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ABSTRACT

The purpose of this study was to explore what options exist for a school district that has chosen to implement or reinforce an elementary technology education program. The option selected was a mobile technology education laboratory. A mobile laboratory can offer the advantages of financial flexibility, currentness, ability to serve a large audience and to facilitate experimentation with alternative models, and the ability of one lab to be used at various school sites. Included in this project is a description of how a mobile elementary technology laboratory can be organized, equipped, staffed, and financed. Included also is a description of curricular needs and activities related to elementary technology education. Through a mobile technology laboratory, the following goals can be achieved: (1) promote technological culture and literacy; (2) support equal opportunity and reduce biases that exist toward gender, ethnicity, culture, and physical or mental ability; (3) facilitate the relevance of academic programs; (4) stimulate experiential learning and foster the development of psychomotor and problem-solving skills; and (5) prepare students to become functional and productive members of society. A list of budgeted items and specifications necessary to ensure successful implementation of the laboratory, including 1991-1992 retail prices, is provided; the total cost is estimated at $249,895. The project concludes with offering several recommendations concerning implementing an elementary technology education laboratory including: select staff; institute an advisory committee; create a project timeline; adopt goals and objectives; establish sources for funding; choose the type of mobile laboratory; select equipment and support material; and set-up site visitation schedule. (Contains 22 references.) (Author/MAS)

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Title: **Mobile Technology Education Laboratory: An Alternative for Elementary Technology Education in a Restructuring School District in Central California**

ABSTRACT

The purpose of this study was to explore what options exist for a school district that has chosen to implement or reinforce an elementary technology education program. The option selected was a mobile technology education laboratory because it is financially logical and educationally cogitable.

More specifically, a mobile technology education laboratory can offer the following advantages: (a) financial flexibility, (b) current and up-to-date, (c) able to serve a larger audience, (d) able to facilitate experimentation with alternative models, and (e) the same laboratory can be used at various school sites. These five reasons are not all mutually exclusive nor are they weighted by order of significance or importance.

Included in this project is a description of how a mobile elementary technology education laboratory can be organized, equipped, staffed, and financed. Included also is a description of curricular needs and activities related to elementary technology education.

Through a mobile elementary technology education laboratory the following goals can be achieved: 1) promote technological culture and literacy; 2) support equal opportunity and reduce biases that exist toward gender, ethnicity, culture, and physical or mental ability; 3) facilitate the relevance of academic programs; 4) stimulate experiential learning and foster the development of psychomotor and problem-solving skills; 5) prepare students to become functional and productive members of society.

The project concludes with offering the following recommendations: 1) Select staff; 2) Institute an advisory committee; 3) Create a project timeline; 4) Adopt goals and objectives; 5) Establish sources for funding; 6) Choose the type of mobile laboratory; 7) Select equipment and support material; 8) Set-up site visitation schedule.

Technology education is a program able to meet the challenges of society and educate students for meaning, purpose, and relevance. Students receive more sensory stimulus input, focusing on psychomotor skills and

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experiential learning, forming a cognitive link that strengthens the instruction of other curriculum areas, including science and math.

A primary function of all schools is to improve a child's understanding of the connection between the education they receive and the real world in which they live. Technology education supports this function and expands the possibilities when taught from a mobile laboratory.

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Title: **Mobile Technology Education Laboratory: An Alternative for Elementary Technology Education in a Restructuring School District in Central California**

The purpose of this study was to explore what options exist for a school district that has chosen to implement or reinforce an elementary technology education program. The option selected was a mobile technology education laboratory because it is financially logical and educationally cogitable.

This study is divided into these sections: Review of Relevant Literature; Why a Mobile Technology Laboratory?; Components of the Mobile Technology Laboratory.

Introduction

A primary function of all schools is to improve a child's understanding of the connection between the education they receive and the real world in which they live. Technology education is a curriculum able to meet the challenges society places upon schools. A formidable technology education program educates students through interdisciplinary action the meaning, purpose, and relevance of education. Students receive more sensory stimulus input, focusing on increased psychomotor skills and experiential learning, forming a cognitive link that strengthens the instruction of other curricular areas, including science and math.

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Schools recognize the importance of technology education by establishing laboratories dedicated to the study of industry and technology. Schools hire staff to facilitate the instruction of technology curriculum and support this curriculum through the purchasing of equipment and supplies.

