' levels is quite distinct. It may take some time before the JMB Environmental Science 'A' level takes on an identity separate from the two longer established Environmental Studies 'A' levels.

Non-adopting teachers in large measure justify not adopting the JMB 'A' level on the grounds that students wishing to take an Environmental Science/Studies degree would be better off doing traditional 'A' levels such as biology and geography, and because the status of this 'A' level is in doubt as it greatly overlaps with traditional related sbujects. Even though some universities and polytechnics do express reservations about acceptance of the 'A' level, and several even suggest candidates would be well advised to do traditional 'A' levels, this survey has shown that the non-adopting teachers' fears about acceptability of the 'A' level are groundless since the majority of establishments of higher education do accept it without any reservations.

All of the non-adopting teachers also stated that one of the reasons that they did not adopt the 'A' level was because it was not an ideal 'A' level for students as careers in the environmental field are few in number. This reason would seem to be unjustified, since the survey of prospective employers has shown that there are a number of job/career opportunities for candidates possessing this 'A' level as a qualification, and that each of the five environmentally-orientated professional organisations surveyed accepted the 'A' level as part of their academic entrance requirements.

CHAPTER TWELVE

COMMUNICATION AND SUPPORT SYSTEMS

12.1 INTRODUCTION

Rudduck (1973), Harding (1975) and Harding and Kelly (1977a, 1977b), have demonstrated the importance of adequate communication and support systems for the diffusion, the adoption and the continuance of new curriculum projects. Rudduck (1973) has even suggested that "without adequate structures for communication and support, innovation is unlikely to survive". (P. 146).

In the light of these statements, it was decided to investigate the communication and support systems available for the continued survival of the new JMB Environmental Science 'A' level. The communications and support available to teachers during the diffusion and adoption of this 'A' level have largely been dealt with in previous chapters. (cf. Chapter 4, Diffusion of the 'A' Level; Chapter 5, The Implementers). This chapter, therefore, deals largely with the communications and support systems available to teachers who have adopted the 'A' level and have begun to teach it. During their investigation, Harding and Kelly (1977a) had found some correlation between the levels of communication and support systems then available and the level of adoption of the Nuffield Science Teaching Projects at that time. It was decided, therefore, to see if any relationship existed between the provision of communication and support systems and the level of implementation of this 'A' level at the time of this investigation, (1980).

12.2 SUPPORT AND COMMUNICATION

Harding (1975) and Harding and Kelly (1977a) developed the concept of a local communication and support system as the context within which teachers decided to use, modify or reject the Nuffield Science Teaching Projects. They identified a number of factors which affected the awareness and use of curriculum projects which they grouped into (a) formalised communication channels; (b) material support; and (c) certain geographical and social factors. These factors were then used to calculate Communication and Support scores for a number of LEA's, but there was only a slight positive correlation between these scores and the level of adoption of Nuffield Science Teaching Projects.

More recently, Gilchrist (1978) has suggested a more elaborate classification of local support systems based on the various roles assumed by the local support systems. The three categories suggested by Gilchrist are:

1. Authoritative - would include individuals who occupy positions of authority and/or power, and may be in a position to offer or refuse financial aid or incentive, directly or indirectly.
   eg. HMIs, LEA advisers.

2. Informative - would include agencies which essentially pass on information, in terms of ideas, techniques, knowledge, etc.
   eg. LEA in-service courses.
   ATO/DES in-service courses.
   Colleges and departments of education.
   Professional associations.

3. Supportive - would include those agencies which provide more or less continuous support of one form or another.
   eg. Teachers' centres.
   Professional centres.
   LEA sponsored organisations.
   School resource centres.

Since Gilchrist's (1978) Authoritative Support category embraces Harding and Kelly's (1977a) material support category and extends it, it was decided to use Gilchrist's scheme for the analysis of support for an innovation.

12.3 THE FRAMEWORK FOR THE INVESTIGATION OF THE COMMUNICATION AND SUPPORT SYSTEMS FOR JMB ENVIRONMENTAL SCIENCE 'A' LEVEL

Harding (1975), in her study of the adoption of Nuffield Science Teaching Projects, stated that her findings confirmed the relevance of an hierarchical framework for curriculum analysis, despite the insistence in the School's Council and elsewhere that the teacher alone (and not LEA's and other bodies) made the final decision on what to teach. Since communication and support for new syllabuses, such as the JMB Environmental Science 'A' level, is not restricted to that organised within LEA's, it was decided to look at the communication and support systems available for this'A' level from the same point of view of Harding and using the national, and the regional hierarchical levels (the latter being the JMB area), and the local, or LEA, level of communication and support.

In her study of the communication aspect of the communication-support system for the Nuffield Science Teaching Projects, Harding (1975) identified the communications to schools from the Local Education Area Office, and the inter-school communications as the more important aspects of communications. In this present study, however, the initial investigations indicated that different communication channels were important for communications between the teachers of this 'A' level so these other aspects of the communication process have been included.

Information on the various communication and support systems at the national level was gathered from a number of sources, though mostly from journals such as "Environmental Education" and "Review of Environmental Education Developments". Information on the communication and support systems within the JMB region was collected from documents published by the Joint Matriculation Board and the (now defunct) Manchester Regional Science and Technology Education Centre. Information on the communication and support systems within the LEA's was obtained from the completed Implementer Survey Questionnaires, from interviews with teachers in colleges and schools which had implemented the JMB 'A' level, and from information supplied by LEA advisers.

This information is concerned only with what is available by way of communication and support systems. It does not investigate the extent to which the teachers made use of them.

12.4 NATIONAL LEVEL OF COMMUNICATION AND SUPPORT SYSTEMS FOR THE JMB 'A' LEVEL

A report, issued in 1974 by H.M. Inspectorate of Schools, stated that:

> "To make environmental education a separate subject of the curriculum is neither possible nor necessary." (H.M. Inspectorate, 1974, p. 15).

It was repeated as recently as 1977 in documents submitted, by the Department of Education and Science, to the first intergovernmental conference on environmental education held in Tbilisi. (DES, 1977). However, since that time there has been a distinct change in the policy of the Department with respect to syllabuses such as Environmental Science and Environmental Studies, as is shown by the following quotation in H.M. Inspectorate's consultative document in the red book series entitled Curriculum 11:16 Environmental Education:

> "There is a variety of opinion about the merits of 'combined' as opposed to separate subject approaches to environmental education, but both should be regarded as valid and necessary." (H.M. Inspectorate, 1979, p. 8).

It would seem that only in recent years has the Department of Education and Science officially regarded Environmental Science/Studies as separate school subjects, so it would appear that only recently have these subjects received active support from the Department.

The Department, through H.M. Inspectorate, has now become more involved in the provision of help for teachers of environmental syllabuses, and particularly in the provision of in-service courses (e.g. Environmental Education in the Curriculum 11-18, DES Short Course N541, 25th July-1st August 1979). In addition, the Department has appointed an HMI with special responsibility for Environmental Education.

Several other national organisations besides the Department of Education and Science also provide some support and/or communication for teachers of the JMB 'A' level, as shown in Table 12.1.

TABLE 12.1

SUPPORT AND COMMUNICATION PROVIDED FOR TEACHERS OF THE JMB 'A' LEVEL AT NATIONAL LEVEL

MODE OF SUPPORT			COMMUNICATION CHANNELS
Authoritative	Informative	Supportive	
-	HMI In-service courses	-	At HMI courses
-	[1]CEE conferences	-	At CEE conferences
-	CEE's REED	-	
-	[2]NAEE conferences	-	At NAEE conferences
-	NAEE's Environmental Education	-	

[1]CEE = Council for Environmental Education
[2]NAEE = National Association for Environmental Education

Organisations such as the Council for Environmental Education and the National Association for Environmental Education provide informative support to teachers of the JMB 'A' level through their annual conferences, and through their publications especially the CEE's "Review of Environmental Education Developments", (published quarterly), and the NAEE's "Environmental Education" (published twice a year). The former journal has published a number of articles concerning the JMB 'A' level.

Conferences and courses which these national organisations hold, even though not specifically aimed at teachers of the JMB 'A' level, provide opportunities for teachers of this 'A' level to come into contact with and communicate with one another, but only informal communication channels are provided for such teachers by these organisations.

As Table 12.1 shows, at the time of the survey no authoritative or supportive support was found to be available on a national scale to teachers of the JMB 'A' level, and the informative support was provided by organisations which were not specifically formed to help teachers of this 'A' level.

12.5 REGIONAL (JMB) LEVEL OF COMMUNICATION AND SUPPORT FOR THE JMB 'A' LEVEL

The types of support available to teachers, and the communications systems within the JMB region are shown in Table 12.3.

TABLE 12.2

SUPPORT AND COMMUNICATION FOR TEACHERS OF THE JMB 'A' LEVEL WITHIN THE JMB REGION

MODES OF SUPPORT			COMMUNICATION CHANNELS
Authoritative	Informative	Supportive	
–	JMB literature		JMB Sub-committee Meetings
	Manchester Regional Centre Conference	Manchester Regional Centre	
	JMB Sub-committee Members		

This table shows that the Joint Matriculation Board itself could be considered as filling only an informative support role for, while it provides booklets for teachers of the 'A' level, (e.g. 'Book Readings' and 'Tips for Practicals'), it does not provide any other form of support. The Environmental Science/ Studies Sub-committee meetings, as will be seen later on in this chapter, provide a communication system for those teacher members who are teaching the 'A' level. Interviews with teachers indicated that the teacher members of this Sub-committee also act as transmitters of information about the 'A' level to other teachers in their own and neighbouring establishments, and can, therefore, be considered as filling an informative support role.

The Manchester Regional Centre for Science and Technology Education filled both informative and supportive roles. In 1976 it organised the Conference on the JMB 'A' level which was held in Manchester and was attended by 60 teachers from 25 LEA's in the JMB region. Until its demise in 1976, it also provided on-going help for teachers of the 'A' level.

At the time of the survey (1979) the only support for teachers of the 'A' level within the JMB region was informative support from the JMB and from teachers on the JMB Sub-committee, for the Manchester Regional Centre was no longer in operation. At the time, the only communication system for teachers in the region operated through the JMB Sub-committee, when its teacher members gathered for the meetings of the Sub-committee. There were no communication systems available for teachers who were not members of this Sub-committee.

12.6 THE LEA'S COMMUNICATION AND SUPPORT SYSTEMS FOR TEACHERS OF THIS 'A' LEVEL

12.6.1 COMMUNICATION AND SUPPROT IN LEA 1

The types of support and communication systems available for teachers of the JMB 'A' level within LEA's varies widely from one to another, so the situation existing within each LEA was surveyed separately. The results for LEA 1 are set out in Table 12.3.

TABLE 12.3

THE TYPE OF SUPPORT AND COMMUNICATION SYSTEMS AVAILABLE TO TEACHERS OF THIS JMB 'A' LEVEL IN LEA NO. 1

MODE OF SUPPORT			COMMUNICATION CHANNELS AVAILABLE	NUMBER OF ESTABLISHMENTS	NUMBER OF TEACHERS
Authoritative	Informative	Supportive			
Adviser	Univ. Ed. Dept. Conference	Sci./Tech. Centre	LEA communications	12	21
	Univ. Extension Course	Env. Ed. Assoc.	Intra-establishment		
	LEA In-service course	School Liaison Officer			
	College of Education Workshop	Developers			

This LEA does have an Environmental Studies Adviser who actively promotes adoption of the 'A' level among the teachers in the county, and who would, therefore, be considered by teachers teaching the 'A' level as occupying the authoritative support role in this county.

This adviser, in association with the local university's Department of Education, organised a one-day conference on the 'A' level in 1975 for teachers in the county, the first such conference on the 'A' level to be organised anywhere in the country. Then, in 1976, in collaboration with the local College of Education, this adviser organised a week-long workshop for those teaching Environmental Science at CSE, 'O' and 'A' levels. In 1979, the same adviser, in cooperation with the local university's Adult Education Department, organised a one-day in-service course on the teaching of Environmental Science at CSE, 'O' and 'A' level, which was attended by teachers from the adviser's county as well as from other neighbouring LEA's. The one-day conference, the week-long workshop and the one-day course are considered here as filling the informative role of support.

In addition to providing informative support for this 'A' level, the adviser approached the local Science and Technology Education Centre in 1976 with a request that an Environmental Science Group be formed. This request was granted and its first meeting was held in 1976. Since that time, regular meetings of the group have been held at a number of different locations within the county, many of them dealing specifically with the 'A' level. This county also had an LEA-sponsored Association for Environmental Education which held regular meetings, some of which concerned matters related to the 'A' level, and, in addition, a Schools' Liaison Officer, centred at the local College of Agriculture, who supplied information and equipment to teachers of environmental subjects, including those teaching the 'A' level. The local Science and Technology Education Centre, the Association for Environmental Education and the Schools' Liaison Officer are considered to be occupying the supportive role in the county because they provide more or less continuous support of one form or another which helps teachers in the teaching of the 'A' level.

This county has three teachers who were members of the original Environmental Science/Studies Sub-committee of the JMB and/or the Working Party, or both, and were, therefore, intimately involved in drafting the new syllabus. These three teachers fulfill a further supportive role, for they give advice and information to other teachers interested in adopting the 'A' level, and have conducted afternoon workshops on aspects of the syllabus for other interested teachers and for their 'A' level students. One of these teachers has chaired a committee which had developed a Mode 2 CSE Environmental Science syllabus for use in the county which was modelled on the JMB 'O' level syllabus. These three teachers are the developers listed in Table 12.3.

Clearly, a number of different channels exist within the communication system for teachers of the 'A' level in this county, including formal channels operating through a number of organisations, and also informal channels.

There were many opportunities for the teachers to communicate with one another at meetings these organisations arranged, as well as at the in-service courses and workshops arranged by the LEA.

Since nine of the twelve establishments offering the 'A' level in the county in 1980 had two or more persons teaching the 'A' level, there were opportunities for informal communications between the persons teaching the 'A' level in the same establishment. The county had a relatively large number of persons teaching the 'A' level in 1980 (21 in all) and many of these teachers knew each other, so there were also opportunities for informal communications between teachers in neighbouring establishments. School and college interviews revealed that a number of teachers did meet and discuss the 'A' level in this informal way.

