A STUDY OF MODUALRIZED INSTRUCTION AND ITS ROLE IN THE TECHNOLOGY EDUCATION CURRICULUM AT SOUTHERN DOOR SCHOOLS

by

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ABSTRACT

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A STUDY OF MODULARIZED INSTRUCTION AND ITS ROLE IN THE
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This study researched the current trends of utilizing modularized instruction in technology education curriculums in school districts surrounding Southern Door Schools in Brussels, Wisconsin. Every district within 25 miles of Southern Door has recently added modularized instruction to their technology education curriculums. The Southern Door technology education department is undecided on what course of action to take in regards to upgrading their curriculums at the present time. By studying what other schools have done, Southern Door hopes to avoid the missteps and problems that may arise regarding modularized instruction and take an informed course of action.

Research was done by visiting surrounding school districts' technology education modular labs while in operation. This helped to better understand how the modularized

programs functioned in actual use. Instructors were also interviewed on the positives and negatives they may have encountered with the modules or vendors who sold them.

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CHAPTER I

Introduction

Like everything else in our society today, technology education has been experiencing rapid change. It must change to keep up with our ever-changing world of work where occupations are here today and gone tomorrow. One of the largest changes in recent years has been the addition of technology education facilities with individualized instructional modules (deGraw & Smallwood, 1998). These modules have been the buzzword of the late 1990's and are quickly changing the look of the technology education curriculums in schools throughout the state of Wisconsin. Mulford (1995) stated that school districts have been spending large sums of money, in some cases more than $250,000, either adding modules to or replacing whole technology education curriculums. Mulford (1995) stated that, after a slow start in the middle schools, individualized instructional module labs are now quickly developing into the high schools, according to the suppliers who make them.

Benefits Of Modular Instruction

Individualized instructional modules have done much to help technology education curriculums. Many feel that technology labs have improved curriculum integration and the school's image in the local community (Quam; Smet; et al, 1999). The Platteville school district in Wisconsin has seen an enrollment boom and 30 percent more females taking their technology education courses (Quam; Smet; et al, 1998). There are many similar examples coming out of the districts that now have these modules.

Wright (1998) commented that people who support traditional industrial education programs are defending something that was developed at the turn of the century and used, with little change, until 1960. Starkweather (1996) stated that schools teaching industrial arts like they were taught when young are at least one decade behind the times. Technology education clearly must change to benefit the students in these programs.

Individualized instructional modules are excellent tools to help in classroom management. Zuga (1999) stated that when vendors sell individualized instructional modules “the ability to manage the classroom” was mentioned frequently. Daugherty and Foster (1996) found that using individualized instructional modules reduces the time it takes teachers to develop a technology-based program. Technology educators are acting more as a facilitator to the lab and have more time for the student.

Drawbacks Of Modular Instruction

According to Johnson (1997), businesses are complaining that students coming out of high school or college have little skills or knowledge of materials and how to process them. Loveland (1999) stated that modules sold by vendors appear very nice but some educators are not sure how effective or appropriate they may be. Students follow directions or a plan of procedures with modules, making them less likely to develop critical thinking skills (Loveland, 1999). Petrina (1993) says that individualized instructional modules are “ground to be covered concepts of education,” or a “cycle through” process. According to Robert Bateman, the technology education department chair at North Penn High School, individualized instructional modules are used for problem solving skills or broad concepts, not for tool usage (Mulford, 1995). Many educators feel that individualized instructional modules do not promote basic tool skills.

Another complaint of modules is the fact that students don't get many chances to make anything of value that they can take home. In a study done by Welty and Wei-Kun (1995), when individualized instructional modules were implemented, take-home projects decreased dramatically. Luna (1998) stated that take-home projects are a good learning tool that students doing modules don't get to do.

Some technology educators are skeptical that modules are improving technology education. Gloeckner and Adamson (1996) said that individualized instructional modules developed by vendors offer advantages but also cause fear in technology educators that have to use them. Some schools have eliminated their traditional program altogether in favor of modules. However, a study of Kentucky teachers found that 53 percent of technology educators feel that individualized instructional modules should be used as a supplement to their present curriculum (de Graw; Smallwood; 1997). Gonzales (1997) states that traditional industrial arts programs are disappearing because the curriculum is developing slow and is being controlled by vendors who sell individualized instructional modules. Pullias (1997) stated that individualized instructional module labs can offer students interesting experiences but are not really the future of technology education.

Venders who state that they are cheaper to operate than the traditional technology education programs are selling modular instruction on this pretext. According to Johnson (1997), technology education has been discarding its curriculum in favor of unproven systems that may be cheaper to operate. Mulford (1995) stated that to purchase a complete set of instructional modules for a class of 30, with two students per station, would cost $80,000 to $250,000. Districts are being asked to spend large sums of money for instructional modules that are supposed to improve the technology education programs.

Summary

There is much controversy concerning the effectiveness of instructional modules and their role in a technology education program. A school district considering modules would have a difficult time deciding what would be best for the program as well as the students involved.

