DEVELOPING AN INTERDISCIPLINARY UNIT WHICH COMBINES TECHNOLOGY EDUCATION WITH CORE CLASSES AT FORT ATKINSON MIDDLE SCHOOL

by

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ABSTRACT

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The purpose of this study was to develop an interdisciplinary unit involving technology education with the science, mathematics, social studies and language arts classes at Fort Atkinson Middle School.

The study explored the development of interdisciplinary units and curricula. It looked at the changes in education and the development and relationships of standards for various disciplines. A rationale was formed for an interdisciplinary unit that would contain technology education. Interviews with teachers examined interdisciplinary units and activities currently being conducted at Fort Atkinson Middle School.

A survey was used to gather information from teachers. Data was collected, analyzed and reported. Research determined which teachers, grade level and subject area would be most willing to develop an interdisciplinary unit with technology education. Further study is recommended to examine the effectiveness of such a unit and how students view the effectiveness of such interdisciplinary units.

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For my wife and family. For without their encouragement and support I would have never returned to teaching and continued my education. Next, my father, while he passed away many years ago and never knew that I returned to teaching and continued my education, I felt his presence and pride at every step of the way. My mom for showing me what a good teacher should be. And finally, my research advisor, Dr. Kat Lui, for without her insight, and guidance, this project would never have been possible.

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CHAPTER 1

Introduction

Providing all students with a sound education has always been a goal of public education. An integrated curriculum is one method to expose students to similar ideas and concepts that are common to many disciplines. The more students are exposed to the ideas the higher their rate of retention (Mesko, 1994). To increase student learning at Fort Atkinson Middle School, (FAMS) technology education should be integrated into the interdisciplinary units currently being taught at our school. Technology education allows for real-world application of abstract concepts and principals (Sanders, 1999). It addresses a number of learning styles that may not be addressed in the typical classroom (Lage, Platt, & Treglia, 2000). There is also a growing amount of research providing evidence that organizing schools into small "team" units has a beneficial effect on students' achievement (Oxley, 2001).

The first public schools in America can be traced back to 1640 when the Puritans established schools to teach their children reading, writing and arithmetic. What was taught and the methods used in public schools changed little over the next 300 years (Vollmer, 2002). As little as 40 years ago, there were still one-room-schools, where all students from a small geographic area went to the same building and were taught by one teacher. The one-room school house may still be seen as one drives around the country. Many older adults can still remember attending those schools. Some teachers still in the classroom even taught in those schools (M. Merkel, personal communication, February 16, 2003).

In the 1940's the role and responsibilities of schools began to change and expand. The curriculum and teaching methods changed dramatically. Included in today's schools are topics such as drivers education, drug and alcohol abuse, and sex education. These topics, and others were added because of our changing societal needs. The schools of today bear little resemblance to the schools of only a few decades ago. Today's curriculum must be continuously modified to meet the changing needs of students and society (Ornstein & Levine, 1989).

One reason society is changing so fast is that advancements and changes in one industry lead to changes in other industries. The development of the nuclear bomb led to advances not only in weapons systems but advances in producing energy, and advances in medicine, such as chemotherapy, and food preservation through irradiation (Thomas & Santanam, 2002). These industries learned from each other and thereby advanced at a greater rate than they would have alone.

Education, on the other hand, is not coordinated. Changes tend to occur within an individual discipline. School curricula tend to be very segregated, the math teacher teaches math concepts. Students see little value in learning something they can not apply to their lives. In many schools the topics are not assembled in coherent bodies of knowledge to be used by the students (Winkelein & Schnell, 1995).

However, as Hillary Clinton, suggests in "*It takes a village and other lessons children teach us*", it is the responsibility of a whole community, working together, to help raise a child into a productive adult (Clinton, 1996). In America each of our schools is like a village. Each teacher, a different craftsman, passing on information often with

what seems like little regard to what others in the village are doing.

In recent years, there has been a serious effort underway to reconstruct the "village" or the educational process. There is a push to develop new standards for what students should learn and how teachers should teach (Council for Citizenship Education, 1997). These reforms include calls for higher standards for curriculum development, higher student achievement, and new approaches to teaching and learning (Childress, 1996). To meet the reforms called for, changes will need to occur. In today's educational climate of increased school responsibility, teacher's will need to plan, communicate, and have common themes if they are to help students achieve in this era of higher educational standards (Stoehr & Buckley, 1997).

The state of Wisconsin has adopted a set of standards for core areas as well as the allied arts disciplines. Reviewing standards for the core disciplines (Wisconsin's Model, 1998), and comparing them to the standards for technology education, similar themes and concepts are very evident. The close relationship of these standards have led many educators to call for teaching practices that integrate different disciplines and fields. Teachers of the various disciplines should communicate, plan and develop curricula that have common themes and concepts (Tchudi & Lafer, 1996).

Interdisciplinary curriculum is a type of curriculum design that brings various disciplines together. According to the Wisconsin Department of Instruction, interdisciplinary units are designed in such a way that the learners are better able to connect interrelated concepts, content and processes (Wisconsin Dept. of Instruction, 1999). To facilitate intercurricular activities, many schools are embracing a team concept. In the team concept, students are placed in smaller units where they have

common teachers and classmates. This team concept and the use of interdisciplinary units have beneficial effects on student achievement (Oxley, 2001).

Merely placing students and teachers on a team, however, does not generate success. Success requires a collaborative effort by teachers to plan common units, activities and lessons, and field trips, and each discipline must view the others as equal partners. Teachers must have the desire to create a positive learning experience for the students (Kew, 2000). When carried out properly, the team concept results in improved academic scores and better retention of knowledge (Mesko, 2001).

Teams and the use of interdisciplinary units are becoming more common among core classes. At FAMS, the sixth grade team currently teaches a number of interdisciplinary units. One such unit is about the Middle Ages. Math will be using scales to determine the length of different lines. They will use scales to draw a castle. The castle plans must include parts of a castle, which were discussed in Social Studies class. Both subjects relate to a story of knights and castles being read in Language Arts class. The science department will discuss alloys with the students. They will talk about and do lab experiments about why a Middle Age alchemist could not produce gold. The inclusion of allied arts subject areas has not been incorporated, nor has it been discussed during meetings. However, depending on the nature of the unit being taught, the inclusion of at least some allied arts classes would make the instruction more meaningful and enjoyable for the students (Mesko, 2001). Technology education is an allied arts class. Technology education unit could be included in Mid-Evil interdisciplinary unit would be by possible producing period piece toys of a scale model of a catapult. Such activities could reinforce other disciplines' concepts while still meeting the goals and

standards of technology education.

Fort Atkinson Middle School makes use of the team concept at the 6th, 7th and 8th grade levels. Teams of teachers are provided time to plan interdisciplinary units and activities to facilitate student learning and discuss various student concerns. But like so many other schools that use the teams and interdisciplinary units, the inclusion of allied arts classes are almost non-existent. Reasons why allied arts classes are not included in interdisciplinary units and team teaching is scheduling difficulties, concentration on state-mandated proficiency tests, and lack of appreciation for non-academic subjects by some teachers (Mesko, 2001).

The principal at Fort Atkinson Middle School is a firm believer in the team concept and the use of interdisciplinary units as a way to educate students (R. Abbott, personal communication, March 30, 2003). To date, Technology Education has not been part of any interdisciplinary units. It is his desire that the technology education department become involved in interdisciplinary education, to help students learn by seeing more of the interrelated content and concepts. Including technology education in interdisciplinary education is a step in meeting our school goal of moving students towards educational excellence, by providing a positive and safe learning environment that fosters respect, responsibility, and cooperation among students, their families, and community (Fort Atkinson Middle School, n.d.).

One of the goals of the school district of Fort Atkinson is to move our school system from one that is academically good to one that is academically excellent. Including technology education in interdisciplinary units is another step in meeting both district and

middle school goals.

Research suggests that an interdisciplinary approach to teaching gives students a richer educational experience that can improve their learning and make learning more interesting. The implementation of interdisciplinary units is common in the core subjects at FAMS.

Statement of the Problem

At Fort Atkinson Middle School (FMAS) no allied arts classes are currently involved with the interdisciplinary units being taught. It is the desire of the administration for technology education to become involved with the core classes and work with the core class teachers in developing a more integrated curriculum.

Research questions

The following research questions will be addressed in this study.

