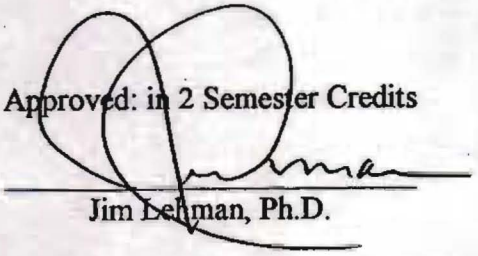
Research of the Effectiveness of the River Ridge Technology Education Program

by

David Goodman

A Grant Proposal Project Report
Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
in

Education



Approved: in 2 Semester Credits

Jim Lehman, Ph.D.

The Graduate School

University of Wisconsin-Stout

December, 2007

The Graduate School
University of Wisconsin-Stout
Menomonie, WI

Author: **Goodman, David J.**

Title: ***Research on the Effectiveness of the River Ridge Technology Education Program***

Graduate Degree/ Major: MS Education

Research Adviser: **Jim Lehman, Ph.D.**

Month/Year: **December/2007**

Number of Pages: **46**

Style Manual Used: **American Psychological Association, 5th edition**

ABSTRACT

The purpose behind teaching a technology education course is to be able to give students skills that they will be able to use in their everyday lives. However, there was doubt within the River Ridge School district as to whether or not these skills were being successfully taught and whether or not the program was a valid necessity to continue to fund. In addition, the technology education program at River Ridge in the past has seen declining numbers and the curriculum itself lacked structure and consistency. The purpose of this study was to examine the River Ridge School District's program goals to see if the goals and objectives have been or will be achieved. A survey was developed that addressed each of the technology education courses that are offered within the district. The survey was given to past, as well as current students. Parents and employees were also given the survey, which resulted in an overall survey response rate of 80.

The research resulted in the following findings: (a) mechanical drafting and

woodworking are the two areas in the curriculum that need the most improvement, (b) in order to increase interest and involvement curriculum planning should focus more on encouraging female enrollment, (c) activities should focus more on linking to female interest and experiences as well as male, (d) group work as well as competitive activities should be included, (e) instruction in all of the courses should be more student-centered and learning should be interactive and meaningful, (f) students enjoy and are able to retain more information when they are taught in such a manner that includes them and is relatable to their lives, (g) there should also be room for creativity and students should feel safe to explore more than one way to complete an activity, and (h) technology should be used in a way that encourages interactive and collaborative problem solving. It is a tool that should be utilized to its fullest ability and will continue to encourage a more productive classroom environment.

The Graduate School

University of Wisconsin Stout

Menomonie, WI

Acknowledgments

To my wife and children for their support, patience and understanding. I couldn't have finished this without them.

woodworking are the two areas in the curriculum that need the most improvement, (b) in order to increase interest and involvement curriculum planning should focus more on encouraging female enrollment, (c) activities should focus more on linking to female interest and experiences as well as male, (d) group work as well as competitive activities should be included, (e) instruction in all of the courses should be more student-centered and learning should be interactive and meaningful, (f) students enjoy and are able to retain more information when they are taught in such a manner that includes them and is relatable to their lives, (g) there should also be room for creativity and students should feel safe to explore more than one way to complete an activity, and (h) technology should be used in a way that encourages interactive and collaborative problem solving. It is a tool that should be utilized to its fullest ability and will continue to encourage a more productive classroom environment.

The Graduate School

University of Wisconsin Stout

Menomonie, WI

Acknowledgments

To my wife and children for their support, patience and understanding. I couldn't have finished this without them.

TABLE OF CONTENTS

Chapter I: Introduction

Background of the Problem

The mission statement of the technology education program at the River Ridge School District in Patch Grove, Wisconsin reads as follows: "The opportunities offered by the River Ridge Technology Education program will provide students with the knowledge, competencies, and skills necessary to succeed in a technological society. The curriculum will provide opportunities for all students to safety explore, and have experiences at the introductory level, as well as provide for the development of occupational skills at the advanced level."

The Technology Education program at the River Ridge School District involves teaching eight different courses to high school students in addition to offering exploratory classes at the middle school level to seventh and eighth grade students. Through these courses students are taught: (a) the proper and safe use of woodworking equipment and hand and power tools, (b) the four core areas of technology (manufacturing, communication, transportation, and construction), (c) marketing and manufacturing processes, (d) steps in building a house, (e) different forms and processes of graphic communications, (f) general woodworking techniques, (g) how to draft a house, and (h) how to draft mechanical parts. The overall goal of the Technology Education program is to prepare students for entry into a technology related field whether it be employment straight out of high school or when continuing on with higher education.

River Ridge is located in a very rural, farming, low-income district. The school mission reads as follows: River Ridge School District will strive to provide a safe, challenging environment for each individual student by promoting excellent staff

development, encouraging meaningful parent involvement, and earning strong community support through honesty, integrity and open communication. The average class size is 50. Administrators are pushing for change within the school. Administrators are trying to reduce staff size whenever possible in order to save money, and they are trying to get staff to rewrite curriculum. Staff resistance is high as is student resistance because they have grown accustomed to doing and having things run a certain way for so many years. The budget is of high concern and many staff cuts and extra curricular cuts have been made in order to find and keep money in the district. Members of the community will get involved when they wish to make changes in the school and during school sponsored activities.

Statement of the Problem

The purpose of this study was to examine the program goals to see if the goals and objectives have been or will be achieved. The Technology Education program at River Ridge in the past has had declining numbers. Class size has dropped from 25 to around 15 over the last 10 years. It was also a class that students took because they did not have to work very hard in order to get an A for the quarter. The curriculum itself lacked structure and consistency. Now there is concern in the school and community about whether or not to keep the program in the school. There is also concern about how the classes should be organized. The results gathered from this study will help to restructure the Technology Education program to better meet student preferences, needs and interests.

Research Questions

The study sought to answer the following inter-related questions as they relate to community and student perceptions about the River Ridge Technology Education program:

1. Which aspects of the curriculum and instruction need improvement?
2. Are there ways to increase interest and involvement in the Technology Education program?
3. How can classroom instruction be improved upon?

Purpose of the Study

Thru this investigation of the River Ridge Technology Education program, there are many different people and organizations that stand to benefit from the results. The results gathered will hopefully lend insight into how to better improve the program so that these stakeholders and organization and further reap the benefits of the program.

First off, the students enrolled in the classes stand to benefit highly from a well thought out technology education program. Some students are taking the class because they are planning on gaining employment after graduation in a technology related field. Others simply want to have these skills to take with them after they graduate and into local employment so to be more hirable.

Next, school administrators have been working hard to shrink an ever-growing budget. They have to decide whether or not to keep funding the courses within the school (whether or not they are a necessity), whether or not the courses are being successful in teaching the skills that they are supposed to be teaching, whether or not the skills are functional. The performance of the students and effectiveness of the program will help aide in these decisions.

Also county organizations such as the Cooperative Educational Service Agency 3 (CESA 3) have a local interest in the technology education program. CESA will be interested in the results because they set standards for districts to follow. They also have previously looked at the program and will be interested in whether or not necessary changes have been made.

Other important people that will hold stake in the technology education program are the community members themselves because they fund the program. Taxpayers are interested in whether or not their money is being well invested and being put to good use. Their tax dollars are funding part of the program and the result will show if the program is preparing their children for the workforce or college

Local businesses also are a part of the technology education program. The business included were Ace Hardware, TruValue, Langmeier's Lumber, Bennett Hardwood Lumber yard, local mechanics, Clark farms, Do It Best, Design Homes, Plastics Company, 3M, Decal Depot, and Sports World. The skills taught in the classes are directly used in these businesses. The businesses are able to give insight about the functionality of the skills and where areas are lacking. Also the mission of the courses relates directly to the businesses (being safe and taking skills taught out into the real world). If proper usage of equipment in being taught in school then the businesses won't have to take the time or money to train employees or pay for injuries as a result of injuries sustained by improper usage.

Local organizations benefit from having a technology education program. The main organization that benefits from the tech classes is the state park. During classes,

various projects are completed for the state park such as benches, bird homes, and bat boxes. The park stands to lose this support if the program is cut.

Local Technical Colleges (Fennimore, WI) very much pay attention to the technology education program too. College prep classes are being offered and they can give information about how prepared the students are when they begin certain courses at the college. Also the mission of the Technology Education program relates closely to the colleges.

When considering whether or not the program could be evaluated, the program names and the leaning objectives were thought-out. The first program was Introduction to Technology. It is designed to familiarize students with the four areas of technology today. After completing this course, students will be able to name, and describe the four areas of technology and tell why they are important to our society today. The four areas of technology are construction, manufacturing, communications, and transportation.

The next class considered was Woodworking. At the completion of Woodworking students will be able to identify and properly use the following: hand and power tools, wood and its use, wood joinery, and product finishing. Students will be provided with and will be required to make projects selected and demonstrated by the instructor.