Statement of the Problem

The technology education department at Southern Door School District in Brussels, Wisconsin is exploring the possibility of adding modular instruction to its curriculum. However, it is difficult to make an informed decision on modular instruction when relying on the vendors who are selling their product. It is for this reason the technology education department in this particular school district is currently undecided as to the merit of implementing modular instruction into their curriculum.

Purpose of the Study

The purpose of this study was to determine if Southern Door School District should incorporate modular instruction into their curriculum. To determine the effectiveness of modules, this study consulted with jr./sr. high school technology educators in the local area near Southern Door District who were currently utilizing modular instruction in their curriculum. Other districts that may be seeking the same information can utilize the results of the study.

Objectives of the Study

This study addressed the following objectives:

1. How effective were the instructional modules in aiding student learning?
2. What are technology education instructor's perceptions of the methodology and use of modular instruction labs?
3. What problems and costs have instructors encountered when implementing a modular instruction lab?

Significance of the Problem

Southern Door Schools have done little to its technology education curriculum in the last five years. All schools in a 25-mile radius have implemented modular instruction technologies to their curriculums with mixed results. A detailed study to determine a plan for possible implementation could save the district much time, effort, and capital.

Limitations

The limitations of this study were as follows:

1. The school district was within a 25-mile radius of Southern Door Schools.
2. Schools surveyed used at least two different module vendors.
3. The schools were similar in size to Southern Door Schools.
4. The qualitative data cannot be generalized. It is only applicable to the populations noted.

Definitions

Modular Instruction: A method of instruction where the teacher gives the same information as when lecturing but does it through a written series of information. The materials are generally in a package and designed so that one or two students may use it without the direct assistance of an instructor (Wimmer, 1991).

Industrial/Technology Education: Those phases of general education that primarily deal with industry and technology, including the four clusters: communications, energy & power, production, and transportation (Wimmer, 1991).

CHAPTER 2

Review of Literature

Much has been documented recently in regard to modular instruction and its role in technology education. The review of literature will attempt to examine both the positive and negative impacts of modular instruction on the students, teachers, and technology education curriculum.

Modular Instruction's Impacts on the Students

Positive Impacts

Many see modular instruction as another tool to help technology education achieve its goal of exposing students to new technologies. Linnel (1995) said that students must deal with the fact that the world is continuously changing and be able to cope with different technological situations. Walker (2000) stated that we must present as many situations as possible to our students so they can cope with the unpredictable future. Gloeckner & Putnam (1995) cited that modern technology labs are pictured as examples of how to blend vocational and academic education. Gloeckner & Putnam (1995) stated that it is possible to integrate technology education with academic related classes. Gloeckner & Putnam (1995) said that for success in today's workforce we need to quickly adjust to changing technologies and have a good foundation of academic competencies. Wright (1997) stated that students must be taught to do things in a variety of ways. Modular instruction offers a way for technology education to carry out its goals.

Technology education is seen by many as too close to its roots of industrial education. Flowers (1998) said that technology education must remove itself further from the "dirty shop," and lean toward "technology" (p. 24). Walker (2000) stated that, because technology education has been traditionally project oriented, we emphasize products over the processes involved. Technology education may need modular instruction to add the technology to its curriculum.

Modular instruction offers a way for technology education to be more attractive to all genders. Flowers (1998) indicated that when classes involved non-traditional curriculum, like robotics or lasers as opposed to the woods or metals, females became much more interested in taking technology education classes. Flowers (1998) found that, to attract females into technology education programs, a clean orderly facility really helps.

Parents and their students are seeing less of a need for technology education programs despite the fact that a majority of high school graduates eventually end up in a technical school. Johnson (1997) commented that many parents are pushing their kids to go into a four-year college, but that 60% of these would likely make a better choice attending a technical school. Magid (1998) states that in Silicon Valley, California, there are many ads in local papers seeking people in high tech occupations. There is a demand for high technology jobs, and technology education needs a way to offer this as well as show the need for its programs.

Negative Impacts

Individualized instructional modules have long been known to be concept oriented, meaning the project is not the end to the means. Technology educators have traditionally used the take-home project as a method of teaching tool skills and developing a sense of pride in students. According to Luna (1998), take-home projects are a good motivating tool and middle school students are anxious to take their projects home to show parents. Johnson (1997) stated that businesses are complaining that students coming out of high school and college have little skills or knowledge of materials and how to process them. According to Loveland (1999), "students need these applied projects to make the connection from their classroom to their future careers"(p. 14). Technology education instructors need to choose between individualized modules or projects to drive home skills to their students. Johnson (1997) stated that modular tech systems have students make toy-like projects of little or no lasting value. Luna (1998) finds that many middle school students are proud of their work and anxious to take projects home to show parents. LaPorte (1999) stated, "A person might think about the unique sense of satisfaction that comes from creating something with one's own hands, and that this is a fundamental need of humans" (p. 2). Modularized instruction downplays the skills that take-home projects may teach, thereby emphasizing concepts for learning instead.