LEA No. 1 had the widest range of support and communication systems for this 'A' level of all the LEA's involved in this study. It was also the one with the largest number of establishments, teachers and students involved with it.

12.6.2 SUPPORT AND COMMUNICATION IN LEA 2

LEA 2, like LEA 1, was a large county and had an Environmental Education Adviser. The results for this LEA are summarised in Table 12.4.

TABLE 12.4

THE TYPES OF SUPPORT AND COMMUNICATION SYSTEMS
FOR TEACHERS OF THE 'A' LEVEL IN LEA NO. 2

MODE OF SUPPORT			COMMUNICATION CHANNELS AVAILABLE	NUMBER OF ESTABLISHMENTS	NUMBER OF TEACHERS
Authoritative	Informative	Supportive			
Adviser	Teacher meetings	Resource centre	Intra-establishment	5	8
	Newsletter	Developers			
		JMB members			

LEA No. 2 was one of the two LEA's first approached by Mr. R. F. Morgan - of Project Environment - with the suggestion to develop the 'A' level. One result was that the Adviser for Environmental Education set up a Steering Committee, and later on Working Parties, which developed the first syllabus in 'A' level Environmental Science to be presented to the JMB in 1974.

The Environmental Education Adviser in this county was active in the promotion of the JMB 'A' level, speaking at several meetings he called in different parts of the county for interested teachers. The adviser arranged for one of the local colleges of higher education to offer evening talks and courses for environmental science teachers, although at the time of the survey (1980) none had been held, and he had started the publication of a newsletter for teachers of environmental science, which contained articles about the 'A' level. The talks by the adviser and the Environmental Science newsletter are regarded here as filling the informative support role in this county and the adviser is regarded as filling the authoritative support role.

This county had also established an Environmental Resource Centre, at one of the local teachers' centres, and this housed materials specifically for the use of teachers of the JMB 'A' level. In addition, the county also had several teachers who had helped in the development of the original 'A' level syllabus and other teachers who had been members of the JMB Environmental Science/Studies Sub-committee and/or of the Working Party which produced the JMB 'A' level syllabus. These individuals, and the Environmental Resource Centre, are considered to be occupying a supportive support role for teachers of this 'A' level in this LEA.

Communication amongst the teachers of the 'A' level in this LEA is almost completely lacking. Although several meetings for these teachers had been planned by the adviser, none had been held because there was not enough response from the teachers themselves. In only two of the five implementing establishments are there two or more persons teaching the 'A' level and the author knows of no informal meetings or communications having been arranged, though this may be because the five implementing establishments in this county are widely distributed. In these circumstances, the Environmental Science Newsletter, sent out from the adviser to teachers, provided a most important communication channel, in the opinion of the adviser. The school and college interviews did, however, reveal that several of the teachers in the LEA No. 2 had attended meetings and workshops organised in LEA No. 1, a neighbouring county, so that there was some contact between them and also with the teachers of the 'A' level in LEA No. 1, particularly at meetings organised outside the constraints which exist within the LEA structure.

12.6.3 SUPPORT AND COMMUNICATION IN LEA'S NOS. 3 TO 9

The types and levels of support and communication systems for teachers of this 'A' level in the remaining seven LEA's in the survey were much fewer than those which were available in either LEA No. 1 or No. 2. The types of support and communication systems available to the teachers of this 'A' level in these seven LEA's are summarised in just one table as shown below.

TABLE 12.5

THE TYPES OF SUPPORT AND COMMUNICATION SYSTEMS
FOR TEACHERS OF THIS 'A' LEVEL IN LEA'S NO. 3 TO NO. 9

LEA	TYPE	MODE OF SUPPORT			COMMUNICATION CHANNELS AVAILABLE	NO. OF ESTABLISHMENTS	NO. OF TEACHERS
		Authoritative	Informative	Supportive			
3	Very large County	-	-	JMB member	-	3	6
4	Small borough	-	-	-	-	1	1
5	Small borough	-	-	-	-	1	1
6	Small county	-	-	-	-	2	6
7	Large county	-	-	JMB member	-	1	3
8	Small borough	-	-	JMB member Developer	Between 2 establishments	2	3
9	Small borough	-	-	-	-	1	1

The table shows that there is no authoritative support for 'A' level Environmental Science in LEA's No. 3 to No. 9. Three of them have advisers for environmental subjects, two of whom are Rural Studies Advisers, and the third has a major responsibility for Geography but also looks after Environmental Studies. None of these advisers was promoting adoption of the 'A' level at the time of the survey.

In LEA No. 3, a very large county, the adviser, at the time, was occupied promoting a county developed Mode 3 Environmental Science syllabus for CSE candidates in the fourth and fifth forms of secondary schools, but was interested in the JMB 'A' level. The county does have its own Environmental Education Association but its meetings did not deal with topics of interest to teachers of the 'A' level. The county, however, has an Environmental Resources Centre located at a local polytechnic, and this centre does have materials suitable for such teachers. One of the teachers of the 'A' level in this county was a member of the JMB Environmental Science/Studies Sub-committee so was in a position to give help to other 'A' level teachers in the county, though enquiries established that he was not in contact with other teachers. There was, therefore, neither authoritative nor informative support for the 'A' level in LEA No. 3, though there was some supportive support for teachers.

At the time of the survey there were no organised communication systems for teachers of this 'A' level in LEA No. 3. Two of its three implementing establishments had two or more persons teaching the 'A' level, and the teachers in these two establishments had opportunities for informal communication with their colleagues in the same establishment. Since the three establishments were located in different parts of such a large county (geographically), distance was an obstacle to their meeting.

In LEA No. 4, a small metropolitan borough, there was an Environmental Studies/Geography Adviser who had arranged financial help for the implementation of the 'A' level at the request of an Environmental Science teacher, but since this adviser was not actively promoting adoption of the 'A' level, she was not considered to be occupying an authoritative support role. In this LEA, as well as in LEA's Nos. 5 and 9, which also had no authoritative support, only one establishment had implemented the 'A' level, and only one person was teaching it in each of these establishments. None of these teachers had helped develop the JMB 'A' level, and none had been a member of the JMB Environmental Science/Studies Subcommittee. There was, therefore, no support of any kind for the teachers of the 'A' level in these three LEA's, and these teachers had no communications with other teachers of this 'A' level. The teachers in LEA's 5 and 8 learned about the 'A' level during courses they were taking, and the teacher in LEA 4 was informed of it by the Adviser in LEA 2 with whom he was in contact. The teachers in two of these LEA's, however, reported obtaining some help from lecturers in colleges of education which were outside of their own respective LEA.

LEA No. 6, a small county, had a Rural Studies Adviser, but he was not promoting adoption of the JMB 'A' level so was considered not to be occupying an authoritative support role.

There was also no informative or supportive support for the teachers of the 'A' level in this county. Each of the two schools offering the 'A' level had three people teaching the 'A' level, so the teachers had some opportunity for communication with colleagues. The two schools, however, were widely separated from one another and distance was a major obstacle to communication between the teachers in the two schools. None of the six teachers was in a position to communicate with teachers of this 'A' level other than in their own schools. None of them had been involved in the development of the 'A' level, and none had been members of the JMB Environmental Science/Studies Sub-committee, so they had no opportunities for contact with other teachers through such meetings.

LEA No. 7, a large county, had no environmental subjects adviser, and only supportive support for the 'A' level was available. It was provided by a teacher who was also a member of the JMB Environmental Science/Studies Sub-committee. There was one implementing establishment in this county with three persons teaching the 'A' level. One of these three was the member of the JMB Environmental Science/Studies Sub-committee, so was in contact with other teachers of the 'A' level who were members of that Sub-committee.

LEA No. 8, a small metropolitan borough, had no adviser for environmental subjects and provided no support for the 'A' level. There were two implementing establishments in this borough, one with one person teaching the 'A' level and the other with two persons teaching the 'A' level. The teacher in the first of these schools had been involved in the development of both the 'A' and 'O' level Environmental Science syllabuses, and could, therefore, be considered as fulfilling the supportive support role for the teachers in the other school with whom he was in frequent contact. This teacher was also a member of the JMB Environmental Science/ Studies Sub-committee so was in communication with other teachers of the 'A' level who were also members of that Sub-committee.

12.7 DISCUSSION

During their preliminary year of interviews and in subsequent studies undertaken for the Curriculum Diffusion Research Project, Nicodemus and Jenkins (1975) found that the importance of a science adviser/inspector in facilitating the dissemination and adoption of new (science) projects became quite evident. Harding (1975), in her study of the adoption of the Nuffield Science Teaching Projects, concluded that:

> Within each local system, for each recognised area of the curriculum, there is a need for a person to assume the responsibility for the dissemination of information about curriculum developments local and national. The LEA adviser is uniquely placed to perform this role. (P. 16).

This present study has also demonstrated the importance of the adviser in the dissemination and adoption of new projects, in this case the JMB Environmental Science 'A' level. In only two of the LEA's surveyed were there named advisers for Environmental Education/Studies, and these two LEA's had the greatest number of implementing establishments, teachers of the 'A' level, and candidates entered for the examinations of the 'A' level. Table 12.6 shows the mean number of implementing establishments, mean number of teachers of the 'A' level, and mean annual number of candidates sitting for the final examinations of the 'A' level for each of three categories of LEA. These three types of LEA's are those with an adviser for Environmental Education/Studies, those with a Rural Science/Studies adviser, and those with no adviser for environmental subjects.

TABLE 12.6

PRESENCE OF AN ADVISER FOR ENVIRONMENTAL SUBJECTS AND MEAN NUMBER OF IMPLEMENTING ESTABLISHMENTS, TEACHERS AND CANDIDATES OF THE 'A' LEVEL IN THESE LEA'S (1980)

ADVISER PRESENT	MEAN NUMBER PER LEA			NUMBER OF LEA'S
	Establishments	Teachers	Candidates*	
Environmental Studies	8.5	14.5	32.5	2
Rural Studies	1.8	3.5	19.3	4
None	1.3	1.8	8.0	5

This table clearly shows that the mean number of implementing establishments (8.5), implementing teachers (14.5), and candidates for the 'A' level (32.5) is significantly higher in the two LEA's with designated Environmental Education/Studies advisers, than in the other nine LEA's not having such an adviser. The mean number of establishments, teachers and candidates in LEA's with a Rural Studies adviser are higher than in LEA's with no adviser for environmental subjects. Although the presence of an adviser for Rural Science/Studies is correlated with higher mean numbers of implementing establishments, teachers and candidates as compared with LEA's with no such adviser, it is in the LEA's with a designated Environmental Education/Studies adviser that the greatest mean numbers of implementing establishments, teachers and candidates of the 'A' level are found.

The importance of the LEA and the LEA adviser in curriculum development is, however, not restricted solely to dissemination and adoption, and a number of researchers have demonstrated the importance of the LEA in providing support systems for the continued success of curriculum innovations. Humble and Rudduck (1972), Light (1973), Schools Council (1974), Nisbet (1975), Steadman et al (1980), and Whitehead (1980), for instance, have all drawn attention to the need for adequate support systems for the long term success of educational innovations, and most of these authors have further suggested that it is at the LEA level where support for an innovation can be most effective. The Schools Council (1974) Report on Dissemination, for instance, stated that,

> The key to successful adoption is, therefore, a local one and whatever support is offered by the project, the Council and the publishers, the extent to which the local education authority is prepared to foster the development is likely to be crucial. (P. 22).

while the Schools Council Impact and Takeup Study has said that,

> ...it seems that in the long run LEA support and the extent to which the LEA's are prepared to foster the development will be crucial. (Whitehead, 1980, p. 16).

Nicodemus and Jenkins (1975), in their study of the adoption of new science projects, indicated the importance of a science adviser/inspector in facilitating the adoption of new projects, and this present study has shown that only two of the eleven LEA's with implementing establishments had specific advisers for Environmental Education/Studies. Table 12.7 shows that it was these two LEA's which had the highest levels of implementation.

TABLE 12.7

THE PRESENCE OF AN ADVISER AND LEVELS OF IMPLEMENTATION OF THE 'A' LEVEL IN ELEVEN LEA'S

ADVISER	LEVEL OF IMPLEMENTATION IN LEA*			
	High	Medium	Low	Totals
Environmental Studies	2	0	0	2
Rural Studies	0	2	2	4
None	0	1	4	5
TOTALS	2	3	6	11

*High = 4 or more implementing establishments.
Medium = 2 or 3 implementing establishments.
Low = 1 implementing establishment.

The table shows that high levels of implementation were found only in the two LEA's with a specific adviser for Environmental Education/Studies. The levels of implementation in LEA's with a Rural Science/Studies adviser were intermediate between those of LEA's with an adviser for Environmental Education/Studies and those of LEA's with no adviser for environmental subjects.

Even though no attempt was made in this present study to allocate scores to the level of support and communication for the 'A' level in each LEA studied, as Harding and Kelly (1977a) did, it is nevertheless clear that there is a positive correlation between the level of support and communication for the 'A' level in an LEA and the level of implementation. An attempt was made to determine which of the types of support and also communication might be the most important for the success of the 'A' level as measured in terms of numbers of implementing establishments, teachers and candidates of the 'A' level in each of the nine LEA's involved in the Implementer Survey and School and College Interviews. These results are shown in Table 12.8.

