Implementing Technology in the School Curriculum: A Case Study Involving Six Secondary Schools

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In Australia, economic, social and educational pressures have led to increasing importance being placed on technology education, just as has happened in other countries (Medway, 1989). The importance of technology in the school curriculum of every secondary student has been strongly advocated (Vohra, 1987) and in the USA the goals of an effective curriculum have been delineated (Fricke, 1987). Even so, how technology will be incorporated within the curriculum and who shall teach technology is not resolved (Gardner, Penna & Brass, 1990). There is a move away from aligning technology with the 'trade' or 'technical' subjects and an effort to place it more central to the curriculum. However, how this will be done is still a source of great debate. In England too, there has been considerable tension about which of the subjects in the school curriculum should take technology within their realm (Woolnough, 1988).

In their review of technology education in schools, Allsop and Woolnough (1990) explain that technology has developed along four different lines, each with its own traditions and character. One approach is that dominated by craft teachers, a second is an approach focusing on hi-tech advances such as computers and electronics, a third approach presents technology as an engineering course at the secondary level, while a fourth views technology as a subset of science. Fensham (1990) has described how science education has gained an increasingly technological perspective in the 1980s and 1990s, and the word 'technology' is mainly used by science educators to refer to applied science (Rennie, 1987), a perception not shared by most industrial and craft teachers. Certainly science teachers can play an important role by teaching technology as applied science, by modifying courses in formal ways, say Engineering and Science instead of Physics, or by extending the science curriculum to involve the design and completion of an investigational or constructional project (Black & Harrison, 1985). However, a more comprehensive view of technology educa-

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tion considers it to comprise four components of technological literacy, technological awareness, technological capability and information technology (Woolnough, 1988), some aspects of which can be taught by all departments in a school.

Recently, and in recognition of the wider educational role technology can play, the Ministry of Education in Western Australia invited schools to submit proposals for the incorporation of technology in their curricula. No specific brief was given to schools, rather they were expected to plan programs which utilized the expertise of their staff, met the needs of their students and were integrated within the context of the local community.

Out of 21 submissions, six successful schools were designated as Technology Schools by the Ministry. They received appropriate funding to implement their proposals during 1988 and 1989 and each school appointed a person as technology coordinator to supervise the implementation. Four of the schools were large senior high schools with between 700 and 1500 students in Grades 8 to 12. Two were in a metropolitan city with over one million people, one in an agricultural district and one in a mining community. Two smaller district high schools had students in Grades 1 to 10: One in a remote area had almost 300 students, many of Aboriginal descent; the other with about 200 students was in an agricultural area.

As might be expected from six schools in different locations and with different clientele, the proposals differed widely in terms of the intended foci and curriculum adaptations to incorporate technology, and also in the perceptions of technology on which these adaptations would be based. Consequently, schools spent their money in different ways. Some schools allocated most of their funds towards the employment of temporary teachers so that regular teachers could have part-time release for planning, inservice and curriculum writing; other schools invested in equipment around which their technology proposals would be implemented.

This paper reports an evaluation of the approaches and programs implemented in the six technology schools. The findings are important, not only because technology education is of increasing interest and these technology-based initiatives were the first to be undertaken in Western Australian schools, but because the identification of successful implementations of technology can provide guidance for other schools wishing to introduce technology in their curricula.

Method

The evaluation approach was based on the framework originally enunciated by Stake (1967): judging success or failure of the implementation based on the congruence between the intents of the program and observations of what eventuated. The effectiveness of the implementation process was evaluated in terms of (a) the intended curriculum, defined by the way technology was pre-

sented by the written statements of policy, the syllabi and the teaching materials; (b) the implemented curriculum, defined by the manner in which the schools incorporated technology into their programs; and (c) the achieved curriculum, defined in terms of the degree of match between the intended and implemented curriculum. Emphasis was placed on description of the schools' programs, in terms of the context (antecedents) and process (transactions) in each program, rather than on student outcomes, an approach which recognized that outcomes rarely guide change (Stake, 1991). Further, cognizance was taken of the gradual adjustments school staff made on the basis of their experiences as their implementation progressed.

The evaluation was designed as a multi-site case study (Merriam, 1988) with data collection in two stages. Schools received funding for their proposals during the 1988 calendar year for the implementation of their programs during 1988 and 1989. The first data collection occurred at the end of the 1989 school year, and the second at the end of 1990, to examine the extent to which the programs had continued. Data were collected by questionnaires, interviews and document analysis. Questionnaires were given to the technology coordinators, to the teachers involved in the implementation process and to the students who experienced the implemented curriculum. During visits to schools, the coordinators and teachers were interviewed and curriculum documents related to the schools' original proposals and to their continuing technology programs were examined.

