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ABSTRACT

An action research project was conducted to find ways of increasing the productive use of time in middle school applied technology laboratories. The population targeted for the study consisted of 26 middle school students in a growing middle-class Illinois community. The problem of nonproductive use of class time was documented through test scores, uncompleted worksheets, and teachers' observations of behavior. The following items were identified as contributing to the problem of nonproductive use of class time: weak student study skills, inadequate or unclear statement of classroom expectations, and inadequate student social skills. Students' productive use of time in an applied technology laboratory was determined to be related to curriculum, classroom organization, and student social and academic skills. An intervention involving the use of daily student lesson logs and daily behavior checklists was tested for three weeks. Postintervention data indicated an increase in student achievement and decrease in inappropriate classroom behaviors. The teacher behavior checklists also indicated an increase in students' use of classroom time. (The paper contains 19 references. Appended are the following: list of available technology modules; sample module schedule; sample of module behavior and score checklist; sample technology teacher survey; and sample lesson log.) (MN)

IMPROVING STUDENT ACHIEVEMENT AND BEHAVIORS IN THE MIDDLE SCHOOL APPLIED TECHNOLOGY LABORATORY

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An Action Research Project Submitted to the Graduate Faculty of the School of Education in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Teaching and Leadership

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This project is dedicated
to my wife Lynda,
who encouraged and supported
me throughout this project.
Thanks, with love, Brent.

ABSTRACT

This report describes a problem for increasing the productive use of time in the applied technology lab in order to increase student post-test scores for modules, worksheet completion, and appropriate classroom behaviors. The targeted population consists of middle school students in a growing middle class Illinois community. The problem of non-productive use of time during class was documented by using data which included; test scores, uncompleted worksheets, and teacher behavior observations.

Analysis of probable cause data reveal that inadequate curriculum, weak student study skills, inadequate or unclear statement of classroom expectations, and inadequate student social skills, appear to contribute to the problem. The productive use of time by students in an applied technology lab appears to be one that is multi-faceted and is related to curriculum, classroom organization, and student social and academic skills.

A review of solution strategies suggested by others, combined with an analysis of the problem setting, has resulted in the selection of an intervention consisting of two components; the use of daily student lesson logs, and the use of daily teacher behavior check lists.

Post intervention data indicated an increase in student achievement and a decrease of inappropriate classroom behaviors. Teacher behavior check lists also indicated an increase in students' use of classroom time.

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CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The students of the targeted eighth grade applied technology labs exhibit ineffective skills in time management. Evidence for the existence of this problem includes low post-test scores, incomplete worksheets, and inappropriate classroom behaviors.

Immediate Problem Context

The subject school is located in a suburb of a large midwestern city. The school is a middle school, grade levels six through eight and has a total enrollment of 954 students. The subject school is in a unit school district with a total of 21 schools: 14 elementary schools, 5 middle schools, and 2 high schools. The subject school population feeds from three of the districts elementary schools. The following is a breakdown of the ethnic characteristics of students from the subject school: 81.4% White, 15.4% Asian / Pacific, 0.8% Hispanic, 1.6% Black, and 0.7% Native American. The subject schools attendance rate was 96.3% with no chronic truants. There is a student mobility rate of 4.8%. The subject school has an average class size, for grade eight, of 25.9. The minutes per day devoted to the teaching of core subjects are: 40 for mathematics, 40 for science, 80 for English, and 40 for social sciences.

The unit district has a total of 970 teachers. The average teaching experience is 14.9 years with 68.6% of the total number of teachers having a Master's Degree or above. From the total number of teachers in the district, 71.2% are female, while 28.8% are male. Teachers earn an average salary of $51,845, while the administrators earn an average of $73,043. The district breakdown of teachers by racial/ethnic background is: 97.6% White, 1.2% Black, 0.5% Hispanic, 0.7% Asian/Pacific Islander, and no Native American. (1997 State School Report Card)

Description of grade eight curriculum program

The eighth grade curriculum consists of three different content areas: core subjects, exploratory subjects, and Physical Education (P.E.). The core subjects (mathematics, science, English, and social studies) are taught by teachers who work as a team. The teams consist of a teacher for each core subject. Each team is responsible for teaching the core subjects to their group of students. The students on each team are randomly chosen by dividing each grade level evenly by three. This generally results in team sizes of 90 to 100 students. Student team sizes are changed each year according to enrollment. Students attend these classes for the complete school year. Exploratory subjects (art, music, learning for independence, family and employment (L.I.F.E.), foreign cultures and applied technology) are taught by teachers that are not part of the core teams. Students rotate through the exploratory classes on a 12 week schedule according to their grade level. Sixth

grade students take art, technology and music. Seventh grade students take art, foreign cultures, and L.I.F.E.. Eighth grade students take art, L.I.F.E., and technology. The performing arts, band, orchestra, and choir, are pulled from the students classes for individual lessons and from study halls for group lessons. Students in all grade levels take physical education all year as a regularly scheduled class.

