STUDENT PERCEPTIONS OF SET INDUCTIONS IN TECHNOLOGY EDUCATION

By

John M. Oman

A Research Paper

Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
With a Major in

Industrial/Technology Education

Approved: _2_ Semester Credits

Michael T. Nicolai
Investigation Advisor

The Graduate College
University of Wisconsin-Stout
August 2002

The Graduate College
University of Wisconsin-Stout
Menomonie, WI 54751

ABSTRACT

Oman John M.
(Writer) (Last name) (First) (Initial)

Student Perceptions of Set Inductions in Technology Education
(Title)

Industrial/Technology Education Michael T. Nicolai August 2002 56
(Graduate Major) (Research Advisor) (Month/Year) (No. of Pages)

Publication Manual of the American Psychological Association (APA)

The purpose of this study was to investigate the impact of set inductions on student interest in the technology education field. A previous study on the characteristics of effective set inductions was conducted in a middle school science classroom. With that study as a foundation, this study was designed to determine the characteristics of set inductions that gather and hold students' interest in a high school technology classroom. The hypothesis for this study is that student interest will increase from the use of set inductions in technology education.

Set inductions are to an educational lesson what an introduction is to a public speech. A set induction introduces an educational lesson to the audience through a variety of techniques. A set's purpose is to change mental gears, promote interest in the lesson, and inform the students of the expectations associated with the upcoming lesson. It may include a demonstration, a review of previously covered material, or an

activity. Anticipatory sets are generally performed at the beginning of a class and typically last five to ten minutes.

The study involves the presentation by the researcher of ten set inductions. The researcher developed each set according to the course topic, appropriateness to the course, and the timing of each performance. The subjects are students of a high school introductory technology course. Upon completion of each set, the student subjects were asked to respond to a questionnaire assessing their reaction to the set induction of the given topic.

Acknowledgements

I would like to thank my research advisor Mr. Michael Nicolai for all his help, direction, and leadership on this project. He guided me enthusiastically through the development, research, and conclusion of the research that is found in this document. Not only has his teaching and writing expertise led me through a valuable research project, he has instilled in me a desire to pursue my teaching career with enthusiasm and determination.

I would also like to thank my fiancée (soon to be wife upon completion of this project), Laura Graversen, for her love and encouragement for me through this last year of research. She has waited patiently for me to complete this project so that we can get married and move on with our lives. This great support has allowed for a successful project to take place.

Table of Contents

Appendices

CHAPTER I

INTRODUCTION TO THE STUDY

Introduction

Technology education is a discipline that utilizes a problem-based learning approach. This involves research and design, development, and application to society (ITEA, 2001, para 1). Applying up-to-date knowledge creates opportunities for students to solve problems within the students' context, which can ultimately be applied to a global setting (ITEA, 2001, p. 2).

A technology teacher may have valuable information in their presentation but if it is not presented in an inviting manner, the students will not be convinced that their effort will bring success (Dill, 1990, p. 31). Students that are interested in what is being taught are simply more motivated to learn (Oman, 2001).

A challenge for technology teachers is to capture the students' interest in the subject matter from the very beginning of the lesson. The use of anticipatory sets may help the teacher gain early student interest. A set induction is typically performed in the beginning of any effective lesson (Oman, 2001). It allows the instructor to redirect the students' attention and focus it toward the objective (Magruder, 2001, para 1). "Its purpose is to change mental gears, review and expand materials, heighten interest, and state expectations" Mark Oman concludes (2001, p. 6). To focus the students' attention on the technology course and not on other things, the teacher needs to aid them in changing mental gears. A review of previously covered material can take place as well as the expansion of the current lesson into related material. Introducing the class to something new or different during the set induction can heighten their interest to want to

learn more. Lastly, expectations can be stated during this set. For example, using the demonstration to illustrate how to perform an upcoming assignment is effective (Oman, 2001).