Thirdly, Advanced Woodworking was evaluated as well. When Advanced Woodworking is finished students will be able to demonstrate advanced jointing skills, and demonstrate an understanding of the learning principals required to design and construct cabinet doors and drawers. They will show this understanding by personally constructing and designing cabinet drawers that meet the set rubric. An emphasis on detail, accuracy of dimensions and overall appearance of the project are stressed.

Next was the class of Mechanical Drafting. Here students will demonstrate and understanding isometric drawings, orthographic drawings, and other forms of drafting and sketching by completing multiple drawings using Autodesk Inventor for each of these. Students will also learn how to correctly use drafting tools such as drafting boards, t-squares, measuring scales, and triangles as well.

Fifthly, Architectural Drafting was considered. In Architectural Drafting, students will be required to reproduce a floor plan layout using drafting tools including drafting boards, t-squares, measuring scales, and triangles. With the use of a computer and CADD software students will be required to design and develop their own floor plans, foundation plans, elevations and sections.

Sixth was the evaluation of Residential Construction. This course will provide students with the practical use of tools and building techniques of the residential carpenter. Students will be able to demonstrate an understanding of tools and building techniques, footings and foundations, floor framing, wall construction, ceilings and roofs by constructing a small building, such as a shed, and build a scaled down version of a home.

Next, Manufacturing was looked at as well. When completing Manufacturing, students will have the responsibility to organize and develop their own company. At the completion of Manufacturing, students will demonstrate and understanding of every phase of the manufacturing enterprise including research and development, production, tooling, quality control, financial control, and the final marketing of the product. They will demonstrate this understanding by designing a product, forming a company, and manufacturing and selling a product.

Finally, Graphic Communications was considered too. When enrolled in this course, students will learn how to use several types of software to create digital movies, edit digital photographs, create web pages, and to correctly use a manual 35mm camera to photograph, develop, and print their own pictures. Students will also learn of several different printing processes, and utilize the screen-printing process to design and print shirts.

Methodology

This paper will unfold by first going through a review of literature. Different teaching styles and why they are effective in teaching will then be considered. The paper will look at how to increase female involvement in the technology education program. Then this paper will review the methodology of the study. First sample selection will be investigated, then the instrumentation used, and the data collection procedures. It will close by looking at the data analysis limitations. The paper will then move on to the results of the study and concludes with a discussion and implementation of the results.

Chapter II: Literature Review

Effective Teaching

Technology is not going to slow down any time soon. According to the U.S. Department of Education (2004), "...we are still at the beginnings of a technological revolution that is bringing dramatic changes to our society. This technological revolution will not automatically translate into a similar revolution in teaching and learning" (paragraph 17). So far we have learned a great deal about how to implement and use technology for learning and teaching. However, there is still "a great need to improve the next generation of technology applications for teaching and learning" (U.S. Department of Education, 2004, paragraph 21). Presently, there is a great need and desire for technology, but there is also different and best ways to teach about technology.

As mentioned above, there is a great emphasis on technology in society. Today people need to be educated to work in the many different areas of technology. However, there is also a need for people to work in the more traditional areas of technology like plumbing, electrical work, architecture, engineering, carpentry, mechanics, and teaching. According to Delisio (2004), in today's society there is a growing need for technically educated people, but fewer and fewer are graduating from technical and 4 year colleges. Without courses offered throughout middle and high school there would be less interest and involvement in technology (Delisio, 2002). With a need for technology education present, comes the need to educate current students according to best practices.

Best practices in technology education currently points to a student-centered learning environment. According to Percival and Ellington (1998) there is going to be big changes as to how technology education, and in education as a whole, courses will

be taught. Traditionally, classes have been taught in a teacher-centered approach. The teacher-centered approach relates to the transmission of knowledge (Brown, 2003). Teacher accomplishments are often directly related to what students are seen as accomplishing or achieving. In these types of classroom teachers are often very focused on meeting standards and sometimes student needs are sacrificed in order to ensure student exposure to the standards (Brown, 2003). For example, the teacher may only teach skills that are specifically mentioned on a district or state test, instead of teaching other skills that may benefit his/her students.

With the help of technology education, there has been, and still is, a shifting to a more student-centered approach towards education. When considering the student-centered approach, emphasis in on the individual learners' heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs (Brown, 2003). To clarify, the teacher sees a student as more than just a learner. The student-centered approach requires active participation from teachers and students alike. Both are learners as well as teachers. According to Consultants (2007), teachers put much of the responsibility for learning on the student and focus on creating communities of people united for the common purpose of learning.

The teacher investigates students in order to discover the best way that the student will be able to learn new knowledge. The teacher looks at the learner in order to discover background knowledge and interests about the learner as well (Foster, 2005). The teacher will then be able to tie any newly presented information to already stored information within the learner. In a student-centered classroom teachers are obligated to create an environment in which students and teachers share responsibility for learning

(Foster, 2005). Teachers are encouraged to construct knowledge from students' experiences. In order to allow students to gain the power of self-learning in the class, teachers cannot simply lecture and let students take a passive role (Aaronsohn, 1996). Teachers must design activities that let students take initiative and that let them discover meaningful information for their own lives (Brown, 2003). They must also get to know the kids on an individual basis so that they can better respond to the individual needs and interests of the students. In general, teachers need to focus on the student's needs, abilities, and interests -- they should consider how students learn instead of just the material that is necessary to teach (Aaronsohn, 1996). According to a study conducted by Canfield (2006), this sort of learning environment leads the way to more interactive and meaningful learning. Students are actively engaged in discussions, they are retaining more information and they are able to provide feedback on how they are learning (Canfield, 2006).

According to Weimer (2002), certain changes occur in a classroom when teaching becomes learner-centered. To Weimer, there are five major classroom changes: (a) the balance of power, (b) the function of content, (c) the role of the teacher, (d) the responsibility for learning, and (e) the purpose and processes of evaluation. When these changes are implemented the classroom changes over from a traditional teacher led classroom to a learner-centered classroom.

The shifting the balance of classroom refers to the power shifting from teacher to student. In research by Floden & McDiarmid (2007), the learning that occurs when instruction is student-centered, encourages learners to actively think about and try out new ideas in light of their prior knowledge, to personally transform the knowledge for

their own use, and to apply it in other situations. According to Floden & McDiarmid (2007) the "mere regurgitation of facts and figures, without a deep rooting in the reasoning behind such information, is not sufficient for in-depth understanding" (paragraph 2). Instead, students need to learn how to come up with their own questions, how to build their own ideas and interpretations, and how to clarify and elaborate upon the ideas of others. "Such skills empower students to acquire a level of understanding that provides them with the flexibility to respond to new situations and serves as the foundation for a lifetime of further learning. The responsibility for learning shifts from teacher to learner" (Floden & McDiarmid, 2007, paragraph 2).

According to Weimer (2002) the change of content means designing content as a means of building knowledge rather than a 'knowledge end' in itself. To clarify, the traditional teacher role changes from the teacher as a director and source of knowledge to a facilitator and contributor. Traditional evaluation moves from paper and pencil tests to assessment that promotes certain learning (Weimer, 2002). The content in a student-centered classroom focuses on activities (Floden & McDiarmid, 2007) that emphasize reasoning and the evaluation of evidence, thus allowing students the opportunity to develop the ability to formulate and solve problems. Teacher made lessons focus on activities that allow students to talk to one another, question and respond to the teacher, and investigate and think upon their own thinking processes (Floden & McDiarmid, 2007).

A strong technology education program should not only invoke a student-centered environment, but also allow for creativity (Lewis, 2005). In most technology classrooms it's okay to come up with more than one right answer, and more than one correct method

of arriving at a solution (Lavonen, 2001). Students are given the tools and then given the opportunity to explore the tools in depth and choose the tool that best suits them. Thus, their creative abilities are enhanced. In addition, it should be designed in such a manner that allows for problem solving and exploration as well (Sanders, 2001).

Technology education works especially well at invoking creativity in students because of its open-endedness according to Lewis (2005). According to Lavonen (2001) open-endedness means that in most technology education classrooms there is not just one right or wrong answer or way to complete a task. Instead of just giving the answer to a problem, the teacher will ask the students how or why questions so that the students can formulate answers and solve their own problems or come up with their own answers to questions.

Problem solving in technology education allows for opportunities for students to step outside of the conventional reasoning processes imposed by other areas of study (Lewis, 2005).