The problem of student time management is specific to the Applied technology program. The Applied technology classes are taught in a technology lab that consists of 30 different workstations each designed to focus on individual technologies (Appendix A). Each workstation is developed around lessons and activities that last for seven days (one lesson per day). Students work in cooperative groups of two, which are randomly selected and change at the end of each seven day rotation (Appendix B). At the end of the 12 week grading period each student will have completed eight different workstations. Student achievement for each rotation is assessed in two areas, class participation and post-test scores. Class participation includes: following class rules and expectations, staying in your seat, completing lesson activities and sharing the work load equally with your partner. Post-tests are taken by both students at the end of each rotation. Students work together on the post-tests and receive the same grade.

The applied technology program began during the 1996-97 school year and replaced the traditional industrial arts program. The applied

technology lab is located in the area where the two industrial arts shops were located. Remodeling and building modifications were completed in two phases. During the first phase, one of the industrial arts labs was unchanged while the other industrial arts lab was converted into an applied technology lab containing 15 technology modules. During the first phase, the sixth grade program continued to follow the current curriculum while the eighth grade program utilized the new applied technology modules. Phase two involved major building modification which included; demolition of walls, building new walls, new flooring, new electrical wiring, networking of all computers at each workstation, new ceilings, installation of new furniture and installation of new modules. The new lab is able to handle a class size of 60 students with two teachers per period. The applied technology program was implemented in all of the five district middle schools. The completion of this program is a result of nine years of research, committee work, Board of Education cooperation, and long hard work by the industrial arts teachers.

The Surrounding Community

The subject school is located in a large midwestern city. The 1996 census showed a population of 110,107 residents. Ethnic breakdown of the total population is: White 88.5%, Asian 5.8%, Black 2.2%, American Indian/other 1.3%, and Hispanic 2.2% (1990 census).

The major industries in the subject city are: research, development,

and technology businesses. There are very few blue collar jobs in the subject city. Those blue collar jobs that do exist are in the service fields. The subject city is located in a major transportation area that allows easy access to major airports, highways, railroads and waterways. The median family income is $60,690 (1990 census). There are a total of 38,312 housing units with an average home value of $230,339. The average rent for rental housing is $852 (Multiple Listing Service). According to the 1990 U.S. Census the subject city is one of the fastest growing cities in the nation.

National Context of the Problem

Modular technology laboratories have begun to replace the more traditional industrial arts programs in many middle schools. This increase in modular technology or technology education is in response to the increased need of schools to train and educate students in the areas of work skills (SCANS,1991). Most of the curricula developed by technology teachers and vendors of modular technology programs include in their lessons, activities and exercises that encourage students to use their psychomotor, cognitive, problem-solving, and affective skills (Gloecker & Adamsom, 1996). These are skills that students will need to make successful educational and vocational decisions (SCANS,1991).

School study skills, and time management skills are other skills that students will need to be successful in the career world. The issue of time management for student's centers around the teacher and students ability

to allocate time for learning during structured and unstructured class time (Saphier & Gower, 1987). Teachers need to make sure that they teach just enough material so that the majority of the students in class can process and learn that material with out being left behind and confused. The students need to be instructed in time management skills so they will be able to manage their time effectively and thus allow them to maximize their learning time during class. Students that use "To-Do" lists to manage their time, overcome study and homework procrastination (Lakein 1974). During a study of eighth grade students by Broden, Hall, and Mitts (1974), they found that students that used this type of written self-record keeping, helped to raise the amount of time spent on the lesson, both in class and out of class. The use of the "To-Do" list also helped to improve student study skills when they were applied to learning outside of school time.

Two work skills that modular technology programs try to emphasize are student accountability for their work and managing their learning environment. Students in modular technology labs have had a difficult time managing their time while in the lab. This is supported by technology teacher observations and is on a list of partial disadvantages of modular education, that was developed by a teacher that has taught in a modular setting for six years (Gloeckner & Adamsom,1996; Grinnell,1995).

As more schools change from industrial arts classes to technology education, the new technology teachers are finding that they now have to

deal with student behaviors and classroom assessments that they haven't seen in their old industrial arts classes. Those that are most prevalent are; student boredom (Gloeckner & Adamsom, 1996, Grinnell, 1995, p.19), incomplete worksheets, low post-test scores, and inappropriate classroom behaviors. Poor student behaviors and grades are not new problems for most teachers. For the technology teacher that has gone from a large open classroom/shop environment and curriculum to the new modular technology lab/classroom curriculum, dealing with students in this new environment will present new classroom and student behavior management challenges.

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

Several data gathering techniques were used in order to document poor student test scores and poor student behaviors in the Applied Technology lab. Student test scores and student behaviors were recorded for a period of three weeks. A student behavior and test score checklist was developed for this process (Appendix C). A survey was developed and mailed to Technology teachers that teach in similar technology labs in order to document the extent of poor student post test scores and behaviors in their Applied technology labs (Appendix D).

The student behaviors being observed during class were; off-task or not working behaviors and out of seat without permission behaviors. The targeted eighth grade class consists of 26 students and was observed for the above behaviors. A behavior checklist (Appendix C) was used during class to record any incidents during the three week period of the intervention. A summary of the number of incidents and the number of students involved is presented in Table 1.