It is an accepted principle among educators that students cannot be forced to learn, "…but you [the instructor] can arrange conditions that will increase the probability of the motivation to learn becoming stronger" (Hunter, 1995, p. 31). These conditions are what teachers manipulate when they execute a set induction effectively. According to Madeline Hunter (1995) the conditions that affect motivation include: concern, feeling tone, interest, success, knowledge of results, and extrinsic-intrinsic motivation.

Concern deals with the amount of compassion or care had for a subject. Too much concern leads to anxiousness in some, while others may excel in this state (Hunter, 1995).

Feeling tone is the way something is said to a person. It can have a positive, negative, or neutral feel. Increased motivation stems from positive tone used in the delivery of a message (Hunter, 1995).

Interest is a condition that is acquired over time, often due to exposure. It usually can be related to two different things. The first is the meaning of the topic to the person (Hunter, 1995). Learning becomes easier as meaning becomes greater (Hunter, 1976). The second is an outcome of different or unexpected results (Hunter, 1995). Stimuli that is slightly different than what we are accustomed to is interesting to people (Postlethwait, 1977).

Success brings joy and confidence to a student when experienced. If the difficulty level is favorable for a student, success results. Success comes with effort, however. If their effort yields results, motivation is the product (Hunter, 1995).

Having knowledge of results allows students to strive for an even better outcome. Knowing what is done well and what can be improved motivates students when the results are given properly (Hunter, 1995).

The last condition comes from intrinsic and extrinsic motivation. Intrinsic motivation occurs when the student is rewarded from doing the work itself. Knowledge is usually what is gained. Extrinsic motivation is brought about by grades, social status, parental approval, or just to finish it (Hunter, 1995).

It is important to understand the psychology of students when preparing a set induction. Howard Gardner (2000) of the Harvard Graduate School of Education has researched how the mind processes information and identified four key views that influence learning. The first is a constructivist view that refers to how the mind seeks out information, searches for prior knowledge, sets goals, and makes an attempt to build upon prior knowledge to accomplish the goals. The second view is that human minds have many representations for the information it processes. Thirdly, humans are individuals and differences occur between them. Some students have better language skills and others are better visual learners. Last of all, ideas that are formed as a young child are not easy to change. When theories oppose a student's understanding, learning becomes more difficult (Gardner, 2000). These are a few of the psychological challenges that teachers face as they try to create interest in their classroom.

Increased attention to a lesson does not result from what we do, but rather how we do it. William Glasser, M.D. (1997) researched this idea in some detail. He believes that our need for power, freedom, fun, and to belong are the psychological motivations for what people want to do. Fulfilling any of these needs is considered pleasurable; if not, learning becomes more difficult. Students' interest increases when the teacher gives them the choices of what and how to learn. If it is presented in a manner that invites students to learn instead of forcing them, the student will subconsciously select one of their needs to fulfill. These four needs bring motivation to a higher level when engaged properly because everyone desires to meet them (Glasser, 1997).

Research supports that set inductions have been used for several decades in educational settings. Studies conducted conclude that when unexpected results occur in a set induction, students exhibit the most interest in a topic. Psychological studies state that the students' minds are motivated by choice.

A review of the literature confirms the benefits of assessing strategies for generating interest in a technology education lesson. Studies have also shown that the set induction is an effective method of building students' interest. Therefore, the research hypothesis for this study is that the use of set inductions in technology education will foster the students' interest in the topic.

Statement of the Problem

Motivation to learn academic content usually does not occur as the product of an extrinsic system or grades. A need occurs "…to explore more systematically the conditions under which students are motivated to think" (Dill, 1990, p. 31). Minimal

research exists to explain if and how successful set inductions conducted in a technology education classroom promote students' interest and motivation to learn.

Purpose of the Study

The purpose of this study was to determine if set inductions create interest and motivation to learn more in technology education students. Several types of set inductions were demonstrated in a classroom and evaluated by students for the level of interest that resulted in them upon viewing each. The research will include analysis of student interest and an evaluation of teacher enthusiasm. This study examines a high school technology classroom in a rural public school system during the third term of the 2001-2002 school year. Using these results, technology educators can write and prepare set inductions to be used in their classroom.