Questionnaire Data

Technology Coordinators. Two open-ended questionnaires were administered to the technology coordinators, one towards the end of 1989 and the other towards the end of 1990. The first questionnaire dealt with the intended and actual implementation of technology in the school, staff planning and communication, resources, financial arrangements and other matters perceived by the coordinators to be important. The second questionnaire had two parts. The first part asked for reactions to the technology coordinator's own statements made in the previous year in light of the implementation process during the current year. The second part asked for the technology coordinator's own summative evaluation of the project.

Teachers. Towards the end of 1990, teachers involved in implementing technology were asked to provide details of any changes they perceived to have taken place in their teaching and in the curriculum materials they were using.

Students. Because of the variation in the approaches taken by the schools, there was no consistent pattern of expected performance-related outcomes for students which could be used as a basis for assessing change in student performance. Further, as described previously, the focus of the evaluation was on the context and process of curriculum change rather than on student outcomes.

Nevertheless, a questionnaire which measured attitudes toward, and perceptions about, technology was used in an attempt to detect any general change in these variables which could be associated with the implementation.

The instrument, called the *Attitudes and Perceptions About Technology* (APAT) questionnaire, consisted of 31 Likert-type items in seven subscales, namely, Interest in Technology, Careers in Technology, Technology is Easy, Importance of Technology, Technology as a Design Process, Diversity in Technology, and Technology as Problem Solving. The questionnaire was based upon previous research into students' ideas about technology, particularly the cross-national studies coordinated by the Pupils' Attitudes Towards Technology (PATT) project in the Netherlands (Raat & de Vries, 1986; Raat, de Klerk Wolters & de Vries, 1987; Raat, Coenen-van den Bergh, de Klerk Wolters & de Vries, 1988; de Klerk Wolters, 1989; de Klerk Wolters, Mottier, Raat, & de Vries, 1989). By using the comprehensive framework developed in the PATT studies, which were not tied to a particular curriculum, it was possible to examine a wide range of possible attitudes and perceptions about technology. Trials of the questionnaire included adaptations in wording to suit local curriculum for an age range of 11 to 15 years. The development and validation of the instrument is described by Rennie and Treagust (1989).

The student questionnaires were administered in five of the six schools towards the beginning and end of 1990. For each scale, items were coded so that higher scores represented more positive attitudes. Reliabilities ranged from .63 (for the two-item Importance scale) to .89 (for the seven-item Interest scale) in this study. Statistical comparisons between the pretest and posttest were made using a repeated measures design for analysis of variance.

Visits to Schools

The evaluators visited country schools once, and metropolitan schools several times to discuss the implementation process with the coordinators, teachers and students. The visits were used as opportunities to confirm or refute data collected by questionnaires and also to examine relevant curriculum documentation in the schools.

Results

Each of the six Technology Schools adopted its own approach to technology. The plans for technology implementation were affected by the location of the school, variations in the size and nature of its student population and the community context. Underpinning these different approaches were differences in perceptions about the nature of technology held by the staff which were discernible in the kinds of curriculum change intended, the way these changes were being implemented, and the distribution of funds to support them. The results of the evaluation of these different programs are reported in Table 1 as a summary of the major findings of each school's intended, implemented, and

achieved curricula concerning technology. The summaries for each school are expanded and important points drawn together in the ensuing discussion.

Eastern Metropolitan Senior High School

This school of almost 700 students serves a predominantly working class, multi-cultural community. This school chose the working definition for technology adopted by UNESCO (Vohra, 1987), namely, that "Technology is the know-how and creative process that may utilize tools, resources and systems to solve problems to enhance control over the natural and man-made [sic] environment in an endeavour to improve the human condition" (p. 415). The implementation of curriculum change based on such a perception of technology was directed towards developing a range of skills, including thinking skills, and encouraging students to use those skills when confronted by new or problem situations. At the outset there was considerable debate among senior teachers about the best approach to take. There was a belief that to be successful, the program had to be implemented on a school-wide basis, because a fragmented approach in a few subjects was unlikely to provide sufficient opportunity for the skills to be learned and practiced. Further, students needed to have experience using the skills to appreciate their transferability to different situations. The adopted model included the four aspects of technological awareness, technological literacy, information technology, and technological capability (Woolnough, 1988), as well as transferable (problem-solving) skills, each of which could be integrated in different areas of the curriculum. Teaching staff in different subjects could then contribute to this model by writing suitable teaching objectives for their own subject areas. Details of how this was done are described by Treagust and Mather (1990).