In recent years the instruction of technology education has come under close scrutiny. Many schools throughout the nation have cut back or curtailed spending on technology education, justifying that technology is too expensive. Some school districts have even eliminated elementary technology education programs completely. The crisis related to these problems is compounded when the technology of the world is rapidly advancing and changing making difficult for any institution, especially schools, to keep up these changes.

What options exist for a school district that has chosen to implement or reinforce an elementary technology education program? A viable option is to establish a mobile elementary technology education laboratory. This project describes how a mobile elementary technology education laboratory can be organized, equipped, staffed, and financed. Included also is a description of curricular needs and activities related to elementary technology education.

A mobile laboratory would be cost effective for many school districts because creative group financing can exist through consortiums, corporate sponsorships, or business partnerships. More specifically, a mobile technology education laboratory can offer the following advantages: (a) financial flexibility, (b) current and up-to-date, (c) able to serve a larger audience, (d) able to facilitate experimentation with alternative models, and (e) the same laboratory can be used at various school sites.

Review of Relevant Literature

Technology is the processing of knowledge related to industry, science and the humanities, demonstrated by a person's ability to adapt to and shape the environment. What is discovered through scientific process and human development becomes manifest in our everyday world through the application of technology (Oregon, 1986; Calder, Renzulli & Calder, 1984; Texas, 1984). Technology is an instrument by which people can alter human condition and effect economic interaction, finance, commerce, communication, transportation, and manufacturing (Atkin, 1991; Waetjen, 1985). Industrial arts and the more accepted term industrial technology are both categorized with technology education (Phillips, 1985; Texas, 1984). Technology education is a broad discipline of study relating to the manufacturing and production of goods, services, and information.

Historically, technology began as hand skills taught, learned, and perfected by individuals for their betterment. These skills were transferred from father to son, from generation to generation by imitation (Phillips, 1985). As civilization progressed so did technology in a cause/effect relationship.

Traditional industrial arts became part of the American education curriculum in the late 1870's (Phillips, 1985). Noted educators Rumble and Woodward introduced at their perspective institutions an adaptation of the Russian System, a systematic teaching of hand skills first presented by Victor DellaVos of the Russian Imperial Technical School of Moscow at the Philadelphia Centennial in 1876. Public supported manual training high schools using the Russian System were opened in Baltimore, Maryland in 1884. The following year, 1885, Philadelphia, Pennsylvania and Toledo, Ohio opened similar high schools.

In Boston, 1888, Gustaf Larsson, a leader in the Swedish Sloyd teacher education movement, introduced manual training in the elementary schools. He later established the Sloyd Training School in Boston in 1890. This school provided manual training instruction to elementary teachers from across the nation.

Influenced by the social settlement movement during the industrial revolution in North America, industrial arts was designed as a way for students to overcome the tenets of Social Darwinism (Luetkemeyer,1985). This compassion and humaneness made possible the opportunity for students to experience creativity in a controlled environment. Industrial arts teachers offered programs that related the relationship of knowledge-skill-application. This experiential learning made available in an industrial arts program reinforced the heads-on/hands-on relationship between mind and hand. In this type of educational program students were allowed to overcome an educational deficiency, the need to learn by doing through the application of theory (Atkin, 1991; Los Angeles, 1990; Pennsylvania, 1983; Thieme, 1974).

Need for Technological Literacy

Technology is the most powerful single factor influencing today's society. Events have sped by so quickly that society has become desensitized to the way in which technology has become a controlling factor in every aspect of our lives (Nannay, 1989; Oregon, 1986; Peterson, 1986; Waetjen, 1985). Insensitivity toward technology and the influence technology has on society has created an educational void in need of attention. The need to become technologically literate is an eminent one (Nannay, 1989; Brusic, Dunlap, Dugger & LaPorte, 1988; Oregon, 1986; Texas, 1984; Pennsylvania, 1983). Technological innovation has a universal influence on society, therefore, technological literacy should be relative to that degree of influence, reflecting our current technological culture.