Research Questions

This study will focus on the following questions:

1. *Are set inductions favorably received by students in the technology education discipline?* This question was designed to determine if set inductions are an asset to a technology instructor's lessons.
2. *Do set inductions encourage further study of a topic on the part of students?* The purpose of a set induction is to gain interest and ultimately promote the students to want to learn more on their own. This question is designed to determine if the purpose of a set induction is being achieved.
3. *What role does instructor enthusiasm and clarity play in the acceptance of a set induction by students?* Several factors influence the effectiveness of set

inductions. Teacher enthusiasm is typically a prominent factor. The level of influence of teacher enthusiasm on set inductions can be determined in this study.

Significance of the Study

1. Student performance can increase through improved interest in what is going on in the classroom. If the students enjoy what is taking place, they will tend to work harder towards their goal.

2. Set inductions relate upcoming instruction to previous knowledge. This knowledge provides the motivation to learn more about what they already know. This study will examine effective ways to activate prior knowledge so learning will be enhanced.

3. Technology teachers will benefit from this study. Valuable methods of generating interest, attention, and motivation will be developed for their use in the classroom. Having this model will aid the teacher in producing quality attention-getters on a daily basis.

4. The more focused the students become on their work, the more efficient classroom management tends to be. A good attention-getting demonstration can draw the students into the subject matter.

5. Teachers, in general, can use these concepts to increase class interest in just about any subject. Curriculum coordinators and learning specialists can use it to enhance their work. Science and math teachers will be able to use these demonstration ideas as well.

Limitations of the Study

1. Researcher bias is difficult to avoid when believing a certain outcome. The researcher prefers certain set induction methods for teaching. These methods must be evaluated fairly in comparison to the other sets.

2. A certain number of survey responses may not reflect the students' actual perception. A variety of factors may influence the responses. This may affect the validity of this study.

3. This study will be limited to grades nine, ten, and eleven in a public school setting. With a three-year possible age difference in the subjects of the study, the instructor can influence interest differently. Prior knowledge of the students can be significantly different so the demonstrations will be perceived differently.

4. The study will be limited to technology education courses. The results may not reflect solutions for regular education set inductions. The results will reflect only the interest of the students who enroll in these courses.

5. Classroom surroundings and personal issues can influence the measurement of student interest. Other objects in the room can attract the students' attention away from the teacher. What is going on in the students' lives can take their mind off the lesson.

** It should be noted that most of these limitations represent the daily atmosphere in any classroom. In actuality, these issues are going to be addressed by educators regardless of what the class activity is.

Definition of Terms

1. *Set induction* (also known as '*anticipatory set* or '*set*')– "…a focusing event to grab the students' attention…" (Oman, 2001). Normally takes places at the beginning of a class period but is not limited to; can be performed when introducing a topic (Oman, 2001).
2. *Interest* – "A feeling that accompanies or causes special attention to an object" (Merriam-Webster, 2000, p.609).
3. *Motivation* – "Something that causes a person to act" (Merriam-Webster, 2000, p. 758)
4. *Technology* – "The practical application of knowledge" (Merriam-Webster, 2000, p. 1206).

CHAPTER II

REVIEW OF LITERATURE

Technology education has had its course objectives, curriculum, and title modified numerous times since its conception to adapt itself to the current needs or beliefs of society (Krueger, 1954). Beginning with the apprenticeship system and moving through the manual training, manual arts, industrial arts periods, the discipline has a current focus on technology education. Throughout these periods, one of the consistent elements is the need for the development and retention of student interest in the subject. The method of reaching this goal has changed over the years but the idea is still the same. A more recent method for gaining interest is through the use of set inductions. The review of literature will cover cognitive psychology, communication barriers, instructors' roles, motivation, advanced organizers and meaningful learning related to set inductions. Research validity will be addressed as the researchers themselves debate it.