TABLE 12.8

PRESENCE OF SUPPORT AND COMMUNICATION SYSTEMS IN LEA'S IN RELATION TO THE MEAN NUMBER OF IMPLEMENTING ESTABLISHMENTS, TEACHERS AND CANDIDATES OF THE 'A' LEVEL IN THESE LEA'S

MEAN NUMBER PER LEA	PRESENCE OF COMMUNICATION AND SUPPORT SYSTEMS IN LEA'S							
	Authoritative		Informative		Supportive		Communication	
	Yes	No	Yes	No	Yes	No	Yes	No
Establishments	8.5	1.6	8.5	1.6	4.6	1.3	6.3	1.5
Teachers	14.5	3.0	14.5	3.0	8.2	2.3	10.7	3.0
Candidates	32.5	14.6	32.5	14.6	23.4	12.5	25.7	15.0
Number of LEA's	2	7	2	7	5	4	3	6

The table shows that the LEA's with authoritative or informative support have higher mean numbers of establishments, teachers and candidates than the LEA's without such types of support. This might indicate that authoritative and/or informative modes of support, individually or in combination, are more highly related to implementation levels in an LEA than supportive support or the presence of communication systems. The table clearly shows that the level of implementation in an LEA is higher when any form of support or communication is present. In contrast, Harding and Kelly (1977a) found only a slight positive correlation between the level of support and communication for Nuffield Science Teaching Projects and the level of implementation in some of the LEA's they studied.

According to Humble and Rudduck (1972):

> Colleges and institutes have a role to play in the long term continuity of a curriculum innovation, but the most effective immediate effort in in-service work is likely to be that of the local authority with its advantages of control over resources, knowledge of and access to the schools, availability of local centres for teachers, and its team of advisory staff. (P. 110)

The present study has shown that there is little or no support for the 'A' level, and no support was given to the 'A' level by the Schools Council. Only informative support was available from the JMB which originated the syllabus. This study has also shown that there is little support offered to teachers of this 'A' level by colleges/institutes of higher education and by university education departments, and that even in those LEA's where such establishments have provided conferences, courses and workshops, these have been the result of approaches by the adviser. The continued existence of this 'A' level seems to depend on the support provided by the LEA's and their advisers, as Humble and Rudduck have suggested.

12.8 CONCLUSIONS

The support now given to the subject (Environmental

Science) by the Department of Education and Science, through its appointment of an HMI with special responsibility for Environmental Education and its provision of in-service courses for teachers of the subject, could also be an important factor in the 'A' level's development, supporting present LEA's initiatives, as well as encouraging other LEA's to become involved in the provision of Environmental Education, and giving support to teachers who have already implemented, or intend to implement, the 'A' level.

If, as Humble and Rudduck (1972), Light (1973), Schools Council (1974), Nisbet (1975), Steadman et al (1980), and Whitehead (1980), all suggest, adequate support is necessary for the long term success of an educational innovation, then this study suggests that the JMB 'A' level will be successful (in terms of implementation and continuance) in only two of eleven LEA's surveyed, namely those which have an Environmental Education/Studies adviser, and in which there are adequate support and communication systems for the teachers of this 'A' level. It would seem that the 'A' level has little chance of success in LEA's without such an adviser, and support and communication systems, unless some regional body, such as the now defunct Manchester Regional Science and Technology Education Centre is set up to provide support. Such support would help teachers of the 'A' level to continue with it. Such an organisation would also disseminate knowledge of the 'A' level to other teachers to encourage more establishments and more teachers to adopt and implement this new JMB 'A' level. It is perhaps significant in this regard that five of the six establishments known to have discontinued the 'A' level (omitting the one grammar school in LEA No. 2 which became a comprehensive school) at the present time (1981) are located in LEA's which do not have an Environmental Education/Science adviser, and in which there is little or no support provided for the teachers of this 'A' level. However, the presence of an adviser for Environmental Education/Studies is not by itself a guarantee of success for the 'A' level, since 8 of the 51 LEA's in the JMB region have such advisers and in only two of them were there establishments which had implemented the 'A' level. There are, in addition, 12 further LEA's in the JMB region with an adviser for Rural Science/Studies or an adviser with a responsibility for Environmental Education as well as other subjects (e.g. Geography), and there were implementing establishments in only four of them. As Table 12.9 shows, there are 31 LEA's in the JMB area with no adviser for environmental subjects and of these only 5 have implementing establishments.

TABLE 12.9

PRESENCE OF AN ADVISER FOR ENVIRONMENTAL SUBJECTS IN LEA'S AND PRESENCE OF IMPLEMENTING ESTABLISHMENTS

IMPLEMENTING ESTABLISHMENTS	ADVISER			
	Environmental Studies	Rural Studies	No Adviser	TOTALS
Yes	2	4	5	11
No	6	8	26	40
TOTALS	8	12	31	51

Since this study has indicated that LEA support is important for the dissemination, adoption and continuance of this and other curriculum innovations, the success of any curriculum initiative could be monitored by the appointment of new advisers for a subject or the delegation of responsibility for the subject to an existing adviser.

CHAPTER THIRTEEN

TEACHERS' AND STUDENTS' OPINIONS OF THE 'A' LEVEL

13.1 INTRODUCTION

In the first few years of the life of a new syllabus it is thought likely that a number of potential adopters, both teachers and students, will not adopt the innovation until it has been tried and tested by others. It is likely, therefore, that the opinions of teachers and students involved with such a new syllabus will influence other potential adopters of such an innovation. For these reasons the opinions of the JMB Environmental Science 'A' level were sought from both teachers and students.

13.2 METHODS

Teachers involved in the Implementer Survey were asked to agree or disagree with a series of statements about the 'A' level. These statements were selected for inclusion in the questionnaire either because they had been expressed about this and/or other environmental 'A' levels in the literature or because they had been expressed by teachers during the preliminary interviews which had led up to the construction of the questionnaire. These same statements were also included in the Non-Implementer Questionnaire for comparison with the views expressed by Implementers. Several (unsolicited) opinions expressed by respondents to the Implementer Survey were also written into the Non-Implementer Questionnaire.

13.3 TEACHERS' OPINIONS

The numbers of implementers, adopters and non-adopters agreeing or disagreeing with each of nine statements of opinion about the 'A' level are shown in Table 13.1. These nine statements were those included in both Implementer and Non-Implementer Questionnaires. A further six statements which were contained in the written-in responses of the Implementers were only included in the Non-Implementer Questionnaire and are shown in Table 13.2. For the purpose of analysis "strongly agree" and "agree" responses were grouped together as "agree" responses, while "strongly disagree" and "disagree" responses were grouped together as "disagree" responses.

TABLE 13.1

NUMBERS OF IMPLEMENTING, ADOPTING AND NON-ADOPTING TEACHERS WHO AGREED OR DISAGREED WITH NINE STATEMENTS ABOUT THE 'A' LEVEL

	TEACHER GROUP											
	IMPLEMENTERS				ADOPTERS				NON-ADOPTERS			
STATEMENT	A	D	N	N/R	A	D	N	N/R	A	D	N	N/R
1. It has a distinct advantage over existing 'A' levels, e.g. Biology and Geography	8	6	11	6	10	7	8	1	2	6	2	0
2. It is relevant to the modern needs of both students and teachers	25	2	4	0	26	0	0	0	5	1	4	0
3. It is educationally worthwhile	27	2	2	0	26	0	0	0	7	1	2	0
4. It shows unity of purpose	22	2	7	0	18	0	7	1	3	1	6	0
5. It is an easier subject than traditional 'A' level	3	23	5	0	1	19	6	0	0	8	2	0
6. It is a trendy course that will eventually fall out of fashion	2	23	5	1	1	18	6	1	3	2	5	0
7. It is a practical possibility in all schools and colleges teaching 'A' level sciences	24	2	3	2	20	3	3	0	3	5	2	0
8. To teach it would require more work than traditional related subjects	26	3	1	1	18	4	3	1	9	0	1	0
9. To teach it successfully the teacher would have to be a dedicated environmentalist	6	15	6	4	16	3	6	1	8	2	0	0
	(n = 31)				(n = 26)				(n = 10)			

A = Agree; D = Disagree; N = Neutral; N/R = No Response

Table 13.1 shows that most of the teachers agree that the 'A' level is "relevant to the modern needs of both students and teachers", is "educationally worthwhile", and that "to teach it would require more work than traditional related subjects".

The table also shows that the response of implementers is very similar indeed to that of adopters for eight of the nine statements incorporated into the table. Statements 1 to 8 fail to distinguish between Implementer and Adopter teachers. Both groups essentially agree with the positive statements 2, 3, 4, 7 and 8, and disagree with the essentially negative statements 5 and 6. Opinions about statement number 1 are more evenly divided but again are similar for Implementers and Adopters.

The one statement for which there is a sharp difference of opinion between Implementers and Adopters is shown in their responses to statement number 9, concerning the extent to which the teachers would need to be dedicated environmentalists. Among the Implementers, significantly more disagree with this statement than agree with it (χ^2 for the Null Hypothesis = 15.43, df = 1 and $p<0.001$), while among the Adopters significantly more agree with the statement than disagree with it (χ^2 for the Null Hypothesis = 35.38, df = 1, and $p<0.001$).

Adopters as a group do not have experience of teaching 'A' level Environmental Science, and neither do Non-Adopters. In this respect it is interesting that most Non-Adopters agree, as do most Adopters, with statement number 9. This is in contrast to the majority of Implementers who do have experience of teaching the 'A' level, for most of these teachers disagree with statement number 9. It would appear, then, that it is the experience of teaching the syllabus that brings about the difference in response. Those without the experience were inclined to believe that it is a course for dedicated environmentalists to teach successfully. Those with the experience were inclined to believe that it is not necessary to be a dedicated environmentalist to teach it.

There are three statements (numbers 1, 6 and 7) on which Implementers and Adopters have similar responses, but whcih markedly differ from the responses of Non-Adopters. However none of these differences is statistically significant.

The majority of Implementers and Adopters disagree with the statement that the 'A' level "has a distinct advantage over existing 'A' levels", while the majority of the Non-Adopters agree with this statement.

The great majority of both Implementers and Adopters disagree with the statement that "it is a trendy course that will eventually fall out of fashion", while more Non-Adopters agree with the statement than disagree with it.

The great majority of both Implementers and Adopters agree with the statement that "it is a practical possibility in all schools and colleges teaching 'A' level sciences", while more Non-Adopters disagree with the statement than agree with it.

Six statements (numbers 10 to 15) were included in the Non-Implementer Questionnaire, but were not included in the Implementer Questionnaire. The responses to these statements are shown in Table 13.2.

TABLE 13.2

NUMBERS OF ADOPTING AND NON-ADOPTING TEACHERS WHO AGREED OR DISAGREED WITH A FURTHER SIX STATEMENTS ABOUT THE 'A' LEVEL

	TEACHER GROUP							
	ADOPTERS				NON-ADOPTERS			
STATEMENT	A	D	N	N/R	A	D	N	N/R
10. It is in reality an 'A' level in Rural Science	0	24	1	1	0	7	3	0
11. It is not an ideal 'A' level for students as careers in the environmental field are very few in number	3	15	7	1	4	0	6	0
12. It would be impossible to teach it adequately without a textbook	4	13	8	1	4	5	1	0
13. Its status as a separate 'A' level is in doubt as it greatly overlaps with traditional related subjects	9	11	6	0	8	1	1	0
14. Students wishing to do a degree in Environmental Science would be better off doing traditional 'A' levels such as Biology and Geography	6	9	10	1	8	2	0	0
15. To teach it properly requires several teachers with different subject specialties	10	7	8	1	9	1	0	0
	(n = 26)				(n = 10)			

A = Agree; D = Disagree; N = Neutral; N/R = No Response

Table 13.2 shows that the majority of both Adopters and Non-Adopters agreed that the 'A' level was not, in reality, an 'A' level in Rural Science.

The majority of Non-Adopters agreed with statements 13, 14 and 15, which are essentially negative statements about the 'A' level, while the responses of the Adopters to these statements were mixed.

The two groups markedly differed in their responses to statement 11, with the Adopters disagreeing with, and the Non-Adopters agreeing with the statement that "it is not an ideal 'A' level for students as careers in the environmental field are very few in number".

As might be expected then, the Non-Adopters tend, in general, to offer negative opinions of the 'A' level (except for statement 10), while the Adopters tend, in general, to offer more positive opinions of the 'A' level. The only statement that significantly distinguishes between Adopters and Non-Adopters is statement number 10. For this statement, statistically significantly more Adopters disagreed with this statement than agreed with it (χ^2 for the Null Hypothesis = 32.0, df = 1 and $p<0.001$). Among the Non-Adopters, however, four agreed with the statement while none disagreed with it.

There are six statements which show the greatest divergence of opinion between the Implementers and Adopters on the one hand, and the Non-Adopters on the other. These six statements are listed in Table 13.3. Since the responses to these statements of the Implementers and Adopters are so similar, their responses are pooled together for statements 1, 7 and 8.

TABLE 13.3

THE STATEMENTS ON WHICH THE OPINIONS OF THE IMPLEMENTING-ADOPTING AND NON-ADOPTING GROUPS MARKEDLY DIFFERED

STATEMENT	IMPLEMENTERS AND ADOPTERS			NON-ADOPTERS		
	Agree	Disagree	Neutral/ No opinion	Agree	Disagree	Neutral/ No opinion
1. It has a distinct advantage over existing 'A' levels such as Biology and Geography	18	13	26	2	6	2
6. It is a trendy course that will eventually fall out of fashion	3	41	13	3	2	5
7. It is a practical possibility in all schools and colleges teaching 'A' level sciences	44	5	8	3	5	2
11. It is not an ideal 'A' level for students, as careers in the environmental field are very few in number	3	15	8	4	0	6
13. Its status as a separate 'A' level is in doubt as it greatly overlaps with traditional related subjects	9	11	6	8	1	1
14. Students wishing to do a degree in Environmental Science would be better off doing traditional 'A' levels such as Biology and Geography	6	9	11	8	2	0
		(n = 57)			(n = 10)	

Three of these six statements listed in Table 13.3 (statements 1, 13 and 14) refer to the status of the new 'A' level in relation to the traditional related 'A' levels such as Biology and Geography. The Non-Adopters were inclined to disagree with the statement that this 'A' level had a distinct advantage over traditional 'A' levels, were evenly divided about its status, but were inclined to agree that the students wishing to take a degree in the subject would be better off doing the separate traditional 'A' levels. This last view also reflects the feelings of some of the implementing teachers, who, as a group, were uncertain, and some of the students who believed that universities prefer the traditional 'A' levels to the Environmental Science 'A' level, a view actually stated by several of the universities presently offering degrees in the subject. (See Chapters 5 and 8).