The need for technological literacy is also evident in our nation's international relations (Nannay, 1989; Waetjen, 1985). If the United States expects to remain economically and technologically competitive on a global scale our

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educational institutions must use technology education as a bridge toward a more technologically literate society. Students must receive more knowledge about technology than just being restricted to the use of computers and audio-visual equipment (Waetjen, 1991; Phillips, 1985).

Need for Equal Opportunity

As our modern culture becomes more aware of biases that exist toward gender, ethnicity, culture, and physical or mental ability there is an expectation that educational institutions also reflect this bias awareness (Nannay, 1989; Calder et. al., 1984; Texas, 1984; Pennsylvania, 1983). Technology education is humanistic, meeting the sociological, physiological, and psychological needs of society by supporting and complementing equal opportunity and access by removing emotional barriers without impairing a student's cultural self.

Need for Relevant Education

Educators continually search for ways in which to motivate, stimulate and enrich their students into understanding the effect, result, and impact of the education the students are receiving (Los Angeles, 1990). Technology is a cognitive link between academic and application (Atkin, 1991; Cestrone, 1989; Ilott & Ilott, 1988; Oregon, 1986; Pennsylvania, 1983; Calder et. al., 1984; Texas, 1984; Thieme, 1974). Technology education can become a facilitator of instruction providing practical, hands-on situations that

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give relevance to education. The quicker a technology education program can be implemented at the elementary level of instruction the better prepared for a highly technological society our future generations will become.

Rationale for Elementary Technology Education

The Texas Education Agency (1984) in "The Rationale for Industrial Technology/Industrial Arts in Texas" examined the national attention given to restructuring the industrial technology curriculum into one which is more viable. As educators look toward the next century wondering what restructuring efforts are required to meet the needs of our rapidly changing society and how to best prepare a student to become a functioning member of that society, technology education is one curriculum already in place, ready to meet the challenges of the future.

To be technologically literate is to say that one fully comprehends the influence technology has upon our complex world. Nannay (1989) makes a point that developing literacy skills relating to technology is a gradual process, not acquired overnight or in the final year of high school. Logically then, technology education should be introduced into the elementary curriculum as early as possible.

In support of an elementary technology education curriculum is Brusic, Dunlap, Dugger & LaPorte (1988). In their article "Launching Technology Education into Elementary Classrooms", Brusic et. al. believe the elementary school is

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the key facility in which to introduce a curriculum focusing on the study of technology. The earlier technology education can be introduced into a child's education the more aware and receptive they will be at embracing the knowledge of technology.

The Oregon Department of Education (1986) recognizes that we live in an advanced technological culture that places demands on society's members to understand and value the importance of being technologically literate. Having technological literacy will release members of society from the drudgery and slavery that same technology can cause. Possessing knowledge of the various technological processes gives people power and control over how they interact and interface with technology. Since elementary students are also members of a highly technical society they should become exposed to the many technological processes as early as possible.

According to the Texas Education Agency (1984) the degree to which a society becomes technologically literate should be comparable to the breadth of technology within the society. Therefore, a society as highly technological as our own needs to introduce into all levels of education a technology education curriculum focusing on becoming technologically literate. There is no better place to begin introducing technology than at the elementary level.

Atkin (1991) encourages that when a greater emphasis is

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placed on technology in schools this provides a great opportunity for this technological literacy to act as an agent for improving the American standard of living, the country's commerce and industry, and enhancement of America's global competitiveness. Armed with technical knowledge people can provide an employable skill able to work in an economy networked with high technology businesses and industries. Using technology, America's global industries are able to work more efficiently, communicate more rapidly and accurately, transport goods and services in a safer manner. Research and development of a more competitive product on the international market is a result of a technologically literate society.

Rationale for Equal Opportunity

In "Elementary School Industrial Arts" the Pennsylvania Department of Education (1983) reports that one reason for a disparity between men and women and the types of careers they pursue is related to the different types of counseling, training, and education they receive. Traditionally, students enrolled in technology and industrial type classes have predominantly been male. Theorists of career development have recently found that technology education activities are ideal for girls in which to participate.

Elementary technology education offers a simulated, non-typical career role for females to experience during their formative years increasing the likelihood of finding a new

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and varied career interest. This non-traditional role-playing helps to reduce occupational stereotyping and places females in roles traditionally labeled "for males only".