Cognitive Psychology

Psychologists believe that learning is a process of change. The change may be behavioral or in the way thinking occurs (Dole and Sinatra, 1998). Either way, knowledge is constructed and reconstructed each time information is learned. This knowledge is constructed upon memory structures that possess an understanding of related content. Reconstruction occurs while the person uses their knowledge and acquires new information (Herschbach, 1998).

Cognitive theorists have developed a number of models in attempt to explain learning. Though differences exist between theories, sensory, memory, and processing components are the common cognitive processes which relate to set inductions (Herschbach, 1998).

Brief processing occurs in the sensory component to analyze information before transferring it to the cognitive system. Audio and visual stimuli are processed. This stage is often affected by distractions and perception difficulties, which result in a lack of attention. To accommodate for this, instruction should take place in a way and at a rate that the student would perceive the information (Herschbach, 1998).

Short-term and long-term memories are both a part of the memory component. Information is held for a moment before it is transferred into long-term memory. It is estimated that three to eight pieces of information can be processed at one time. It is up to the instructor to present the right amount and the right form of information that allows for rapid processing. Information can be lost if it is not processed rapidly or reconstructed (Herschbach, 1998).

Communication Barriers

Communication barriers exist in education that prohibit the learner from absorbing what the message was intended to say. To account for this problem, teachers must get the attention of the learner, have the message interpreted properly, and use the information appropriately. Communication barriers come in a number of forms. It could be the result of noise, passive listening, or selective listening. Also, it could stem from a lack of common knowledge between the teacher and the learner,

misinformation about the correlation of a symbol and what it represents, or the message is presented unclearly (McIntyre-Birkner and Birkner, 2001). It is possible that a message is understandable to one student but not to another. Also, the quality of a message is subject to each individual's interpretation and interest (Dole and Sinatra, 1998).

In order for quality instruction to take place, a two-way learning environment must be developed. This allows for the teacher to know whether their message was understood or not. An effective method to determine if the message was comprehended is for the teacher to ask the following question of him/her self: Upon the completion of the set induction, what will the students be able to do with the information? "Putting yourself in the learner's place can help you analyze the message from his or her perspective" (McIntyre-Birkner and Birkner, 2001, p.13).

Learning transfer takes place when prior knowledge is activated and affects the way that new information is learned and related. "Transfer is generated by the similarity of the situation in which something is learned and the situation to which that learning may transfer" (Hunter, 1973, p. 11). As the complexity of a lesson increases, the number of ways that knowledge is activated must also increase if the learner is to understand. If this knowledge is not activated, the student will not derive meaning. Providing a context for information allows for a connection to be made with previous knowledge. Real-world contexts demonstrate how new knowledge will affect students' lives (Schell and Rojewski, 1993).

Technology Instructor Roles

A technology instructor has a wide variety of roles that must be performed in order for his/her students to learn effectively. First, they must perform their job as a professional. Content for their course has to be selected based on their audience's background and the objectives to be met by the class. Along with content, they need to establish an environment that allows for the students to interact (Kellough, 1993). This environment allows for the teacher to guide them through the learning process. Finally, an evaluation of the learning is done to determine if the objectives have been met (Miller, 1990).

Second, teaching requires technical competency. Teachers have to be knowledgeable on the subject and understand the skills required for application. In addition, "an instructor's work experience increases credibility and provides examples that can be used to make instruction interesting and meaningful" (Miller, 1990, p. 3). On the other hand, it is important to understand that high competency can result in basic processes not being recognized as a part of necessary instruction. To present up-to-date material, an instructor must continue studying the field and experience the subject first-hand (Miller, 1990).

Third, personal competency is essential to effective instruction. Certain behaviors that teachers have affect their performance as well as the students' behaviors. Instruction is often directly affected from emotional and psychological characteristics. Attitudes result from interactions with others and life experiences. Typically, "…students are more motivated to learn under the direction of an instructor interested in students as individuals and in the particular subject" (Miller, 1990, p.7).