So are the vendors selling education or is this just another way to make technology education like every other subject? According to Loveland (1999), in a module process is a priority over content. As a result the repetitive nature of modularized activities bores students, leaving them to jump through imaginary hoops (Loveland, 1999). LaPorte (1999) stated, "activities" of the past are rapidly becoming "passivity's," meaning that the students merely follow the directions to pre-determined outcomes with the hope that learning is a by-product (p.2). Pullias (1997) said that the information and activities students perform in individualized instructional modules are considered low-level learning, where all they are doing is following directions without having any time to use problem-solving skills. Pullias (1997) states further that students only get a true understanding of a concept when they actually apply them to real problems. Luna (1998) states that,

> A knowledgeable student can control a problem, a student with little knowledge is controlled by the problem. Let's not send students to a computer, pneumatic nail gun, surface planer, or wind tunnel and tell them to research, experiment, and discover how to use it. This technique, with the teacher acting as the facilitator, is inefficient, ineffective, and unsafe. (p.26)

Shultz (1999) stated that technology education programs teach tool and material use and, as a result, we are teaching how to think.

Technology educators must determine what the students really need to know to succeed after high school. Rogers (1998) questions whether or not industrial teacher educators are placing technology education philosophies ahead of the actual needs of school districts. Pullias (1997) asks what the students can do after using modular labs for a semester or a year. Pullias (1997) stated that modular environments make it hard to teach students real world problem solving. Modularized technology education programs are making technology education less unique from the academic programs, and may be suffering enrollment problems as a result.

The overuse of utilizing computers to educate has also seen critics. Laporte (1999) thinks that computer use in technology education gives the students utilizing them a passive, sedentary experience. Laporte (1999) found that computers play a major role in nearly all modular programs, leaving students seat-bound for most of the instructional time. Could the trend of heavily relying on computers in modular programs cause more harm than good to technology education programs?

Modularized Instruction's Impacts on the Instructors

Positive Impacts

Modularized instruction is seen as a tool that can help technology educators teach and, in some ways, make their jobs easier to do. Hobbs (2001) said that when technology education was in its early stages, teachers tried to assemble the curriculum themselves and they found this to be nearly impossible. Hobbs (2001) commented that teachers are not as prepared to develop curriculum as the vendors who hire people to do only that for a living. Hobbs (2001) stated that teachers lack the time to develop curriculum when they are already overwhelmed with the daily duties of their classes. Hobbs (2001) said that vendors design curriculum much closer to state and national standards than teachers in the classroom. Walker (2000) said that technology education has always pushed problem solving, which is stressed by modules. Rogers (1998) stated that technology educators must find a way to mix industrial processes with new industry-related modular technology education systems. Gloeckner & Putnam (1995) said that teachers don't have the resources or the time to design new curriculum and vendors are becoming the solution to this problem. In many ways modules are seen as tools that educators don't have to develop themselves.

Negative Impacts

Some technology educators perceive modularized instruction as a detour down the wrong road. R. Johnson (1997) illustrates an example of this thinking in the following statement:

> One of the biggest mistakes we've made in technology education is throwing away the baby and keeping the bath water. Rather than integrating

> technology into existing curriculum, as we have in our school, we've thrown away curricula to experiment with new, untested systems-systems that may be more economical to run but seldom develop skills. (p. 33)

With modularized instruction, students learn how something works or is done but do little when it comes to practical application. Shultz (1999) stated "technology education is an academic discipline, where industrial technology education is an applied art"(p.83). In 1995 Rogers (1998) did a survey of 287 Nebraska technology education teachers and found that the ability to operate industrial equipment is still a major component in technology teacher education. Rogers (1998) stated that technology educators must not abandon skills and processes for non-skill oriented technology education modules. Pullias (1997) said "The lack of flexibility and synergy in the modular labs stifles any meaningful growth on the part of the students. They are stuck with the activities, the structure, and the lack of opportunity for creativity and true problem solving" (p.29). Many technology educators feel that there is a definite need to teach and utilize equipment to produce something worthwhile.

The current trends in technology teacher training are disturbing in many respects. Johnson (1997) found that colleges and universities with technology education programs have been eliminating what would be considered the traditional shop, leaving a shortage of skilled instructors and forgoing the traditional technology education teaching practices. Rogers (1998) states that, since 1985, more and more industrial education programs have been training their graduates for work in a modular lab setting. Rogers (1998) found in a 1995 study that 82% of high school technology education programs require students to learn welding operations, but only 6.1% of technology teacher education programs require this type of training. Rogers (1998) feels that technology educators are not listening to what the local public schools actually need. Technology educators are caught up in the debate of the merits of modularized instruction and the traditional technology education programs.