1. What types of interdisciplinary units are currently being taught at FAMS?
2. How are other allied arts classes involved in interdisciplinary units?
3. Which teachers are more likely to develop an interdisciplinary curriculum.
4. What type of projects/work can the Technology Education classes implement to become involved in interdisciplinary teaching at the Fort Atkinson Middle School?

The results and information gathered through this study will be used to develop interdisciplinary units. The implementation of any units are not part of this study.

Purpose of the study

The purpose of this study is to look at a number of items.

1. To explore what units are currently being taught using the interdisciplinary concept.
2. To identify if other allied arts classes are currently involved in teaching interdisciplinary units.
3. To determine the feasibility of including technology education in interdisciplinary units and what type of projects may be included in such units at FAMS.

Research objective

1. Determine the view core subject teachers have of technology education.
2. Identify what type of teacher is most likely to participate in interdisciplinary education.
3. Demonstrate to core subject educators, administrators and students the value of adding Technology Education to the interdisciplinary units being taught.
4. Discover what types of interdisciplinary units are currently being taught.
5. Identify types of units/activities that technology education can do to become involved in interdisciplinary units.

Significance of the study

This study is significant for a number of reasons.

1. This study will recognize the advantages of interdisciplinary teaching units to the students. It will show that an interdisciplinary approach to education develops a better understanding of the concepts by the students (Wisconsin Department of Public Instruction, 1999).
2. The information will be useful to other allied arts teachers at FAMS who may be interested in teaching interdisciplinary units.
3. The information may be useful to teachers in other districts that do not use the

interdisciplinary approach to teaching students.

4. The results of this study may be used to develop and implement interdisciplinary units that may help students more fully understand themes concept expressed.

Limitations

1. The sampling was limited to core class teachers at FAMS.
2. The results can only be applied to FAMS. The researcher does not guarantee that other school districts not included in the study will be able to utilize the findings.
3. Retirements, resignations, of faculty and staff, new hires or layoffs, and the willingness to participate in this study may effect the results of this research.
4. Data from this research can be used to develop and implement interdisciplinary units although implementation is not part of the scope of this research.

Definition of Terms

For clarity of understanding, the following terms need to be defined.

Allied Arts- Any class offered at the Fort Atkinson Middle School which is not considered a core class (R. Britson, personal communication, March,7, 2003).

Core-Subjects- The classes Math, Science, Social Studies, Language Arts/Reading, which students are required to take during school hours (R. Britson 2003).

Interdisciplinary curriculum- The process teachers form different disciplines use to organize and transfer knowledge under a united theme (Maurer, 1994).

Team- Teachers and students of a grade level grouped together around core academic subjects (Mesko, J. 2001).

Technology- The use of critical thinking skills, resources, and the devices people have invented to solve problems. (Maurer, 1994).

Technology Education- A discipline that involves knowledge and the study of human endeavors in creating and using tools, techniques, resources, and systems to manage man-made and natural environment for the purpose of extending human potential and looking at the relationship of these to individuals, society and the civilization process (Sterry & Wright, 1987).

Methodology

This study examined to what extent there is interdisciplinary curriculum among core teachers and allied arts teachers, and what types of interdisciplinary curricular units are being taught at FAMS. A survey was distributed to core and allied arts teachers at FAMS, September of 2003, which examined teacher demographics, and the perceptions of those teachers on the subject of interdisciplinary curriculum. The study examined the willingness of surveyed teachers to develop a more integrated curriculum with technology education. Discussions with core teachers examined the interdisciplinary curriculum units currently being taught. There were discussions of possible topics and instructional units, which may include technology education. This inclusion may enforce concepts/themes and standards for all involved disciplines. The following chapter will describe the changes in American education, the value of an interdisciplinary curriculum and team concept, and similarities of standards. It will examine how interdisciplinary curriculum and team concepts are currently being implemented at FAMS. And it will suggest possible topics and activities for an interdisciplinary unit.

Chapter 2

Review of literature

This chapter will briefly examine how American education has changed over the years regarding the range of subjects taught and their scope of responsibilities. It will also review the emergence of educational disciplines and why standards were developed. It will look at how various discipline standards are related and review interdisciplinary curriculum, also known as integrated curricula. It will look at the benefits to an integrated curriculum and the team concept in a school. Finally, it will examine interdisciplinary curriculum and teams within the Fort Atkinson Middle School to see how technology education might be integrated into the interdisciplinary curricula, which includes mathematics, science, language arts, and social studies.

In 1640, the Puritans established the first public schools in Massachusetts to teach basic reading, writing and arithmetic skills. They served to cultivate values that the Puritans felt would serve a democratic society. Gradually, schools added science and social studies to the curriculum. For over 260 years the curriculum in public schools remained very focused on these areas (Vollmer, 2002). Then the industrial revolution saw waves of immigrants coming to America. Politicians saw public schools as the logical place to help young people assimilate into American society and as a place to do social engineering. Beginning in the 20th century, curriculums were expanded to include health and nutrition. In the 1920's

vocational education and physical education were added. The 40's saw the addition of business education, art, and music.

In the 1950's, public schools added drivers' education and sex education. The 60's, 70's, and 80's there was a dramatic increase in programs, such as Head Start, Title I, Title IX, drug and alcohol prevention programs, environmental awareness, career and consumer education, multicultural education and conflict resolution. The expectations and needs of American society forced these changes in the schools curriculum (Adams 2000).

To accomplish these educational goals, schools have developed a curriculum to act as a guide and framework for what will be accomplished within each classroom.

A curriculum is, "a plan for the education of learners, and to identify a field of study". However, the most difficult part of a curriculum is what should the teacher "plan" to teach according to (Zais, 1976).

How teachers interpreted the curriculum and what they felt they should teach lead to disparities across the state and nation.

In 1983, the National Commission on Excellence in Education issued a report called A Nation at Risk. In this report, the commission explained how there was a "crisis" in education America and there was a need to improve student achievement in mathematics, science, and English. After this report, disciplinary education and specialized curriculum in schools flourished. Schools divided their curricular disciplines into two main discipline – Core discipline which include, science, math, language arts, and social studies, and the exploratory (allied arts) discipline, which included art, music education, family and consumer education, and

technology education (George, 2000).

Each discipline concentrated on its own subject matter, particular curriculum and plan.

Merriam-Webster defines a discipline as "teaching, learning, a given field of study that corrects, molds or perfects the mental faculties or moral order". Disciplines have generally been considered to be mathematics, science, language arts, social studies, and various fine arts. The influence of academic disciplines is pervasive throughout all educational levels. Colleges are even organized by departments of separate disciplines; faculties are hired, trained, and promoted by colleagues within the discipline. Students are expected to specialize in a discipline as well as some other specialization in order to graduate from college. Frequently, various disciplines have built barriers around themselves, which keep other disciplines out. Each discipline focused on their particular subject matter with little regard for other disciplines. Teachers have tended to look at their discipline as a stand-alone area of study (Graff 1989).

Despite the curriculum reforms implemented after the report A Nation at Risk, the National Center for Educational Statistics (2000) found that disciplinary education did not improve education in math and science. It reported the following about eighth grade students from 41 countries:

1. In science, American students outperformed their peers from 15 countries but were still outscored by 9 other countries.

2. In arithmetic, the United States was not among the top 50%.

They placed lower than 20 of the 41 countries and outperformed only 7 countries.

Curriculum reform throughout American history had been triggered by events such as population growth, both by immigration and migration, war, economic growth, and societal expectations, such as those pointed out in A Nation At Risk. More times than not, reforms targeted at the classroom have failed to change what is taught or how it is taught (Adams, 2000).

Contemporary society is placing immense academic demands on students. Clear statements about what students must know and be able to do are essential to ensure that schools offer students the opportunity to acquire the knowledge and skills necessary for success (Wisconsin model academic standards, 1998).

Standard achievement tests given to all students in the State are one way of evaluating a given school district's academic performance. Wisconsin standards are intended to ensure levels of quality and uniformity across the state of Wisconsin. Included in the standards are areas of content, performance, and proficiency.

These standards tell a school district what a student should know, how students will show they know the information, and how well they must do on tests to demonstrate understanding (Wisconsin Model Academic Standards, 1998). State standards do not dictate the curriculum of a discipline, rather they act as guides to the concepts and themes the students of Wisconsin public schools should know and understand.

In Wisconsin there are standards written for core classes as well as allied arts classes, and for grade levels four, eight, and twelve. Each standard looks at various areas within each discipline. At the eighth grade level:

The Wisconsin Model Academics Standards for Technology Education, 1998 include areas for the nature of technology, technological systems, human ingenuity, and the impacts of technology. Two standards within technology education point directly to the reason for this study.