Similarly, minorities have had limited career options due in part to a disparity in the education they received (Pennsylvania, 1983). Technology education is a program which has emerged to help put an end to the inequalities minorities have had to endure. When exposed to the diversified activities in an elementary technology education programs, minorities will be given the opportunity to be exposed to a future career leading to more gainful employment, making them an economic asset to society.

To meet the varied needs of special students; emotional, physical, and gifted, elementary technology activities meet the physiological, psychological, and sociological needs of young learners (Nannay, 1989; Calder et. al., 1984; Pennsylvania, 1983). Technology education offers a program that builds character, promotes self-esteem, and fosters independence. Becoming more self-aware and independent will help students meet the needs and expectations placed upon them by society.

Rationale for Relevant Education

In the past, industrial arts has been perceived as a "make it- take it home" project-oriented curriculum. Texas (1984) reports that a concerted nation-wide effort spanning three decades has been made to develop and organize a more viable technology curriculum. What has emerged from this metamorphosis is a curriculum rich in meaning centered work which reinforces (Peterson, 1986; Pennsylvania, 1983) and facilitates (Cestrone, 1990; Calder et. al., 1984) interdisciplinary instruction (Brusic et. al., 1988; Peterson, 1986).

One major strength of an elementary technology education curriculum is how technology is integrated with other curricula leading to students having a greater understanding of that subject. Brusic et. al. (1988) found no less than six subjects into which technology was integrated: science, math, fine arts, social studies, language arts, physical education.

Technology contributed to the general conceptual and linguistic growth and improved student development in the use of oral and written language through the interaction of language use and manipulative experience (Ilott & Ilott, 1988). Calder et. al. (1984) discovered that technology education activities became a cognitive link with other content areas by stimulating, enriching, and clarifying instruction. An exciting elementary technology education program performed as a bridge across the gap existing between science, math, and technology was reported by Cestrone (1990).

Kieft (1988) supports the way in which technology education can assist and strengthen the instruction of other

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curriculum areas through the practical applications of science, math, and language arts. The Los Angeles Unified School District (1990) and the Pennsylvania Department of Education (1983) both realize the importance of and elementary technology education curriculum and how that program, when effectively implemented, can enhance reading, writing, and speaking skills. The concepts encountered in many academic areas are enriched and clarified through experiences provided by technologically-based activities.

In his "A Rationale for Studying Technology Education in the K-6 Curriculum" Nannay (1989) writes that employers will be hiring a future worker who can possess, as one favorable characteristic, the ability to problem-solve. This skill is reinforced to students while they are engaged in a manipulative activity as part of a properly designed technology education program. Brusic et. al. (1988) echoed Nannay's report when they said that the elementary school curriculum is enhanced through technology education by providing flexible problem-solving activities.

Problem-solving skills and abilities as well as creative/critical thinking skills were the focus of a NASA awarded training grant (Barnes et. al., 1990). NASA awarded a graduate training grant for the development of elementary school technology education materials. Kieft (1988) and Cestrone (1990) both report on elementary schools with technology-based curriculum and how problem-solving

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skills/abilities are developed and improved through technology education activities.

The relationship between mind and hand or psychomotor is another critical learning skill reinforced in a technology education program (Atkin, 1991; Los Angeles, 1990; Pennsylvania, 1983). A technology program that focuses on experiential learning through manipulative, activity-based subject matter will provide more sensory stimulus input for the students enrolled in that program. The more a child's mental and physical processes are actively connected the more permanent their learning will be. Atkin (1991) goes on to state that this reinforcement of and persistent focus on psychomotor skills more closely meets the needs of education and society than other subjects, including science.

Technology education is a facilitator of instruction, reinforcing psychomotor and problem-solving skills through an experiential learning and interdisciplinary approach where technology instruction is a cognitive link integrating academic subjects. This practical hands-on approach to learning brings relevance to a child's understanding of the connection between the education they receive and the real world in which they live. Variety and creativity are encouraged through research and development for technology education serves as a way of transferring abstract learning concepts into concrete applications. Teaching a course of study for the subject matter is beautiful but if you desire

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to educate for meaning, purpose, and relevance use technology education.