The Non-Adopters, as a group, were uncertain as to their opinion of the new 'A' level as being a trendy one which would fall out of fashion, a danger that many such new 'A' levels in non-traditional subjects also suffer from.

The Non-Adopters, as a group, were also uncertain about whether it was an ideal 'A' level as environmental careers were few in number. However the evidence presented in Chapter 11 suggests that there are many possibilities for such careers.

Non-Adopters also were uncertain about the 'A' level not being a practical possibility in schools and colleges offering 'A' level sciences. Those who felt that it was not a practical possibility (see Chapter 7) suggest that this is because competition between this 'A' level and traditional 'A' levels would decrease the numbers taking each of these subjects to less than viable numbers.

13.4 STUDENTS' OPINIONS

Forty-six students from two schools, three colleges of further education and one sixth form college completed the Student Opinion Survey Questionnaire in April, 1980, representing a 45% sample of the 103 students who sat the final examinations of the JMB Environmental Science 'A' level in June, 1980.

These students were asked to compare the interest, difficulty and time involved in out-of-class study of this 'A' level with their other 'A' levels, and these results are shown in Table 13.4.

TABLE 13.4

STUDENTS' COMPARISON OF THE INTEREST, DIFFICULTY AND TIME INVOLVED IN OUT-OF-CLASS STUDY FOR THIS AND OTHER 'A' LEVELS

CATEGORY	INTEREST		DIFFICULTY		TIME	
Much more	9	(21%)	1	(2%)	8	(19%)
More	16	(36%)	6	(14%)	17	(40%)
Same	15	(34%)	24	(56%)	15	(35%)
Less	4	(9%)	12	(28%)	3	(7%)
Much less	0		0		0	
TOTALS	44		43		43	
Can't say/ No response	2		3		3	

The table shows that 57% of the respondents rated the 'A' level as being more or much more interesting than their other 'A' levels while only 9% rated it as less interesting. Fifty-six percent of the students rated it as being as difficult as their other 'A' levels, while another 16% rated it as being more difficult. Thirty-five percent of the students rated it as being as time-consuming as their other 'A' levels, while a further 59% rated it as more or much more time-consuming.

The data displayed in Table 13.4 were then analysed further to find out how many of the twenty-five students who rated the 'A' level as more or much more interesting also rated it as at least as difficult as their other 'A' levels and at least as time-consuming as their other 'A' levels. These results are displayed in Figure 13.1.

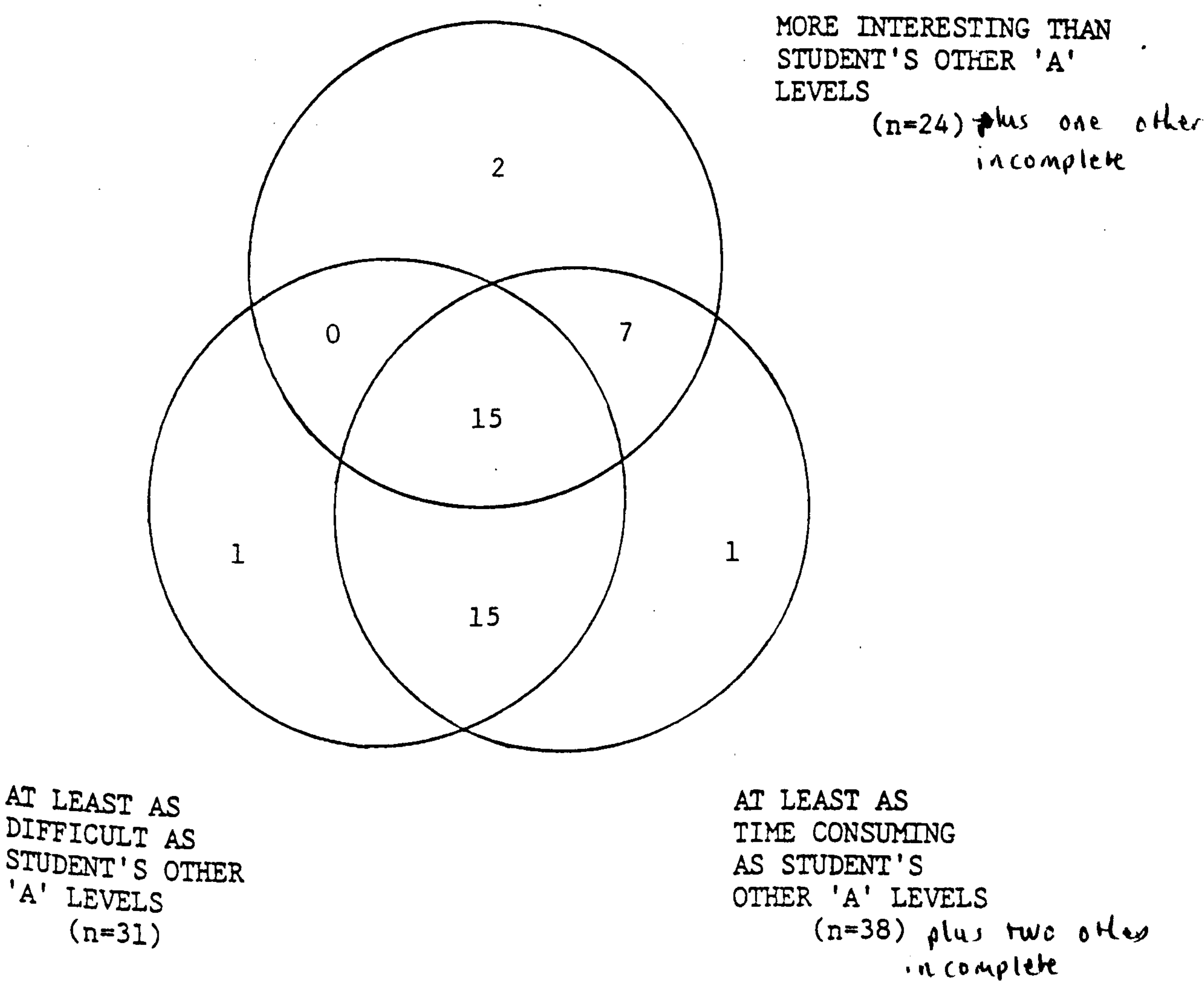


FIGURE 13.1

NUMBERS OF STUDENTS RATING THE 'A' LEVEL AS MORE INTERESTING, AT LEAST AS DIFFICULT AND/OR TIME CONSUMING

The figure shows that 15 of the 24 students who rated the 'A' level as "more interesting" than their other 'A' levels also rated it "at least as difficult" and "at least as time-consuming" as their other 'A' levels. A further 7 rated it "at least as time-consuming" as their 'A' levels, as well as more interesting, and another two found it "more interesting" than their other 'A' levels.

The data in Table 13.4 were also analysed to find out which other 'A' levels the students were comparing the Environmental Science with when they rated it "at least as difficult" or "at least as time consuming". Table 13.5 lists the subjects students were taking at 'A' level in addition to Environmental Science, and also shows the frequencies with which a subject was taken by students rating Environmental Science as "more interesting than", "at least as difficult as" and "at least as time-consuming" as their other 'A' levels. Subjects taken by fewer than three students have been omitted.

TABLE 13.5

THE POSITIVE RATING OF ENVIRONMENTAL SCIENCE BY STUDENTS

	FREQUENCY WITH WHICH AN 'A' LEVEL WAS RATED		
SUBJECT	More interesting	At least as difficult	At least as time-consuming
Biology	5/12	10/11	12/12
Chemistry	7/8	4/9	6/7
English	6/7	6/7	6/7
Geography	10/14	9/14	13/14
Geology	2/5	2/4	5/5
General Studies	16/24	20/28	25/28
History	3/4	4/4	4/4
Human Biology	0/4	4/5	4/4
Mathematics	2/7	4/7	6/7
Social Biology	0/3	2/2	3/3
Sociology	1/3	3/3	3/3
	n=24	n=31	n=38

Even though students were not asked to rate Environmental Science separately against each of their other 'A' levels, the data from Table 13.5 can be used to gain an indication of which subjects were rated as less interesting than the 'A' level and which 'A' levels seem to be at least as time-consuming or difficult.

The table indicates that the majority of students find the Environmental Science more interesting than Chemistry, English, Geography, General Studies [and History] if they are taking any of these subjects in addition to Environmental Science. The responses also showed that the majority of students found this 'A' level to be as interesting as Biology, Human Biology and Social Biology. The data also indicate that students find the 'A' level to be at least as difficult as each of their other subjects, with the exception of Chemistry. The great majority of students indicated that Environmental Science was at least as time-consuming as each of their other 'A' levels.

It would appear that students of Environmental Science at 'A' level are positively disposed towards their course, finding it more interesting than most, though not all, other 'A' levels taken by the group. In the opinion of the students, it seems Environmental Science is as interesting as Biology, Human Biology and Social Biology, and less interesting than Mathematics, Geology and Sociology. This 'A' level also appears to be at least as difficult as all other 'A' levels other than Chemistry, and as time-consuming as all other 'A' levels taken by these students.

The positive impact of Environmental Science on students taking it is further shown by the fact that nine (20%) of the students stated that they had changed their future plans as a result of the 'A' level and had decided to enter an environmental science/studies degree programme or start an environmental career after the completion of their 'A' levels.

These 46 students were also asked if they would recommend this 'A' level to other students, and the results are shown in Figure 13.2 below.

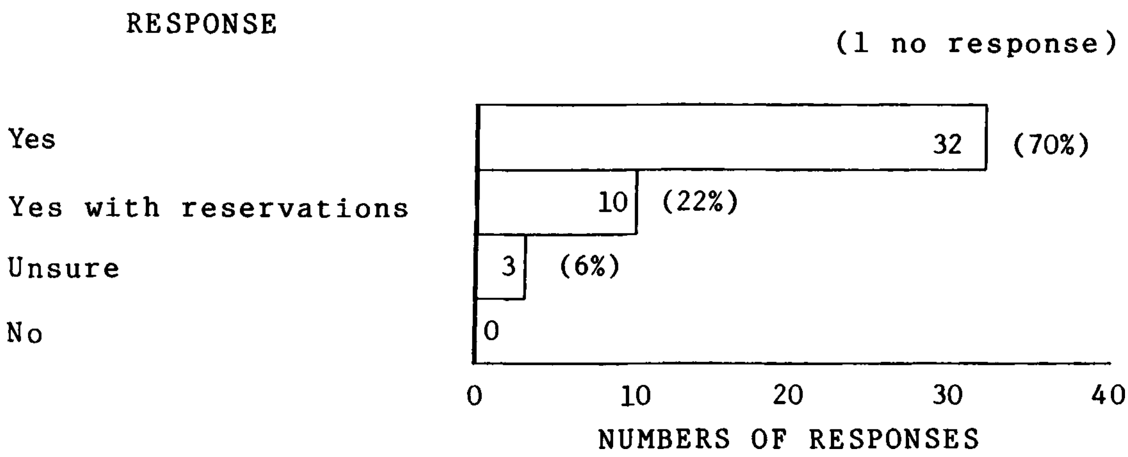


FIGURE 13.2

NUMBERS AND PERCENTAGES OF STUDENTS WHO WOULD RECOMMEND OR NOT RECOMMEND THIS 'A' LEVEL TO OTHER STUDENTS

The great majority of these students (70%) indicated that they would recommend this 'A' level to other students, and another 22% said that they would recommend it to other students but only if it would be useful to these students' future plans. A small minority (6%) were unsure whether or not they would recommend it but none of these students stated that they would not recommend it.

These students were also asked for their overall opinions of this 'A' level, and 45 of the 46 responded to the request. All of the opinions expressed were positive. The following responses are representative of the students opinions:

> "A very interesting and worthwhile subject."
>
> "A very good 'A' level to take."
>
> "I find it interesting and a useful basis to formulate environmental opinions on."
>
> "Very interesting and enjoyable course."
>
> "It is a very interesting 'A' level to take and it has taught me a lot about the world and

my environment which other subjects would never have done."

"An extremely interesting subject and a very worthwhile 'A' level to take."

"Environmental Science is relevant and applicable to everyday life and useful, therefore it is very good."

"Good discipline in basic scientific methods, helps to view and relate problems to many scientific fields, avoids the tunnel vision encountered in many sciences."

The students were also invited to make further comments about the 'A' level in a free response, and 16 took the opportunity of doing so. The acceptability of the 'A' level by universities and potential employers was mentioned as a concern by five of the sixteen students. Four students commented on the importance of including environmental studies in school and college curricula, and four (from different establishments) commented favourably on teaching methods used by their teachers. The remaining four comments related to the background required at 'O' level/CSE for entrance into the 'A' level, the content of the syllabus and students' general lack of awareness of the existence of this 'A' level.

13.5 DISCUSSION

A number of non-adopting teachers expressed opinions about the 'A' level which diverged from the opinions of adopting and implementing teachers. Among these differences were the opinions that the status of the 'A' level was in doubt as it greatly overlapped the content of traditional 'A' levels and that students wishing to take a degree in the subject would be better off doing traditional 'A' levels such as biology and geography. In both cases the great majority of non-adopters agreed with these statements while the responses of the adopters were mixed, but with more disagreeing with the statement than agreeing with it. These opinions were also expressed by a small number of universities and polytechnics involved in the survey of establishments of higher education. (See Chapter 11). That this problem of university acceptance of this 'A' level is seen as a problem by potential adopters at the time of the survey is further shown by the fact that one of the teachers in the Non-Implementer Survey stated that he had decided not to teach the 'A' level because he did not think that it would be acceptable to universities as a pure science, and a number of students involved in the Student Opinion Survey also expressed concern about the acceptability of this 'A' level by both universities and potential employers.

13.6 CONCLUSIONS

A number of the opinions of the 'A' level expressed by non-adopting teachers are based on some misapprehensions of the real situation. These respondents expressed the opinion that its status as an 'A' level was in doubt as it greatly overlapped with traditional related subjects, and that students wishing to take a degree in the subject would be better off doing traditional 'A' levels. However, the survey of higher education establishments showed that even though a small number of these establishments were concerned about the overlapping, and some even suggested that students should take the traditional 'A' levels, the majority expressed no reservation about accepting the 'A' level as part of the entrance requirements for a degree in the subject.