Table 1

Categories and Number of Behavioral Incidents During Three Week Study

Behavior	Number of Incidents	Number of Students
Off-task	48	9
Out of seat	25	9

Of the 26 students in the class, 35 percent were responsible for inappropriate classroom behaviors. Off-task behaviors occurred 48% more than students who are out of their seats. Seventy-three incidents occurred during the three week study. This represents an average of 3.5 inappropriate behaviors per day.

Data from post-test scores were gathered on the Module Grade Sheet (Appendix C). During the three week study period, three post-tests were administered to the targeted class. A summary of the test scores by grade and percentages for each week is presented in Table 2.

Table 2

Post-test Grades and Number of Students Receiving that Grade by Week

	Week		
Grade/Percentage	1	2	3
A=100-92%	8	6	5
B= 91-82%	6	6	6
C= 81-70%	12	12	12
D= 69-60%	0	2	2
F= 59- 0%	0	0	1

Of the 26 students in the study, 46 percent received post-test grades that ranged from 70 to 81 percent, and 8 percent received grades that ranged between 60 to 69 percent, for a total of 54 percent of the

students receiving an average grade or lower on the three post-tests.

A teacher survey was designed and mailed to 50 Technology teachers in three states, Illinois, Indiana, and Michigan (Appendix D). The survey was sent to junior high and middle school (grades 6-9) technology teachers that taught in similar Applied Technology Labs. Questions on the survey included; general background questions, student behavior questions, and student achievement questions. Of the 50 surveys mailed, 28 were returned. The average number of years teaching for the teachers responding to the survey was 17 years of service. All respondents taught grades 6-9, of those teachers responding 93 percent were full-time teachers and 7 percent taught part-time. The school systems have been using Modular Applied Technology labs for an average of 2.18 years. The average number of workstations in each schools technology lab was 15 per school. When asked if their students enjoyed or liked the Applied Technology Lab experience, 32 percent of the teachers strongly agreed, 64 percent of the teachers agreed and 4 percent were undecided. These results show that a large majority of students who have taken an Applied Technology class have enjoyed or liked their experience.

A summary of teacher ratings of student achievement and behaviors from question six is presented in Table 3.

Table 3

Student Behaviors and Achievements Observed in the Technology Lab.

Behavior	Never	Seldom	Occasionally	Always
Incomplete work	0	24%	72%	4%
low post-test scores	0	14%	76%	10%
out of seats	10%	62%	24%	4%
incomplete projects	4%	32%	60%	4%
boredom	11%	54%	35%	0
inappropriate behavior	3%	68%	29%	0
productive use of time	0	12%	76%	12%

Poor student achievement in the Applied Technology Lab, as reported by teachers that responded to the survey, appears to occur occasionally in three of the observed categories. Incomplete work occurred occasionally in 72 percent of the technology labs in the survey. Low post-test scores occurred occasionally in 76 percent of the technology labs in the survey. Incomplete projects occurred occasionally in 60 percent of the technology labs in the survey. These results are evidence that there is a problem of low student achievement in the Applied Technology Labs that responded to the survey. Two other student behaviors were observed in the technology labs. Students being out of their seats occurred in 62 percent of the technology labs surveyed and inappropriate class behaviors occurred in 68 percent of the technology labs surveyed. Even though students being out of their seats and student inappropriate behaviors were not as prevalent as others behaviors observed, they still represent a problem that is occurring in the technology lab.

Probable Causes

When analyzing the change of the Industrial Arts program to an Applied Technology Lab it was observed that students were having a hard time making the transfer from the old program to the new. Some student behaviors that were observed that led to this conclusion were, students out of seats, students off task, and poor post-test scores. These behaviors could be attributed to the new Applied Technology Lab's curriculum. The curriculum contains lessons that include activities and exercises that direct students to use their psychomotor, cognitive, problem solving and other affective skills (Gloecker & Adamsom, 1996). These skills are mostly overlooked in other school classes and students have not had to use these skills when solving problems and working on class lessons. Students may feel uncomfortable as a result of this new way of learning. As with anything that makes people uncomfortable the students inappropriate behaviors may be a result of their inability to adapt to a new learning enviorment. To determine if these problems were only occurring at the subject site, a survey (Appendix D) was developed for other technology teachers to see if they too were observing the same student behaviors and post-test outcomes in their new Applied Technology Labs. The results of the survey indicated that there were similar student behaviors being observed by the teachers that responded to the survey.

After determining that there were student behavior and achievement

problems at the subject site the next step was to search the literature for the underlying causes of these problems. According to Grinnell (1995), the most prevalent inappropriate behaviors in technology labs are: boredom, incomplete worksheets, low post-test scores, and inappropriate behaviors. Grinnell suggests that students get tired of following repetitive directions and as a result behaviors and test scores may suffer. Poor student behaviors and achievement on tests occur when students do not use their structured and unstructured time in class productively (Saphier & Gower, 1987). As a result of his observations and research in classrooms, Lakein (1974) found that if students use a "to do list," students are able to manage their time in class more effectively and also helps students to stay on task and reduces inappropriate behaviors in class. Broden, Hall, and Mitts (1974) , studied a group of eighth grade students that used a written log that recorded what they did and learned in lessons. The results found that the students who used these written records improved study skills both in and out of school.