Because it adopted a whole school approach to implementing technology, Eastern Metropolitan Senior High allocated nearly all of its funds to teacher release, allowing the coordinator to fulfil her leadership role and teachers to write or modify their own curriculum. Other money was spent on resources such as books and audiovisual materials. Except for a small amount of release time for the coordinator in 1990, the school's project funds were used by the end of 1989 and the costs related to maintaining the technology program have come from other sources. Despite the loss of several key people over the last three years and changes of Principal, the technology program has continued with two discernible thrusts. The first is technology as a design process or problem-solving approach which appears as an integrating theme across subjects, and the second is the modification within prescribed curriculum objectives to emphasise the products and impact of technology on society. The findings from the APAT student questionnaire were consistently positive, but few of the pretest-posttest differences were statistically significant. Eastern Metropolitan Senior High judges itself to have been successful in its technology

Table 1
Major Findings for the Six Technology Schools in Terms of Their Intended, Implemented and Achieved Curricula

School	Intended	Implemented Curriculum	Achieved Curriculum
Eastern Metropolitan Senior High	• Technology as a human process involving thinking and problem solving. • Technology to be integrated on a school-wide basis by means of a curriculum focused on the development of appropriate technological skills. • Introduction of computing on a school-wide basis.	• Development of teaching and learning strategies for introducing technology across the curriculum. • Technology objectives integrated into most subjects throughout Grades 8 – 10. • Activities coordinated by, but not solely dependent on, the coordinator. • Contacts with local industries and businesses pursued. • Computers used by all students in the school through the Information Technology Center.	• Few significant pretest-posttest difference scores on APAT questionnaire for Grades 8–10, but change consistently positive. • Highly visible contacts outside the school. •Definite ethos of a technology school shared by almost all faculty. • The intended curriculum has been achieved using a coordinated and well articulated approach.
Southern Metropolitan Senior High	• Technology as a human process involving thinking and problem solving. • Integrate technology as a way of thinking within some subjects and as a means to change teaching methods. • Introduction of computing on a school-wide basis.	• Technology focus and/or objectives introduced in some subjects but not coordinated within or between departments, except Social Studies. • Activities initiated by interested staff in conjunction with coordinator. • Activities coordinated by, but not solely dependent on, the coordinator. • Computers used by all students as part of their program.	• No substantial APAT questionnaire pretest-posttest difference scores for Grades 9 and 10. In Grade 8 statistically significant increase in Possibility of a Career in Technology and the Importance of Technology. However, difference scores in Grades 9 and 10 were smaller than in Grade 8, and often negative. • The intended curriculum has been achieved in several subject areas within the school. • Highly visible computing program in the school through joint venture with large computer company.

Table 1 (cont.)
Major Findings for the Six Technology Schools in Terms of Their Intended, Implemented and Achieved Curricula

School	Intended	Implemented Curriculum	Achieved Curriculum
Rural Senior High	• Technology as the human attempt to deploy matter, energy and information. • A variety of projects to be developed with the goal of enhancing technological literacy across all subject areas.	• Technology introduced in most subjects in lower school at some level. • New technology equipment purchased and installed. • Emphasis on technology projects in Science and Industrial Arts. • Activities facilitated by coordinator who has remained in the school and continues in this capacity despite no further Ministry funding.	• No substantial APAT questionnaire pretest-posttest difference scores for Grades 9 and 10. In Grade 8 statistically significant decrease in Interest in Technology, Ease of Technology and that Technology is a Design Process. • Technology focus highly visible in some subjects, less so in others. • Most intended aspects successfully achieved though some with substantial delay. • Definite ethos of a technology school shared by most faculty.
Country Senior High	• Technology as the application of appropriate science to jobs in order that they can be completed more easily. • Different subject areas to develop technological themes.	• Two new Science units in lower school with an emphasis on mining. • Electronics and robotics taught in Industrial Arts. • Some aspects of technology introduced in Business Studies but not maintained. • Activities dependent on initiating coordinator who left the School at the end of 1989.	• No substantial pretest-posttest differences scores on APAT questionnaire for Grades 8–10. Grade 8 view Technology as Problem Solving to a greater extent than previously. Grade 10 scores consistently higher than Grade 8. • Only Science and Industrial Arts have some technology activities but those are not coordinated between Departments. • Lack of a coordinator meant that, with very few exceptions, the intended curriculum was not achieved. • Almost no awareness of the technology project by teachers in other subject areas.