Technology Education Programs

Although many technology education programs are being curtailed or terminated due to lack of funds there are many successful programs happening around the country (Waetjen, 1991; Kieft, 1988). In his research conducted among 49 of the 50 states technology curriculum supervisors, Oaks (1991) reported that 44 states changed their industrial arts name to reflect the need to reinforce technology education, or were planning to do so in the near future. Oaks goes on to say that adequate funding is available for technology education programs and that these programs can be accelerated into being if over the next five years state and federal legislation is passed. Local businesses and industries can also contribute to successful funding of technology education programs. Because of limited research relating to technology education, those instrumental in funding technology programs must be convinced by the scientific research of the rationale for technology education.

NASA has identified the need for technological literacy by funding training grants in elementary schools for developing materials and professional development in technology education (Barnes et. al., 1990). These schools, using an holistic approach, have shown a significant increase of fifth grade standardized test scores. Another program identified by Cestrone (1990) talked about other teachers becoming excited by the results of that school's technology education program when the students enrolled in that program became excited about subject area application.

Successful technology education programs have these common subject areas in their curriculum; manufacturing, transportation, communication, construction, energy, and power (Kieft, 1988; Luetkemeyer, 1985; Oregon,1986; Texas, 1984). Among these curricular areas one could find such learning/teaching devices as Tinker Toys, Lincoln Logs, and Lego Blocks (Calder et. al., 1984).

The successful technology program need not be in an enclosed classroom as reinforced by the Pennsylvania Department of Education (1983) when they reported that many children could be served at minimal cost through the use of a mobile laboratory. Roberts (1975) in his final report regarding a mobile spectroscopy laboratory for the Department of Chemistry at the University of Arkansas touted the success of the program. Beyond the financial success of the mobile spectroscopy laboratory, a spirit of comradeship and working together was also an accomplishment that had not been expected. When Rowland School District developed a mobile music studio the number of students participating in the program greatly increased, the dropout rate noticed a significant decrease, and a second teacher and traveling studio had to be added to the district's music program

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(Smith, 1982).

Why a Mobile Technology Laboratory?

School districts planning to enrich their curriculum with an elementary technology education program must give careful consideration as to how and where the program will be implemented. Those school districts must achieve unique goals and objectives relating to technology education. The following are five reasons to consider as to why an elementary technology education program should be housed in a well-equipped and modern high technology mobile laboratory.

One reason why a school district should invest in a mobile laboratory is a financial one. As schools search for more ways to meet the needs of students the money required to meet those needs might not be in as great amounts as needed. If a school district decides to implement a technology education program at all of their elementary schools then facilities are needed if none exist. If many of those elementary schools are impacted with high enrollment then new facilities need to be built too. Building funds for new facilities construction might not be readily available or could be nonexistent. Funding for a mobile laboratory then seems more practical, meeting the needs of the students and schools without constructing new specialized facilities. Chances are that funds for a mobile technology laboratory could be more easily acquired than depleting the district's general fund or passing a bond issue for new

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classroom/laboratory construction.

A second reason for implementing a mobile technology laboratory would be the ability to keep equipment, apparatus, and supplies housed within the laboratory current and up-to-date. Modern technology needs to be taught with modern equipment. Emphasizing a focus on up-to-date equipment demonstrates to the elementary children that their school district cares about them at such an early age. Caring so much to provide modern equipment could only help to boost the student's self-esteem. Using modern equipment also helps the technology education curriculum keep abreast of current technology changes. Supplying the mobile laboratory with recent and updated equipment is cost-effective, reducing costly repairs to old and worn-out equipment.

The ability to serve a larger audience than an individual teacher in a single classroom is a third reason for a school district to invest in a mobile technology laboratory. This reason is mutually related to the financial reason, too. Exclusively a mobile laborat ry could be transported from school site to school site in accordance with a predetermined schedule or as needed. A teaching technology specialist would travel with the laboratory, offering their expertise, enhancing the technology education programs at many schools, not just one. In this way the technology laboratory on wheels would be in use all of the time not as equipment setting at a site only to be used a short time during the school year.

The ability to experiment with alternative models is a fourth reason to use a mobile technology education laboratory. The mobile laboratory could host special research models, guest speakers from high technology corporations, unique university programs, and educational trends. New teaching and learning techniques relating to technology education could be experimented, tested, and evaluated in this mobile setting.