Problem Evidence Conclusion

The evidence presented from the site observations clearly shows that students in the Applied Technology Lab have a problem staying on task, staying in their seats, and earning acceptable scores on post-tests. The literature suggests that students who have difficulty managing their class time may also develop behaviors that are not productive and result in low test scores and incomplete class work. The survey evidence shows

that there are similar problems occurring in other Applied technology labs.

The probable causes are inadequate curriculum, poor student study skills, and lack of behavior check lists.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

Technology education is a new area of school curricula. The literature suggests that more schools will include technology education in their curriculum plans (Gloeckner & Adamsom, 1996). Observers note that technology education is replacing the traditional industrial arts classes. Johnson (1989) explains this change: "Traditional industrial arts programs, which focused primarily on developing manipulative skills and understanding about industrial materials and processes, are giving way to technology education classes that emphasize a broad approach to technology" (p.9). "Technology education is making a strong bid to replace traditional skill-focused industrial arts classes in the curriculum in many schools across the country" (Wright, 1990, p.26). As a result of his study, Oaks (1991), "found that there has been significant progress in the transition to technology education," (p.72).

The literature also suggests that as a result of the change to technology education, students are benefiting in many positive ways. During their studies of seventh and eighth grade technology students, Dobrauc, Harnish, and Jerich (1995) found that modular technology education has a positive effect on: (a) desire to learn, (b) interest in doing research, (c) self-esteem, and (d) ability to work with classmates. In his reaction paper to modular technology education, Grinnell (1995),

listed the following advantages of technology education that he received from a teacher who had taught technology in a modular setting. They are: flexibility without changing the entire curriculum, minimal equipment cost, ability to meet individual needs of students, exposure to many technical concepts, clear expected outcomes, ability to update as technology changes, and clear and concise testing.

Not all of the literature is positive about the use of modular technology labs. Gloeckner, when interviewed by Daugherty and Foster (1996), recalls a statement made by a technology teacher that the modular system of teaching technology was, " tech by numbers", and that most students, in his opinion, were bored by the modular approach to technology education. Gloeckner argues that, "modular technology education is what you make it" and that " a technology teacher has to use all the tricks that he or she knows in order to motivate those students that lack the discipline to learn how to learn through a self-paced system. (p.28)"

One of the main advantages of using the modular system to teach technology is that students must learn how to work cooperatively with another student in order to complete each module. As mentioned earlier, some students have a difficult time learning how to work on their own. As a result, these students find it hard to: stay on task and focused on learning subject content, complete all of the required work, score well on tests and at times become behavior problems because of their inability to

manage their time effectively. In reviewing the literature about modular technology the researcher looked for information that would help to develop a solution strategy. The problems that occur in technology labs also occur in all classroom environments. It became apparent that a solution strategy may be found in the areas of classroom management and classroom discipline.

Many teachers are tired. Tired of trying to get their students attention for the first five minutes of class. Tired of listening to repetitive questions about material already covered in class a couple of minutes ago. Tired of stopping class to discipline a student for pushing or hitting another student. Tired of repeating directions each day that students should have known weeks earlier. Classroom management and discipline can make or break a teacher, new or old. In his book, Discipline in the Classroom, Savage (1991) makes the observation that a teacher who can establish a classroom environment based on mutual respect and concern, where individuals feel safe from physical and emotional threat, where rules and regulations are logical and are fairly and consistently enforced, and where individual needs are met, will discover that a school can become an attractive place where learners want to be. These teachers find that classroom management and discipline is not an onerous task but, rather, one that contributes to the deep rewards and satisfactions that can be a part of teaching.

Not every teacher has the perfect classroom, and no matter how hard

teachers try, problems will happen. It's how well the teacher responds to these problems, that will determine if the teacher will be successful. A successful teacher will have several responses to different problems that may occur during class. If the response to a problem leads a student to learn self-control and self-esteem rather than to anger and hostility the teacher has helped that student to improve their learning environment and gained more control of your classroom (Savage, 1991).

Savage (1991) divides classroom management into the following six subtopics; leadership, motivation, physical environment, time management, group dynamics and lesson management. Teachers that can problem solve in these areas will have a classroom environment that will lend itself to student learning. Of the different subtopics that Savage identifies, time management for teachers and students seems to have the biggest effect on classroom management and discipline. Many researchers in classroom management and discipline agree that the teachers effective use of time during classes helps to keep students on task and decreases student misbehaving during class. Evertson and Harris (1992) reviewed past research and field studies and found that effective classroom teachers used: time as effectively as possible, choose lesson plans that kept student engagement high, and implemented a classroom management system at the beginning of the school year. Time management is one of several essential components for creating and maintaining a classroom climate that promotes learning (Burke,1992). Teachers that develop class

procedures at the start of the school year, find that the procedures not only help them manage the classroom but also helps their students learn how to use their time more efficiently while in classes. Many experienced teachers state that they keep learners so busy that they don't have time to misbehave (Savage,1991). If this method is used you must be sure that the work is useful. Useful work consists of skills, that students see as valuable and that make sense to them (Glasser,1993). Glasser also stresses that teachers ask their students to produce quality work and that the process should be initiated slowly so that students will understand the meaning of completing quality work (Glasser, 1993).