> "Technology education classes are set up in a way that allows learners to explore a variety of activities related to many areas of human interest. Learners can develop problem solving strategies and work habits that will be useful in almost any career and or occupation. Learners should develop a greater appreciation for the work of craft workers and the skill required of that work" (Technology Education, 2007, paragraph 6)

Problem solving techniques are heavily emphasized as best practices (Center for Teaching and Learning, 1998 & Kirkley, 2003), and according to a study conducted by

Sanders, (2001) many technology classrooms are set up in a way that is conducive to problem solving. In Sanders' study (2001), the

> "data indicated that more than half (56.9%) of the instruction delivered engaged students in problem-solving and a full third of the programs surveyed (32.7%) devote 80-100% of their instruction to problem-solving activities. On a related note, the field remains committed to hands-on instruction; only about one fourth (22.8%) of instruction was identified as lecture/demonstration (i.e., not hands-on activity)." (p. 47)

Technology education classes are designed to allow students adequate time and opportunities to look deeper into areas of study. Floden & McDiarmid (2007) agree that students should be given time to expand upon ideas and think dilemmas and conflicts through themselves. They should be given time to forge there own answers and explore other endless possibilities. The amount of time varies according to class needs.

Allowing students to conduct and construct their own learning, and weaving it into the curriculum creatively, lets learning become more meaningful to the student and in turn, allows the learner to remember the information, or store the information in the long term memory (Aaronsohn, 1996). Student-centered teaching has been proven effective in its ability to teach students the material they need to know in many different ways. McCombs and Whistler (1997) site numerous studies that followed students who were taught in the student-centered approach. McCombs and Whistler (1997) found that actual learning and performance had increased.

Moreover, students taught in a student-centered classroom retain more material for longer periods of time (Aaronsohn, 1996 & Silberman, 1996). In order to learn, the

brain cannot simply receive information; it must also process the information so that it can be stored and recalled (Silberman 1996). The active nature of the student-centered approach helps students actually work with information, and therefore learn it and store it. According to Brunner, (1997) not only is the way a teacher teaches important to how a student learns, but it also plays a key role in who will enroll in a course, male or female. Females and males prefer different learning situations. These different learning situations and preferences will be described in greater detail below.

Increasing Involvement

When teaching in a technology education class, it is also critical to consider a sound gender-balanced curriculum design. Gender-balanced means having an equal number of males and females enrolled in a course. Research has found that there are instructional methods, learning styles, and interests that can be characterized as distinctively female or male (Brunner, 1997). Additionally, curriculum materials need to connect in meaningful ways with students' prior experiences and the world in which they live (Zuga, 1999).

While this is important for all students, it is particularly important that technology education teachers attend to the experience base of female students because currently in many districts in the United States (Markert, 2003) female enrollment is significantly less than that of males. Female students often feel that content lacks relevance to their lives (Markert, 2003). This is why is important for technology education teachers to try to connect content to a students' life experiences.

Teachers need to make the connection between school and work clearer (Silverman and Pritchard, 1996). In order to do this, instructors should obtain materials

and videos that are designed to show students how the skills they are learning are used in the workplace. The videos and learning materials should also show women in the technical field have contributing to society (Silverman and Pritchard, 1996). Instead of using traditional tools, materials, or examples to demonstrate technological concepts, teachers should use examples with which both genders can identify. Silverman and Pritchard (1996) suggest using pictures that show women working in technological jobs and products made by female students could be displayed in the classroom and through out the school hallways if possible (Horrocks and Brakoniecki, 2005). There should be more choices about what kind of projects to pick and whether or not design and decoration can be given as much credit on a project along with the technical aspects (Silverman and Pritchard, 1996). Moreover, according to Silverman and Pritchard (1996) teachers need to make sure that the guidelines and rules on acceptable behavior for boys and girls are clear so that girls can play an equal role in the classroom and the boys don't overpower the classroom. Class expectations should be gender neutral (Horrocks and Brakoniecki, 2005).

Females prefer collaboration and teamwork over competition so group work becomes very important in a successful curriculum (Horrocks and Brakoniecki, 2005). According to Weber and Custer (2005) contemporary trends in technology education are shifting toward including even more small group work as part of the technology education curriculum. Contemporary practice also employs the substantial use of student competitions. For example, the Technology Student Association (TSA) and the Technology Education Collegiate Association (TECA) feature collaborative activities, with much emphasis placed on the competitive aspects of the events (Custer & Weber,

2005). For example, students might be asked to create their own Carbon dioxide (CO2) dragsters. After which they are encouraged to attended local and state competitions. At these such competitions students are evaluated on things like best design, their construction or assembly of the car, their pencil or CADD technical drawing of the car, and whether or not they meet certain specifications such as axles diameter, dragster body length, screw eyes, and wheel base (SkillsUSA, 2006).

Current Classroom Instructional Trends

Evident in many sources is the importance of computers and computer based activities in current technology education curriculums as a way to teach. According to Haynie, DeLuca, and Matthews (2005) computers are used much more frequently and in more ways by both teachers and students now than they were in 1989. Computers are most popularly integrated into the curriculum by way of problem solving activities. Students might be asked to design a webpage, edit graphics, or create computer aided drafting and design (CADD) drawings. Hands-on, problem-solving activities will provide a good basis for curricular integration with other disciplines in the schools. Over the years Haynie, DeLuca, and Matthews also discovered that some changes in teaching methods have evolved (2005).

Demonstrations, lecture demonstrations, individualized instruction, and lectures over 30 minutes have decreased significantly (Haynie, Deluca, and Matthews, 2005). Even though computer use has been integrated into teaching methodology over the years, traditional techniques familiar to the industrial arts labs of the 1950's and 60's are still evident at a high rate, including demonstrations, individual projects, and lab experiments (Haynie, DeLuca, and Matthews, 2005). Demonstrations, individual projects, and lab

experiments are still being used today, not only because they are traditional, but because they adapt to allow for a student-centered way of learning.

During Sander's research (2001) it was found that it appears there is no one dominant instructional approach currently in use when teaching technology education. Respondents were asked to identify the

> "...teaching approach most used in their programs. He found a "fairly even split among the modular approach (students rotating centers) (35.4%; divided between "vendor-created" and "teacher-created"), the project approach (27.9%; "projects from plans provided by instructors"), and a design and technology approach (36.7%; "students design and build solutions to problems posed by instructors"). Looking at it another way, nearly three-fourths of instruction does *not* utilize the project (from plans) method that was popular during the industrial arts era." (p. 49).

Another interesting and viable teaching technique that has begun to grow in popularity, but is very underutilized, is teaching by student led instruction. Basically, students manage the class with guidance from the teacher. This approach has been shown to be very effective in other disciplines with co-curricula vocational student, such as the Future Farmers of America and the Vocational and Industrial Clubs of America (DeLuca, Haynie & Matthews, 2005). This co-curricular approach allows not only for the technology teacher to ease his or her own lab management burdens, but it also allows the assisting students to once again lead their own learning as well as gain leadership and social skills. It helps the student form a deeper understanding of the concepts as well. This type of teaching works very well in

Over the years the activities required of students enrolled in technology education courses has evolved as the teaching methods have changed. Problem solving activities ranked highest. The use of individual projects remained unchanged but there was a significant increase in the use of group projects. There was a significant decrease in the use of student designed/selected projects and a significant increase in teacher designed/assigned projects (DeLuca, Haynie & Matthews, 2005). The mass production or line production activities that were a huge visible hallmark of the Industrial Arts Curriculum Project and other curriculum projects of the 1970's and 80's showed a significant decrease, along with the laboratories designated to support technology systems such as manufacturing and transportation (DeLuca, Haynie & Matthews, 2005).

Another noteworthy but negative finding is that library and Internet research papers and written assignments of over half a page in length ranked in the bottom third of the activities and techniques considered (DeLuca, Haynie & Matthews, 2005). With a movement in the profession toward increased curricular integration, and leaders in other disciplines calling for writing across the curriculum, it seems out of step for Technology Education classes not to require more and longer written and research assignments.

In summary, technology education courses offer a unique opportunity for students to think outside of the normal constraints of a classroom. The classroom should provide for student-centered creative learning. Students should be given a chance to not only be the learner, but also the teacher as well. Teaching strategies should not only include competitive activities, but group work as well. Other activities that should be included in the curriculum should include the use of written assignments that are somehow directly

relevant to what the students are learning in the classroom and more computer based problem solving activities as well.

Chapter III: Methodology

Introduction

The evaluation model that was used to assess the Technology Education program at River Ridge was an objective based evaluation. The purpose of this study was to examine the program goals to see if the goals and objectives have been or will be achieved. The results gathered from this study will help restructure the Technology Education program to better meet student preferences, needs and interests. In the end, the study will offer recommendations of how to restructure the program.

Sample Selection

A random sample of a maximum of three students from each technology education course (there are six courses each semester) offered over the past three years were the subjects for this research project. Three were chosen from each course, for each semester. Thus, there were three students from six classes (18 total) for each semester. So per year there were 36 students and for three years there were roughly a total of 108 students given the survey. Also, 58 (40 included) surveys were given to the parents of these past and current students. In addition, certain stockholders from the community were chosen to partake in the evaluation. Administrators and teachers were offered the evaluation as well.