Table 1 (cont.)
Major Findings for the Six Technology Schools in Terms of Their Intended, Implemented and Achieved Curricula

School	Intended	Implemented Curriculum	Achieved Curriculum
Remote District High	• Technology as a change agent in society. • Five projects to be developed and integrated into different curriculum areas. • Computers introduced into the Library and Secretarial Studies for word processing.	• Activities highly dependent on initiating coordinator who left the School at the end of 1988. • The Low Technology Project is implemented. • Attempts to have one computer per classroom, but use of computers in the School ineffective.	• No APAT questionnaire data to report. • The Low Technology Project maintained by one teacher – students report on high utility of the project. • Lack of coordinator means that, with the exception of the above, the intended curriculum was not achieved.
Central District High	•Technology as a human process involving thinking and problem solving. • Technology to be integrated as a whole-school approach with emphasis on computer applications. • Computing and Desk Top Publishing offered in Grades 8-10.	• Links made with the community by offering Technical and Further Education Subjects • Computing equipment purchased and installed in the school. • Desk Top Publishing and Computing offered but few students take these subjects. • Activities highly dependent on initial coordinator who left the School at the end of 1989.	• APAT questionnaire results for Grades 8, 9, and 10 show that attitudes are generally positive, but sample size too small for tests of significance. • Current lack of a coordinator has meant very little of the intended curriculum has continued to be achieved. • Technology Project 'on hold' and identified in future School Development Plan.

implementation, and has assigned the task of maintaining the technological impetus to a designated staff member. In addition, a Technology Information Centre equipped by a partnership with a large computer company, and an innovative Fashion and Design curriculum stream, are projects which have resulted from the supportive environment in the school.

Southern Metropolitan Senior High School

This large metropolitan school caters for over 1,400 students from a middle class community. The school adopted the same UNESCO definition of technology as Eastern Metropolitan Senior High and implemented technology on a school-wide basis. Most of the funds for the technology project were directed to releasing teachers from teaching duties. The technology coordinator had full-time release for part of the life of the original period of funding to help other teachers develop their ideas and to teach classes while teachers worked on curriculum modifications. The coordinator expressed concern at the end of 1989 that implementing a technology philosophy school-wide was a difficult and generally new process, because it took a long time for teachers to accept the rationale underlying the technology implementation.

By the end of 1990 it was evident that technology had been included in many subjects across the curriculum. In some subjects, technology was viewed as a way of thinking to solve problems and change teaching methods which enabled students to develop thinking skills. In addition, the school has an extensive program centered around computing as a result of its joint venture with a major computing company. A range of school-based initiatives have created an atmosphere supportive of change and technology became a focus for that change. Gains made by Grade 8 students, but not others on the APAT questionnaire, suggested that technology was particularly influential when students entered the school.

Rural Senior High School

This country school had an enrolment of about 800 students from agricultural communities. The school adopted a definition of technology which emphasized the human attempt to deploy matter, energy and information and the intended curriculum included a wide variety of projects to develop technological literacy across all subject areas. Emphasis was placed on understanding science and technology and their effects on society. About two thirds of funds were committed to the purchase of hardware and technical support for it, and curriculum modifications were made in nearly all subject areas.

By the end of 1989, when the original funds were spent, progress had been made in most areas except a satellite remote sensing project where software problems were not solved for nearly two years. Despite nearly all the technology initiatives having been implemented by 1990, the students' responses to the

APAT questionnaire resulted in no statistically significant gain scores. Aside from the computer-related problems, most delays were caused by lack of time to make the curriculum modifications. The continuation by the school with its program could be attributed to the sense of school staff ownership of the program and the continuing presence of, and direction given by, the technology coordinator even though funds for his release time were not available in 1990.

Country Senior High School

This school is in a mining area distant from the metropolitan area, where many of its approximately 1000 students are transient and there is a large staff turnover each year. The school focused on technology as the application of "appropriate science" to jobs in order for them to be completed more easily and involved teachers from different subject areas to develop technological themes – in Industrial Arts, Science, Library Studies and Media. Its funds were divided between teacher release for curriculum modifications, appropriate equipment, and travel (including part-purchase of a bus for student transport to off-campus activity sites).