Jones and his associates have conducted many observations in hundreds of elementary and high schools across the country. His main interest lays with developing and identifying effective methods of classroom management. One of the conclusions Jones made as a result of his observation was what he referred to as "massive time wasting". This is when students talked when they shouldn't, goofed off, and moved around the room without permission (Jones,1987a). He also found the critical time when this student behavior occurs. Students do well on their lessons until the students are told to work on their own. At this point during the lesson is when students hands go up, talking begins, some lose focus on work, and some leave their seats (Jones,1987). The effective classroom manager will have to remember to use the following techniques from a report by Rardin (1978) to help prevent discipline problems and students

wasting time teachers should: catch misbehavior early and deal with it immediately, use body language instead of words, show that you mean business through your posture, eye contact, facial expressions, and gestures, use physical proximity in dealing with misbehaving or deviant students, use incentives to motivate work and good behavior, use 10-second interactions with students when providing help, do not use threats, and establish classroom rules and procedures.

Project Objectives and Processes

As a result of increased instructional emphasis on study skills, during the period of October 1997 to January 1998, the eighth grade students from the targeted Applied Technology class will increase their post-test scores as measured by post-tests.

As a result of increased instructional emphasis on study skills, during the period of October 1997 to January 1998, the eighth grade students from the targeted Applied Technology class will increase their completion of worksheets as measured by worksheet grade records.

As a result of increased instructional emphasis on time management skills, during the period of October 1997 to January 1998, the eighth grade students from the targeted Applied Technology class will increase their ability to manage classroom time as measured by teacher observation sheets.

In order to accomplish the terminal objectives, the following processes are necessary:

1. Create a survey that will be used to determine if other technology teachers are experiencing student behaviors and study skill problems in their classes.
2. Lesson plans will need to be created that will emphasize study skills and productive time management skills.
3. Materials that will record lesson ideas and concepts will be created (lesson logs).
4. Materials that will record student behaviors will be developed (behavior checklist).

Project Action Plan

Week one of the research project will be spent developing and mailing out surveys to other technology teachers. The surveys will help to determine if other teachers are experiencing similar low post-test scores and behavior problems in their Technology Labs.

Week two will focus on the collection and the recording of the survey results. Designing and developing of classroom intervention tools (learning logs, and behavior observation forms) will also be completed.

During week three a short lesson plan that introduces the intervention tool will be developed. Week three through week six is when student data prior to intervention will be gathered. The items that will be gathered will be; post-test scores, off task, and out of seat student behavior observations.

Week six through week seven is when the classroom intervention will be implemented. The lesson plan to introduce the new interventions will

be taught on day one of week six. Students will continue to work at their assigned workstations as they have before the start of the research project. No physical changes to the classroom will be needed.

Methods of Assessment

In order to assess the effects of the intervention, student post-test scores from the modules they completed before intervention will be compared to the post-test scores of modules they completed after the intervention. Behavior observation sheets that recorded out-of-seat and off-task incidents for each student before intervention will be compared to those observations taken after the intervention. Data gathered as a result of the intervention will be used to determine whether there was an increase in students post-test grades and a decrease in the occurrences of students being off-task and out of their seats.

CHAPTER 4

PROJECT RESULTS

Historical Description of Intervention

The terminal objective of the intervention addressed the problem of low student test scores and inappropriate classroom behaviors. Indications were that inadequate curriculum, weak student study skills, unclear classroom expectations, and inadequate student social skills may have contributed to the problem.

Therefore the terminal objective stated:

> As a result of increased instructional emphasis on study skills during the period of October 1997 to January 1998, the eighth grade students from the targeted Applied Technology class will increase their post-test scores as measured by post-tests.
>
> As a result of increased instructional emphasis on study skills during the period of October 1997 to January 1998, the eighth grade students from the targeted Applied Technology class will increase their completion of worksheets as measured by worksheet grade records.
>
> As a result of increased instructional emphasis on time management skills, during the period of October 1997 to January 1998, the eighth grade student from the targeted Applied Technology class will increase their ability to manage classroom time as measured by teacher observation sheets.

Interventions

The implementation of lesson logs and classroom behavior checklists were chosen as the tools that would effect the desired changes.

The research project began with a survey being sent to Technology teachers in several states. The purpose of the survey was to determine if other teachers were experiencing problems with students in their Technology classes similar to those that were occurring in the subject school's classes (Appendix D). Results of the surveys confirmed that other Applied Technology classes were experiencing poor student achievement on post-tests, incomplete worksheets, and inappropriate classroom behaviors. The researcher interviewed other technology teachers in his school district to see whether they had observed these problems in their classes. The results of the survey confirmed the widespread nature of the problem.