Modularized Instruction's Impacts on Curriculum

Positive Impacts

Modules affect the technology education curriculum because their methods of teaching are so divergent from the traditional technology education styles. Wright (1997) stated "modules, along with other ways to present the curriculum, should be evaluated on their ability to provide appropriate opportunities for students to develop technological proficiencies" (p.5). Maughan and Prince Ball stated that "the cognitive tasks required of students in tech ed remain at lower levels at best, ending when students demonstrate that they can apply system-specific facts and knowledge" (p30). Degraw & Smallwood (1997) found that vendor sold individualized instructional modules emphasize how well classrooms could be controlled with each student at a desk, monitored and working. Hobbs (2001) found that modules are effective independently as well as in pairs, but teachers usually group students together. Gloeckner & Putnam (1995) stated that vendor designed curriculums are saving technology educators much time and they must be willing to accept these contributions. Modular classroom facilities are proving to be vastly different from the traditional technology education facilities. Mulford (1995) stated that with carpeted floors and equipment on modern furniture, the modular classroom looks more like an office instead of a classroom. Modularized programs emphasize the use of computers to achieve the high tech atmosphere in their labs.

LaPorte (1999) states “Technology education has embraced computer use in a variety of different ways, arguably with more divergence than any other subject in school” (p. 2). Educators cannot ignore what modularized instruction offers technology education.

<u>Negative Impacts</u>

Many educators have spoken out against modules within the technology education curriculum. Johnson (1997) comments that business and industry would never stay in business if they dumped everything they knew and started over in the way technology education has in recent years. Rogers (1998) stated that there has been little research into what laboratory equipment is actually being utilized in secondary schools today. Rogers (1998) said that the selection of laboratory equipment should be based upon the individual school districts philosophy and goals. Luna (1998) stated that proponents of the so-called new technology education are so far from traditional that schools should not even utilize the old industrial arts facilities. Technology educators must begin to ask themselves if they really are throwing away valuable teaching techniques and tools all in the name of change.

Concerns are surfacing that vendors of individualized instructional modules are beginning to take over the technology education curriculum development. Of all the concerns educators may have about individualized instructional modules, the vendors who sell them are at or near the top of the list. Instead of selling the modules on the merits of the course content, vendors are pushing something of a very different nature, which is control of the technology education classroom. Zuga (1999) stated that in the evaluation of certain products, vendors frequently mentioned “the ability to manage the classroom” (p.4). According to Zuga (1999), children are in a desk with the teacher monitoring them by a computer with minute-by-minute updates of their progress. K. Zuga (1999) further illustrates this with the following statement:

> Gone are the days of students being given and taking the responsibility for managing their time, supplies, and work on projects. Gone are the interactions with other students as they work and plan together and observe each others' projects. Gone are large and small group work and the personal interaction and shared learning, which comes from these activities. Gone, also is the kind of creativity, which results from all of the above activities. Gone is the unique environment of technology education which used to bring my middle school students running down to the lab so excited to work on their own after being chained to a desk for five other periods each day. We managed to emulate the methods of the rest of the school subjects and provide students with a controlled environment at desks. In fact, we've managed to go one step further and arrange the modules so that they minimize whole class interaction. (p.4)

Gonzales (1997) states that traditional industrial arts programs are disappearing because the curriculum is developing slow and is being controlled by vendors. Gloeckner & Putnam (1995) stated that vendors are the primary source in the development and design of modular programs. Technology educators must begin to question what is happening to the curriculums as vendors of modules push their wares in the name of profit.

Many educators are concerned that tool usage and skills are being thrown away with modularized instruction. Luna (1998) states that technology education should continue teaching the use of tools, machines, and materials, placing an emphasis on solving problems from these fundamentals. Luna (1998) found that, according to the new technology education philosophy, teaching students skills on tools, machines, materials, and/or processes is no longer a needed part of a student's general education in middle school programs. LaPorte (1999) asks what skills and needs of our students are also being thrown away as we throw away the tools used in the past and replace them with computers.

Summary

The future of technology education is difficult to predict. Pullias (1997) commented that modular teaching is nothing more than a stepping-stone for technology education and the future may already be beyond it. Pullias (1997) stated that seeing modular technology teaching as a complete solution will put technology education into self-obsolescence. Modular instructional programs are likely not the cure-all technology education has been searching for. They may become another tool that technology educators utilize to efficiently teach concepts, but the need for what is considered a traditional program is still likely part of the future of technology education.

CHAPTER III

Methodology

The purpose of this study was to determine if Southern Door School District should incorporate modular instruction into their curriculum. To determine the effectiveness of modules, this study consulted with jr./sr. high school technology educators in the local area near Southern Door District who were currently utilizing modular instruction in their curriculum. Other districts that may be seeking the same information can utilize the results of the study.

Objectives of the Study

This study addressed the following objectives:

1. How effective were the instructional modules in aiding student learning?
2. What are technology education instructor's perceptions of the methodology and use of modular instruction labs?
3. What problems and costs have instructors encountered when implementing a modular instruction lab?