Standard A.8.2 Explain the need for and application of knowledge and skills from other disciplines when engaging in technological activities.

The state of Wisconsin also recognizes the fact that the various disciplines have common concepts and themes. The Wisconsin Department of Instruction, in the publication of Wisconsin's Model of Academic Standards for Technology Education, states that, "teachers in every class should expect and encourage the development of these shared applications, both to promote learning of subject content and to extend learning across curriculum". It also goes on to state that technology education at the middle school level should "be activity-based. Learning activities can be developed and linked across disciplines to provide more opportunities for students to apply what they have learned in other classes.

Standard A.8.3 Asks that students identify and contrast connections and differences between technology and other disciplines.

Examining standards from other disciplines, and relating them to standards found in technology education, may give teachers common ground when planning and developing a course curriculum. Common planning and cooperation among

teachers of interdisciplinary units are a good way to increase student leaning and understanding in the core disciplines.

Some standards, found in the Wisconsin Model Academic Standards, for the core classes that can be directly or indirectly related to technology education units follow:

Language arts standards:

A.8.1 Use effective reading strategies to achieve their purposes in reading.

A.8.3 Read and discuss literary and nonliterary texts in order to understand human experience.

B.8.1 Create or produce writing to communicate with different audiences for a variety of purposes.

C.8.1 Orally communicate information, opinions, and ideas effectively to different audiences for a variety of purposes.

C.8.2 Listen to and comprehend oral communications.

C.8.3 Participate effectively in discussion.

E.8.1 Use computers to acquire, organize, and communicate information.

E.8.4 Demonstrate a working knowledge of media production and distribution.

F.8.1 Conduct research and inquiry on self-selected or assigned topics, issues, or problems and use an appropriate form to communicate their findings.

Mathematics standards:

A.8.1 Use reasoning abilities

A.8.3 Analyze non-routine problems by modeling, illustrating, guessing, simplifying, generalizing, shifting to another point of view.

A.8.4 Develop effective oral and written presentations.

B.8.7 In problem-solving situations, select and use appropriate computational procedures with rational numbers.

D.8.2 Demonstrate understanding of basic measurement facts, principals, and techniques.

D.8.3 Determine measurement directly using standard units to within a given degree of accuracy.

D.8.4 Determine measurements indirectly.

E.8.2. Organize and display data from statistical investigation.

E.8.2 Use results of data analysis to predict, develop arguments and draw conclusions.

Social studies standards:

A.8.7 Describe the movement of people, ideas, disease, and products throughout the world.

A.8.8 Describe and analyze the ways in which people in different regions of the world interact with their physical environments through vocational and recreational activities.

A.8.10 Identify major discoveries in science and technology and describe their social and economic effects on the physical and human environment.

D.8.1 Describe and explain how money makes it easier to borrow, save, invest, and compare the value of goods and services.

D.8.2 Identify and explain basic economic concepts.

E.8.3 Describe ways in which local, regional, and ethnic cultures may influence

the everyday lives of people.

E.8.10 Explain how language, art, music, beliefs, and other components of culture can further global understandings of cause misunderstandings.

Science standards:

A.8.5 Show how models and explanations, based on systems, were changed as new evidence accumulated.

A.8.6 Use models and explanations to predict actions and events in the natural world.

B.8.5 Explain ways in which science knowledge is shared, checked, and show how these change over time.

C.8.8 Use computer software and other technologies to organize, process, and present their data.

D.8.1 Observe, describe, and measure physical and chemical properties of elements and other substances.

D.8.5 While conducting investigations, explain the motion of objects by describing the forces acting upon them.

D.8.9 Explain the behavior of various forms of energy.

G.8.3 Illustrate the impact that science and technology have had, both good and bad, on careers, systems, society, environment, and quality of life.

G.8.7 Show evidence of how science and technology are interdependent.

H.8.3 Understand the consequences of decisions affecting personal health and safety.

Communication with core subject teachers about the relationship between their subject standards, and how they can be related other standards for technology education is essential if there is to be any kind of interdisciplinary curriculum.

Traditionally educators have put fences around the academic content areas and have taught each subject as a stand-alone area. However, in actuality we combine the skills of many content areas are combined in our daily lives. Interdisciplinary teaching is instruction that emphasizes the connections and interrelationships among the various disciplines. It more accurately reflects real-life situations where everything done reflects relationships and impacts other areas of life. Standards, concepts and themes from core classes can be related to technology education.

The Wisconsin Model for Academic Standards describes how a middle school's team of teachers could develop learning activities so curriculum and learning are linked across disciplines to provide more opportunities for students to apply what they have learned.

Technology education standards have direct applications to the core subject areas. Daugherty and Wicklin (1993) wrote; "Professionals within the field of technology education have called for a discipline more closely aligned with mathematics and science, and few individuals in the profession are not aware of the emphases being placed on presenting mathematics and science in a technological framework."

Snyder (2000) describes how technology education is also closely linked to the humanities, since language itself is a technological achievement of humans. He

goes on to say that "language is still of fundamental importance to the area of communication technology and technology teachers are necessarily involved in the process of teaching basic skills on a daily basis. Therefore, technology education is interdisciplinary by nature - - a fact that should be appreciated and promoted." Integrating technology education with science and math has gained considerable attention during the past decade (Sanders, 1999).

Many engineering-like activities are common in the middle level technology education curriculum. These activities challenge students to design, construct, and test solutions to problems posed. To solve these problems, students must integrate principals of mathematics, science, language arts and social; studies (Sanders, 1999).

It is the conclusion of Sanders, M., Moss, S & Fuller, M., Kew, D., and Mesko, J. that integrating disciplines which include technology education into an interdisciplinary curriculum is highly motivating and engaging to students and teachers. It can also help make instruction more meaningful and enjoyable, which can result in improved academic scores and retention of knowledge.

A growing body of research is providing evidence that organizing schools into small units or teams has beneficial effects on student achievement and psychological well-being (Oxley, 2001). However, David Kew (2000) points out the fact that by "merely putting teachers on a team does not guarantee success." It requires team teachers to take ownership of the team budget, interdisciplinary teaching themes, field trips, and co-curricular opportunities. It happens when individual team teachers collaboratively decide to appreciate each other's work and

work together in a professional manner (Gullatt, 1995).

It is not just teachers though which makes team teaching and intercurricular activities possible and successful. The administration must work to help teams succeed in an interdisciplinary curriculum. It must provide team planning time each day and instructional leadership, which helps coordinate and support the teaching teams (Oxley 2001).

The administration at Fort Atkinson Middle School takes an active role in promoting team teaching and interdisciplinary curriculum. In supporting the philosophy upon which the middle school operates, students are assigned to teams of core subject teachers. The team teachers plan meaningful instruction and offer coordinated assistance to the same group of students based upon their unique needs.

Allied arts teachers also have a common time in which they can meet and discuss ideas/projects (R. Abbott, personal communication, Sept. 8, 2003). Teams at Fort Atkinson Middle School are divided by grade level. While every teacher in the school is assigned to a grade level team, it is the core subject teachers that have been given common time to discuss students and plan curriculum topics. Sixth grade has three teaching teams for core classes, two teams of three teachers and one team of two teachers. Grade seven has one team of five core class teachers, and grade eight has one team of five core subject teachers. There is also a grades seven-eight team consisting of five core class teachers. These teachers have both seventh and eighth grade students (Fort Atkinson Middle school, n.d.).

An interdisciplinary curriculum is currently being implemented to some degree

at each grade level at FAMS. In grade six, there have been primarily two main interdisciplinary units – ancient Greece and medieval Europe. During the ancient Greece unit, social studies classes discussed the Greek culture, city states, and religious beliefs. Language arts students read Greek myths and stories, and science students studied the stars and constellations (V. Timm, personal communication, Sept. 9, 2003.). In mathematics, students worked with Roman numerals and story problems set in ancient times (L. Loyde, personal communication, Sept. 9, 2003). The Greek unit culminated with students wearing togas for Olympic style games students (J. Searing, personal communication, Sept. 9, 2003).

During the medieval unit, social studies students discussed the feudal system and world events. Mathematic classes uses scales and fractions to draw castles, solve medieval story problems with medieval situations. Science classes discussed medieval medicines and views of the solar system, Language arts students read stories set in medieval times and kept a log of good deeds they performed so that they could be knighted at a banquet at the end of the unit (K. Conner, personal communication, Sept. 5, 2003). The Medieval unit culminated in presentations by period reenactments by the guild of St. Michael and a banquet (S. Arndt, personal communication, Sept. 5, 2003).