The intervention tools, behavior check list and lesson log (Appendix C and E) were developed during week two. Several different drafts of each tool were designed and evaluated by several other teachers before the final tools were drafted. The researcher believes that having other teachers as evaluators helped to develop more effective tools.

Observations of students behaviors and tracking of test scores occurred during the next three weeks. This results were collected and used as baseline data for comparison with post-intervention data. The observation step occurred without the targeted class knowing that they were being observed by the researcher. A lesson plan was developed to introduce the correct use of the lesson logs to the targeted class.

The intervention began during the next two weeks with the introduction of the intervention tools to the class. A sample form of the lesson log was handed out to the targeted class and student expectations were explained. Proper use of the lesson logs were explained by the teacher/researcher along with the explanation of how the behavior checklist would be used by the teacher/researcher. It is important to note that, when using a behavior observation chart, the teacher/researcher must continually move around the technology lab so the students are aware of the observation process. The researcher found that becoming involved with lengthy student questions during class, diminished the observation process. As the interventions progressed, the only unexpected problem occurred when students claimed to be unable to list seven concepts or ideas that they learned from each lesson. This problem eased as the students became more familiar with the lesson logs and became more aware of what they were learning during each lesson. The students improved their lesson logs each day as the intervention continued. An additional benefit of the intervention was the increase of teamwork between students as each took turns completing the lesson logs.

Presentation and Analysis of Project Results

In order to assess the effect of lesson logs (Appendix E) on the test scores of the targeted eighth grade students in the Applied Technology Lab, the test scores before the intervention were compared to the test scores after the intervention. The intervention data show that 14 of 26

students increased their test scores by an average of 11.9%. This represents an increase in test scores by 53% of students in the targeted eighth grade Applied Technology class (Table 4).

Table 4

Intervention Post-test Scores/Percentage Increases by Student Number

Student Number	% of Increase	Student Number	% of Increase
2	10%	17	10%
3	14%	19	23%
5	02%	20	04%
8	14%	21	30%
11	07%	22	13%
13	10%	25	10%
14	13%	26	07%

The use of lesson logs to increase student achievement on tests appears to have had a positive effect on the test scores of the targeted eighth grade Applied Technology class.

To assess the effect of classroom behavior checklists (Appendix C) on the inappropriate behaviors of the targeted eighth grade Applied Technology class, a behavior checklist was used to record the occurrences of off-task and out-of-seat behaviors without the students awareness of being observed. This data was then compared to the data gathered when the targeted class knew it was being observed. Before the intervention

started there were 48 recorded incidents of off-task behaviors that were caused by nine students and 25 recorded incidents of out-of-seat caused by nine students. The data shows that 35% of the 26 students in the targeted eighth grade Applied Technology class were causing the inappropriate behaviors prior to the intervention. The post intervention data recorded three students causing five off-task behaviors and no out-of-seat behaviors. The post intervention data shows that 12% of the 26 students were causing inappropriate behaviors (Table 5).

The use of behavior checklists appears to have had a positive effect on reducing inappropriate classroom behaviors. The intervention has resulted in an 89% drop in off-task behaviors and a 100% drop in out-of-seat behaviors (Table 5).

Table 5

Inappropriate Behaviors by Behaviors, Number of Occurrences, and Number of Students.

Behavior	Number of Occurrences			Number of Students		
	BI	AI	Change	BI	AI	Change
Off-task	48	05	-43	09	03	-6
Out of Seat	25	--	-25	09	--	-9

BI= Before intervention AI= After intervention

Conclusions and Recommendations

Based on the presentation and analysis of the project results, 53%

of the students of the targeted eighth grade Applied Technology class have increased their test scores by an average of 11.9 %. These results can be directly attributed to the students use of lesson logs as a means of learning more about the subjects they are studying. The use of lesson logs has helped to improve the students study skills and improved achievement in the Applied Technology class.

An 89% decrease of inappropriate classroom behaviors in the targeted eighth grade Applied Technology class resulted from the teacher/researcher's use of classroom behavior checklists during class. The key to the success of the behavior checklist was in making sure the students knew that the teacher/researcher was monitoring their classroom behaviors. It benefited students to know that their grades were negatively affected by their inappropriate behaviors during class. The same behavior checklist was used before the intervention. The only difference then was the students were not aware that they were being observed and there were no grade consequences related to inappropriate behaviors. After the teacher/researcher analyzed the results of the intervention, another possible reason for the decrease of inappropriate behavior appeared. The use of a lesson logs may have also contributed to the decrease of inappropriate behaviors. This may be due to the additional work that the students had to do in order to complete the daily lesson logs. This created less time for possible off-task behavior for the student.

The third objective, increasing completion of worksheets by the targeted eighth grade Applied Technology class, was abandoned by the teacher/researcher when the software and management system that was designed to grade and track completion of student worksheets failed to work correctly. The problem of increasing student worksheet completion, will be addressed at a later date after the computer programs and network system problems are corrected.