Instrumentation

In order to gather data on the proposed problem, a survey was constructed (Appendix B). The first part of the survey consisted of demographic questions (location, occupation, gender, age and previous class grade if applicable.) Participants were asked to either write in or circle this information. The second half of the survey was constructed

using a Likert based scale model (Hasson, 2005). Participants were asked 16 questions based on their perceptions of the courses that they had taken and then given five choices of: Strongly Agree, Agree, Disagree, and Strongly Disagree and n/a to answer the question. Following the Likert based scale portion of the survey was an area where the participant could add additional pertaining information at will.

Grades and enrollment rates within the past three years were also examined. Personal observations and interviews were conducted so to gather data and discover prominent change to make to the program. Also the CESA 3 recommendations and data that they have available were considered.

Data Collection Procedures

Informed consent forms (Appendix A) were distributed to the students (and parents when dealing with minors) and all participants. They were collected prior to administration of the survey (Weber, 2005). Surveys were then handed out to students during class time when applicable. They were also sent out via the mail. A self-addressed, stamped envelope was sent along with each mailed survey in order to aide in the response rate. Any unreturned surveys were mailed out again to the participant after roughly 30 days.

Data Analysis

The questioner was developed in order to gain a better understanding of whether or not the stated program goals of each course were actually being fulfilled. The results of the survey are focused on most heavily when making recommendations. The results of the survey were analyzed by counting up the number of responses to each question.

Those numbers were then converted in to charts using Excel (see tables 1-11) to give a visual representation of the questions that were asked.

Limitations

Some of the possible ethical issues that were considered before and during the evaluation included the following:

1. The results of the study can only be applied to the River Ridge School District because of the specificity of the study.
2. Inaccurate conclusions may result in people making changes to the program unnecessarily. That would result in wasted time and money.
3. Support for the program may decrease if results yield a negative result; students may not be able to complete projects that they have been able to in the past.
4. If results are inaccurately positive, then students participating in the program may not be getting the best possible education out of the courses.
5. If, as a result of the evaluation, the program was to be decreased because of negative results, some community members and school clubs may suffer and not receive some of the products once produced by the Technology Education department such as shirts, photos, bat houses, bird houses, park benches and etc.
6. If results of the evaluation yielded a falsely negative result, the school may end up getting a negative reputation.

Chapter IV: Results

Introduction

The purpose of this study was to examine the program goals to see if the goals and objectives have been or will be achieved. The Technology Education program at River Ridge in the past has had declining numbers. The curriculum itself lacked structure and consistency. There was a concern in the school and community about whether or not to keep the program in the school and about how it should be organized. The results gathered from this study will help to restructure the Technology Education program to better meet student preferences, needs and interests.

The study sought the answer the following questions as they relate to community and student perceptions about the River Ridge Technology Education program:

1. Which aspects of the curriculum and instruction need improvement?
2. Are there ways to increase interest and involvement in the Technology Education program?
3. How can classroom instruction be improved upon?

The collected survey data were analyzed by looking at and comparing the survey results. Overall the survey response to this study was relatively small. Of the 120 surveys that were given and mailed out, 80 could be included in this study.

Item Analysis

Overall most parents and employees (95%) and most students (88%) either strongly agreed or agreed that the current technology education program was meeting its current class goals.

Stronger areas indicated by the student survey fell in graphic communications, woodworking, and residential construction. There were many responses where students wrote in enthusiastic responses and shared information such as, "I can apply this to real life" and "I really learned a lot". Graphic communications was a very popular course were out of the 40 student responses 37 said that they either strongly agreed or agreed that they could properly use a 35mm camera, understood the screen printing process, could independently use Dreamweaver to create a web page and could develop their own pictures.

Areas of weakness were mechanical drafting and advanced woodworking. mechanical drafting had a total of 31 student responses. Of the 31, eight choose either disagree or strongly disagree about being able to identify and properly use common hand and power tools and identifying wood type and its use. Advanced woodworking had a response total of 22. Three students said they either disagreed or strongly disagreed about being able to construct cabinet doors and drawers without assistance.

When considering the Parent/Employee survey the results showed that overall most felt satisfied with the program (refer to table Parent & Employee Results in Appendix C). Twenty-one of the 40 people surveyed said that they agreed that were satisfied with the Technology Education program at River Ridge, were satisfied with the classes offered, they felt that the technology education courses had been helpful to my child/employee(s) and that their child still uses some of the skills acquired in a course that he/she took, and that it is important for students to have exposure to technology education classes so that students can be successful after high school. Overall only two said that they disagreed with the above questions.

The results from the survey in regards to the introduction to technology course offered showed that of the students that had taken the course most students choose agree to the questions listed (survey appendix B). There were a total of 13 students who responded to this question. Seven students agreed that they were able to identify the four areas of technology today. Strongly agree followed with only 1 student choosing disagree. Refer to table Introduction to Technology in Appendix C.

Chapter V: Discussion

Introduction

The technology education program at River Ridge High School is facing questions about its validity and usefulness. A survey was conducted in order to discover ways to improve upon the program and increase involvement.

Since students seem to learn best in environments that encourage student direct involvement, technology education courses should be designed in such a manner that encourages this type of involvement. Plus, collaborative learning as well as competitive learning strategies should be implemented.

Statement of the Problem

The purpose of this study was to examine the program goals to see if the goals and objectives have been or will be achieved. The technology education program at River Ridge in the past has had declining numbers. The curriculum itself lacked structure and consistency. There was concern in the school and community about whether or not to keep the program in the school and about how it should be organized. The results gathered from this study will help to restructure the technology education program to better meet student preferences, needs and interests.

Findings

In regards to instructional improvement it was found that the courses that had the highest student approval (graphic communications, residential construction, and architectural design) were also those where the instructor most specifically used a student-centered approach to teaching. Cooperative groups were going on, student-led

lessons were implemented, and the lessons also allowed for much creativity. Interestingly this correlates with the information presented in the literature review.

In order to increase interest and involvement in the technology education program it was found that graphic communication is also the course that usually has the highest amount of enrolled females. This can be attributed at least somewhat to the collaborative groups and the course ability to relate to everyday student life.

In order to improve classroom instruction results showed that those courses with the highest disagreeing rate (mechanical drafting and woodworking) are those courses where the instructor does the most lecturing and the least amount of group work. Again this is in direct correlation to previous research done on teaching methodology.

Conclusions

Based on the findings the following conclusions were drawn. In regards to which aspects of the curriculum and instruction need improvement, mechanical drafting and woodworking are the two areas in the curriculum that need the most improvement.

In order to discover ways to increase interest and involvement in the technology education program planning should focus more on encouraging female enrollment. In addition, activities should focus more on linking to female interest and experiences as well as male. Group work as well as competitive activities should be included too.

When looking at how classroom instruction be improved upon instruction in all of the courses should be more student-centered. Learning should be interactive and meaningful as well. Moreover, students enjoy and are able to retain more information when they are taught in such a manner that includes them and is relatable to their lives. There should also be room for creativity and students should feel safe to explore more

than one way to complete an activity. Technology should be used in a way that encourages interactive and collaborative problem solving. It is a tool that should be utilized to its fullest ability and will continue to encourage a more productive classroom environment.

Recommendations

Based on the findings and the conclusions the following recommendations have been made. First, the activities conducted in all of the courses should be re-evaluated so that they are important and relevant to females as well as males. Moreover, the projects completed should either be gender neutral, or gender specific options should be allowed. They should be re-thought so that they relate more to students' lives and experiences. Second, the teaching strategies in the mechanical drafting and woodworking courses should be revised so that they include a more student-centered approach. Third, the teaching strategies in the mechanical drafting and woodworking courses should have more collaborative group work in addition to competitive activities. Fourth, when looking at all of the courses as a whole, more collaborative group work should be encouraged. Fifth, further research could be done in years to come to compare how student responses change as a result of the changed teaching practices implemented.

References

Aaronsohn, E. (1996). *Going against the grain: Supporting the student-centered teacher*. Thousand Oaks: Corwin Press.