In addition, a number (4 of 10) of these non-adopting teachers agreed with the statement that it was not an ideal 'A' level for students as careers in the environmental field were very few in number, while none disagreed with the statement. However, the survey of prospective employers showed that there were a number of openings in environmental careers for graduates of the 'A' level.

It is, therefore, important for the future of this 'A' level that the position regarding university acceptance of this 'A' level* be clarified and established, and that careers in environmentally-related fields be brought to the attention of both potential adopting teachers and potential students.

* Since this survey was taken, the concern about university acceptance of the 'A' level has been allayed by the JMB at a conference in Keele (Dudley, personal communication, 1981). It was stated at this conference that the JMB's constituent universities would allow prospective university candidates to offer Geography with Environmental Science, thereby rescinding the 1978 regulation preventing candidates from offering Geography in addition to Environmental Science (JMB, October 1978, pamphlet UER 1, p. 6).

CHAPTER FOURTEEN

CONCLUSIONS AND IMPLICATIONS

14.1 CONCLUSIONS ABOUT 'A' LEVEL ENVIRONMENTAL SCIENCE

Though a number of independent groups of teachers within the JMB region were involved in the development of environmental 'A' level syllabuses in the period 1972-74, with the aim of submitting these to the JMB, the present Environmental Science 'A' level syllabus was developed by the JMB's Integrated Studies Panel's Environmental Science/Studies Sub-committee using the joint proposals of just two of these groups. Both of these groups of teachers, in Cheshire and Manchester respectively, were set up originally at the suggestion of the Deputy Director of Schools Council Project Environment. This 'A' level was developed without funding from either the Schools Council or private organisations and without the sponsorship of a professional teaching organisation.

This new 'A' level, then, was regionally developed by practising teachers without the financial support of the Schools Council or private organisations, in contrast to the earlier and much researched Nuffield Science Teaching Projects which were developed nationally under the sponsorship of organisations such as the Association for Science Education and funded by the Nuffield Foundation.

Unlike the funded national Nuffield Science Teaching Projects which were well publicized and had planned dissemination strategies in the form of publications about the project, conferences and workshops, the JMB Environmental Science 'A' level has not been well-publicized, and diffusion of knowledge about it to potential adopters has been limited. Unlike the Nuffield Projects, there has been no planned dissemination strategy for it within the JMB region, beyond its inclusion in the JMB's Annual Regulations and Syllabuses, and the Conference on the 'A' level organised by the Manchester Regional Science and Technology Education Centre in 1976. Published articles about it have been few and restricted to two local county journals and national journals with small circulation. Talks and/or conferences on the 'A' level have been organised in only two of the 51 LEA's in the JMB region, and these were for the teachers in those two LEA's. The spread of knowledge about this 'A' level, therefore, has been largely unplanned and is more appropriately termed "diffusion" and not "dissemination", in contrast to the dissemination strategies of the Nuffield Science Projects organised both nationally and locally within LEA's.

Unlike these national projects, therefore, the most important sources of information about the 'A' level for teachers have not been conferences and journal articles but JMB publications, fellow teachers and LEA advisers.

The most important sources of knowledge for students who are taking the 'A' level depend on the type of establishment in which they are studying for their 'A' levels. The CSE/'O' level Environmental Science teacher and the school list of 'A' levels are the most important sources for students staying on at school to take their 'A' levels.

Most of the students who take the 'A' level at sixth form colleges or colleges of further education seem largely unaware of its existence before they enter these colleges, since college lists of 'A' levels, interviews with college 'A' level tutors, and, in addition for sixth form colleges, materials distributed by the colleges, are the most important sources of knowledge. Analysis of the collected data suggests that distributed materials and an Environmental Science lecturer being the college 'A' level tutor are important ways of increasing the numbers of students taking the 'A' level in colleges.

Unlike the Nuffield Science Projects which are implemented nationally, implementation of the JMB Environmental Science 'A' level is presently confined to establishments in the JMB region. Implementation is not evenly distributed in the JMB region since the majority of implementing establishments are located in just two of these 51 LEA's, and in both of these LEA's there are advisers for environmental education/studies. While higher levels of implementation of Nuffield Projects were noted for large county LEA's, and in LEA's with relevant advisers, implementation of Environmental Science is not related to either size or type of LEA, or the presence of an adviser for environmental subjects. There were, however, higher levels of implementation in two large county LEA's with such an adviser.

However the presence of an adviser does not by itself lead to adoption and implementation, since a number of LEA's with such an adviser had no adoption or implementation, and, indeed, even in the two LEA's with such an adviser and high levels of adoption and implementation, there were also rejecting establishments.

In those LEA's showing adoption, higher levels of adoption were noted in those with a named adviser for Environmental Studies, with lower levels of adoption in LEA's with a Rural Studies/Science adviser or an adviser with partial responsibility for Environmental Studies, and the lowest rates of adoption were in LEA's with no adviser for environmental subjects at all. This study, therefore, shows the importance of an adviser in the adoption of new curricula, a factor also noted in studies of the adoption of the Nuffield Science Teaching Projects.

This study also showed a positive relationship between adoption/implementation and activity of the adviser, as measured in terms of the number of meetings held in the LEA concerning the 'A' level, since the two LEA's with the highest implementation rates also had held such meetings for the teachers in their LEA's. This confirmed Roger's (1962) finding that the adoption of an innovation was directly related to the level of promotional activities by change agents.

Analysis of the establishments adopting the 'A' level showed the importance of an environmental studies tradition in favouring adoption of the 'A' level, since adoption was far more likely in those establishments which already had offered other environmental syllabuses, and hence had created a climate of acceptance towards the 'A' level. Rejection was far more likely in establishments without such a tradition. This finding was similar to those in the

Nuffield studies which showed that adoption of a Nuffield project was more likely in a school which already offered such a syllabus.

Even though the existence of Rural Studies in a school was more likely to lead to adoption of the 'A' level than in a school in which there was no such tradition, the existence of a Rural Studies tradition was correlated with smaller numbers of candidates than schools in which Environmental Studies (rather than Rural Studies) syllabuses were already present. This was due to the poor image of Rural Studies in these schools, which was associated with the weaker academic students. The Rural Studies tradition invariably led to the discontinuance of the 'A' level after its initial implementation.

The reasons given by the schools and colleges for adopting the 'A' level were quite different. In schools the 'A' level is usually a new subject at the sixth form level, when the reasons usually given by teachers for adopting it included student and/or teacher interest in it or being asked by a Head of Department to teach it. Only occasionally was it being taught in a school as a condition of accepting a teaching post. In colleges, however, the lecturers usually adopted the 'A' level as a preferred replacement for an existing syllabus.

Discontinuance, as with the Nuffield Science Teaching Projects is usually not the result of discontent with the syllabus, but is due to situational factors such as teacher retirement, lack of student numbers and LEA re-organisation of schools.

Past research has shown adequate levels of both communication and support to be necessary for the long-term success of a new project or syllabus. On this basis, the present indications are that the success of the 'A' level will be assured only by the appointment of an Environmental Education/Studies adviser in each LEA, with these providing active support to local teachers through conferences and in-service courses. However, there is no evidence available of sufficient teacher interest in these other LEA's to warrant such appointments, though the recent appointment of an HMI with special responsibility for Environmental Education could be an important development by encouraging LEA's to become involved in the provision of environmental science in schools.

14.2 COMPARISON OF ENVIRONMENTAL SCIENCE FINDINGS WITH THOSE OF OTHER ENGLISH AND AMERICAN STUDIES

This research has shown that whereas there was planned and extensive dissemination of nationally developed and funded science projects such as BSCS, ESCP, IPS, Project Physics and PSSC in the U.S.A., and the Nuffield Science Teaching Projects in England, there was no such planned dissemination of the JMB Environmental Science 'A' level, and knowledge of this syllabus was spread by unplanned diffusion.

The comprehensive dissemination strategies used for BSCS, ESCP, IPS, Project Physics and PSSC in the U.S.A. and for the Nuffield Science Teaching Projects in England have contributed to high levels of teacher familiarity with these projects. While implementation of the American projects has been very high (over 50% in some cases), the implementation of Nuffield 'O' level Projects has been mixed, varying from 80% of schools having implemented Combined Science to 18% of schools having implemented Physical Science. The Nuffield Science 'A' levels have had even lower implementation despite the comprehensive dissemination strategies.

There has been no planned dissemination of the JMB Environmental Science 'A' level and levels of implementation, even within the JMB area have been very low. Even in the one LEA where there is an adviser for the subject who has been actively promoting the syllabus and has the highest implementation rate of any LEA, less than 20% of potential adopting schools and colleges had done so (1981).

Research on the Schools Council and Nuffield Projects has shown that the Geography for Young School Leavers and History 13-16 projects which had separate funding for dissemination and aftercare have taken full advantage of dissemination strategies, and levels of awareness and use are substantial.

A number of studies have shown that there is a difference between implementation of a project and use of a project, and that there may be as many as three times as many establishments making use of project materials as there are actually implementing a project. This research into the Environmental Science 'A' level also discovered the use of both the 'A' level and the 'O' level syllabus materials in other courses, the 'A' level syllabus having been modified into a CEE course in one school, and the 'O' level having been modified into a CSE course in one CSE examining board area. All of these studies suggest that the actual use of a project or syllabus in a school may be much higher than the implementation figures for that project or syllabus.

An investigation of a number of Schools Council and Nuffield Projects has also shown that projects within single subject areas have achieved high levels of "familiarity" and "use", although the levels are not so high with the 16-19 year age group. The investigation also found that projects which crossed the curriculum or which bridge traditional subject boundaries have not achieved high levels of use and familiarity. These findings are reinforced by the low implementation rates for the JMB Environmental Science 'A' level, since the subject (Environmental Science) is not within a single subject area and does bridge subject boundaries, reasons cited for non-adoption by several respondents. In addition, this 'A' level is, of course, designed primarily for candidates in the 16-19 year old age group, and the investigation noted that levels of familiarity and use were generally lower for projects designed for this age group.

It is interesting to note that two Environmental Studies/Science Schools Council projects, namely "Environmental Studies 5-13" and "Project Environment" (which latter led to the development of the JMB 'A' level) were found to have two of the lowest levels of "familiarity" and "use" of any of the 56 projects investigated.

The study also found that projects with separate resources for dissemination and aftercare had substantial levels of "familiarity" and "use", and with the Environmental Science 'A' level, the LEA showing the highest levels of aftercare had by far the greatest implementation rate of any LEA in the JMB region. This is, however, in contrast to the findings of the Schools Council Dissemination Report which showed no good correlations between levels of support and communication in an LEA and the uptake of a project in that LEA.

Studies of the American projects mentioned previously, as well as studies of the Nuffield and Schools Council projects, and the present study all suggest that the rate of implementation of a new project or syllabus, whether measured in terms of textbook sales, numbers of examination centres or numbers of candidates measured over time, resembles an S-shaped curve. These studies further show that most of the implementation of an innovation typically occurs in the first five years of a project's life with little further implementation after that time.

Teachers' reasons for adoption of the Nuffield and Schools Council Projects were related to advantages of the course. Further education college lecturers also cited advantages of Environmental Science as their reasons for adopting it, whereas teachers in schools most often cited their own and/or students' interest in it as the reason(s) for its adoption. In the Nuffield, Schools Council and the Environmental Science studies, teachers' reasons for rejection were most often not related to the course but to situational reasons such as over-full school or teacher time-tables, and school or LEA policies.

Discontinuance of the Environmental Science was not related to the syllabus itself but to factors such as teacher retirement, school re-organisation and lack of students, whereas the discontinuance of Schools Council projects was usually due to a teacher's change of school or post within a school, or the teacher's own evaluation of the course or a change in school or department policy.

The previous studies have shown that other teachers were important sources of information about both Nuffield and Schools Council Projects, as well as the Environmental Science 'A' level, while ASE publications, Times Educational Supplement and Science journals were important sources of information about Nuffield projects, and textbooks, courses and the educational press were other important sources of information about Schools Council projects. By contrast, the main source of information about the Environmental Science syllabus for adopters was the publications of the examining board itself, and the LEA advisers were also important first sources of information about the syllabus.

The available research indicates that teachers who are familiar with and use Schools Council projects are usually highly placed in the school organisation, and hold qualifications other than the Certificate of Education. These findings are similar to those of the present study which showed that most adopters of the syllabus hold at least a head of subject post, and usually hold at least a Bachelor's degree as well as professional teacher training. These characteristics of adopters are also similar to the findings that adopters of Nuffield 'A' level biology usually hold a degree and have professional teacher training, and are consistent with Yegge et al's findings in the U.S.A.

that adopters of PSSC usually tend to be heads of their (science) departments.

APPENDIX A

THE QUESTIONNAIRES

A.1. IMPLEMENTER QUESTIONNAIRE

A.2. NON-IMPLEMENTER QUESTIONNAIRE

A.3. STUDENT INFORMATION QUESTIONNAIRE

A.4. STUDENT OPINION QUESTIONNAIRE

APPENDIX A.1.

THE IMPLEMENTER QUESTIONNAIRE

(SURVEY OF THE NEW JMB 'A' LEVEL
'ENVIRONMENTAL SCIENCE')

SURVEY OF THE NEW J.M.B. "A" LEVEL 'ENVIRONMENTAL SCIENCE'.

1. Please indicate your answers by a tick in the appropriate box or column, unless otherwise requested.

2. If insufficient space has been left for any responses please continue these on a separate piece of paper.

3. The lines on the extreme right of each page are for office use only and should not be used for responses

4. All information supplied in this questionnaire will be treated in the strictest confidence and will not be revealed to anyone.

PART A. BACKGROUND INFORMATION ON THE SCHOOL/COLLEGE.

This part of the questionnaire concerns information about the school/college teaching "A" level Environmental Science.