Research Design

The design used for this study was a qualitative research. The information gathered was limited to the individualized modular systems utilized in public schools within a 25-mile radius of Southern Door Schools. The information for the research was gathered during on-site visits to selected schools during operating hours. Direct observation of modules being used during class was studied. Instructors were interviewed to obtain their perceptions of individualized modular systems (see Appendix A). During the interview, a portable mini-cassette tape recorder was used to more accurately gather data. It was used to help get the tone and feeling of each question and answer.

Population

The population for the study was limited to six different school districts in the local area that utilize modular instruction. The type of process was observation. The expertise of the instructors who utilize modules will help to form conclusions on their effectiveness.

Procedures

The laboratory observations and instructor interviews were conducted as follows:

1. The researcher contacted technology educators from each of the six public schools surrounding Southern Door District and asked if they would participate in a study of their modular instruction programs. At that time they were informed what questions they would be asked during the on-site observation so they could prepare themselves accordingly.
2. The researcher scheduled visits to all six schools.
3. The researcher observed the modular classes for about 1-½ hours each. The instructors were then asked the interview questions.

Data Analysis

The following criteria were analyzed during the observation and interview with the instructor regarding each of the study objectives as follows:

Objective One: How effective were the modules in aiding student learning?

- Overall appearance of the modular labs and furniture
- Types of modules being used

- The use of modules individually or in groups
- Time spent with modules
- Durability of modules
- Relevancy to technology education curriculum
- Instructor involvement

Objective Two: What are technology education instructor's perceptions of the methodology and use of modular instruction labs?

- Likes
- Dislikes
- Enrollment affects
- Relationships with vendors

Objective Three: What problems and costs have instructors encountered when implementing a modular instruction lab?

- Implementation problems
- Ongoing problems
- Vandalism
- Costs

CHAPTER IV

Results of the Study

The purpose of this study was to determine if Southern Door School District should incorporate modular instruction into their curriculum. To determine the effectiveness of these modules this study consulted with jr./sr. high school technology educators in the local area near Southern Door District who were currently utilizing modular instruction in their curriculum. Other districts that may be seeking the same information can utilize the results of the study.

Population

As shown in Table 1, the districts involved in this study had high school enrollments in a ranging from 233-657 students. Southern Door has an enrollment of about 453 and falls close to the middle of this range. The study schools had either two or three technology education instructors; Southern Door has three. The average modular class sizes varied considerably in each school with a range between 10 and 30. Modular classes were limited in size by how many modules the lab contained. All schools had a two student per module limit in their labs. Enrollment trends after modules were implemented are also listed.

Table 1

SCHOOL	1	2	3	4	5	6
No. of Students Enrolled In School	657	503	233	276	426	329
No. of Tech Ed. Instructors	3	2	2	2	3	2
Average Modular Class Size	15	10	30	12	25	16
Enrollment Trends In Tech Ed. After Modular Program Was Implemented	Higher	Same	Same	Lower	Higher	Same
Enrollment Trends By Gender After Modular Lab Was Implemented	Same	Same	Same	Same	Higher	Higher

Research Objective One

Research objective one asked to identify how effective were the modules in aiding student learning?

Overall Appearance of the Modular Labs and Furniture

Overall appearance of the different school's modular labs was widely varied. Many of the instructors made comments that the high-tech look to their lab has helped the enrollments in technology education classes. Five of the six schools that were visited had purchased custom furniture for their labs from vendors or local contractors. The sixth school converted a classroom and utilized existing tables to save money. In this lab the modules were scattered about the room and the class looked out of place compared to the other modular labs. Some of the modules were portable and were moved around the room when used. This appeared to have little effect on those utilizing the modules. Another lab was very cramped for space, making it difficult for the class or instructor to get where they needed to go.

Types of Modules Being Used

When the schools were visited, it was noted that modules considered as part of traditional technology education curriculums like hydraulics, pneumatics, mechanisms, electronics, or machining were not being utilized. Modules like space technology, biomedical technology, and alternate energy were almost always observed being used. Much favoritism for certain modules was quite evident during the visits. Especially favored were the modules that actually produced a small project as an end result. Instructors commented that modules deemed difficult are quite often avoided. Every school observed allowed free choice of which modules to work on to gear the class toward personal interests.

The Uses of Modules Individually Or In Groups

When the modules were utilized by a group of two or more, it appeared that learning had gone down. Much of the period seemed wasted by conversations centered on things other than the modules at hand. Modules that were being used independently appeared to accomplish much more. These individuals worked on the modules from the beginning to the end of the class, wasting little, if any, time.

Time Spent With Modules

Most of the schools had 45 minutes allotted for each class. At four of the schools the time spent actually working was reduced dramatically because of startup or shutdown at the end of the period. One of the schools had all computers in the modular classroom wired to the Internet. Rather than work on the modules, the computers were used to check E-mail, etc., for the first 10 minutes of class. At one school, 13 minutes before the end of the period, all but two modules were shut down for the day. At two schools, it was observed that the modules were running the whole period. The work pace in all but one lab was very low pressure, with no sense of urgency to get done and move on.