Brown, K. (2003). From teacher-centered to learner-centered curriculum: Improving learning in diverse classrooms. *Education,* 1(6). Retrieved September 15, 2007, from http://findarticles.com/p/articles/mi_qa3673/is_200310/ai_n9332034/pg_5

Brunner, C. (1997). Opening technology to girls. *Electronic Learning*, 16(4), 55. Retrieved September 14, 2007 from www.maryflanagan.com/josie/articles/archive/short.htm

Canfield, P. (2006). An interactive, student-centered approach to teaching large-group sessions in veterinary clinical pathology. *Journal of Veterinary Medical Education*, 29(2), 105-110. Retrieved November 3, 2007, from http://www.jvmeonline.org/cgi/content/abstract/29/2/105

Consultants, T. A. (2007). *Teaching philosophies: Teacher and student centered.* Retrieved November 3, 2007, from http://72.14.205.104/search?q=cache:oL1VnO-9hsQJ:trc.ucdavis.edu/TRC/ta/tatips/philosophies1.pdf+student+centered+approach+to+teaching&hl=en&ct=clnk&cd=2&gl=us

Custer, R. & Valesey, B. (2001). An assessment model for design approach to technical problem solving. *Journal of Technology*, 12(2), 5-20. Retrieved November 4, 2007, from http://scholar.lib.vt.edu:8765/query.html?col=ejournal&qt=more+than+one+corre

ct+answer&charset=iso-8859-1&qp=url%3Ahttp%3A%2F%2Fscholar.lib.vt.edu%2Fejournals%2FJTE%2C

Delisio, E. (2002). Highschools introduce engineering. *Education World.* Retrieved September 15, 2007, from http://www.education-world.com/a_curr/curr396.shtml

DeLuca, V., Haynie, W. & Matthews, B. (2005). Perceptions and practices of technology student association advisors on implementation strategies and teaching methods. *Journal of Technology Education, 16(2),25-36.* Retrieved July 23, 2006, from http://scholar.lib.vt.edu/ejournals/JTE/v16n2/haynie.html

Floden, R., & McDiarmid, G. (2007). *How teachers learn to engage students in active learning*. Retrieved November 3, 2007, from http://72.14.205.104/search?q=cache:kNAiZal8PsYJ:ncrtl.msu.edu/http/teachers.pdf+students+as+active+learners&hl=en&ct=clnk&cd=10&gl=us

Hasson, D., & Arnez. (2005). Validation and findings comparing VAS vs. Likert Scales for measurements. *The International Journal of Health Education*, 8. Retrieved November 22, 2005, from www.iejhe.org

Haynie, W. (2003). Gender issues in technology education: A quasi-ethnographic interview approach. *Journal of Technology Education*, 15(1), 12-16. Retrieved December 9, 2005, from http://scholar.lib.vt.edu/ejournals/JTE/v15n1/haynie.html

Horrocks, K. & Brakoniecki, L. (2005*). Strategies for recruiting and supporting girls in technology education.* Retrieved November 7, 2007, from http://www.cwealf.org/resources/strategies_girlsteched.pdf

Kirkley, J. (2003). *Principles for teaching problem solving*. Indiana University: Plato Learning Inc.

Lavonen, J. (2001). Problem solving with an icon oriented programming tool: A case study in technology education. *Journal of Technology Education*, 12(2), 21-34. Retrieved November 4, 2007, from http://scholar.lib.vt.edu:8765/query.html?col=ejournal&qt=more+than+one+correct+answer&charset=iso-8859-1&qp=url%3Ahttp%3A%2F%2Fscholar.lib.vt.edu%2Fejournals%2FJTE%2C

Lewis, T. (2005). Creativity—A framework for the design/problem solving discourse in technology education. *Journal of Technology Education,* 17(1), 36-53. Retrieved September 25, 2006, from http://jte-fall2005v17n1-lewist- creativity—a framework for the design/Problem Solving Discourse in Technology Education

Markert, L. R. (2003). And the beat goes on: Diversity reconsidered. *Initiatives in technology education: Comparative perspectives*. Griffith University: Technical Foundation of America.

O'Connell, J., & Phye, G. (2005). Creating strategies for improved teaching and learning. *The Journal Online*. Retrieved November 29, 2005, from http://www.thejournal.com/magazine/vault/articleprintversion.cfm?aid=5392

Sanders, M. (2001). New paradigm or old wine? *Journal of Technology Education*, 12(2), 35-55. Retrieved November 3, 2007, from http://scholar.lib.vt.edu/ejournals/JTE/v12n2/sanders.html

Silberman, M. (1996). *Active learning*. Boston: Allyn & Bacon.

SkillsUSA. (2006). *Wisconsin skills USA championships technical standards CO2 dragster middle/high school*. Retrieved November 7, 2007, from http://www.skillsusa-wi.org/guideline_downloads/co2.doc

Technology Education. (2007). In *Wikipedia, the Free Encyclopedia*. Retrieved November 3, 2007, from http://en.wikipedia.org/wiki/Technology%5FEducation

U.S. Department of Education. (2004). *Executive Summary*. Retrieved October 31, 2007, from http://www.ed.gov/about/offices/list/os/technology/reports/e-learning.html

Weber, K., & Custer, R. (2005). Gender-based preferences toward technology education content, activities, and instructional methods. *Journal of Technology Education*, 16(2), 55-71. Retrieved December 9, 2005, from http://scholar.lib.vt.edu/ejounals/JTE/v16n2/weber.html

Weimer, M. (2002). *Learner-centered teaching: Five key changes to practice.* San Francisco: Jossey-Bass/Wiley.

Zuga, K. (1999). Addressing women's way of knowing to improve the technology education environment for all students. *Journal of Technology Education*, 10(2), 57-71.

Appendix A: Consent Form

Consent to Participate In UW-Stout Approved Research

Title: *Researching the River Ridge Technology Education Program*

Investigator:

David Goodman

608.994.2715 goodman@rrsd.k12.wi.us.

Description:

Research of the River Ridge Technology Education program is being conducted in order to better improve the program. The evaluator will examine the program goals to see if the goals and objectives have been or will be achieved of the technology education program at River Ridge. More specific reasons for conducting the research are as follows:

a. *To discover which aspects of the curriculum and instruction need improvement.*
b. *To account for the funding that is being offered to the program through the school and community.*
c. *To justify the need to keep the program in the school.*
d. *To discover ways to increase interest and involvement in the technology education program.*
e. *To discover ways to improve classroom instruction.*

A survey will be given to the participants in order to gather data. The survey questions relate directly to the central goals of the courses. The evaluator is using the results of the survey to base most of the findings because surveys are helpful and a best means for assessing instructor performance, determining what and how students are learning, gaining insight into student attitudes about course content and assignments, assessing changes in instructional practice. First demographic questions (location, occupation, sex, age etc.) will be presented and then it will ask questions related directly to the goals of the program.

A Likert rating scale in order to answer the questions, which will indicate whether the goals of the program have been met, or are closer to being met over the years and areas of weakness (a scale 1-4). Participants will answer: Strongly Agree, Agree, Disagree or Strongly Disagree to the questions presented. There will also be a choice of n/a if the question does not apply to the participant. There will also be space for other comments as well.

There will be enclosed a self addressed, stamped envelope to aide in the response rate and any unreturned surveys will be mailed out again to the participant after roughly 30 days.

Also, past grades of students will be looked at and name will be kept completely anonymous as well. As will interview information gathered from students, teachers, parents and administrators.

Risks and Benefits:

By completing the survey you will be helping to ensure that improvements be made to the Technology Education program at River Ridge. You will be helping the evaluator investigate and make changes to the program as necessary. However certain negative outcomes could arise as well. If the conclusions are inaccurate people would be making changes to the program unnecessarily. This would result in wasted time and money. Support for the program may decrease if results yield a negative result; students may not be able to complete projects that they have been able to in the past. If results are inaccurately positive, then students participating in the program will not be getting the best possible education out of the courses. If, as a result of the evaluation, the program was to be decreased because of negative results, some community members and school clubs may suffer and not receive some of the products once produced by the tech ed department such as shirts, photos, park benches and etc. If results of the evaluation yield a falsely negative result the school may end up getting a negative reputation as well.

Time Commitment and Payment:

Filing out the survey should only take you five minutes.

Confidentiality

All identifying information taken from the surveys will be kept confidential. Your name will not be included on any documents. I do not believe that you can be identified from any of the information gathered from the surveys. The informed consent will not be kept with any other documents completed with this project.

Right to Withdraw:

Your participation in this study is entirely voluntary. It is your choice not to participate and you may do so without any adverse consequences to you. However, you should know that should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous form after it has been turned into the investigator.

IRB Approval:

This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator: *David Goodman,*

563.873.2029, goodmanda@uwstout.edu

Advisor: *Robert Sedlak,* UW-Stout

sedlakr@uwstout.edu

IRB Administrator
Sue Foxwell, Director, Research Services
152 Vocational Rehabilitation Bldg.
715-232-2477
Menomonie, WI 54751
foxwells@uwstout.edu

Statement of Consent:

By signing this consent form you agree to participate in the project *entitled Researching the River Ridge Technology Education Program.*

_____

Signature..... Date

_____

Signature of parent or guardian:..... Date

(If minors are involved)

Appendix B: Surveys

Student Survey

Demographic Information

Please circle the option that pertains the most to you or write where space is provided.

Location (city, town, or village)	
Gender	M F
Occupation	
Age	14-17 years 18-20 years 21 years or older
If you were a student of a technology education course in the past 3 years, what was your letter grade	A range B range C range D or lower range

Program Survey Questions For Students

Please read the questions and circle the number that you most agree with. Only answer the questions that apply to a course that you have taken or are currently taken. Please write an answer where space is provided.