The objective of this research project was to increase student achievement and reduce inappropriate behaviors in the Applied Technology Lab. The interventions that were used helped to attain these objectives. The teacher/researcher recommends the use of lesson logs and behavior checklists as effective classroom management tools for any school that has an Applied Technology Lab. Due to this projects' positive results, the other four middle school technology teachers in the district have started using lesson logs and behavior checklists in their classes, also with positive results. The researcher recommends that if a behavior checklist is used, the teacher heavily weights the course grade towards the behavior checklist. Doing so lets the students know how important it is to behave appropriately in class.

The researcher recommends the use of lesson logs (Appendix E) in an Applied Technology class as an additional way to incorporate more writing, reading and critical problem solving. Students can transfer the use of lesson logs into other classes as a way to take effective notes and

as a study guide for tests. Students that have used lesson logs have said that they like how they are structured and like how easy they are to complete. If teachers plan to use the lesson logs in a cooperative group setting, they will need to decide if all group members should fill out the lesson logs or have just one set completed for the whole group. The teacher/researcher found that one set per group worked well because it encouraged the group members to work together in order to produce a set of effective lesson logs (small groups of 2-3 students). The teacher/researcher has continued the use of both interventions that were used in this study.

As a result of this research project the researcher has several additional recommendations that may help other teachers with Applied Technology Lab curricula in the future. The first recommendation is to be sure that there is some form of classroom behavior control in place before the students begin working in the lab. The researcher feels that if the behavior checklist were used at the start of the new Applied Technology program the transition to the new Applied Technology curriculum would have been less stressful for the teacher/researcher. As a result of using the behavior checklist, the students would have stayed on task and in their seats, thus allowing the researcher to deal with computer, software and hardware problems in a more efficient manner. The researcher also recommends the use of the lesson logs on the first day in the Applied Technology lab. This practice not only keeps the students on task but also

offers a place where the students can record any problems that they may encounter while working in the Applied Technology lab. This gives the teacher a written record of lab problems that will have to be corrected at a later time.

The researcher's final recommendation is not to try to do a research project in a new Applied Technology lab until the computers, software, building modifications, furniture, curriculum, and lab management plans are in place and operational. This will make it easier to follow an action plan with little interruption from lab-generated problems. The researcher found that by starting this project before the lab was running smoothly, he encountered numerous stressful and conflicting situations which were created from lab problems and coordination of the project. Live and learn.

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Appendix A
Available Technology Modules

Class: 9997
Rotation #1

Student	Module
1, 1	PRODUCTION
10, 10	COMPUTER-AIDED DESIGN FOR WINDOWS (1)
11, 11	COMPUTER GRAPHIC DESIGN - IBM (1)
12, 12	CNC MILL (1)
13, 13	CONTROLS & SENSORS (1)
14, 14	AERODYNAMICS (1)
15, 15	DESKTOP PUBLISHING - IBM (1)
16, 16	EXPLORATORY ELECTRONICS (1)
17, 17	ENGINEERING & STRESS ANALYSIS (1)
18, 18	FIBER OPTICS AND LASERS (1)
19, 19	FLIGHT SIMULATION (1)
2, 2	FLUID POWER (1)
20, 20	AIR TRACK (1)
21, 21	SATELLITE COMMUNICATIONS (1)
22, 22	VIDEO EDITING (1)
23, 23	VIDEO PRODUCTION (1)
24, 24	CO2 RACEWAY (1)
25, 25	CONCEPTUAL/APPLIED PHYSICS (1)
26, 26	SPACE & ROCKETRY (1)
27, 27	WEATHER SATELLITE (1)
28, 28	RADIO BROADCASTING (1)
29, 29	HEALTH (1)
3, 3	ALTERNATIVE ENERGY (1)
30, 30	PLASTICS (1)
4, 4	VIRTUAL REALITY (1)
5, 5	ANIMATION - IBM (1)

Class: 9997
Rotation #1

Student	Module
6, 6	ARTIFICIAL INTELLIGENCE (1)
7, 7	ELECTRONIC MUSIC - IBM (1)
8, 8	AUTOMATION AND ROBOTICS (1)
9, 9	BIOTECHNOLOGY (1)

Appendix B
Sample Module Schedule

Module Schedule and Grade Sheet
Class: 9297
Rotation #4

Student	1	2	3	4	5	6	7	Module	P/T	L/L
TAYLOR								AUTOMATION AND ROBOTICS (1)		
SARA								WEATHER SATELLITE (1)		
MEGAN								AERODYNAMICS (1)		
NOAH								FLUID POWER (1)		
MELISSA								DESKTOP PUBLISHING - IBM (1)		
BRITTANY								FLIGHT SIMULATION (1)		
ANGELI								CO2 RACEWAY (1)		
COLLEEN								FLIGHT SIMULATION (1)		
LINDSAY								RADIO BROADCASTING (1)		
TIM								FLUID POWER (1)		
KEVIN								ENGINEERING & STRESS ANALYSIS (1)		
PAM								BIOTECHNOLOGY (1)		
JENNY								SPACE & ROCKETRY (1)		
ANNE								CO2 RACEWAY (1)		
AIYESHA								AUTOMATION AND ROBOTICS (1)		
TOM								DESKTOP PUBLISHING - IBM (1)		
CHARISSA								ELECTRONIC MUSIC - IBM (1)		
CHELSEA								ANIMATION - IBM (1)		
TERRY								ENGINEERING & STRESS ANALYSIS (1)		
MIKE								SPACE & ROCKETRY (1)		
CONOR								WEATHER SATELLITE (1)		
VEREN								ANIMATION - IBM (1)		
MITCHELL								BIOTECHNOLOGY (1)		
CHRIS								RADIO BROADCASTING (1)		
CODY								ELECTRONIC MUSIC - IBM (1)		
BETSY								AERODYNAMICS (1)		