A more dynamic educational setting as opposed to a static one is a future trend in modern education and the fifth reason for a school district to consider using a mobile technology education laboratory. A mobile lab will give more permanence of the technology education program to more schools and a feeling of ownership to high technology. The ability to move form site to site would encourage activity and hands-on participation from the students and teachers for the mobile laboratory would be on site for only a short time.

All school districts with more than one elementary school should give careful consideration to implementing a mobile technology education laboratory. Five reasons for investing in a mobile technology education laboratory were proposed upon which to base careful consideration. Those five reasons are: financially sound, current and up-to-date, ability to serve a larger audience, experiment with alternative models, more dynamic. These five reasons are not all mutually exclusive as some are interrelated. Neither are these reasons weighted by importance or significance. The importance and significance of each reason must come from each school district considering a mobile laboratory and how this lab on wheels will meet or exceed the district's goals and objectives at implementing or improving the technology education curriculum within the district.

Description of a Mobile Technology Laboratory

The following description of a mobile technology laboratory is designed to serve the needs of the Fresno Unified School District. The Fresno Unified School District has a total enrollment of 44,457 elementary (K-6) students housed among 57 school sites. Of that total student population 21,614 are females and 22,843 are males (Fresno County, 1991). The following is a percentage breakdown of the cultural heritage and diversity of the elementary students in the Fresno Unified School District: African American, 10.5%; Asian, 19.6%; Filipino, .5%; Hispanic, 35.6%; Native American, .7%; White, 33.1%. The student to teacher ratio of 23:1 is comparable to the same total student to teacher ratio for the State of California.

The mobile technology laboratory is designed to be self-contained, able to travel from school site to school site based on a prearranged schedule. Once on site the mobile lab will be available for students and teachers to use on a pull-out basis either as individuals or class sections. An

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educator/technician will be available to assist on-site personnel. The mobile laboratory can facilitate up to 15 work stations with the unique ability to also serve those students with special physical needs. Each work area can be used for individual instruction or all lab stations can be used for group instruction. At the work stations a student can work individually or as a member of a team or work group.

Stored in the mobile laboratory will be portable equipment, apparatus, and tools on portable carts to be circulated among the site classrooms. This allows the project to be more dynamic and able to facilitate the needs of more students and teachers.

Training sessions will be provided for all interested personnel as to familiarize them in the purpose of the mobile laboratory project. These sessions will also be used to inform participants in the project as to the functionality and use of the equipment, apparatus, and tools housed in the mobile techn logy laboratory.

Goals

The goals of the elementary technology education program are developed to promote educational readiness and nurture academic success. These goals are also created to meet or exceed those goals and objectives established by the California State Department of Education and the Fresno Unified School District.

The following are five goals of this Elementary

Technology Education Mobile Laboratory:

1. Promote technological culture and literacy.
2. Support equal opportunity and reduce biases that exist toward gender, ethnicity, culture, and physical or mental ability.
3. Facilitate the relevance of academic programs.
4. Stimulate experiential learning and foster the development of psychomotor and problem-solving skills.
5. Prepare students to become functional and productive members of society.

These goals are recommendations only. The goals objectives and suggested related activities to meet the goals and objectives of the program are the responsibility of an advisory committee comprised of educators, experts in the field of technology, parents, and students. The purpose of the advisory committee is twofold: (1) provide direction and support, (2) give ownership to the project. There are no minimum or maximum number of advisory committee members but, based on past experiences, this author suggests that the fewer the number of members, and still be representative of their peers, the more productive the advisory committee will be.

Administration

Administration of the Elementary Technology Education Program, Mobile Technology Laboratory must come from the

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Education Center of the Fresno Unified School District. Considering the recent pyramid/site-based management structure changes, the responsibility to facilitate quality education common to all schools within the district still resides at the district's central office. Schools that choose to use the services of the technology education mobile laboratory facilities will benefit from needing to only contact one office for inquiring into using the facilities. Being centrally located will also benefit the technology education program by reducing time between transactions relating to personnel, purchasing, and maintenance.

The mobile laboratory should be stored at the central warehouse area to accommodate cleaning, upkeep, and maintenance of the vehicle. This area must be secure so as not to jeopardize the integrity of the mobile laboratory or the equipment contained therein.