1=Strongly Agree	2=Agree	3=Disagree	4=Strongly Disagree	n/a=not applicable

INTRO TO TECHNOLOGY-The four areas of technology today, are construction, manufacturing, communications, and transportation.	1	2	3	4	n/a
WOODWORKING- I am able to identify and properly use the following: hand and power tools, wood and its use, wood joinery, and product finishing.	1	2	3	4	n/a
ADVANCED WOODWORKING- I am able to construct cabinet doors and drawers without assistance.	1	2	3	4	n/a
MECHANICAL DRAFTING-I am able to	1	2	3	4	n/a

confidently use AutoDesk Inventor to make part drawings and assemblies.					
MECHANICAL DRAFTING- I am able to confidently use the following drafting tools	1	2	3	4	n/a
ARCHITECTURAL DRAFTING- I understand the principles of basic residential design	1	2	3	4	n/a
ARCHITECTURAL DRAFTING- I can us the AutoCADD program to draft the floor plans and elevations a house.	1	2	3	4	n/a
RESIDENTIAL CONSTRUCTION-I understand the construction process from footings to roof framing	1	2	3	4	n/a
RESIDENTIAL CONSTRUCTION- I can create basic residential electric circuits	1	2	3	4	n/a
MANUFACTURING- I understand how to design a product.	1	2	3	4	n/a
MANUFACTURING- I understand how to form a company.	1	2	3	4	n/a
MANUFACTURING- I understand how to market and sell a product.	1	2	3	4	n/a

GRAPHIC COMMUNICATIONS- I am able to use a manual 35mm camera to take photographs.	1	2	3	4	n/a
GRAPHIC COMMUNICATIONS- I under stand the steps required in the screen printing process	1	2	3	4	n/a
GRAPHIC COMMUNICATIONS- I can use Macromedia Dreamweaver to create a web page	1	2	3	4	n/a
GRAPHIC COMMUNICATIONS- I am able to develop my own photographs.	1	2	3	4	n/a
Please add any additional comments or suggestions about the Technology Education program below:					

Parent Survey

Demographic Information

Please circle the option that pertains the most to you or write in where space is provided.

Location (city, town, or village)	
Gender	M F
Occupation	
Age	14-17 years 18-20 years 21 years or older

Program Survey Questions For Parents and Employers

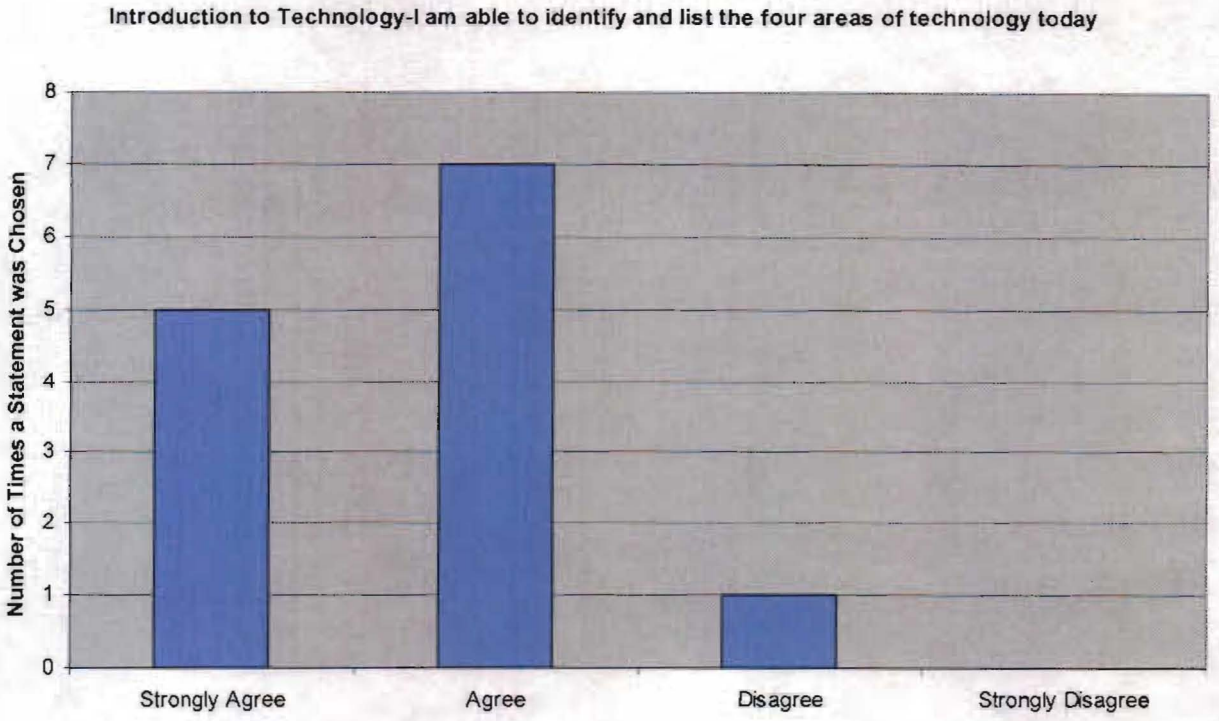
Please read the questions and circle the number that you most agree with. Please write an answer where space is provided.

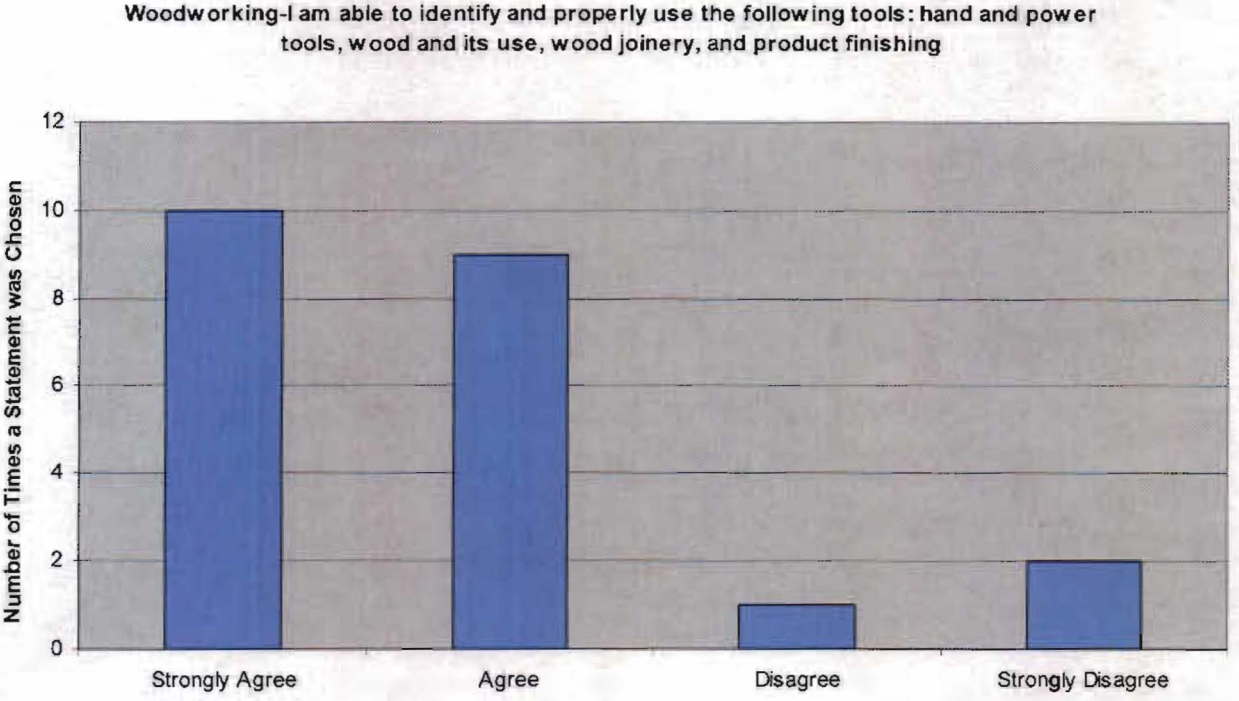
1=Strongly Agree	2=Agree	3=Disagree	4=Strongly Disagree	n/a=not applicable

I am satisfied with the Technology Education program at River Ridge.	1	2	3	4	n/a
I feel that the classes offered through the Technology Education department at River Ridge have been helpful to my child/employee(s).	1	2	3	4	n/a
My child still uses some of the skills acquired in a course that he/she took.	1	2	3	4	n/a
I feel that the education that some of my employees received at through the River Ridge Technology Education program has been helpful.	1	2	3	4	n/a
It is important for students to have exposure to Technology Education classes so that they can be successful after high school.	1	2	3	4	n/a