When the teacher portrays a positive attitude, reinforcement is given to the student that what they are learning is valuable to them. Another valuable characteristic is to be approachable and available for the students to meet with. This allows for relationships to develop with the students. Being considerate of others impacts learning. Reacting towards a student's comments or actions in a demeaning manner can hinder a student's will to learn more. The last personal competence is friendliness. A teacher cannot expect cooperation if they continually "trick" the class into learning. A smile or greeting is helpful in relieving student apprehension concerning the instructor. Friendliness is often established through patience, self-control, and showing maturity while learning takes place (Miller, 1990).

Motivation

In addition to using transfer to facilitate learning, motivating students will produce a desire in them to progress in school. A reason for learning is needed before it can begin (Oman, 2001). This may be either an intrinsic or extrinsic reason.

Intrinsic motivation is often found in students with high self-confidence. They enjoy obtaining knowledge and testing what they already know (Dole and Sinatra, 1998). However, not all students are motivated intrinsically. When a teacher shows his/her enthusiasm towards a lesson, learning becomes more efficient. This excitement invites the students to focus their attention and increases their desire to learn more (Oman, 2001).

For those that are extrinsically motivated, a need for effort must be portrayed to the student. In order for effort to be produced, the student must know why they should

be involved. A personal value to the task and a belief that they can accomplish the task are both essential for effort to result. "…The learning task needs to be presented in a way that is engaging and meaningful to the student, and in a way that promotes positive expectations for the successful achievement of learning objectives" (Small, 2000, p.1).

There are four strategies identified by Keller (1983) that create motivating instruction: attention, relevance, confidence, and satisfaction. Attention strategies bring interest to the subject and sustain it. Relevance strategies relate the students' interest. Confidence strategies give a positive outlook on the subject. Satisfaction strategies reinforce why something is important for intrinsic and extrinsic reasons. By using any combination of these strategies, interest will be created in the lesson and the teacher's job will be made easier.

Introducing a Lesson: Advanced Organizers and Meaningful Learning

An analogy can be made between the introduction of a lesson to the appetizer of a meal. Appetizers prepare palettes for what is to come. Similarly, an introduction stimulates interest in what is to be learned. The purpose of an introduction is the "…(1) orienting your students to the objectives of the lesson, and (2) getting and holding your students' attention" (NCRVE, 1983, p.8).

Advanced organizers are designed to reinforce students' cognitive structures. The cognitive structure that exists in students' minds determines how meaningful information is and to what extent it will be retained. Generally, advanced organizers are presented in an abstract manner in the introduction to the lesson. Effective organizers

include the use of concepts, terms, and analogies that are currently used by the students. Their purpose is to interrelate previously learned material, yet discriminate it from the learning task. They are used to incorporate both familiar and unfamiliar material. (Ausubel, 1960).

By clarifying previous cognitive structures, the acquiring and retaining of information is promoted in the learner. "By making learning meaningful you can reduce the amount of time you need to spend in practice" (Hunter, 1995). Meaningful learning is strongly correlated with previous cognitive structures. The ability to apply this new knowledge creatively is essential when new situations are encountered. Suggested advanced organizers include the providing of related information to a topic, such as a newspaper article, or the explanation of what a topic generally means. For example, to learn about *culture*, the students need to know what defines the term before they can learn about it (Joyce and Weil, 1986).

Ausubel (1960) feels that learning does not depend on the presentational method but rather on the learner and the material. However, more recent research by Joyce and Weil (1986) found that: If the learner begins with the right "set," and if the material is potentially understandable, then meaningful learning can occur. The key to meaning involves solidly connecting the new learning material with existing ideas in the learner's cognitive structure. In other words, we must relate and reconcile what we know with what we are learning. A meaningful learning set implies that the learner must be ready to comprehend and relate what is being presented, rather than to memorize it verbatim (p. 73).