The seventh grade team at FAMS also had two major interdisciplinary units. The first was a colonial unit, during which social studies discussed various aspects of life in colonial times (D. Zernicke, personal communication, Sept, 4, 2003), language arts students read stories related to colonial times (S. Freidman, personal communication, Sept. 4, 2003). The unit ended with a meal of colonial style foods

and time period activities.

The other seventh grade interdisciplinary unit was about the civil war. Again social studies discussed the life and times during the 1860's along with the civil war. Language arts read stories and books related to the time period. The large group activity was a trip to the state capitol, Madison, Wisconsin for reenactment activities related to the civil war including medicine, dress, armies and customs of the time.

Interdisciplinary curriculum in the eighth grade consisted of only one unit – a zoo unit. Science classes looked at the ecosystems of various animals (J. Statz, personal communication, Sept. 6, 2003). Social studies examined rain forest preservation and factors which lead to deforestation (B. Delsarte, personal communication Sept. 6, 2003). Language arts classes did research and reports on various animals, and mathematics students designed and calculated enclosures sizes for various animals (A. Gladam, & K. Diece, personal communication Sept. 11, 2003). The unit ended with students constructing a zoo. An open house was held so parents could tour the zoo and look at students' work.

Technology education classes have not been a part of any interdisciplinary units taught at FAMS. During class time, references to core and allied arts classes have been made though and students have come to the technology education classroom asking for help on projects for other classes. However, there has not been a conscious effort to formally include technology education into any of the interdisciplinary units at any grade level at FAMS (W. Rowlinson, personal communication Sept. 5, 2003).

This research paper will attempt to identify those teachers and areas that are most likely to work with the technology education teacher to develop interdisciplinary curriculum and activities.

Chapter 3

Methodology

Introduction

The purpose of this study is to determine to how interdisciplinary curriculum is viewed by teachers and to what extent an interdisciplinary unit is being taught in core and allied arts classes at FAMS. It will also be used to determine how technology education classes may be incorporated into the interdisciplinary units currently being taught. A survey was used to obtain information from mathematics, science, language arts, social studies, and allied arts instructors. Information obtained was used to determine the possibility of incorporating technology education into the core classes. This chapter describes information about participants, the survey instrument, procedures followed along with the limitations of this study.

Subjects and Sample Selection

Upon receiving permission from the principal at FAMS, the research study was conducted. This style of research was conducted because it dealt with opinions, views and ideas of instructors. The school population consisted of the mathematics, science, language arts, social studies, allied arts physical education and special education teachers. The criteria to be included in this survey was:

1. Must be a core or an allied arts teacher at FAMS.
2. Must teach a core or allied arts subject at least .5 time.

There are 31 teachers who met the criteria for being a possible research participant.

Instrument

The researcher designed a confidential survey during the summer of 2003. The survey instrument consisted of three pages. The first page and cover letter, (appendix a) addressed four areas of concern. It explained who was conducting the study and the nature and purpose of the study. The next area addressed how and when the survey was to be returned to the researcher. The third area addressed information regarding their rights as participants in this study. The last part of the letter gave names and phone numbers of the researcher, research advisor and contact people at the university of Wisconsin-Stout if they had any questions or concerns about the research being conducted. Pages two and three (appendix b) consisted of the survey. There where nominal questions which focused on demographics of the participants and interval questions dealing with attitudes and perceptions of an interdisciplinary curriculum which used a Likert scale. The survey included instructions for using the Likert scale. The selection of this style of research was based upon two main factors:

1. Research indicated that most studies researching attitudes, perceptions and opinions used a Likert scale as a measuring tool.
2. A limited number of research participants would not be conducive to a correlational study.

Questions developed for the survey are based upon, and are relevant to the research questions. They are of a similar structure to another study by D. Rosstier (2000), who looked for views and opinions of the participants. The majority of the questions use the five point Likert scale. This scale allows for a wide range of

opinions and attitudes. The survey also contained an area for further comments by the participant.

Before distribution the survey was previewed by the research advisor for content, four teachers at Fort Atkinson High School for understanding, readability and ease of completion, and the principal at FAMS for content and appropriateness.

Procedure

On September, 8th 2003 the researcher placed the cover letter and survey in the school mailboxes of each teacher that met the criteria for receiving the survey. The participants were given nine days to complete the survey. Completed surveys were retuned to the researchers school mailbox. On September 18th an e-mail was sent to teachers who had not returned the survey asking them if they had misplaced their survey and if they still wished to participate, another survey would be provided. Completed surveys were collected for analyses.

Limitations

There are several limitations identified by this researcher. These limitations are similar to the limitations identified in chapter 1.

1. The sampling was limited to the core and allied arts teachers at FAMS.
2. The results can only be applied to FAMS. The researcher does not guarantee that other school districts not included in this study will be able to utilize the findings.
3. Retirements, resignations of staff, new hires and layoffs, along with the willingness to participate in this study may effect the results of this research.
4. Data from this research can be used to develop and implement interdisciplinary

curriculum and units although implementation is not part of this research.

5. Results of the survey are based upon responses of participants and may not reflect the views of those who did not participate.

Chapter 4

Results

This chapter will present the results and findings of this study, which was designed to discover the perceptions and attitudes of teachers at Fort Atkinson Middle School towards an interdisciplinary curriculum the and their willingness to include technology education department in such a curriculum.

Rate or Response

Forty surveys were distributed to all core and allied arts teachers at Fort Atkinson Middle School. All forty surveys were returned. All surveys were usable.

Demographics

The participants in this study were mathematic, science, language arts, social studies and allied arts teachers. Questions 1, 2, and 3 of the survey were demographic in nature. Of the survey participants, 15% were strictly mathematics teachers, 7.5% taught only science, 15% taught just language arts, 7.5% had only social studies classes. The allied arts teachers accounted for 37.5% of the responses, and 17.5% of the participants taught in more than one discipline area (table 1). The participants in this survey reported a wide range of years of teaching experience, but percentages for each group was quite similar. 22.5% of the participants had 0-5 years experience, 15% had 6-10 years teaching experience, 22.5% had 11-15 years in the classroom, 20% of the teachers had 16-20 years experience, and 20% of the participants have spent over 20 years in the classroom (table 2). Of the three grade levels taught at FAMS, 20 % of the teachers taught

just sixth grade, 12.5% taught only seventh graders, 17.5% had just eighth grade students and 50% of the teachers taught more than one grade level (table 3). These respondents were asked demographic questions which indicated their subject area, grade level taught, years of teaching experience, and current view of interdisciplinary education. Using a nominal scale, tables 1, 2, and 3 report frequency data and the percentages for each of those items.

There were an additional 12 questions on the survey, which requested participants to respond to the questions using a rating system. Items were scored on a five-point Likert scale. (1 Strongly Disagree to 5 Strongly Agree). Table 4 presents the mean and standard deviations for each of these statements.

Item Analysis

The mean and standard deviation results for each of the survey items are listed in table 4. The survey can be found on Appendix B.

Item four on the survey asked participants their level of agreement on interdisciplinary curriculum. "Interdisciplinary curriculum is the study of a topic in your classroom that has themes/concepts related to topics/units currently being taught in other classes." Research indicated that most teachers agreed that interdisciplinary curriculum was a collaborative effort that takes place with a number of teachers across disciplines.

In item five, respondents were asked, "My current curriculum contains elements of interdisciplinary curriculum". There was little deviation from the mean number, indicating that most teachers felt their curriculum did contain

intercurricular units and activities.

Item six of the survey had participants examine the flexibility of their curriculum in allowing for an integrated curriculum. The mean number showed only a slight agreement that the curriculum was flexible enough to allow for more integration of classes. The larger standard deviation indicated that the opinions on their individual curriculums flexibility varied greatly.

Item seven asked participants to recall their teacher training, and whether their education included interdisciplinary philosophy or training. The mean score indicated that the average teacher felt they did not receive such preparation in college.

Survey item eight asked participants if they agreed or disagreed that it was easy to work with other teachers at FAMS in developing an integrated curriculum. The higher standard deviation number indicated a wide range of responses. The lower mean score, however, implied that as teachers, survey respondents remember they found it difficult to work with other teachers to plan and implement and integrated curriculum.