Durability Of Modules

Most of the modules in each lab contained numerous small parts. Most of the instructors were observed utilizing some type of inventory system to see to it that parts were in place at the beginning and end of the period. Many of these parts appeared to be easily damaged if misused. A number of the modules at each school were non-functioning on the day of observation. Most of the schools had two to five modules inoperative because of one problem or another. One school had only 14 of 29 modules left functioning.

Relevancy To Technology Education Curriculum

Numerous modules at all the schools dealt with subject matter that seemed more appropriate in a science curriculum rather than technology education. Some examples from various schools are biomedical technology, alternative energy, solar power, laser power, digital sound technology, and space technology. Others, like multimedia production, graphics and animation and video production appeared to be more closely related to the English or art curriculums. Many modules had manipulative activities, but none offered any skills training.

Instructor Involvement

The instructors were not observed to be teaching any concepts and only acted as facilitators. In modular classrooms the teaching was left to the modules themselves. A good portion of the instructor's time was spent either troubleshooting a problem that occurred or retrieving supplies for activities. Three of the six classrooms had all tests and quizzes sent to the instructor's computer using a special grade book program. This cut down on paperwork and the extra time was spent with the class. One instructor with a particularly large class was kept busy from the beginning of the period to the end. All other instructors had much free time to roam the lab and help out where needed.

Research Objective Two

Research objective two asked what are technology education instructor's perceptions of the methodology and use of modular instruction labs?

Likes

Instructors had many good things to say about their modular programs. The most often mentioned comments had something to do with the laboratory environment. One instructor stated that, compared to a traditional technology education lab, the fear of injury is non-existent, and this contributes to a very relaxed atmosphere. The cleanliness of the lab was considered another plus. All the instructors stated that the depth of the curriculum modular instruction provides is far superior to anything they could attempt themselves. "We couldn't even come close," was one such comment. Another stated that all the materials and tests would take years to develop. All agreed that vendor supplied modular equipment has strong merit in the technology education curriculum.

The instructors who had the automatic grading programs that gave them instant results of student progress commented that it was quite easy to see what was accomplished on any given day. This cut down considerably on paperwork and even retests were easy to deal with.

Dislikes

The lack of basic skills training was the most frequently mentioned dislike of modular instruction. All the instructors further stated that modules are not a replacement for traditional technology education courses. One of the schools in the study completely dropped traditional courses to go completely modular. The instructor of that school said that, after five years of modular instruction, he couldn't think of any students who could weld or pound nails with any degree of proficiency. He went on to say that going completely modular created an appetite for some of the traditional technology education courses and they are now going that direction with their curriculum.

Another dislike of modular instruction, according to instructors, is that classes must be eliminated to make room in the curriculum and lab for modular instruction. Four of the schools modified their existing lab space to accommodate the modular lab. As a result, some of the technology education curriculum was reduced and labs were scaled back or eliminated. One of the study schools had to cut their popular consumer automotive and power technology classes as a result of these cuts. Programs were also cut because all but one school did not add instructors when they implemented modular instruction.

Enrollment Affects

Nearly all instructors in the study experienced similar trends regarding enrollment in the modular courses. Every schools enrollment increased significantly the first two years. After this time enrollment tapered off to approximately what it was prior to the modules being added to the curriculum. Two of the schools saw a significant increase in female enrollment. One of the classes observed was about 50 percent female. That instructor said that modular instruction was one possible reason for this change. He stated another possible reason is that this school recently cut the electives in other programs.

Relationships With Vendors

Instructor experiences with various vendors varied dramatically. Two of the instructors stated that their vendors were very supportive in every way. One of these reported that he has never been charged for any parts or services he asked for in the three years after implementation. Most of the instructors were somewhat satisfied with the vendors they chose. One instructor reported that the minute the order was made, the vendors he worked with stopped nearly all support of the modules. They didn't even have help in setting up the lab. The modules were delivered by truck and they had to assemble everything on their own. He further commented that the vendor sent the instructors to another state to receive what they called training. They ended up installing a lab for another school that had also ordered modules. As a result, the instructors had to train themselves.

Research Objective Three

Research objective three asked what problems and costs have instructors encountered when implementing a modular instruction lab?

Implementation Problems

How the school districts instituted their modular instruction proved to be a hot topic of discussion among the instructors. Of the six participating schools in the study, three stated that the idea to add modular instruction to the technology education curriculum was driven by the school administration. One school reported that an instructor initiated the modular instruction. The remaining two instructors stated that both they and the administration investigated the idea of implementing modules. The instructors at the three schools where modules were forced in by the administration felt they lost control of their own curriculum. In two of these cases, the administration considered modular instruction as a cheaper alternative to traditional technology education. Another instructor reported that an administrator stated at a public meeting that he wanted to get rid of what he termed "dirty technology education."

Another problem area brought up by instructors was an attempt to incorporate existing equipment into the new modular lab. This initially was thought of as a cost saving measure, but eventually evolved into more trouble than it was worth in every case. The most trouble resulted in using refurbished computers that would not properly operate the software used in the modules. Most instructors found computers were usually the primary reason that a module was deemed inoperable.