1. Name and Address of School/College. ______________________ 1___
2. Number of full-time students in School/College. (please encircle appropriate number). 0-250 251-500 501-750 751-1000 1001-1250 1251-1500 1501-1750 1751-2000 2000+ 2___
3. Age range of students. ______________ 3___
4. What is the number of students enrolled in all "A" level subjects? ________ 4___
5. Has this School/College changed its status under re-organization? Yes[ ] No[ ] 5___
6. If it has changed its status, what was its earlier status and when was the change made? ______________________ 6___
7. Is your School/College presently teaching or has it taught 'Environmental Studies' syllabuses of other Examining Boards? Yes[ ] No[ ] 7___
8. If yes, could you please indicate which syllabuses below.

   a. A.E.B. "O" level.______ 8___
   b. A.E.B. "AO" level.______ 9___
   c. A.E.B. "A" level.______ 10___
   d. London "O" level.______ 11___
   e. London "AO" level.______ 12___
   f. London "A" level.______ 13___
   g. Oxford " level.______ 14___
   h. Other (please specify).______________________ 15___

9. Is Environmental Science taught at any of the following levels in your School/College?

	YES	NO	
a. "A" level			
b. "AO" level			16
c. "O" level			17
d. CEE			18
e. CSE			19
			20

10. If any of the courses listed in 9 are not presently taught but have been in the past which are these courses? ________________ 21

11. If the School/College plans to offer any of the courses listed in 9 which are not presently taught , which courses are these? ________________ 22

12. Are there any other environmental-type courses other than those in 9 presently taught in the School/College? (ie. Environmental Studies, Energy Resources, Rural Science etc.) Yes ☐ No ☐ 23

13. If yes, please name these courses. ________________

________________ 24

14. As of August 1979 how many years will you have taught this new "A" level?

1.☐ 2.☐ 3.☐ 4.☐ 25

PART B. INFORMATION ABOUT THE RESPONDENT.

This part of the questionnaire requests information about the teacher of "A" level Environmental Science (J.M.B.) , whether he/she teaches the whole of the course or just part of it. (If there is more than one teacher involved in this "A" level, each teacher should complete a copy of this quesionnaire. If more copies of this questionnaire are required please request them).

1. What is your age as of August 1979? (Please encircle appropriate range).

20-25 26-30 31-35 36-40 41-45 46-50 51-55 56-60 61-65 65+ 34

2. Which of the following qualifications do you possess?

	TITLE	GRADUATION DATE	MAIN SUBJECTS	
Degrees				35
				36
Certificate (2 or 3 years).				37
Diploma				38
Certificate (1 year)				39
Other				40

3. Please list an educational/professional institutes, societies etc. to which you presently belong. (ie. ASE, NAEE, Inst. of Biol. etc.)

____

____ 41 ___

4. Please list any conservation/environmental/natural history societies to which you presently belong. ______________________

____ 42 ___

5. Please list any educational/environmental/professional/scientific journals, magazines etc. that you presently subscribe to or regularly purchase.

____ 43 ___

6. Which other educational/environmental/professional/scientific journals, magazines etc. do you refer to? ______________________

____ 44 ___

7. How many years will you have been teaching (excluding teaching practice) as of August 1979? __________ 45 ___

8. Which of the following scaled posts do you presently hold?
None [ ] Scale 1 [ ] Scale 2 [ ] Scale 3 [ ] Scale 4 [ ] Scale 5 [ ] 46 ___

9. What is your present teaching status and title? (ie. Head of Science, Teacher of Biology, Subject Leader of Rural Studies etc.)

____ 47 ___

10. Which subjects were you originally appointed to teach in this School/College? ______________________ 48 ___

11. How many years will you have taught in this School/College as of August 1979? __________ 49 ___

12. Is this your first teaching position? Yes [ ] No [ ] 50 ___

13. If no, what was your previous position and where? ______________________

____

14. Which subjects and at which levels do you currently teach? (ie. "O" Biology, 1st. Form General Science etc.) Please indicate if you teach more than one class of each subject.

a. ______________ b. ______________ 51 ___

c. ______________ d. ______________ 52 ___

e. ______________ f. ______________ 53 ___

15. Which other subjects have you taught since August 1975?

____ 54 ___

16. How many of each of the following have you attended since August 1975 concerning educational, environmental, professional or scientific topics?

a. Talks ________ b. Short Courses ________ c. Seminars ________ 55 ___

d. Long Courses (1 term or more) ________ e. Workshops ________ 56 ___

f. Field Centre Courses ________ g. Open University Courses ________ 57 ___

h. Correspondence Courses ________ i. Conferences ________ 58 ___

j. Others (please specify) ______________________ 59 ___

17. Have you engaged in any other educational activities since August 1975? (ie. conducting workshops, giving talks, writing articles etc.)

Yes [ ] No [ ] 60___

18. If yes, please specify these activities. ________________________________

____

________________________________ 61___

19. Do you presently hold any educational/environmental/professional positions of responsibility? (ie. Member of Examining Board Panel, Chairman of a Natural History Society etc.) Yes [ ] No [ ] 62___

20. If yes, please name these positions. ________________________________

________________________________ 63___

21. Please name any other positions you have held since August 1975.

________________________________ 64___

PART C. INFORMATION ABOUT THE J.M.B. "A" LEVEL ENVIRONMENTAL SCIENCE AND ITS TEACHING.

This part of the questionnaire asks for information about this new "A" level its place in the School/College, outside available help and the teachers' opinions of the new "A" level.

i. KNOWLEDGE OF THE J.M.B. ENVIRONMENTAL SCIENCE "A" LEVEL.

1. Were you involved in any teaching projects of an environmental nature previous to August 1975? (ie. developing Sixth Form General Studies environmental units, producing Mode 2/3 syllabuses in environmental studies etc.) Yes [ ] No [ ] 65___

2. If yes, please could you specify. ________________________________

________________________________ 66___

3. Were you involved in any way with the development of this new J.M.B. "A" level in Environmental Science? Yes [ ] No [ ] 67___

4. If yes, what was your involvement? ________________________________

____

5. If your answer to 3 above was no, how did you first come to hear of this new J.M.B. "A" level?

a. In a journal [ ] b. At a Conference [ ] c. From Dept. Head [ ]

d. In a Job Advert [ ] e. From another Teacher [ ]

f. From LEA Adviser [ ] g. Other (please specify) ________________ 68___

6. Which of the following did you contact, if any, for further information about this new "A" level?

a. Nobody [ ] b. J.M.B. [ ] c. LEA Adviser [ ] d. Journals [ ]

e. Dept. Head [ ] f. Other Teachers [ ] g. Other (please specify) ________ 69___

7. Did you attend any conferences, talks, workshops etc. to learn more about this new J.M.B. Environmental Science "A" level? Yes [ ] No [ ] 70___

8. Were you employed in your present school/college at the time that the introduction f this new "A" level was being considered?
Yes [ ] No [ ] 71___

(If no, plea.e omit the next section ii, and go onto Section iii.)

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ii. THE DECISION TO OFFER J.M.B. "A" LEVEL ENVIRONMENTAL SCIENCE IN THE SCHOOL/COLLEGE.

1. Whose original idea was it to introduce this new "A" level into this school/college?
a. Your's [ ] b. Dept. Head [ ] c. LEA Adviser [ ]
d. Other (please specify) ________________ 72___

2. Whose was the final decision as to whether this "A" level would be offered in your school/college?
a. Your's [ ] b. Dept. Head [ ] c. Head/Principal [ ]
d. Other (please specify) ________________ 73___

3. Did you have any involvement in the decision to offer this new "A" level in this school/college?
a. No involvement [ ] b. Member of Committee suggesting its acceptance [ ]
c. Was asked for an opinion [ ] d. Other (please specify) ____________ 74___

4. Did you vol nteer to teach this "A" level or were you asked to teach it by a department head etc?
a. Volunteered [ ] b. Asked by Dept. Head [ ]
c. Condition of accepting present post [ ] d. Other (please specify)
________________ 75___

5. How would you rate each of the following as an obstacle/problem in the effort to have this "A" level introduced into your school/college?

	Major	Minor	None	Not Applic.	
a. Resistan e from science staff					76___
b. Resistance from geography staff					77___
c. Timetab e already too full					78___
d. Too few possible students					79___
e. No "O" level or CSE courses taught in the Environmental field in the school/college					80___
f. Laboratory/space problems					81___
g. Financial problems					82___
h. School undergoing re-organization					83___
i. Competition from other new courses also being introduced into the school/college					84___

5. cont.	Major	Minor	None	Not Applic.	
j. Transport for fieldwork					85___
k. Lack of Environmental Science qualifications of intending teacher					86___
l. Intending teacher's general lack of experience at teaching "A" level					87___
m. Lack of support from LEA					88___
n. No other schools/colleges in area teaching it					89___
o. Others (please specify)					90___

iii. <u>SOURCES OF HELP IN THE OFFERING AND TEACHING OF J.M.B. "A" LEVEL ENVIRONMENTAL SCIENCE</u>.

1. What is the LEA for your School/College? ______________________
2. Does this LEA have a specified Environmental Science/Studies Adviser?
   Yes [ ] No [ ] 91___
3. If not, what is the official title and name of the person having responsibility for Environmental Science/Studies? ______________________ 92___
4. How many times in an average school year does this adviser visit you at your School/College in connection with Environmental Science? __________ 93___
5. Has this LEA organized conferences, talks, workshops etc. concerning this new "A" level? Yes [ ] No [ ] 94___
6. Does this LEA currently organize meetings etc. of those teaching this "A" level? Yes [ ] No [ ] 95___
7. Have your local Colleges of Education or University Departments of Education organized any conferences, talks, workshops etc. concerning this new J.M.B. "A" level? Yes [ ] No [ ] 96___
8. If yes, please name the Colleges/Universities concerned.
   ____ 97___
9. Have any other local organizations (ie. Regional Science and Technology Centres, Professional Societies etc.) held meetings concerning this new J.M.B. "A" level? Yes [ ] No [ ] 98___
10. If yes, please name these organizations.
    ____ 99___
11. Have you been financed partly or wholly to attend meetings etc. concerning
    a. this J.M.B. "A" level? Yes [ ] No [ ] 100___
    b. environmental education? Yes [ ] No [ ] 101___
12. Did the LEA provide assistance (finance, books, materials, equipment etc.) for the teaching of this "A" level? Yes [ ] No [ ] 102___

13. How often di you refer to each of the following for advice and/or help with this new "A" level?

	Very often	Sometimes	Rarely	Never	
a. Colleagues in same school/college					103__
b. Colleagues in another school/college					104__
c. Colleagues in a society					105__
d. College of Education staff					106__
e. University Education staff					107__
f. LEA Adviser					108__
g. Teachers' Centre staff					109__
h. HMI					110__
i. Others (please specify)					111__

iv. THE ORGANIZATION AND TEACHING OF J.M.B. "A" LEVEL ENVIRONMENTAL SCIENCE.

1. How is Environmental Science administered departmentally in your school/college?

   a. Part of Science Dept. ☐ b. Part of Geography Dept. ☐

   c. Part of Rural Studies Dept. ☐

   d. Jointly administered by Geography and Science ☐

   e. Other (please specify) ______________________ 112__

2. Are you the only person involved in the teaching of Environmental Science/Studies in your school/college? Yes ☐ No ☐ 113__

3. If you are not the only teacher, how many others are involved and at which levels do t y teach Environmental Science/Studies?

   ____

   ______________________ 114__

4. How is each of the "A" level Environmental Science classes taught?

   a. By one teacher ☐ b. Teamteaching ☐

   c. Part taught by geographer, part by biologist ☐

   d. Other (please specify) ______________________ 115__

5. Do you have any of the following? (For "A" level Environmental Science).

   a. Own Lab. facilities ? Yes ☐ No ☐ 116__

   (If not, whose facilities do you use? ______________________). 117__

   b. Help of a technician in preparing for labs? Yes ☐ No ☐ 118__

   c. Specific environmental science equipment? Yes ☐ No ☐ 119__

   d. Specif c environmental science books in lab. or library?

   Yes ☐ No ☐ 120__

   e. Envi mental journals, periodicals etc.? Yes ☐ No ☐ 121__

   f. Specific environmental audio-visuals? Yes ☐ No ☐ 122__

6. How would you rate each of the following as a problem in your teaching?

	Major	Minor	None	Not Appl	
a. Breadth of material to cover					123__
b. Depth at which material should be taught					124__
c. Developing relevant lab. exercises					125__
d. Organizing time for fieldwork					126__
e. Mixed backgrounds of students					127__
f. Mixed ability levels of students					128__
g. Lack of basic science knowledge of students					129__
h. Lack of previous knowledge at "O" level or CSE in this subject of students					130__
i. Lack of practical skills of non-scientists					131__
j. Others (please specify)					132__

7. In comparison with other "A" levels that you have taught, how would you rate the amount of preparation required for teaching "A" level Environmental Science?

Much more ☐ More ☐ Same ☐ Less ☐ Much less ☐

Not comparable ☐ 133__

8. During the planning for, or first teaching of this new "A" level were you given a lighter teaching load? Yes ☐ No ☐ 134__

9. Has the school/college financed the purchase of library books concerning environmental science? Yes ☐ No ☐ 135__

10. If you are presently teaching or have taught this "A" level do you intend to continue teaching it in the future? Yes ☐ No ☐ 136__

11. If you have already given up teaching this "A" level, or you intend to do so in the future, what were/are your reasons for doing so?