Set Inductions

Set inductions have not been researched extensively but rather have been included as a part of motivational research. There was one recent study that did focus specifically on the role of set inductions. This study involved students in an 8th grade science course. Fifty set induction demonstrations were performed, evaluated, ranked, and analyzed. Mark Oman (2001) concluded that, "Student interest in science was increased by demonstrations that have unexpected results, unusual results, and those that involve rapid stimulus changes" (p. 15). His findings are supported by a variety of educational research studies.

Researcher Perspectives

As it was introduced in Chapter 1, set inductions accomplish a number of tasks. Including everything from changing mental gears to heightening interest, set inductions give a class a head start on learning. Stirring motivation inside a student to learn is a key element to a successful set induction as well. Madeline Hunter is a well-known educational practitioner who has addressed several ways in which motivation is influenced, which are cited in this work. She is an advocate of using the set induction. Her writing and educational models have been a part of an on-going debate among researchers and educators.

Madeline's validity has been questioned by a number of people in the field. The claim is that her work does not cite supporting evidence or research. One of several anti-Hunter activists, Richard A. Gibboney (1987) states that, "Hunter has not produced the research evidence to support her claim for improved learning" (p.49). He goes on to

say that in her book, *Using What We Know About Teaching,* no bibliography or research citations were provided.

Hunter (1987) responded to Gibboney by saying, “It seems odd for Gibboney to be so adamant about the research behind my model and yet fail to cite any research to support all the recommendations he derives from Dewey.” Gibboney (1987) is a follower of Dewey’s idea that “the primary aim of teaching is to cultivate thought.” Hunter (1987) questioned his support for Dewey’s position. She is in agreement with this statement but does not know of any support for it. This battle of research validity went back and forth in the 1980s.

One of the many Hunter supporters was Pat Wolfe (1998). She used neuroscience as a support for Hunter’s work. In regards to set inductions:

This emphasis on setting the stage for learning fits precisely with the research on the attentional mechanisms of the brain…a set induction increases the possibility that the brain will search through the right networks and attend to the information that is relevant for a particular topic or issue (p. 61).

Neuroscience does not support one particular method of teaching but believes that it does add to a knowledge base for learning. Wolfe (1998) concludes that Hunter’s positions are in alignment with current research of the brain.

These differing viewpoints of Hunter’s work suggest the need for the study of set inductions.

CHAPTER III

METHODOLOGY

The methods and procedures used in this study of Student Perception of Set Inductions in Technology Education are explained in this chapter under the headings of (1) method of study, (2) sample selection, (3) instrumentation, (4) procedures followed, and (5) method of analysis.

Method of Study

The study of Student Perception of Set Inductions in Technology Education stems from a previous study that was conducted in an 8th grade science classroom. The researcher, in that case, was a science educator who wanted to know which type of set induction would stimulate student interest in the topic of the lesson. Fifty set inductions were performed and evaluated. Upon viewing each set induction, the students were asked to respond to the statement, "This demonstration increases my interest in science" (Oman, 2001) with their level of agreement. A Likert scale was used to measure their agreement with the statement.

The study of set inductions in science education allowed for further study of set inductions in the technology education field. Assuming that science concepts are commonly integrated into technology courses, the researcher, in this case, determined that basing a study in technology education off of the research that previously took place in a science classroom would create a platform for comparison.

Similar to the science study, ten set inductions were performed over the course of a ten-week class. The students viewed each set. Immediately following, they were

given a questionnaire containing a series of statements (See *Instrumentation* below). They were to mark the appropriate selection to indicate their level of agreement with each statement. The statements were designed to determine whether interest was generated, what the influencing factors were on their interest, clarity of the purpose, and whether it promoted further learning.

Sample Selection

The science study took place in three sections of 8th grade science in a rural Wisconsin school district. There were 61 student participants.

This follow-up Technology Education study occurred in another rural Wisconsin district. Limited by the classes that the researcher was assigned to teach, the technology set inductions were performed in one section of a high school Principles of Technology I class. The course curriculum was designed to introduce a variety of topics of technology to the students that they should know before they enroll further in advanced technology courses.