Another area of concern was the placement of a modular lab in the school. One half of the schools that were studied refurbished an existing room or former technology education lab when implementing modularized instruction. The instructors found numerous difficulties in these situations, with space being the primary concern. One lab was so tight for space that getting between modules was nearly impossible during class time. Another problem in small labs was the unbearable noise level of the tightly confined activities. A lack of proper facilities within the lab, such as a sink for cleanup, was observed in two of the labs. Proximity to other technology labs in the school was a minor concern cited by one instructor.

Nearly all instructors mentioned the lack of training for new instructors in modular labs as a major concern. They stated that the first year through the program, the students know more about the modules than do the instructors. All instructors commented that, in order to understand each module, they have to actually work through each activity. With some modules taking up to 30 hours of instructional time, they found this to be a difficult task.

Ongoing Problems

Another problem encountered by instructors was the length of time allotted to each module activity. They found that some students obviously take longer or shorter periods of time to complete different units. Absences are also a problem when each day is planned in the semester. One instructor commented that a student was absent for a long period and it was impossible to make up the work because it had to be done in the lab. Another concern instructors had is that students can lose interest in a given module and as a result have difficulty staying on task.

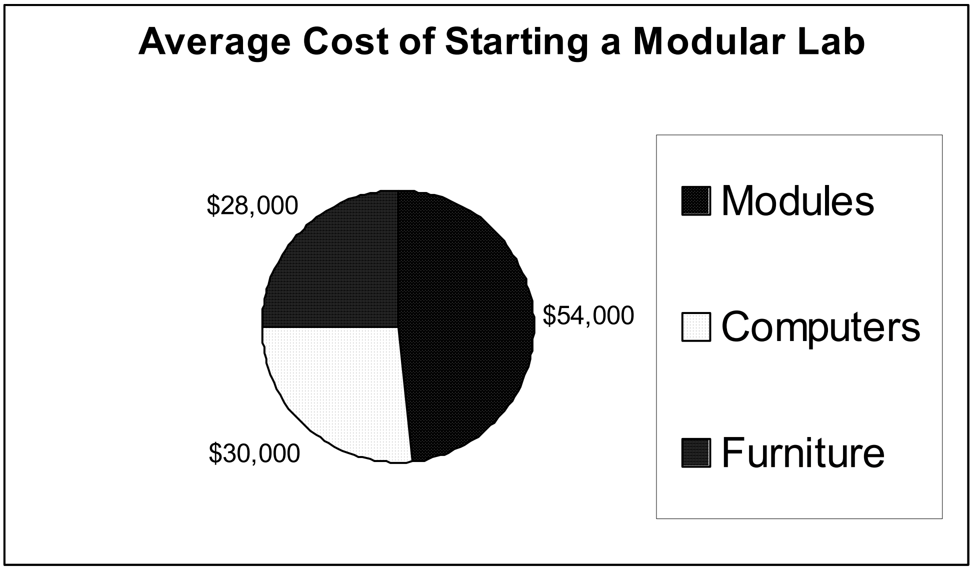
Vandalism

Vandalism of equipment and parts of modules was, to varying degrees, a nagging concern for all the instructors. One instructor, when asked about vandalism, said he experiences it on a daily basis, with modules constantly disabled. He stated that in his lab the students caught on to the fact that, if a module is broken, they don't have to do that activity. This instructor was observed asking a student to count the mouse balls for the computers at the end of the class period. The instructor stated that the large classes assigned to the modular lab greatly contributed to the vandalism problems. He said that large classes make it impossible to see everything that goes on. All other instructors had only small problems with vandalism or theft, but significant enough to find concern.

Costs

Startup costs are a major factor when implementing a modular instructional lab. The costs of a modular lab are usually divided between the modules, computers, and furniture for the lab. Some districts, in an attempt to save money, used existing furniture or computers. As a result, the total spent by all districts in the study ranged between $69,000-$250,000. The average cost for districts that purchased all three items was about $112,000. Graph 1 illustrates the average cost that the districts paid for each item.

Graph 1



A further concern for instructors was the yearly operating budget needed to repair, replace, or purchase supplies for the modular lab. One instructor reported that the administration was reluctant to fund the modules once they were implemented. Another instructor found difficulty in dealing with the administration on a long-term budget plan. In both cases the administration viewed the modules as a cheaper alternative to traditional technology education. Average yearly operating costs for supplies at the study schools was between $500-$2000. The schools reported a repair and replacement budget of about $2000-$5000.

CHAPTER V

Conclusions and Recommendations

The purpose of this study was to determine if Southern Door School District should incorporate modular instruction into their curriculum. To determine the effectiveness of these modules, this study consulted with jr./sr. high school technology educators in the local area near Southern Door District who were currently utilizing modular instruction in their curriculum. Other districts that may be seeking the same information can utilize the results of the study.

Conclusions and Recommendations

Research objective one asked how effective were the instructional modules in aiding student learning?