______________________________ 137__

______________________________ 138__

______________________________ 139__

______________________________ 140__

______________________________ 141__

______________________________ 142__

V. YOUR OPINIONS OF THE J.M.B. "A" LEVEL 'ENVIRONMENTAL SCIENCE'.

1. How would you rate each of the following as aims you are trying to achieve by offering this "A" level in your School/College?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not appl	
a. Encouraging non-scientists to take an "A" level science							143__
b. Giving students the opportunity to perform fieldwork							144__
c. Giving "academic respectability" to Environmental/Rural Studies in your School/College							145__
d. Providing a course for students which relates the 'real world' to an academic discipline(s)							146__
e. Offering weaker students an easier "A" level science							147__
f. Stimulating environmental interest in the School/College							148__
g. Offering students a multi-disciplinary "A" level							149__
h. Offering students an "A" level which is modern in content and is up-to-date							150__
i. Offering students a more interesting science than the traditional ones							151__
j. Offering students an interesting science to counteract the swing away from science							152__
k. Offering a course for those students interested in environmental problems							153__
l. Increasing the number and variety of "A" level sciences							154__
m. Teaching an "A" level to enhance your teaching status							155__
n. Teaching an "A" level to enhance your promotion prospects within the teaching profession							156__
o. Others (please specify)							157__

2. Various general aims (objectives) have been stated for this "A" level, which students taking it should make progress towards. How would you rate each of the following as aims (objectives) for this J.M.B. "A" level?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Not appl	
a. Encouraging positive attitudes to the environment							158__
b. Learning of major environmental concepts							159__
c. Learning of factual environmental information							160__
d. Learning of basic scientific facts and principles necessary for the understanding of the workings of the environment							161__
e. Encouraging the scientific attitudes of questioning and investigating							162__
f. Using original materials as sources of information rather than relying on textbooks							163__
g. Extracting available information on an environmental issue and evaluating it							164__
h. Presenting available information on an issue to the other members of the class							165__
i. Forming value judgements on issues and defending them							166__
j. Developing informed concern for environmental quality							167__
k. Developing aesthetic appreciation for the environment							168__
l. Stimulating student involvement in local environmental issues							169__
m. Fostering opposition to modern technological progress							170__
n. Others (please specify)							171__

3. What do you consider to be the main strengths of this J.M.B. "A" level, if any? ______________________________

____

____

______________________________ 172__

4. What do you consider to be the main weaknesses of this new J.M.B. "A" level, if any? ______________________________

____

____

______________________________ 173__

5. What would you say are the main distinctions between this Environmental Science "A" level and related traditional disciplines such as Biology and Geography, if any? ______________________________

____

____

______________________________ 174__

6. What would you say are the main ways in which this J.M.B. "A" level is indistinct from these traditional related subjects?

____

____

____

______________________________ 175__

7. What changes/modifications would you like to see made to this new J.M.B. "A" level, if any? ______________________________

____

____

____

____

______________________________ 176__

P.T O.

8. To what extent would you agree/disagree with the following views of this new J.M.B. Environmental Science "A" level?

	Strongly agree	Agree	Neu-tral	Dis-agree	Strongly disagree	Not appl.	
a. It has a distinct advantage over existing courses such as Biology and Geography.							177__
b. It is compatible with current conditions in schools/colleges ie. present facilities, available resources etc.							178__
c. It is not complex as regards preparation, setting up of labs, organizing fieldwork etc.							179__
d. It is possible to try out most parts of the course before one decides to teach it fully for the first time.							180__
e. It is easy to communicate its aims, methods etc. to other teachers not familiar with it.							181__
f. It is relevant to the modern needs of students and teachers.							182__
g. It is educationally worthwhile.							183__
h. It shows a unity of purpose.							184__
i. It is an easier subject than traditional "A" levels.							185__
j. Its teaching includes new educational methods different from those of traditional related subjects.							186__
i. It is a trendy course that will eventually fall out of fashion.							187__
j. It is a practical possibility in all schools/colleges teaching "A" level sciences.							188__
k. To teach it requires more work than traditional related subjects.							189__
l. To teach it successfully the teacher must be a dedicated environmentalist.							190__

THANK YOU VERY MUCH FOR YOUR HELP IN COMPLETING THIS QUESTIONNAIRE. WE GREATLY APPRECIATE THE CO-OPERATION THAT YOU HAVE KINDLY GIVEN.

APPENDIX A.2.

THE NON-IMPLEMENTER QUESTIONNAIRE

(JMB ENVIRONMENTAL SCIENCE 'A' LEVEL - TEACHER SURVEY)

J.M.B. ENVIRONMENTAL SCIENCE 'A' LEVEL - TEACHER SURVEY.

1. Please tick the appropriate box or column, or write in your answer when space is provided.
2. The lines on the extreme right of each page are for office use only.
3. All information supplied in this questionnaire will be treated in the strictest confidence and will not be revealed to anyone.

A. KNOWLEDGE OF THE ENVIRONMENTAL SCIENCE 'A' LEVEL.

1. How did you first come to hear of this new 'A' level?
   a. Was involved in its development ☐
   (Please state the nature of your involvement ______________________)
   b. Read about it in a journal ☐ c. Was told by Dept. Head ☐
   d. Was told by another teacher ☐ e. Was told by LEA Adviser ☐
   f. Read about it in a circular advertising a conference etc. about it ☐
   (Please state the date and location of the conference and who sent the circular. ______________________)
   g. Other (please specify) ______________________

2.i. Did you obtain further information about this new 'A' level? Yes ☐ No ☐
  ii. If yes, from whom did you obtain the information?
   a. The J.M.B. ☐ b. L.E.A. Adviser ☐ c. Dept. Head ☐
   d. Other (please specify) ______________________

3.i. Did you attend any conferences, talks etc. about this new 'A' level? Yes ☐ No ☐
  ii. If yes, please list the conference(s) etc., where held, year, and the sponsor. ______________________
  ____
  ____
  iii. Why did you attend the above conferences etc.?
   a. My own idea to attend ☐ b. Was asked to go by Dept. Head ☐
   c. Was asked to go by Head/Principal ☐
   d. Was asked to go by L.E.A. Adviser ☐
   e. Other (please specify) ______________________

4. Who financed your attendance at these talks/conferences?
   a. No finance involved ☐ b. Financed myself ☐
   c. School/College ☐ d. L.E.A. Adviser ☐
   e. Other (please specify) ______________________

5. Does your L.E.A., local College or University or any other local organisation currently organise meetings concerning this 'A' level? Yes ☐ No ☐
   (If yes, please state the organisation. ______________________)

6. As a result of your knowledge of this new 'A' level were you interested in teaching it? Yes [ ] No [ ] Undecided [ ]

7. Do you have any contact with teachers who are currently teaching this 'A' level? Yes [ ] No [ ]

B. YOUR SCHOOL/COLLEGE AND THE ENVIRONMENTAL SCIENCE 'A' LEVEL.

8.i. Has your School/College considered the introduction of this 'A' level into its timetable? Yes [ ] No [ ]

ii. If yes, when did it consider it ? ______

iii. Who initiated the move for its introduction? ______

iv. What was the result of this consideration?

a. Would be introduced [ ] (Expected date of initial teaching ______)

b. Would not be introduced [ ]

c. Other (please specify) ______

v. How would you rate each of the following as a problem/obstacle in the attempt to h e this 'A' level introduced into your School/College?

	MAJOR	MINOR	NONE	NOT APPLIC.
Resistance from Geography Staff				
Resistance from Science Staff				
Timetable lready too full				
Too few possible students				
No 'O' level or CSE courses taught in this subject in school/college				
Laboratory/space problems				
Financial problems				
School undergoing re-organisation				
Competition from other new courses also being introduced				
Transport for fieldwork				
Lack of Environmental Science qualific ions of intending teacher				
Intending teacher's lack of experience at teaching 'A' level				
Lack of support from L.E.A.				
No other schools/colleges in area teaching this 'A' level				

Other(s) (please specify) ______

______

9. If your School/College has not yet considered the introduction of this 'A' level, what are the reasons for this? (ie. Re-organisation, your decision not to teach it etc.) ______

______

______

10. Is your School/College likely to consider the introduction of this 'A' level in the future? Yes ☐ No ☐ Unsure ☐

11. Are you still interested in teaching this 'A' level should the opportunity arise? Yes ☐ No ☐ Unsure ☐

12. If you are no longer interested in teaching this 'A' level could you list your reasons for this. ______________________________

____

____

____

C. BACKGROUND INFORMATION.

13. Name of your School/College ______________________________

14. Number of full time students in School/College

0-250 251-500 501-750 751-1000 1001-1250 1251-1500

1501-1750 1751-2000 2000+

15. Does your School/College presently teach or has it taught since August 1975 any of the following?

	Presently taught	Taught in the past
a. CSE Environmental Science/Studies		
b. CSE Rural Science/Studies		
c. JMB 'O' level Environmental Science		
d. 'O' level Rural Science/Studies		
e. 'O', 'AO', 'A' level Environmental Studies of the AEB or London or Oxford Boards, and if so please state which ones		

(______________________________)

16. How many teachers in your School/College, including yourself, are involved in the teaching of all levels of Environmental Science/Studies? __________

17. What is your present teaching position?

a. Head of Science ☐ b. Head of Biology ☐ c. Head of Geography ☐

d. Head of Rural Studies ☐ e. Teacher of Biology ☐

f. Other (please specify) ______________________________

18. Which of the following scaled posts do you hold?

None ☐ Scale 1 ☐ Scale 2 ☐ Scale 3 ☐ Scale 4 ☐

19. How many years will you have been teaching (excluding teaching practice) as of August 1980 __________

20. Please list your qualifications below, including your major subjects.

a. Degree(s) ______________________________

b. Certificate(s) ______________________________

c. Diploma(s) ______________________________

d. Other(s) ______________________________

21. Please list the subjects you presently teach and at which level. Please indicate if you teach more than one class of each.

____

____

____

D. YOUR OPINIONS OF 'A' LEVEL ENVIRONMENTAL SCIENCE.

(For the following questions please ring the number which you consider to be the most appropriate response for each question.

1 = Strongly Agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly Disagree.)

To what ex ent would you agree or disagree with each of the following views of this 'A' level?

22.	It has a distinct advantage over existing 'A' levels such as Biology and Geography	1 2 3 4 5
23.	It is relevant to the modern needs of both students and teachers	1 2 3 4 5
24.	It is educationally worthwhile	1 2 3 4 5
25.	It shows a u-ity of purpose	1 2 3 4 5
26.	It is an easier subject than traditional 'A' levels	1 2 3 4 5
27.	It is a trendy course that will eventually fall out of fashion	1 2 3 4 5
28.	It is a p actical possibility in all schools and colleges t aching 'A' level sciences	1 2 3 4 5
29.	It is in reality an 'A' level in Rural Science	1 2 3 4 5
30.	To teach it would require more work than traditional related subjects	1 2 3 4 5
31.	It is not an ideal 'A' level for students as careers in Environmental Science are very few in number	1 2 3 4 5
32.	To teach it successfully the teacher would have to be a dedicated environmentalist	1 2 3 4 5
33.	It would be impossible to teach it adequately without a textbook	1 2 3 4 5
34.	Its status as a separate 'A' level is in doubt as it greatly overlaps with traditional related subjects	1 2 3 4 5

Are there any other comments you would like to make about this 'A' level?

____

____

____

THANK YOU VERY MUCH FOR YOUR HELP IN COMPLETING THIS QUESTIONNAIRE. WE GREATLY APPRECIATE THE CO-OPERATION THAT YOU HAVE KINDLY GIVEN.

APPENDIX A.3.

THE STUDENT INFORMATION QUESTIONNAIRE

('A' LEVEL ENVIRONMENTAL SCIENCE -
STUDENT INFORMATION SURVEY)

'A' LEVEL ENVIRONMENTAL SCIENCE - STUDENT ~~OPINION~~ INFORMATION SURVEY.

This survey is about the Environmental Science 'A' level that you are presently taking. Please answer the questions in the spaces provided or tick the appropriate box, unless otherwise requested. All the information you supply will be treated in the strictest confidence and will not be revealed to anyone. Thank you very much for your help.
(The lines on the extreme right of each page are for office use only and should not be used).

1. Your Name ______________________________

2. Name of your School/College ______________________________

3. Date of Birth ______________________________

4. Your Sex Male ☐ Female ☐

5. In which year do you expect to sit the exams for this 'A' level?
1980 ☐ 1981 ☐ 1982 ☐ Other ______________

6. Please write down the CSE and 'O' levels that you have taken, and if you can remember, the grades you achieved in each, and the year and month you sat each exam.

______________ ______________ ______________

______________ ______________ ______________

______________ ______________ ______________

7. Which other subjects are you also studying for this year? (Please state for each whether 'A', CEE, 'O', CSE etc.)

________ ________ ______________ ______________

______________ ______________ ______________

8. If you are presently taking more than one 'A' level please indicate below which is your first preference, which is your second preference etc.

a. First preference ____________ b. Second preference ____________

c. Third preference ____________ d. Fourth preference ____________

9. Did your choice of a future career, profession, degree etc. influence your selection of your first 'A' level preference? Yes ☐ No ☐

10. I am interested in this Environmental Science 'A' level and the way(s) in which you first came to hear of it. Read through the list of possible ways listed below and if one or more accurately describe(s) the way(s) by which you first came to hear of this 'A' level please tick the appropriate box(es). If the way(s) you first came to hear of it is (are) not listed space is provided at the end of the question for you to write in the way(s) you first came to hear of this 'A' level.

a. Environmental Science teacher told us about the 'A' level while we were doing the 'O' level/CSE. ☐

b. A friend doing the 'A' level told me about it. ☐

c. I saw it in a list of 'A' levels offered by my School/College. ☐

d. I saw it in an advert in the local paperplaced there by the local Sixth Form College/College of Further Education. ☐

e. Heard about it in a talk given at the School by a teacher from the local Sixth Form College/College of Further Education. ☐

f. Read about it in printed materials circulated by the local Sixth Form College/College of Further Education. ☐

g. Was told about it in interview with the 'A' level tutor. ☐

h. Other way(s) ____

____

11. I am also interested in the reasons why students are studying this particular 'A' level. Read through the list of possible reasons listed below and if one or more accurately describe(s) your reason(s) for doing this 'A' level please tick the apprpriate box(es). Space is provided at the end of the question for you to write in any other reason(s) not listed here.

a. Have done CSE/'O' level in Rural Science/Studies or in Environmental Science/Studies and want to continue the subject at 'A' level. ☐

b. Want to take a Degree in Environmental Science/Studies and think this will be an appropriate 'A' level for entry into the degree programme. ☐

c. Want to take an 'A' level Science and this is the only one I can take without having to do the appropriate 'O' level first. ☐

d. Am interested in the environment, conservation, pollution etc. ☐

e. Want to get a job in an environmentally-related field and think this 'A' level will help get such a job. ☐

f. Want to take an 'A' level Science but am turned off by Biology, Chemistry and Physics. ☐

(Question 11 is continued on the next page).

g. Sounded like an interesting course. ☐

h. Friends do ng the 'A' level recommended it to me ☐

i. Because the Environmental Science Teacher has a good reputation. ☐

j. Because I think that it will be an easy 'A' level. ☐

k. It is the only other 'A' level that I can take because of timetable clashes. ☐

l. Other reason(s) ____________________

____

____

12. Which 'O' levels do you think would be the most appropriate to take before starting this 'A' level, if any?

____

13. What do you intend to do after having completed your 'A' level(s), discounting summer vacation jobs?

a. Go to University ☐ b. Go to a Polytechnic ☐

c. Go to a College of Further Education ☐

d. Go to a College of Higher Education ☐

e. Get a job ☐ f. Start a career ☐

g. Unsure ☐

h. Other (please state what) ____________________

14. If you intend to go to a University, Polytechnic or College please state which Degree, Diploma, Certificate etc. you intend to study for, and in which subject(s). (ie. B.A. in French, H.N.D. in Architecture etc.)