Two new Science curriculum units relating to mining were introduced in Grades 9 and 10 and input was sought from mining personnel to assist teachers make the curriculum changes. Technology was considered to be integral to the Industrial Arts program and one of the teachers taught electronics and robotics as technology-based units. A notable feature of the APAT student scores was that the most positive results were in Grade 10, perhaps reflecting the introduction of these new units in Grades 9 and 10. Since its specific funding for technology ceased in 1989, Country Senior High has continued to pursue technology in Science and Industrial Arts, but there has been no sense of school-wide acceptance that the school is a Technology School.

Remote District High School

This small school of less than 300 students is in a very remote part of Western Australia, has frequent staff changes and a high percentage of Aboriginal students. Partly because of frequent staff changes, students did not complete the APAT questionnaire. Technology focussed on changes in society and the school's intention was to integrate five projects in different curriculum areas. Four of the projects began, but a large staff turnover (including the original technology coordinator) between 1988 and 1989 resulted in only two projects remaining: the use of computers for both staff and students and a Low-Technology pastoral project. The teacher in charge of the Low-Technology Project is the 'lone survivor' of the early technology planning, and this was the only technology initiative which remained through 1990.

Central District High School

This small country school enrolled approximately 200 students in an agricultural area. It adopted a whole school approach to technology based on the UNESCO definition (Vohra, 1987). The school purchased a computer incorporating CD-Rom to improve resources for research and equipment for desktop publishing and all students were given opportunities to use these facilities as part of their normal subjects. About half of the technology funds were used to purchase equipment and about a quarter used for teacher release. All staff attended inservice sessions in 1988 and 1989 to deal with curricular aspects of technology implementation and use of the new equipment. Students' responses to the APAT questionnaire indicated very positive attitudes; however, with small numbers of students in each grade no tests for statistical significance were carried out. In 1990, the technology program was put 'on hold' because the rural recession and falling student numbers affected the viability of timetabling some curriculum units.

Discussion

Were the intended curricula implemented and intended outcomes achieved?

The results of the evaluation suggest that three schools achieved, to some extent, their intended objectives as a Technology School. These schools – Eastern Metropolitan Senior High, Rural Senior High and Southern Metropolitan Senior High – each have particular features that may be instructive to other schools wishing to implement technology education. Three schools were unable, for one or more reasons, to fulfill their intended objectives to become a Technology School. While these schools - Country Senior High, Remote District High and Central District High - were unsuccessful in achieving all of their objectives, there were several important aspects which contributed to this situation. Careful analysis of these aspects can identify potential obstacles for schools attempting school-based technology curriculum change.

What obstacles prevented the intended outcomes being achieved?

In the three unsuccessful schools, the major factors preventing achievement of the intended outcomes were the high degree of dependency of the project on the initiator and original coordinator, the high turnover of the staff, and the lack of articulation between new staff and those leaving the school. In all three schools, the initial technology coordinator was able to implement the intended activities in the short term, but because these activities were so dependent on him or her, once he or she had left the school, various aspects of the projects were not continued.

At Country Senior High School, some technology initiatives remained in Science and Industrial Arts although there was no coordination between the two subject areas. The teachers involved realised the need to provide some

overall coordination, as did the newly appointed Principal in 1990, but no decision was made to finance such a position within the school. Remote District High had a viable technology initiative in the Low-Technology Project which was dependent on one staff member who had been at the school for a number of years. The other projects in this school have not continued because there was no communication between outgoing and incoming staff to the school, especially between the initial outgoing Deputy Principal who was the technology coordinator and her successor. Central District High made the decision to officially place the technology project 'on hold' since there was no relevant expertise within the school's present staff.

What aspects contributed to successful outcomes being achieved?

The success of the technology implementation was dependent on effective communication among staff and the devolution of responsibility for the intended curriculum change from the coordinator to the individual teachers and/or departments in different subject areas. Effective communication and devolution of responsibility were most successful at Eastern Metropolitan Senior High, where, as a result of an overall school-coordinated approach, almost all subject areas of the school curricula were involved in technology education. A feature of the technology program in this school was the high level of communication among the staff. Throughout the implementation period, the coordinator had frequent meetings with an advisory board of senior staff in the school and some outside persons. Further, the coordinator remained knowledgable about developments in different subject areas by meeting frequently with key staff and organizing teacher inservice sessions to help teachers do the work for which they had made a commitment. Eastern Metropolitan Senior High's approach to technology implementation illustrated its strength at the end of 1989 when the original coordinator was transferred from the school but momentum continued because of effective communication and support within the school. The decision to develop and implement an approach which involved all teachers of all subjects, to a greater or lesser extent depending on their interests, appears to have been compatible with the working environment in the school.