The analysis of the data for objective one concluded that modular instruction, if carefully planned to fit a given technology education curriculum, can indeed enhance student learning.

The research indicated that furniture and appearance of the modular labs did not seem to affect actual learning, but that it might spark interest and enrollment as a by-product. It was also observed that a module is chosen by the class because it may be appealing or considered fun, and not for what may be learned. The research indicated that when modules are used independently, rather than in groups, they become more efficient tools for learning. The research also observed much wasted time in the modular lab if the classes are not monitored closely or the module computers have multiple uses like the Internet. The research pointed out that, if not cared for, modules can be easily damaged or lose parts and this is a major concern for instructors. It was also found that some modules might contain subject matter that might be better suited to other curriculums in the school. The research also pointed to the fact that in most cases, modular instruction allows the instructor to have much more one-on-one contact with the student than traditional teaching methods.

Based on the conclusions, recommendations for objective one are:

1. That Southern Door Schools should seek to set up a modular instruction lab to enhance its technology education curriculum.
2. That Southern Door Schools carefully layout and plan placement for a modular instructional lab in its facilities to avoid the missteps of other schools in the study.
3. That Southern Door Schools purchase only those modules that closely follow their technology education curriculum philosophies.

Research objective two asked what are technology education instructor's perceptions of the methodology and use of modular instruction labs?

Overall, the research indicated that the instructors thought that their modular instructional lab was a good addition to the technology education programs at each school in the study.

The instructors pointed out that the modules save much time and effort on their behalf when it comes to curriculum writing. All instructors felt that vendor purchased equipment had strong educational merit. Every one of the educators stated that a modular instructional program is unable to replace the traditional technology education offerings because of its lack of skills training. The research also pointed out that instructors feel there is a need for training before trying to teach a modular class. The research also found that, when implemented, modular instruction eliminated course offerings that the instructors felt still had strong merit in the technology education curriculum. The research pointed out that enrollment will likely stay about the same in technology education programs after modules are implemented. Educators also made it clear that vendors must be carefully selected.

Based on the research, recommendations for objective two are:

1. That Southern Door Schools adopt a modular instructional program because the study found that it will add depth to the existing technology education curriculum.
2. That Southern Door Schools should, based on the data in the study, add a modular lab in such a way as to not destroy its existing curriculum. Schools in the study made cuts of whole programs to make room for modular instruction and in many cases the curriculum that was lost was very worthwile.
3. That Southern Door Schools carefully select vendors who sell modules by following the recommendations of the instructors in the study. Their knowledge and insight will help to select a reputable vendor.

Research objective three asked what problems and costs have instructors encountered when implementing a modular instruction lab?

The analysis of the research revealed numerous problems and costs associated with attempting to set up a modular instructional lab.

The research indicated that one-half of the study schools were forced by their administration to implement some kind of modular instructional lab. The research suggests that the instructors in these schools are losing control of the technology education curriculum. The research indicated that utilizing existing equipment, furniture, and lab areas causes much difficulty in implementing a new modular lab. The study also found that instructors feel they were not adequately prepared to teach modular instruction. The research found that the time allotted to each model activity is inflexible and creates problem with absences and the interests of students. The research indicated that instructors were concerned with vandalism and that at least one school had a serious problem.

To start-up a new modular lab, the research found that the average cost, not including the facility, averaged $112,00. The research stated that a yearly average supply budget for the study schools was approximately $1300. The repair and replacement budget was found to average about $3500 at the participating schools.

Based on the research, recommendations for objective three are:

1. That Southern Door School's technology education instructors take an active role in implementing a modular instructional lab into their curriculum.
2. That Southern Door School's technology education instructors receive adequate training in modular instruction prior to starting their own lab.
3. That Southern Door Schools should, based on the data in the study, begin preparing adequate funding for implementation of a high quality modular instruction learning lab.

Recommendations for Further Study

Recommendations for further study include the following:

1. A follow-up study on comparing the effectiveness of modular instruction verses traditional technology education.
2. A follow-up study on technology educators' thoughts of modular instruction.
3. A follow-up study on what is happening in schools using modular instruction after more than five years.
4. A follow-up study on the effects of large or small class sizes in a modular instructional lab.

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APPENDIX A

Modular Instructor Interview Questions

1. What were the original reasons for implementing a modularized lab?
2. What was the opinion of your advisory committee when it was decided that your school would implement a modular lab?
3. How relevant do you feel these modules are to the student's occupational opportunities in the local community?
4. How has your modular lab affected enrollments in the technology education department? Enrollments by gender?
5. Are the modules you have updateable to new and changing technologies?
6. How effective do you feel modules are in teaching actual skills as well as knowledge?
7. How durable are the parts on each module station in normal use?
8. Have you encountered any problems with vandalism on the modules by students during class?
9. What were the total startup costs for your modular lab?
10. What are your yearly costs for maintaining and updating the modular lab?
11. If your school had to do it all over again, would you add a modular lab to the technology education curriculum?