A=absent W=not working S=out of seat P/T=Post test grade

L/L=learning log check

Appendix C
Sample of Module Behavior and Score Check List

Module Schedule and Grade Sheet
Class: 9297
Rotation #4

Student	1	2	3	4	5	6	7	Module	P/T	L/L
TAYLOR								AUTOMATION AND ROBOTICS (1)		
SARA								WEATHER SATELLITE (1)		
MEGAN								AERODYNAMICS (1)		
NOAH								FLUID POWER (1)		
MELISSA								DESKTOP PUBLISHING - IBM (1)		
BRITTANY								FLIGHT SIMULATION (1)		
ANGELI								CO2 RACEWAY (1)		
COLLEEN								FLIGHT SIMULATION (1)		
LINDSAY								RADIO BROADCASTING (1)		
TIM								FLUID POWER (1)		
KEVIN								ENGINEERING & STRESS ANALYSIS (1)		
PAM								BIOTECHNOLOGY (1)		
JENNY								SPACE & ROCKETRY (1)		
ANNE								CO2 RACEWAY (1)		
AIYESHA								AUTOMATION AND ROBOTICS (1)		
TOM								DESKTOP PUBLISHING - IBM (1)		
CHARISSA								ELECTRONIC MUSIC - IBM (1)		
CHELSEA								ANIMATION - IBM (1)		
TERRY								ENGINEERING & STRESS ANALYSIS (1)		
MIKE								SPACE & ROCKETRY (1)		
CONOR								WEATHER SATELLITE (1)		
VEREN								ANIMATION - IBM (1)		
MITCHELL								BIOTECHNOLOGY (1)		
CHRIS								RADIO BROADCASTING (1)		
CODY								ELECTRONIC MUSIC - IBM (1)		
BETSY								AERODYNAMICS (1)		

A=absent W=not working S=out of seat P/T=Post test grade

L/L=learning log check

Appendix D
Sample of Technology Teacher Survey

APPLIED TECHNOLOGY LAB SURVEY

Directions: Please complete the questions as best as you can. Upon completion of survey send to,
or use the S.A.S.E. enclosed. Please complete and return by September 6th, 1997. Thank you for your time and information.

1.) How many years have you taught Industrial Arts or Technology?_____

2.) What grade level do you teach?
____ High School (9-12) ____ Junior High (6-8)

3.) How long has your school been using technology labs? _____

4.) Do you teach Technology Ed.,____ full-time, ____ part-time?

4.) Are you certified to teach Industrial Arts/ Technology Ed.
____Yes ____ No, if no what are you certified to teach?_____

5.) How many work stations does your lab utilize? _____

6.) Which of the following student behaviors/outcomes, have you observed during your class periods? (use a scale of 1-4 to rank those that occur,1-never, 2-seldom, 3-occasionaly, 4-always)

__ incomplete worksheets
__ low post-test scores
__ students out of seats during class
__ incomplete experiments/projects
__ boredom
__ inappropriate classroom behavior
__ productive use of unstructured time

7.) Do you use any supplemental classroom control devices/forms to manage your class/lab? ___ yes ___ no, if yes, which devices/forms do you use?_____

8.) If the workstation lesson plans designed for a specific time frame do not fill that time frame you, (check those that apply);

__ write more lessons to fill the time.
__ have students work on other subjects or homework.
__ have students talk to other students that are also caught up with their lessons.
__ have students explore other workstations.
__ combine two short workstations so they fill time frame.
__ assign students supplemental work or projects.
__ have students move to another curriculum level.
__ rely on the students to use free-time productively.
__ other,_____

_____

9.) Generally speaking your students use their time in class/lab;

a. effectively, staying on task and engaged in lessons.
__strongly agree __ agree __ disagree __ strongly disagree

b. some what effectively, working in spurts and doing just enough to complete all required assignments.
__strongly agree __agree __ disagree __ strongly disagree

c. ineffectively, working only when pushed by teacher and occasionally completing required assignments.
__strongly agree __agree __ disagree __ strongly disagree

10.) Generally speaking, your students have enjoyed their Technology lab experience.(check one)

__ strongly agree
__ agree
__ disagree
__ strongly disagree
__ undecided/not sure

Thanks again.

Appendix E
Sample of Lesson Log

TECHNOLOGY LESSON LOG

Names:_____

_____

Period:_____

Module subject name:_____
Lesson number:_____
Lesson main subject:_____

List and describe at least seven concepts or important ideas contained in this lesson.

1.

2.

3.

4.

5.

6.

7.

Write a short summary (3-5 sentences) of this lesson. Use the back of this paper if needed.

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