____

15. If you intend to start a job or career please state what this will be.

____

THANK YOU VERY MUCH FOR YOUR HELP IN COMPLETING THIS QUESTIONNAIRE.
WE GREATLY APPRECIATE THE CO-OPERATION THAT YOU HAVE GIVEN.

APPENDIX A.4.

THE STUDENT OPINION QUESTIONNAIRE

('A' LEVEL ENVIRONMENTAL SCIENCE -
STUDENT OPINION SURVEY (F2))

'A' LEVEL ENVIRONMENTAL SCIENCE - STUDENT OPINION SURVEY (F2).

This survey concerns the Environmental Science 'A' level that you are presently studying. Please answer the questions in the spaces provided or tick the appropriate box, unless otherwise requested. All the information you supply will be treated in the strictest confidence and will not be revealed to anyone. Thankyou very much for your help.

---

1. Your Name ____________________

2. Name of your School/College ____________________

3. In which year do you expect to sit the exams for this 'A' level?

   1980 __ 1981 __ 1982 __ Other ____________

4. Which other subjects are you also taking this year? (Please state for each whether 'A', CEE, 'O', CSE etc.)

   ________ ________ ________

   ________ ________ ________

5. How does this Environmental Science 'A' level compare with your other 'A' levels as regards the following- (Please ring appropriate answer).

   a. DIFFICULTY? Much more More Same Less Much less Can't say

   b. TIME INVO /ED IN STUDY OUTSIDE OF CLASS PERIODS?

   Much more More Same Less Much less Can't say

   c. INTEREST. Much more More Same Less Much less Can't say

6. What do you like most about this 'A' level, if anything?

   ____

   ____

   ____

7. What do you dislike most about this 'A' level, if anything?

   ____

   ____

   ____

8. Is there any of the content of this 'A' level that you think should be left out, and if so, w ,?

   ____

   ____

   ____

9. Is there anything missing from the content of this 'A' level that you think should be put in?

   ____

   ____

   ____

10. Having now completed a year of this 'A' level, which do you think would have been the most appropriate CSE/'O' levels to have taken before starting this 'A' level?

____

11. What do you intend to do after having completed your 'A' levels, discounting summer vacation jobs?

a. Go to University __ b. Go to a Polytechnic __

c. Go to a College of Higher Education __

d. Go to a College of Further Education __

e. Get a job __ f. Start a career __ g. Unsure __

h. Other (Please state what) ______________________________

12. If you intend to go to a University, Polytechnic or College please state which Degree, Diploma, Certificate etc. you intend to study for, and in which subject(s). ie. B.A. in French, H.N.D. in Architecture etc)

____

13. If you intend to start a career or job please state what this will be.

____

14. Has this Environmental Science 'A' level made you change your mind as to the Degree etc, job or career that you were originally intending to do after finishing your 'A' levels? Yes __ No __ Unsure __

(If yes, what had you originally planned to do? ______________________________)

15. Would you recommend this 'A' level to other students?

a. Yes __ b. No __ c. Don't know __

d. Only if it would be useful to their future plans __

e. Other (Please state what) ______________________________

16. Overall what is your opinion of this 'A' level?

____

____

____

17. Are there any other comments that you would like to make about this 'A' level?

____

____

____

APPENDIX B

THE TEACHER INTERVIEW SCHEDULE

TEACHER INTERVIEW SCHEDULE.

A. THE SCHOOL/COLLEGE AND ENV. SCI.

1. Were any environmental type courses taught in the school/college before the introduction of this 'A' level?

   a. Nothing b. Rural Science/Studies c. AEB/London Env. St.

   d. Other(s) ______

2. Is the school/college intending to introduce any other environmental type courses?

   a. 'O' level b. 'AO' level c. CSE d. CEE

   e. Other(s) ______

3. What is the image of this 'A' level among each of the following?

	Good	Fair	Poor	Don't Know	Other
a. Head/Princip l					
b. Dept. Head					
c. Science staff					
d. Geography staff					
e. Students					

4. Has this 'A' level suffered from the legacy of Rural Science/Studies?

   a. Yes b. Only slightly c. No d. N/A

   e. Other ______

5. When are students first acquainted with Env. Sci. as a separate discipline in this school/college?

   a. Before 'O' level b. At 'O' level c. At 'A' level

6. Are any restrictions placed on the students' choices of Env. Sci. at 'O' or 'A' level as compared with the other sciences, and if so what?

   'O' level ______

   'A' level ______

7. How is Env. Sci. financed?

   a. Separately b. With Rural Sci./St. c. With Bio.

   d. With Geog. e. Other ______

8. What is the future of Env. Sci. in this school/college?

   a. Good b. Fair c. Poor d. None

   e. Depends on numbers f. Other ______

9. Have there been any anticipated or unanticipated changes in the school/college as the result of the introduction of this 'A' level?

a. No b. Yes ____________________

B. THE COURSE AND ITS TEACHING.

10. What facilities do you have for the teaching of this 'A' level?

Laboratory Greenhouse Garden Animal House
Farm Weather Station Pond Ecological Area
Storage Shed Other(s) ____________________

(Which of these do you consider essential? ____________________)

11. What is the calibre of these 'A' level students as compared with other sciences?

a. Better b. Same c. Worse d. Other ________

12. What particular problems do you face in the preparation and teaching of this 'A' level? ____________________

____

13. Do you have any particular problems with the teaching of this course being a ________ and the only person teaching it?

____

14. What would you consider to be the ideal 'O' levels for entry into this 'A' level and what other pre-requisites should students possess?

____

____

C. YOUR VIEWS OF THIS 'A' LEVEL.

15. Are you familiar with any of the following?

	Heard	Read	Used	Other
Project Environment				
Cheshire/Manchester 'A' level				
AEB 'A' level				
London 'A' level				

16. What were your reasons for wanting to start the teaching of this 'A' level?

a. Rural Scientist b. Conservationist

c. Other ____ ____________________

17. How did the other teachers in this school/college become involved in the teaching of this 'A' level?

a. Interested b. Compelled c. Condition of job

d. Timetable e. Other ______________________________

18. What types of students would you regard this 'A' level as being most suitable for?

a. All b. Environmentalists c. Non-scientists

d. Weak studen^s e. Other ______________________________

19. What do you see as the major aims of this 'A' level?

____

D. COMMUNICATION AND SUPPORT.

20. Have you talked to or visited any other teachers of this 'A' level, and if so who and how often?

a. No b. Yes ______________________________

21. Do any local c.ganisations etc. offer help, materials, in-service courses etc. for teachers of this 'A' level, and if so who and how often?

a. No b. Yes ______________________________

22. What help would you like to see provided for teachers of this 'A' level?

a. Locally ______________________________

b. In this LEA ______________________________

c. By the JMB ______________________________

23. Do you belong to or are you aware of any Environmental Education Societies?

a. No b. Yes ______________________________

24. Is there anything else you would like to say in connection with this 'A' level?

____

APPENDIX C

LETTERS

C.1. FIRST LETTER TO IMPLEMENTERS

C.2. REMINDER TO IMPLEMENTERS

C.3. LETTER TO NON-IMPLEMENTERS

C.4. REMINDER TO NON-IMPLEMENTERS

C.5. LETTER TO POTENTIAL EMPLOYERS

C.6. LETTER TO PROFESSIONAL ENVIRONMENTAL INSTITUTES

University of Keele

Keele, Staffordshire, ST5 5BG

Telephone: Newcastle (Staffs) (0782) 621111
Telex: 36113 UNKLIB G

Department of Education

Dear

Your Headmaster has given me permission to collect from you information and opinions concerning the new J.M.B. 'A' level in Environmental Science. This questionnaire, part of a study sponsored by the Department of Education at Keele is sent to you for this purpose.

The questionnaire is for teachers who are presently teaching or who have taught this new 'A' level. Information is requested concerning the teacher, his/her school or college, the adoption of the 'A' level, and in addition the teacher's use and opinions of the sy'labus.

At the present time the subject is at a very early stage of its development and the data from this questionnaire will supply information on the pioneering work of 'A' level Environmental Science teachers, which will be of help in the future development of the subject. Since the number of teachers involved with this 'A' level is so small (around 40) we need the views of as many Environmental Science teachers as possible to obtain a truly representative picture of the present status of this new 'A' level, and so your contribution is especially valued.

Although the questionnaire might appear to be rather long most of the answers can be accomplished by a tick in the appropriate box or column.

All the information collected in this questionnaire will be treated in the strictest confidence and will not be shown to anyone else.

A summary of the collected data will be made available to any respondent requesting one.

May I take this opportunity of thanking you for your kind co-operation in this study which we hope will be of benefit to all concerned.

Yours sincerely,

(Michael Collins).

PS. IT WOULD BE MOST HELPFUL IF YOU COULD RETURN THE COMPLETED QUESTIONNAIRE IN THE STAMPED, ADDRESSED ENVELOPE PROVIDED BY IF POSSIBLE.

University of Keele

Keele, Staffordshire, ST5 5BG

Telephone: Newcastle (Staffs) (0782) 621111
Telex: 36113 UNKLIB G

Department of Education

15th. May 1979.

Dear

Earlier this year I sent you a questionnaire concerning the new J.M.B. Environmental Science 'A' level that you are teaching in the hope that you would be able to complete it for me. I would still be most grateful for the completed questionnaire if you have the time as I am still in the process of collecting completed questionnaires and collating the data. I enclose a spare copy of the questionnaire just in case you have not previously received a copy or it has been lost.

Thankyou very much for sparing the time to consider my request.

Yours sincerely,

(Michael Collins)

University of Keele

Keele, Staffordshire, ST5 5BG

Telephone: Newcastle (Staffs) (0782) 621111
Telex: 36113 UNKLIB G

Department of Education

29th. November 1979.

Dear Sir/Madam,

I am presently conducting research into the development and future viability of the new J.M.B. 'A' level in Environmental Science. This questionnaire, part of a study ·ponsored by the Department of Education at Keele, is sent to you for the purpose of collecting information on how you first came to hear of this new 'A' level, whether or not your School/College has considered its adoption, and your views of this 'A' level. This questionnaire has been sent to you because we understand that you are presently teaching 'O' level Environmental Science. If you do know of the 'A' level we would be ·st grateful for your help in the completion of this questionnaire.

At the present time this 'A' level is at an early stage of its development and the data from this questionnaire will supply information concerning its future viability.

Although the questionnaire might appear to be rather long most of the answers can be accomplished by a tick in the appropriate box or by encircling the most appropriate response.

All the information collected in this questionnaire will be treated in the strictest confidence and will not be revealed to anyone else.

May I take this opportunity of thanking you for your kind co-operation in this study.

Yours sincerely,

(Michael Collins).

PS. IT WOULD BE MOST HELPFUL IF YOU COULD RETURN THE COMPLETED QUESTIONNAIRE IN THE STAMPED, ADDRESSED RETURN ENVELOPE BY IF POSSIBLE. THANKYOU.

University of Keele

Keele, Staffordshire, ST5 5BG

Telephone: Newcastle (Staffs) (0782) 621111
Telex: 36113 UNKLIB G

Department of Education

29th. January 1980

Dear

Towards the end of last year I sent you a questionnaire concerning the new J.M.B. Environmental Science 'A' level in the hope that you would be able to complete it for m I would still be most grateful for the completed questionnaire if you have the time as I am still in the process of collecting completed questionnaires and collating the data. I enclose a spare copy of the questionnaire just in case you have not previously received a copy or it has been lost.

Thankyou very much for sparing the time to consider my request.

Yours sincerely,

(Michael Collins).

University of Keele

Keele, Staffordshire, ST5 5BG

Telephone: Newcastle (Staffs) (0782) 621111
Telex: 36113 UNKLIB G

Department of Education

8th. October 1979.

Dear Sir,

I am conducting research into the viability of the Northern Universities Joint Matriculation Board's new G.C.E. 'A' level, Environmental Science. I am presently assessing the opportunities available at the non-graduate level for students who have completed this new 'A' level and who wish to pursue an environmental career.

I would be most grateful if you could advise me as to whether your organisation would consider giving a position to a student who has completed this 'A' level either as a single 'A' level <u>or</u> as one of two or three 'A' levels, and what sort of positions would be available to such a student.

I thank you for any information you can give me in this matter.

Yours sincerely,

(Michael Collins).

University of Keele

Keele, Staffordshire, ST5 5BG

Telephone: Newcastle (Staffs) (0782) 621111
Telex: 36113 UNKLIB G

Department of Education

29th. January 1980

Dear Sirs,

I am conducting research into the viability of the Joint Matriculation Board's new G.C.E. 'A' level entitled 'Environmental Science'. I am presently assessing the opportunities available at the non-graduate level for persons who have completed this 'A' level and who wish to pursue an environmental career.

I would therefore be most grateful if you could inform me of the academic and other qualifications required for entrance into membership of your Institute and whether or not this Environmental Science 'A' level would be accepted as part of the entrance requirements.

I enclose a s^amped, addressed envelope for your reply. Thankyou.

Yours sincerely,

(Michael Collins).

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