The strength of the devolution approach was also evident at Southern Metropolitan Senior High which has a very large staff. The Principal was highly supportive of the technology focus of the school and took a leadership role in expanding the computing aspects of the curriculum. The technology coordinator assisted individual teachers implementing some aspect of technology into their curriculum and this personal approach did appear to be at least partially successful. However, when this was done without coordination between subject staff, the focus of that initiative was lost if the teacher left the school. The Social Studies Department had a coordinated approach in all units at all

levels of the school and the emphasis was to use technology as a way of thinking, involving problem solving and critical analysis.

When the initial coordinator was on leave during 1990, the focus of the implementation was retained though there was reduced activity, partly because of staff transfers in some subject departments and the alternative coordinator for 1990 only had partial release time from teaching. However, because staff in some subject areas had already begun to change their teaching methods to focus on technology objectives, these initiatives were able to continue. The active involvement of the technology coordinator with teachers throughout the school and his continued presence (or the role being taken over by someone else in his absence) contributed greatly to the school addressing many of its intended objectives. It is conceivable that, for example, Country Senior High would have achieved much greater success in meeting its technology objectives if a person had taken over the role of technology coordinator either temporarily or permanently once the initial coordinator had left the school.

The devolution approach at Rural Senior High was also effective. The technology coordinator played a key role in planning the original submission for the school to be a Technology School and activities were coordinated and monitored by him during their implementation, though in 1990 he had less time to devote to the project due to his other responsibilities as Relieving Deputy Principal. Progress during 1990 could not have continued had the staff turnover been as substantial as that at Remote District High School or Country Senior High School. The technology focus of the school comprised separate initiatives administered by individual departments with the coordinator ensuring that these activities received visibility among all members of the school community. This visibility was apparent through a regular newsletter to keep teaching colleagues informed of technology activities and happenings throughout the school and through activities such as the “Technology Week” held in October each year. During this week different activities took place each lunchtime for the staff and students to observe and student groups visited local primary schools to explain and demonstrate science and technology activities.

There was a perception among teachers in all three successful schools that “this is a Technology School and we are doing something different and important with our programs compared to other schools”. Once the focus on technology in the school was sufficiently clear, and when some teachers other than the coordinator had success with and responsibility for what they were doing, then there was sufficient momentum in the school to ensure that, with monitoring, encouragment and assistance by the coordinator, the implementation process would continue. Both Eastern and Southern Metropolitan Senior High Schools have developed a status within their community as a ‘Technology School’ in relation to the visible joint ventures with large computer companies. The funding for this aspect of their technology focus did not come directly from the

original Ministry of Education grant, but the funds acted as seed monies to provide climates within the schools which were receptive to such joint ventures.

Conclusion

The concerns about how and where technology can be implemented within the school curriculum have been partially addressed by the six schools who were designated Technology Schools by the Western Australian Ministry of Education. The four larger schools attempted to introduce technology on a school-wide basis with varying degrees of success. At Eastern Metropolitan, Southern Metropolitan, Rural and Country Senior High Schools, the science department in each school introduced technology into their curricula, mainly as applied science, but certainly dealing with aspects of technological capability. At Remote District High School, the Low-Technology Project has a science orientation with its focus on the local pastoral industry. The schools which were most successful at introducing technology into the curriculum involved many, or most, departments in the school. These departments incorporated those aspects of technology into their curricula which were considered to be most relevant to their subject areas. Only Eastern Metropolitan High School developed objectives based on the four components of technology education described by Woolnough (1988).

Overall, the results of the evaluation have identified three major factors crucial for success of the school-based curriculum initiatives in technology education. First, there is a need for continuous coordination by someone who has the resources (particularly time) to reflect about, and maintain an overview of, what is happening in the school. Second, there needs to be thorough documentation about what is intended and what is happening, so that faculty (particularly new faculty) are kept informed about direction and progress. Finally, success requires time, time for the faculty to accept ownership of the program, time to plan modifications to their curricula and teaching strategies, time to implement those changes, and time for them to be reflected in student outcomes.

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