Instrumentation

For each set induction, the survey instrument contained five statements to which each student would respond to with their level of agreement (See *Appendix B*). The statements were designed to allow little room for interpretation by the subjects, produce data that demonstrates the value of each set, and to create efficient data tabulation. Outlined below are the statements used for each set induction. Following each statement is an explanation of the purpose of the statement.

1. *I found the activity to be interesting.* This statement was necessary because it immediately established an overall opinion towards the set induction by the student.
2. *The introduction showed me something that I had not seen before.* This statement was designed to determine the amount of prior knowledge that the student had and whether or not viewing the set induction activated it.
3. *The teacher was enthusiastic about teaching the activity.* There are many external influencing factors on students' attention. The teacher's enthusiasm was identified as one major influential factor (positive/ negative) that could alter the results of the survey. Therefore, this statement was developed to determine how the teacher's enthusiasm played a role in interesting the students to learn.
4. *It was clear to me what the introduction was trying to teach.* Generally, the teacher attempts to make his/her point clear for better understanding. Sometimes, provoking related thoughts is their purpose and the point will be made later. This statement was written to determine if the students understood the content of the set induction.
5. *The introduction made me want to learn more about the topic.* A determination of whether the set induction was successfully performed was necessary. In accordance with the literature review, the researcher determined success to be whether the students became interested enough to learn more about the topic.

The subjects responded to each statement by marking the following criteria:

1.) Strongly Agree

2.) Somewhat Agree

3.) Somewhat Disagree

4.) Strongly Disagree

5.) No Opinion

The “No Opinion” option was designed to allow students to express that the set had no impact positively or negatively on them.

Procedures Followed

Parental consent was obtained prior to the start of the set inductions in order for the students to be able to participate in the study (See *Appendix D).* The school principal and district superintendent were contacted for permission and approval to do the study in their school. Their approval was given prior to commencement of the study.

The survey contained instructions that described what the students should evaluate and how they should score this evaluation. The surveys were distributed after each set induction was completed. The students were asked not to compare sets to sets that they had previously witnessed, but to evaluate how they felt about each individual set induction.

Set inductions used in technology education are commonly used to gain attention and interest of the students in a lesson. The set inductions studied in this case were designed for that sole purpose. As stated earlier, the objectives for this study are to identify the characteristics of quality set inductions that can be used by technology

educators and what interests technology students the least and the most about set inductions. When designing each of the ten different sets, the research objectives were focused upon in order to maintain continuity throughout the entire study. Each set was designed to occur in approximately five minutes of time, activate students' prior knowledge of the topic, and initiate discussion that leads into the body of the lesson. Outlined below is a summary of each of the set inductions. For a complete explanation of each set induction, see A*ppendix A.*

A.) Packaging Shipping Simulation

Set Induction Objective: To show students something that they had not seen before.

This set induction simulated the shipping environment that a basic package would encounter in transit with Federal Express. It demonstrated a variety of potential damaging situations to a package as well as where a package must go between the source and its destination.

B.) Introduction to Air Transportation

Set Induction Objective: To demonstrate the upcoming project prior to any lecture on the topic.

By demonstrating what the students would be doing later in the laboratory portion of the class, the set induction was intended to generate interest towards the upcoming lesson. The instructor created an airplane propeller and mounted it to a DC motor. An instrument was also built to measure wind speed. With the students observing, the propeller was engaged and the wind speed was measured.

C.) Bernoulli's Principle

Set Induction Objective: To show students something that they had not seen before.

This lesson was introduced with a set induction that required the teacher to have a few essential pieces of equipment; a hair dryer and a ping-pong ball. The hair dryer was turned on and aimed upward, towards the ceiling. A ping-pong ball was placed in the path of the moving air. The result was that the ball was suspended in air from the difference in air pressure created.

D.) Introduction to Drafting

Set Induction Objective: To help students access previous knowledge by activating their schemata.