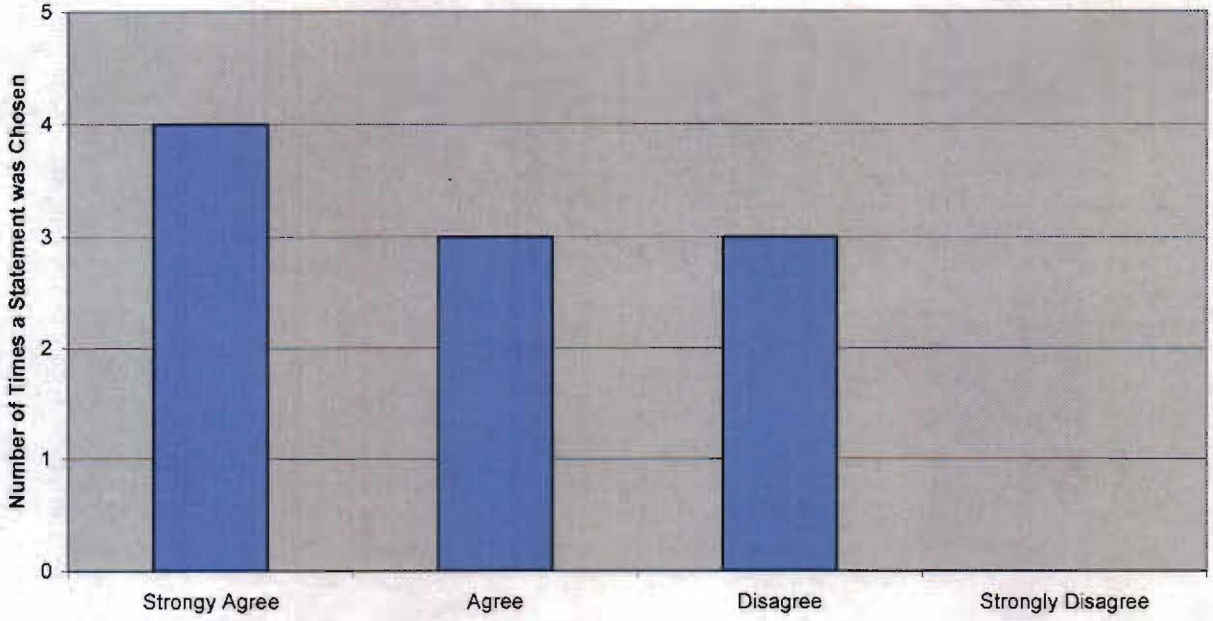
Please add any additional comments or suggestions about the Technology Education program below.:

Appendix C: Survey Results

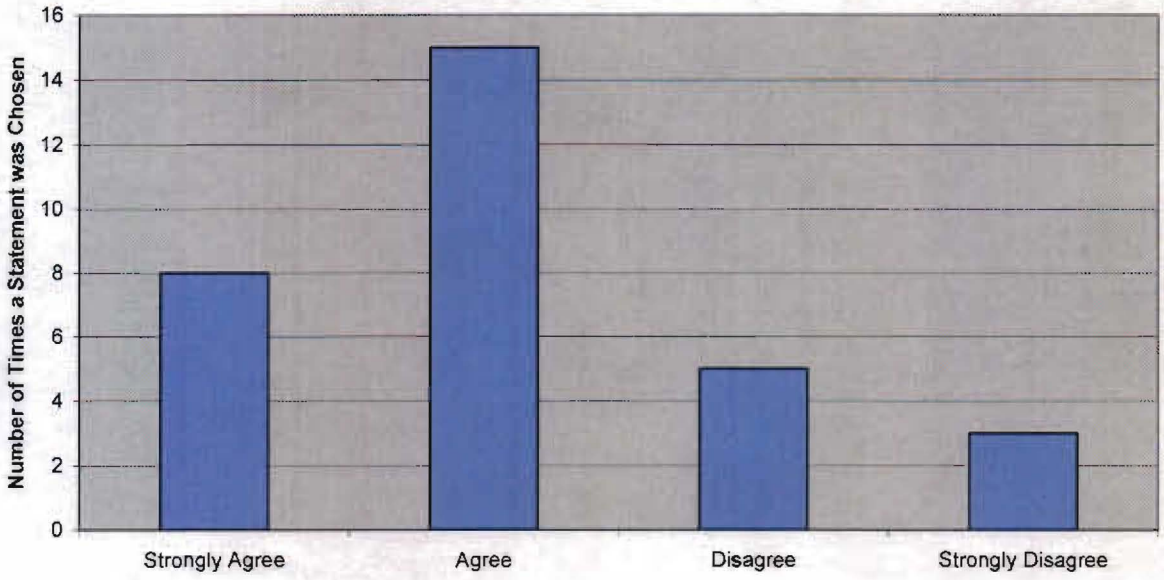




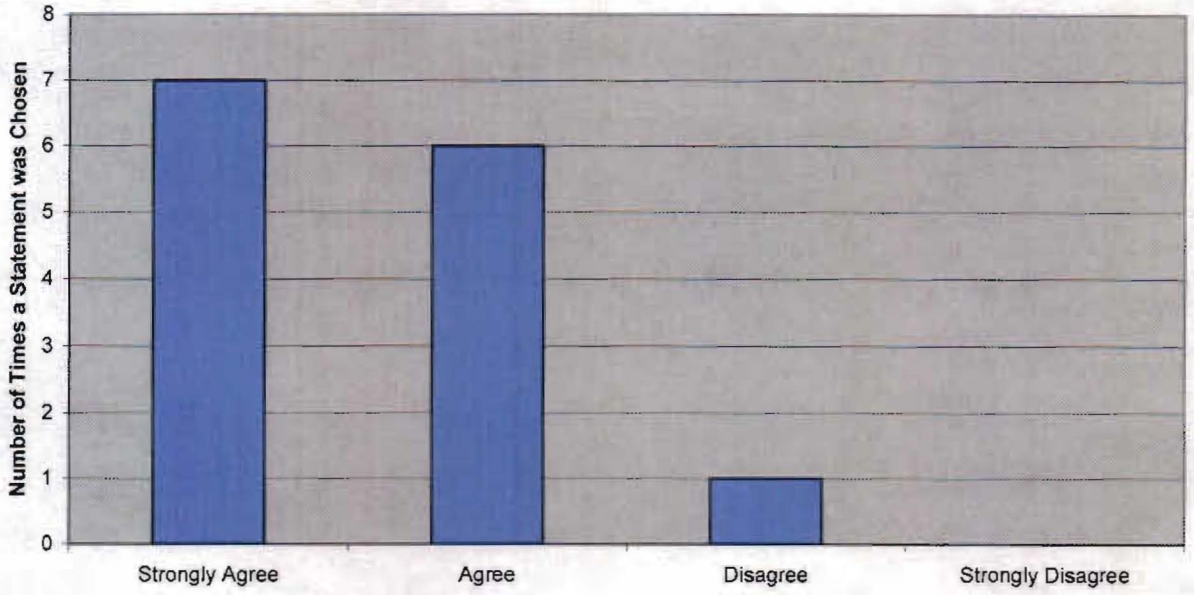
Advance Woodworking- I am able to construct cabinet dors and drawers wthout assistance



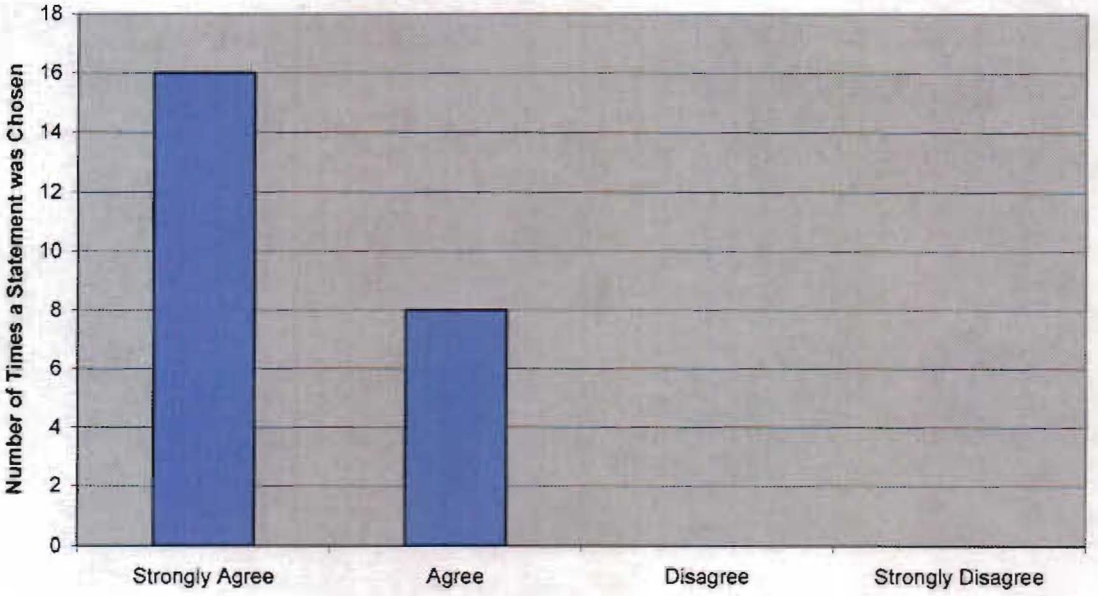
Mechnical Drafting- I am able to confienty use AutoDek Inventor to make drawings and asseblies and I can confidently use draftng tools