Item nine explored whether teachers agreed or disagreed that a required curriculum made it difficult to development and implement an interdisciplinary curriculum. A higher standard deviation number showed very disperse opinions. There was a slight agreement that required curriculum makes involvement in an integrated curriculum difficult. However, item ten's results indicated a strong agreement among teachers that providing an integrated curriculum could improve their current curriculum.

Item eleven asked teachers if they agreed or disagreed that they would like to see greater involvement of allied arts classes in an integrated curriculum. Findings indicated an agreement among teachers that the would like to see a greater involvement of allied arts classes in an interdisciplinary curriculum.

Item twelve asked participants if they would be willing to modify their curriculum to allow for the expansion of more interdisciplinary units that included allied arts classes. Research indicated that most teachers agreed that they would be willing to modify their curriculum to allow for such expansion.

Item thirteen asked whether teachers agreed with research that stated that an interdisciplinary educational approach to student learning is beneficial. Findings indicated the highest level of agreement and the lowest standard deviation of any survey item.

Item fourteen asked if teachers agreed that an interdisciplinary approach to education helped FAMS meet part of its mission statement to move students towards educational excellence. Findings indicated that most teachers were in agreement that an integrated curricula does help FAMS meet its mission statement.

Survey item fifteen explored whether teachers viewed interdisciplinary education as just another educational reform that will eventually be abandoned. Research findings indicated that to a very high degree, most teachers felt that interdisciplinary education will not be just a short-lived idea without true merit but is a positive development in the education of students.

Survey item sixteen asked teachers if they agreed with the idea that an interdisciplinary curriculum can be accomplished within a single classroom

regardless of what is being done in other classes. Research results in the standard deviation showed that opinions did vary, but most teachers felt that an interdisciplinary curriculum involved other teachers and classrooms.

Tables

Table 1: Discipline area

Subject area	Frequency	Percent
Mathematics	6	15
Science	3	7.5
Language Arts	6	15
Social Studies	3	7.5
Allied Arts	15	37.5
Multiple areas	8	20

Table 2: Years teaching experience

	Frequency	Percent
0-5	9	22.5
6-10	6	15
11-15	9	22.5
16-20	8	20
+21	8	20

Table 3: Grade level taught

Grade	Frequency	Percent
6^{th}	8	20
7^{th}	5	12.5
8^{th}	7	17.5
Multiple Grades	20	50

Table 4 Survey results

Survey questions	Mean	Standard deviation
4. Interdisciplinary curriculum is the study of a topic in your classroom with related themes/concepts currently being taught in other classes.	4.32	.85
5. My curriculum contains interdisciplinary curriculum	4	.61
6. My curriculum is flexible	3.8	1.06
7. I had good teacher training in interdisciplinary curriculum.	2.6	1.40
8. I find it easy to work with teachers on integrated curriculum.	2.2	1.15
9. Required curriculum make my involvement in integrated curriculum difficult	2.65	1.17
10. Integrating curriculum would improve my current curriculum.	3.7	.75
11. I would like to see more allied arts involved in integrated curriculum	4.05	.88
12. I would be willing to modify my curriculum	4.05	.89
13. Interdisciplinary curriculum can help students more fully understand themes and concepts.	4.45	.50
14. Interdisciplinary curriculum helps meet our schools mission statement.	4.25	.79
15. Interdisciplinary curriculum is just another educational reform.	1.3	.75
16. Interdisciplinary curriculum is studying a topic and integrating other disciplines into your class regardless of what other teachers are covering at the time.	2.65	1.19

Relationship of Research Survey to Research Questions and Goals

There can be relationships drawn between a number of the demographic and survey questions. A variety of inferential statistics were used to examine the relationships that I feel would have the greatest impact on the research questions and the research goal of developing a plan to integrate technology education into core classes at Fort Atkinson Middle School.

1. Do years of teaching affect the involvement of teachers in an interdisciplinary curriculum (table 5)?

   All teachers were placed into one of three groups based upon the number of years they have been teaching. Research results indicate that the each of the groups were very consistent. There does not seem to be any relationship between the number of years a teacher has been teaching and the likelihood that they will or will not be involved in an interdisciplinary curriculum. With a low degree of deviation, each group agreed that they were participating in interdisciplinary units to some degree.

Table 5: involved in interdisciplinary curriculum

	Mean	Standard Deviation
0-10 years teaching	4.0	.53
11-20 years teaching	4.0	.73
+20 years teaching	4.0	.53

2. Does the number of years a teacher has been teaching affect his/her view of an interdisciplinary curriculum as just another educational reform with no effect on student performance? (Table 6)

Research participants were placed into one of three groups based upon the number of years teaching. Research indicates that teachers with less than 10 years teaching experience most strongly disagreed with the research question and had the lowest standard deviation. Teachers with +20 years teaching did disagree with the research question, but there was a wide range of responses.

Table 6: Interdisciplinary curriculum does not effect student performance.

	Mean	Standard Deviation
0-10 years teaching	1.3	.51
11-20 years teaching	1.7	.75
+20 years teaching	1.8	1.15

3. Based on years of teaching experience, which teachers agree that their university prepared them to plan/teach an interdisciplinary curriculum and units. (table 7)?

Research participants were again divided into three groups based on years of teaching experience. To some extent, teachers from each group disagreed with the research question. There was a high degree of deviation in each of the groups, indicating the wide range of educational experiences and university philosophies. The teachers with the most experience felt they had the least amount of training in interdisciplinary curriculum.

Table 7: Teacher training did a good job in preparing for interdisciplinary curriculum.

	Frequency	Standard Deviation
0-10 years	2.92	1.32
11-20 years	2.29	1.25
+ 20 years	2.10	1.45

5. Based upon subject area, which teachers are most likely to agree to work with other discipline areas to form interdisciplinary units? (Table 8).

Research findings indicated there is general agreement among all subject area teachers that they are willing to modify their curriculum to allow for more interdisciplinary teaching. The two most consistent subject areas willing to agree to modify their curriculum was science and social studies. These two core subject areas also had the lowest standard deviation score.

Table 8: Willingness to modify curriculum based on subject area

	Mean	Standard Deviation
Math	3.8	.89
Science	4.3	.81
Language arts	4.0	1.22
Social studies	4.2	.44
Allied arts	3.8	.96

6. For all teachers, which grade level would be most willing to agree to modify their curriculum to allow for technology education involvement in an integrated curriculum? (Table 9)

Research indicated that there is strong agreement among sixth and eighth grade teachers to modify curriculum to include technology education. There was a moderate amount of deviation from the mean for these grade levels, reflecting individual teacher views and subject area.

Table 9: Willingness to modify curriculum based on Grade level

Grade	Mean	Standard Deviation
6th	4.16	.70
7th	3.75	.98
8th	4.18	.85

7. Which of the core teachers from each grade level would be most willing to agree to modify their curriculum to allow for more integrated units that may include technology education. (Table 10)

Research indicated that core subject teachers from all grades would modify their curriculum. Grades six had the highest level of agreement among core teachers and had the lowest standard deviation.

Table 10. Core subject teachers willing to modify curriculum based on grade level

Grade	Mean	Standard Deviation
6th	4.30	.51
7th	3.80	1.07
8th	4.20	.6

The survey allowed for further comments by participants. The following is a collection of those comments:

> "Teachers should be aware of what others are teaching so you may be able to draw them into the interdisciplinary curriculum, but it is not necessary to involve everyone."
>
> "My participation in an interdisciplinary curriculum depends on the unit and when in the year it is taught."
>
> "Interdisciplinary units which include allied arts are tough to do unless the whole grade has the same classes throughout the year."
>
> "Teaching language arts is easier because we can easily cover curriculum and make the topic interdisciplinary."
>
> "I am too new. I work with two other teachers already and don't know how much room to roam I have."
>
> "At times my curriculum would allow my to participate, other times not."
>
> "Scheduling of exploratory class rotations, especially 6th grade at 7 week rotation and 7th grade at a 9 weeks, makes it hard to be included as we have a certain curriculum we must get through."
>
> "I would not want anything imposed on me. I would like to have the time and resources to plan and implement units though."
>
> "I would like to see more interdisciplinary interaction among academics and allied arts."
>
> "We are never told what others are doing on a team."
>
> "Usually we are not given enough time to prepare, then we are involved on other units."
>
> "When all academics are involved in an interdisciplinary unit, kids enjoy having a class where they can forget about the subject."
>
> "I think it is great if everyone is given time to prepare and research, but if it just something to do to adhere to an interdisciplinary curriculum, then it is a waste of time."

"You should ask students how they feel about interdisciplinary units."