Facilitating coordination of the mobile technology education laboratory from the education center and working closely with the advisory committee is an administrator who is inspired to pursue dynamic elementary programs and enlightened to the intimate knowledge of the technology education curriculum. Assisting the administrator is a secretary in the elementary programs office. The key role to a successful mobile laboratory is the educator/technician. This person must be able to transport the mobile laboratory from site to site, set up equipment, facilitate instruction,

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assist in creating and refining elementary technology curriculum and work closely with the teachers and students, just to name a few duties.

Components of the Mobile Technology Laboratory

The following is a proposed list of budgeted items and specifications necessary to ensure successful implementation of a mobile technology education laboratory. All prices are current 1991-92 according to manufacturer's retail advertisement and catalog.

I. Salary/Benefits	Budgeted
a. Teacher/technician	$40,000
II. Mobile Laboratory	Budgeted
a. 40' Special Purpose Commercial Coach	$150,000

1. Front & rear 13,500 BTU air conditioners.
2. Front & rear 41,000 BTU furnaces.
3. 6.5 kW generator with fuel tank, dash & monitor control panels, insulated with acoustical foam.
4. 45 amp 12V converter with battery charger.
5. 50 amp shore power cord with automatic transfer switch.
6. Insulated floor, walls, and ceiling.
7. Driver side door.
8. Passenger front door and rear exit.

9. Wheelchair accessibility.
10. Automotive heater/air conditioner.
11. Emergency radio.
12. Padded dash.
13. Rear view T.V. monitor system.
14. Back-up alarm.
15. Air horns.
16. Fog & docking lights.
17. Smoke detector.
18. Air suspension.
19. Spare tire and wheel.
20. Solar battery charger.
21. Remote control rear view mirrors.
22. Remote hydraulic power levelers.
23. Window awnings.
24. Patio awnings.
25. Gillig-Caterpillar 3208T, 10.4L, 300 HP Turbo Diesel.
26. 150 gallon fuel tank.
27. 262" wheelbase.
28. 8' width.
29. 15 work stations with corian counter tops.

III. Maintenance	Budgeted
a. Fuel, 10,000 miles @ 2,000 gallons @ $1.50/gal.	$3,000

b. Parts	$2,000
	$5,000
IV. Travel	Budgeted
a. Conferences and Workshops	$6,000
V. Equipment	Budgeted
a. 15 benches (2 students per bench)	$1,000
b. 2 LEGO Technic I Ten-Pack #0704	$ 980
c. LEGO Technic I Teacher Guide #1035	$ 10
d. LEGO Simple machines curriculum #999	$ 22
e. 5 LEGO Technic Resource Set #9605	$ 850
f. LEGO #958 Apple TCI Pack	$ 575
g. LEGO #968 MS-DOS TCI Pack	$ 595
h. 5 LEGO Technic II #1032	$ 333
i. LEGO Technic II Teacher Guide #1036	$ 10
j. 15 Tinker Toy sets	$ 250
k. 15 Log building sets	$ 270
l. Robotics	$ 600
m. Computers and Printers	$6,000
n. Telecommunications	$1,000
o. CAD/CAM	$5,000
p. 5 Activity carts	$ 400
q. Future purchases $6,000/year, 5 years	$30,000
	$47,895
VI. Resource Materials and Software	Budgeted
a. Periodicals	$ 100

b.	Books	$1,000
c.	Software	$1,000
		$2,100

Total Budgeted Items I-VI	$249,895

Conclusions and Recommendations

A mobile elementary technology education laboratory is a viable option for the successful implementation and reinforcement of an elementary technology education program. An accomplished technology education program operating from a mobile laboratory can offer the following advantages: (a) financial flexibility, (b) current and up-to-date, (c) able to serve a larger audience, (d) able to facilitate experimentation with alternative models, and (e) the same laboratory can be used at various school sites. Students involved in this project should receive more sensory stimulus input, focusing on increased psychomotor skills and experiential learning, forming a cognitive link that strengthens the instruction of other curricular areas, including science and math.

Recommendations

In order to succeed in this project the author recommends the following:

1. Select staff.
2. Institute an advisory committee.
3. Create a project timeline.

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4 Adopt goals and objectives.

5. Establish sources for funding.

6. Choose the type of mobile laboratory.

7. Select equipment and support material.

8. Set-up site visitation schedule.

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