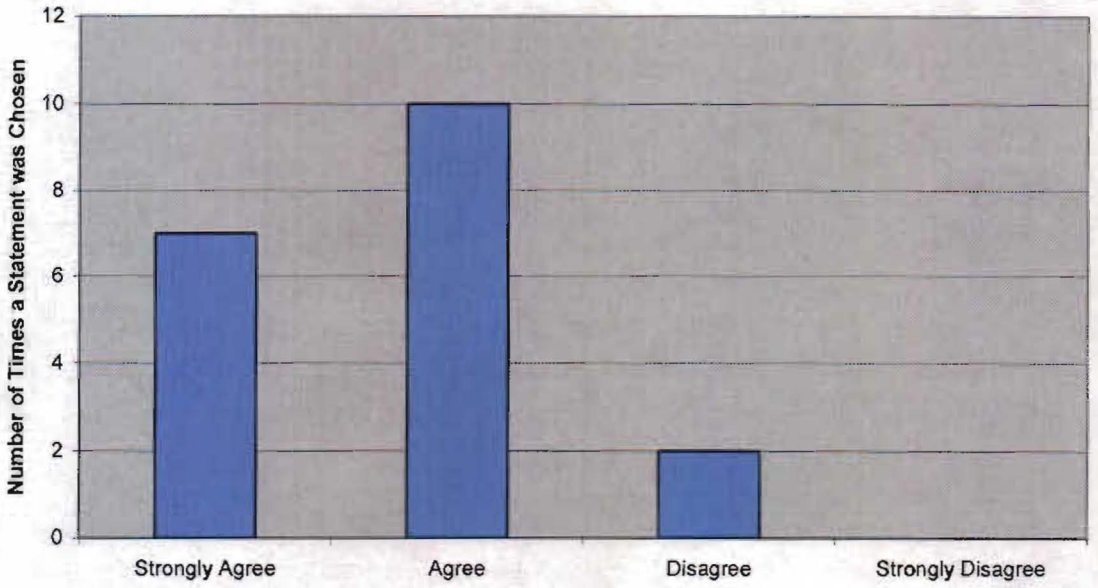
Architectural Drafting- I understand the principles of basic residential design ad can use the AutoCaDD progra to drat the floor plans and elevations of a house



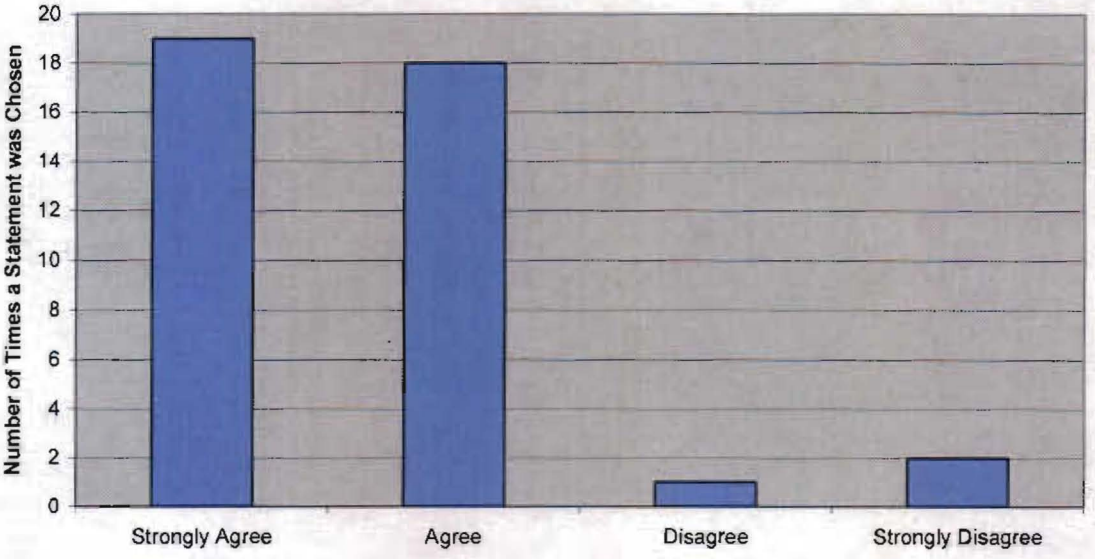
Residential Construction- I understand the constuction process from footings to roof framing and I can create basic residential electirc circuits



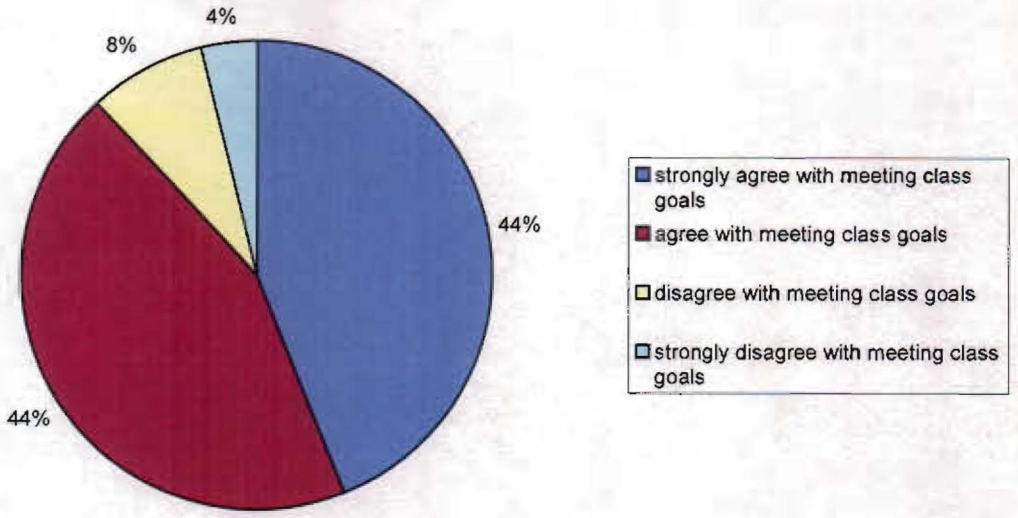
Manufacturing- I understand how to desing a product, form a company,and market and sell a product



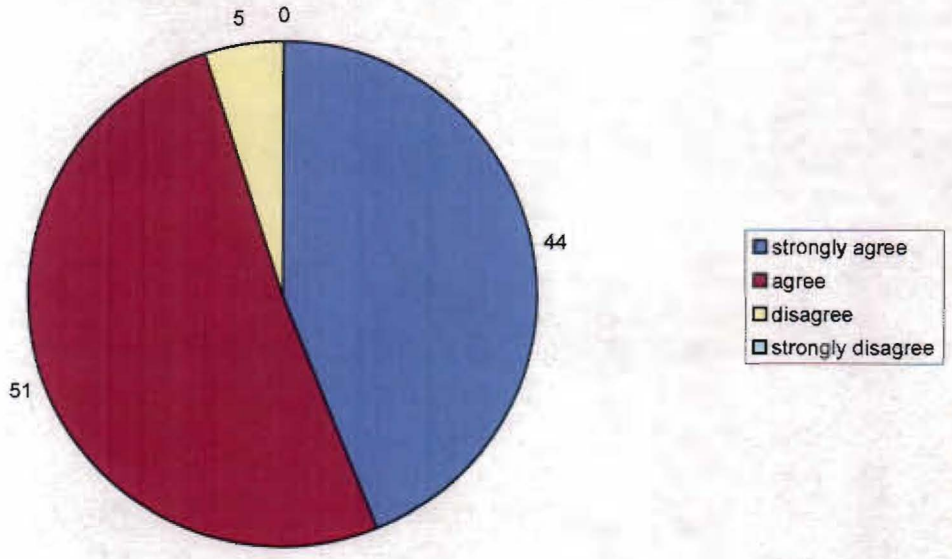
Graphic Communications- I am able to use a 3mm camera and develop my own photographs, the steps required in tehs ceen printing procss and ho to use MacroMedia Dremweaver to create a web page



Overall Look at Ratings of the Technology Education Program



Overall Look at Parent & Employee Survey Results



Parents and Employees Compared to Students Results