This research has indicated how teachers view an integrated curriculum at Fort Atkinson Middle School. Research has indicated what teachers and subject areas are most open to adding technology education into an integrated curriculum. There could be many other comparisons made, and conclusions drawn, if other demographic and Likert statements were analyzed. This researcher looked at a limited number of relationships which he felt would best help him reach the goals of the study. The following chapter will look at conclusions, which may be drawn from the research about an integrated curriculum in the Fort Atkinson Middle School. It will also include the scope and sequence for a technology education unit which combines technology education with core classes at FAMS in an integrated curriculum.

Chapter 5

Summary, Conclusions, and Recommendations

Summary

This study was developed to obtain information from core and allied arts teachers about their perceptions and attitudes toward interdisciplinary curriculum. The information gathered from this study was used to develop an interdisciplinary unit, which would include technology education in core subjects taught at FAMS. A survey was developed and placed in school mailboxes of core and allied arts instructors. The majority of the questions used a five-point Likert scale. This scaling system allowed for a wide range of opinions. Forty teachers returned the survey agreeing to participate in this study. Responses to the demographics and various questions relating to interdisciplinary curriculum were recorded and analyzed by the researcher. While analyzing the data, an understanding was developed as to how teachers from various disciplines and grade levels and with varying years of teaching experience and years of experience viewed an interdisciplinary curriculum. Data was recorded and reported using percentages. An ANOVA and T-tests were used for analysis to provide inferential statistics.

Conclusions

All surveys that were distributed were returned to the researcher. The number of participants was relatively small in number but did represent a 100% rate of response. There were many common views among the teachers, reflecting current thinking and research about interdisciplinary curriculum.

Teachers at the FAMS view interdisciplinary curriculum and team teaching as a positive educational reform that improves student performance. All teachers, regardless of the number of years they have been teaching, generally hold this view. Their views reflect what other researchers have found. That interdisciplinary education is an educational reform that has merit. Research has indicated that if done properly by a team of teachers, integrating different subjects into a unified learning experience in which students can see how different subjects interrelate, may result in improved academic scores and retention of knowledge (Mesko. 2001). Integrating technology education into core curriculum can be highly motivating and can engage students intellectually allowing them to apply abstract concepts and principals in concrete ways (Sanders, 1999).

The results of this research yielded information that met the research objectives and questions and also provided other interesting information, which will be discussed.

There are a number of interdisciplinary units currently being taught at FAMS. These units are taught at each grade level by a variety of teachers, using activities with common themes and concepts. Interviews with teachers indicated that similar units would be taught in the future.

Currently there are is no formal involvement of any allied arts classes in these units. Many allied arts instructors felt that they brought in elements of other disciplines into their class, but they have never been part of an organized interdisciplinary unit. The research shows that on the average, there is a

willingness on the part of allied arts teachers, to modify their curriculum allowing them to become involved in such units.

Research indicated that the all core teachers would be willing to work with others to develop an interdisciplinary unit. The teachers in grade six core classes, however, are the most open to including an allied arts class, such as technology education, into their interdisciplinary units. This researcher will pursue working with grade six core teachers in developing an interdisciplinary unit. There are three sixth grade teams of core teachers and the researcher will develop a unit with one of these teams. Initial conversations with core teachers indicate a strong willingness to discuss possible concepts, themes, and activities.

Analysis provided an insight into a number of issues and topics that were not part of this research topic but merit mention, as the issues raised may affect future use of this research by others.

For example, one survey question asked teachers how they felt about their training by the universities to prepare them to plan and teach an integrated curriculum. Despite the positive research on interdisciplinary curriculums, universities have generally done a poor job in preparing teachers to plan and teach such units. Universities tend to build programs around separate disciplines, focusing on their subject area with little regard of other disciplines (Graff, 1989). Then, once teachers have positions, they are expected to integrate their subject into others with little or no training. The survey results suggest that universities have improved slightly over the years, but they still have much room for improving

teacher training in the area of interdisciplinary curriculum development.

One observation of the survey results proved most interesting. The researcher compared survey results about how teachers feel about the effectiveness of an interdisciplinary curriculum, the flexibility of teachers' curricula, their willingness to modify curricula, and how easy they find it to work with other teachers on an integrated curriculum. Teachers generally felt an interdisciplinary curriculum is effective, and they are willing to make such units possible. They find it difficult, however, to work with other teachers to plan and develop such units (see table 5, Questions 6, 8, 10, 12, 13). Perhaps some teachers are not as willing to modify their curriculum as they think. Perhaps some teachers feel they are asked to do more planning than others. Maybe teachers feel the have been asked to make big changes in their curriculum compared to others.

Regardless of the reason, if teachers are to work and plan and teach together, communication and cooperation is essential by all parties if an interdisciplinary curriculum is to be developed and implemented.

Recommendations

It is the recommendation of this researcher to use this study as a reference for other allied arts instructors who wish to become involved in an interdisciplinary curriculum at FAMS. The scope and process of developing and implementing a successful interdisciplinary curriculum is complex and goes beyond the information learned from this study alone. More studies need to be conducted to find out why teachers find it difficult to work with others, and how much interdisciplinary

curriculum students want to have.

The findings of this study resulted in the following recommendations:

- The researcher should conduct a meeting with sixth grade core subject teachers to discuss interdisciplinary units that will be taught 2003-2004 school year.
- The researcher should work with sixth grade core subject teachers to develop an interdisciplinary unit.
- The researcher should conduct a meeting with allied arts teachers which will educate them about the advantages to an interdisciplinary curriculum.
- The researcher or other interested party should conduct a similar study, in which students are asked about their perceptions of interdisciplinary curriculum.
- The researcher of other interested party should conduct a similar study of teachers in which they are asked about their working relationship with other staff members.

INTERDISCIPLINARY UNIT

One of the sixth grade teams decided to do an interdisciplinary unit centered around animals and insects. This is a new interdisciplinary unit for the team. Based upon research results this was the team of teachers the researcher decided to work with to develop his interdisciplinary unit.

The unit is to last about four weeks. Students will find that all core classes and technology education will revolve around and be related to animals in one form or another. At the end of the unit, students will watch the video *A Bugs Life*.

The following is a listing of the subjects involved and the activities they will be doing in the interdisciplinary unit:

Mathematics: Students will use types of animals and population changes to work on graphing and graph interpretation. Students will also review area.

Social Studies: Students will select an animal and use maps to find where in the world they are located, and the type of environment in which they are found. They will also discuss the impact technological changes can have on animals.

Language arts: Students will select an animal, and research information about it. This information will be written into a report using proper English.

Science: Students will discuss differences between vertebrates, Invertebrates and insects. Students will do a small bug collection. Introduction of insects will be delayed until students are building the "Bug Barn".

Technology Education: Students will build a "Bug Barn". The students may use this project to collect insects for their science bug collection or personal use. Tests

will require short answers written in complete sentences. Students will be required to use proper English when asking or answering questions. Students will discuss various properties of wood including how trees grow. Source and uses of plastics will also be discussed.

Scope and Sequence

Course: 6th Grade Technology Education – Exploration

UNIT: Machine & Tool Safety/ Material processing - Interdisciplinary Unit Animals & Insects.

Project: Bug Barn

Technology Education State Standards addressed:
A.4.8, A.8.2, B.4.6, C.8.1, C.8.2, C.8.3, C.8.5, D.8.2

CONTENT:

1. **Safety**
   - Machine safety
   - Personal Safety

2. **Sanding**
   - Grit sizes
   - Cross grain/With grain

3. **Branding**
   - How
   - Why

4. **Wood finishing**
   - Staining
   - Varnishing

5. **Separating material**
   - Shearing
   - Sawing
   - Induced Fracture

6. **Combining Material**
   - Nailing
   - Gluing
   - Screwing
   - Stapling

Unit Activities:
Demonstrations, Discussion, Construction of an insect container

Course: 6th Grade Technology Education - Exploration

Unit: Machine & Tool Safety/ Material processing - Interdisciplinary Unit Animals & Insects

Project: Bug Barn

Lesson: 1 Days (1-2) Machine Safety and Demonstrations

Outcomes:

Students will understand the importance of following safety rules and procedures when working with various tools

Objectives:

On a safety test, students must score 100% before they can work with power tools

Key Concepts:

- Safety rules common to all machines
- Personal safety rules
- Safety rules associated with specific machines
- Drill Press
    - Pilot holes
- Band saw
    - Relief cuts
- Disk sander

Learning Activities:

Have students write out in complete sentences, examples of how and why a person was hurt using a machine and what could/should have been done to prevent the accident.
Demonstrate and explain each machine students will use.
Allow Students to cut and drill parts for their project.

Course: 6th Grade Technology Education - Exploration

Unit: Machine & Tool Safety/ Material processing - Interdisciplinary Unit
Animals & Insects

Project: Bug Barn

Lesson: 2 (Days 2-3) Finishing material

Outcomes:

Students will understand there are many types of sand paper and "grit sizes" and when and how to use each type of paper. Students will understand there are certain procedures that must be followed when they are attempting to create something.

Objectives:

Given a piece of wood, students will cut, drill, and then select the proper sequence of sandpaper to smooth the projects edges so there are no sanding lines on the face or edge of the project. Students will also select a method of branding their project to show ownership and/or decoration.

Key Concepts:

- Sand paper
  - Grit sizes
  - Grain direction
  - Sequence of sand paper usage
- Staining
  - Application
- Branding
  - Why
  - How
- Vanishing
  - Why
  - How
  - Types of finish
  - Water soluble vs. Oil base

Learning Activities:
Discussion
After projects have been cut, have students sand projects using proper grit size sandpaper. Later have students brand. Stain and Varnish pieces.
Discuss disposal of stain and varnish and possible impacts on health and environment handled properly.

Course: 6th Grade Technology Education - Exploration

Unit: Machine & Tool Safety/ Material processing - Interdisciplinary Unit Animals & Insects

Project: Bug Barn

Lesson: 3 (Days 2-3) Separating and combining material

Outcomes:

Students will understand there are three basic ways to separate materials. Students will understand there are a number of ways to combine materials. Students will understand that by processing materials there value can be increased.

Objectives:

Given pieces for a project, students will assemble pieces into a finished product. Students will select the proper sequence of assembly and method of combining materials to complete their project.

Key Concepts:

- Material separation
  - Cutting
  - Shearing
  - Induced fracture
- Combining materials
  - Nailing
  - Stapling
  - Gluing
  - Screwing

- Processing materials can increase the value

Learning Activities:
Discussion
Have students cut screen mesh using shearing process. After project pieces have been properly cut and finished, have students select proper method to combine pieces to complete their project.

6th Grade Handouts

Machine use and Tool Safety Name_____
Hour _____

Outcomes:
At the completion of this unit students will be able to:

1. Explain the importance of machine/tool safety rules.
2. Demonstrate proper tool use and power equipment.
3. Create a product using machine and tools safely.
4. Explain methods of separating and joining material.
5. Explain how processing material may increase their value.

Procedure:

1. Explain the importance of machine/tool safety rules.
2. Watch demonstrations of power tools.
3. Create a product using tools and equipment.

Evaluation

Criteria	**Points Possible**	**Student Rating**	**Instructor Rating**
Participation in demonstrations	0-10	_____	_____
Safety test	15	_____	_____
Product (See Evaluation Sheet)	25	_____	_____
Student Behavior	0-10	_____	_____
Total	60	_____	_____

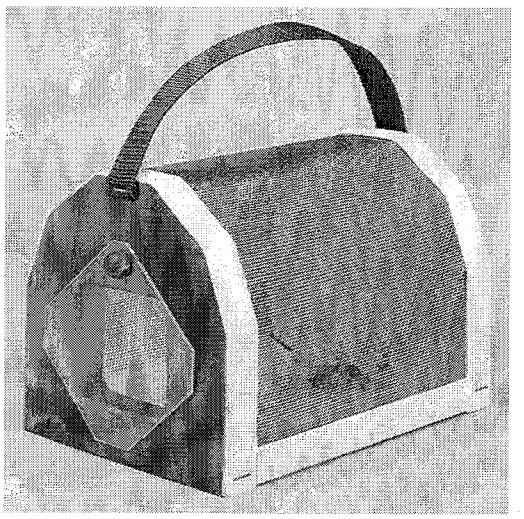
Product Evaluation

Name_____
Hour_____

	Possible Points	Student Rating	Instructor Rating
Cutting: Cut to size using safe methods	0-1	_____	_____
Sanding:			
No visible sanding lines	10		
Some visible lines	7-9	_____	_____
Visible lines on face	3-6		
Drilling: Hole drilled in proper location	0-1	_____	_____
Staining: Stain applied evenly	0-3	_____	_____
Varnishing: Two coats applied evenly with no drops or brush marks	0-5	_____	_____
Combining material: Material combined neatly	0-5	_____	_____
TOTAL		_____	_____

Materials list and Instructions

1 – 1" x 4" x 19" White Pine or hardwood
1 – 1/8' x 2" x 3" Plexi-glass
1 – 7.5" x 12" Screening (metal or Plastic)
1 – Nylon Strap or Twine for handle
Tape (Duct tape works well)
Staples
Nails
#6 Flat head wood Screw
Glue
Varnish/Paint
Drill Bits - 1 3/8" and 3/16".



(Store for Knowledge, 2003)

Directions:

Steps:

1. Lay out bottom and sides of bug barn on wood.
2. Cut Bottom 4" x 5 1/2" long.
3. Cut two (2) ends. 4" x 5 1/2" Round top using relief lines and cuts.
4. Drill 1 3/8" hole in one end piece at least 3/4" from an edge.
5. Sand wood pieces.
6. Brand project with heat or ink.
7. Varnish wood (at least two coats) or paint to desired color.
8. Cut plexi-glass to size.
9. Drill 1/8" hole near top of plexi-glass
10. Attach plexi-glass over hole with wood screw. Do not tighten! Allow plexi-glass to shift exposing hole to allow you to put bugs in or take them out.
11. Fasten ends to bottom using glue/nails.
12. Fit screen on bottom and end pieces, Cut to size/Attach with staples.
13. Trim off excess screening and cover edges with tape to trim it out.
14. Attach handle.

BASIC RULES FOR STATIONARY MACHINES and PERSONAL SAFETY

Common Safety rules to all machines

- Always wear eye protection.
- Loose clothing must be tucked in, rolled up, or removed.
- Long hair must be pulled back.
- Hands and fingers must stay a minimum of 3" away from moving parts of the machine at all times. (even if machine is off!)
- Equipment must be inspected and adjusted in necessary before starting the machine.
- Material to be cut, drilled, or sheared must be properly prepared.
- Material must stay in contact with the machines work table.
- Wait for the machine to come to a stop before leaving the machine.
- Remove scraps of material with a push stick.
- Only one person works on a machine at a time.
- Always pay close attention to what you are doing and where your fingers are.

Special rules for the Drill Press

- Work should be clamped or held secure while drilling.
- Create a pilot hole by center punching material to be drilled.
- Center drill bit in chuck, secure with chuck key, remove chuck key.
- ALWAYS use back-up stock when drilling
- Always check and adjust the depth the drill bit will go with depth stop.
- Do not force drill bit through the work piece.

Special rules for the Disk Sander

- Check abrasive disk to be sure it is not torn or loose before sanding.
- Never smooth small pieces.
- ALWAYS sand on the DOWNWARD traveling side of the disk.
- Move stock around to reduce overheating.

Special Rules for the Band Saw

- Adjust upper guide assembly so it is1/4" above work piece.
- Plan saw cuts to avoid backing out of long curves.
- Turn saw off before backing out of long curves.
- Do not cut curves that are sharper that the blade will permit.
- Use relief lines and cuts when cutting on outside curves
- Keep fingers away from the cutting edge of the blade in case you slip.
- Feed material into saw only as fast as it will remove the waste product.

SAFETY TEST

NAME_____
HOUR_____

True or False **T or F**

1._____ Long sleeves should be rolled up and long hair pulled back when operating a machine.

2._____ Only one person should be operating a machine at a time.

3._____ Maintain a 2 inch margin of safety with your fingers around the band saw blade.

4._____ Material to be processed should be held firmly on the table of the machine.

5._____ When you are done cutting, it is all right to remove scraps of wood with your fingers.

6._____ Adjust the upper guide assemble oh the band saw so that it is 1" above your work.

7._____ As part of a safe working environment, **everyone** will watch out for each other and help keep the lab area clean.

8._____ It is all right for the drill press bit to make contact with the metal table.

9._____ Relief lines and cuts should be used on curves when cutting out a project on the band saw.

10._____ Always wear safety glasses when using hand tools or machines.

11._____If you are unsure of how to use a machine or are nervous, just think about it, and

12._____You should leave a machine running for the next person, if they will be using the machine right after you.

REFERENCES

Childress, J. (1996). Does integration technology, science, and mathematics improve technology problem solving? A quasi-experiment. *Journal of Technology Education*, 8 (1), 16-28.

Clinton, H. (1996). *It takes a village and other lessons children teach us*. Simon & Schuster, New York, NY.

Council for Citizen Education. (1997). *Connections: An interdisciplinary team approach to professional development*. Albany, NY: New York Department of Education.

Fort Atkinson, Administration District Goals. (n.d.). Retrieved February 13, 2003, from http://fortschools.org/distadmin/districtgoals.htm.

Fort Atkinson, Middle School Middle School Goals. (n.d.). Retrieved February 13, 2003, from http://fortschools.org/ms/goals.hmt.

Fort Atkinson, Middle School Middle School Teams. (n.d.) Retrieved August 12, 2003, from http://www.fortschools.org/ms/teams.htm.

Fort Atkinson Middle School Interdisciplinary Teams. (n.d.) Retrieved August 12, 2003, from http://www.fortschools.org/ms/Admin/Interdisciplinary.htm.

George, P. (2000). The evolution of middle schools. *Educational Leadership*, 58 (3), 40-44.

Gullatt, D. (1995). Effective leadership in the middle school. Paper presented at the Annual Conference of the Middle School Association.

Kew, D. (2000). *Middle level teaming—strength in collaboration.* Schools in the Middle. 9 (9), 39-40.

Lage, M., Platt, G., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education,* 31 (1), 30-43.

Maurer, R. (1994). *Designing interdisciplinary curriculum in middle, junior high, and high schools.* Boston, MA: Allyn and Bacon.

Mesko, J. (2001). *Integrating special subjects: A team approach.* Reston, Va. 80 (5), 38-39.

Moss, S. & Fuller, M. (2000). *Implementing effective practices: Teachers perspective.* Phi Delta Kappen, 82 (4), 273-276,

Ornstein, A. & Levine, D. (1989). *Foundations of education.* Boston, MA: Houghton Mifflin Company.

Oxley, D. (2001). *Organizing schools into small learning communities.* NASSP Bulletin 85 (625), 5-16.

Rossiter, D. (2002). *Perceptions of mathematics, science, and technology Teachers of an interdisciplinary curriculum in a middle school.* Unpublished masters thesis, University of Wisconsin-Stout, Menomonie, WI.

Sanders, M. (1999). Technology education in the middle level school: Its Role and Purpose. *NASSP Bulletin* 83 (608), 34-44.

Snyder, M. (2000). Broadening the interdisciplinary approach of technology education: connections between communications, language, and the literary arts. *Journal of Industrial Teacher Education.* 37 (4), 24-38.

Sterry, L., & Wright, T. (1987). *A guide for developing contemporary industrial arts/technology education*. Lansing, MI: Technical Foundations of America.

Stoehr, J. & Buckley, S. (1997). *Getting started, project for the integrated curriculum*. Tucson, AZ: Zepher Press.

Store for Knowledge. (2003). Retrieved, October, 20, 2003, http://www.storeforknowledge.com/itemdetails.cfm/ID/644

Tchudi, S., & Lafer, S. (1996). *The interdisciplinary teachers handbook.* Portsmouth, MA: Boynton/Cook Publishers, Inc.

Thomas, M. A., and Santanam, R. (2002). *NUMEC made significant advancements*. Valley News Dispatch, Aug. 28.

Winkein, R. & Schnell, J. (1995). Case studies of multidisciplinary approaches to integrating mathematics, science, and technology education. *Journal of Technology Education*, 6 (20), 59-74.

Wisconsin Department of Public Instruction. (1999). *Selected integrated and applied curricula in Wisconsin secondary schools 1999* (no. 99110). Madison, WI: Lifework Education Team Department of Public Instruction.

Wisconsin's Model Academic Standards. (1998). Wisconsin Department of Public Instruction. Retrieved March 7, 2003. http://www.dpi.state.wi.us/standards/index.html

Wright, T. (1996). Technology: An intellectual discipline. The Technology Teacher, 56 (2), 33-34.

Vollmer, J. (2002). *The increasing burden on American schools*. Poster ,Vollmer and Ass.

Zais, R.S. (1976). *Curriculum principals and foundation,* New York: Thomas Y. Crowell Company, Inc.

Appendix A
Cover Letter

Dear colleague,

I am pursuing a masters degree in industrial and technology education at the University of Wisconsin-Stout. The topic of my thesis is integrating technology education into core classes at Fort Atkinson Middle School. The information you provide will help develop a plan to integrate technology education units into an integrated curriculum here the Fort Atkinson Middle School.

Your involvement in this study is meaningful and will be greatly appreciated. Please take a few minuets to read this letter and complete the attached survey. Place the survey in my mailbox in the main office by **September 12, 2003**. I am asking all core and allied arts teachers at the Fort Atkinson Middle School to participate in this survey.

Your participation in this survey is strictly voluntary and you may discontinue your participation at anytime without prejudice.

> I understand the basic nature of this study and agree that the potential risks are exceedingly small. I understand the purpose of this study is to investigate inter-disciplinary curriculum and interdisciplinary development at Fort Atkinson Middle School. I further understand that information gathered will be held in the strictest confidence and will be destroyed at the conclusion of this study. I also understand the potential benefits that may be realized from the successful completion of this study. I am aware that the information requested is being sought in such a manner that no identifiers are needed so confidentiality is guaranteed.

Completion of this survey implies consent for participation

I look forward to sharing the results of this study as we work together.

Thank you for your participation.

Sincerely,

Steven Merkel

NOTE: Any questions or concerns about the research study should be addressed to Steven Merkel at the middle school, 563-7833 ext 514, the research advisor Dr. Kat Lui, Program Director, Training and Development Department of Communications, Education and Training, University of Wisconsin-Stout, Phone (715)-232-5634. Questions about the rights of research participants can be addressed to Sue Foxwell, Human Protection Administrator, U.W. Stout Institutional Review Board for the Protection of Human Subjects in research, 11 Harvey Hall, Menomonie, WI, 54751. Phone (715)-232-1126.

Appendix B
Survey

Please complete the following survey questions by **placing a check in the space provided to the left of your best choice**. Once completed, please return to Steven Merkel by **September 12, 2003**. You can place it in my mailbox in the main office. Thank you

1. In which discipline do you currently teach? (Check all that apply)
   _____Mathematics _____Science _____Language Arts _____Social Studies
   _____Allied arts

2. Years of teaching experience.
   _____0-5 _____6-10 _____11-15 _____16-20 _____+21

3. What grade level(s) do you teach? _____6^{th} _____7^{th} _____8^{th}

Please read and answer each of the following statements by circling your best response.

1 = Strongly Disagree **2** = Disagree **3** = No Opinion **4** = Agree **5** = Strongly Agree

4. Interdisciplinary curriculum is the study of a topic in your classroom that has themes/concepts related to topics/units currently being taught in other classes.

   1 **2** **3** **4** **5**

5. My current curriculum contains elements of interdisciplinary curriculum.

   1 **2** **3** **4** **5**

6. My current curriculum allows me the flexibility actively participate in interdisciplinary curriculum.

   1 **2** **3** **4** **5**

7. My teacher training did a good job in preparing me to participate in an integrated curriculum and teaching approach in my classroom.

   1 **2** **3** **4** **5**

8. I find it difficult to work with teachers of other disciplines on interdisciplinary curriculum.

   1 **2** **3** **4** **5**

9. Required curriculum, such as those for the state standards, makes it difficult to implement and participate in an interdisciplinary curriculum.

1 2 3 4 5

10. An Integrated curriculum could improve my current curriculum.

1 2 3 4 5

11. I would like to see more allied arts classes involved in an interdisciplinary curriculum.

1 2 3 4 5

12. I would be willing to modify my teaching units to allow for an inclusion of allied arts classes into interdisciplinary curriculum units.

1 2 3 4 5

13. Interdisciplinary curriculum can help students more fully comprehend topics and themes.

1 2 3 4 5

14. Interdisciplinary curriculum helps fulfill the mission statement of, "To move students towards educational excellence.

1 2 3 4 5

15. Interdisciplinary curriculum is just another educational idea that does not effect student performance.

1 2 3 4 5

16. Interdisciplinary curriculum, is studying a topic and integrating other disciplines into your classroom regardless of what others are teaching at the time.

1 2 3 4 5

Please include any additional comments you may have. Thank you