From the use of a series of questions and statements, the instructor attempted to have the students attach their own meaning to what they already know about the topic. The questions were designed to be relevant to the students' lives and pertinent to the lesson.

The students were asked about the types of measurement that they had done previously, whether it was with a ruler or another measuring device. They were also asked why measurement is important to them and the world around them. A floor plan was displayed to provide an example of how measurement is critical to the people who read drawings.

E.) Dimensioning CAD drawings

Set Induction Objective: To show students why it is important to have dimensions on a drawing.

The students had being using AutoCAD software to draw various objects assigned by the teacher. Their drawings, at this point, did not include

dimensions. The set induction included questions, which asked how someone would use their drawings to make the object accurately. The example of the floppy disk manufacturer 3M was used to show how the dimensional information on their drawings needed to be accurate in order for someone to make the disk properly.

F.) Rule of Thirds

Set Induction Objective: To pique the students' interest to learn more about proper photography techniques.

The set induction consisted of a series of questions along with two pictures being displayed. One pictured was the original, which had a person standing in the very center of the photo. The second photo was the same photograph, except that it had been cropped. The person now appeared to lie about one-third of the width of the photo from the right and from the bottom. This photo complied with the Rule of Thirds. These two photos were displayed and the students were asked to determine what was the difference between the two. This led into a lesson on proper photography techniques.

G.) Introduction to Space Transportation; Model Rocketry

Set Induction Objective: To demonstrate the upcoming lab activity that the students would be participating in during that class period.

This set induction came as a part of a review from previous lecture material and as a way to show the students what they would be doing later on in the laboratory. The progression of stages that a rocket goes through while in flight was demonstrated. This was performed with a model rocket that the students would be constructing later on. By showing them the lab activity to

come, the intention of the set induction was that the students would become interested in the subject of the following lecture.

H.) Fixed Route Vehicles; Brain Teaser

Set Induction Objective: To obtain the students' attention, but not directly on the topic at hand.

This set induction was intended to activate the students' minds in a way that they would find enjoyable, in a non-academic way. It also was designed to direct the students' thoughts away from whatever they were previously doing/thinking about before class and on to the lesson.

The students were asked, "How can you cut a doughnut into 12 pieces using only 3 cuts?" They worked towards the answer in groups. The question was totally unrelated to the topic of land transportation.

I.) Bridge Structures

Set Induction Objective: To show something to the students that they had never seen before.

Set inductions do not always involve a lot of teacher interaction. In this case, the set induction primarily consisted of a brief video clip about bridges. The video contained a segment about the Tacoma Narrows Bridge, which tended to sway severely in the wind. This was not a common occurrence, so it was designed to show the students something new.

J.) Basic Energy: Torque

Set Induction Objective: To demonstrate a concept that the students have previous experience with.

Since most students have seen a racetrack, they should have an understanding that the person in the outside lane has to start farther ahead in order to make up the extra distance that they would have to run.

The teacher demonstrated this concept in the classroom with the help of a student. The teacher walked a small circle in the middle of the room while the student walked the perimeter of the room, trying to keep up with the teacher. The student had to run much faster. This idea was applied to the concept of torque.

Data Analysis

A one-way analysis of variance of the data was completed. This type of analysis allows for a comparison of the individual statements. A cross tabulation of the results was performed to detail the number of responses to each statement for each set induction.

CHAPTER IV

RESULTS AND DISCUSSION

This study involved a survey of high school students enrolled in an introductory technology course. The respondents were given a survey containing five statements for which they were to respond to according to their level of agreement. The agreement levels were assigned the following number values; strongly agree = 4, somewhat agree = 3, somewhat disagree = 2, strongly disagree = 1, no opinion = 0 (missing). No opinion responses were indicated as missing and were not included in the respondent sample.

Response Similarity Among Set Inductions

An analysis and discussion can take place on all ten set inductions as a single entity because of the high level of statistical similarity in responses. *Table 1* demonstrates the similarity of responses through the one-way analysis of variance of the results. It also confirms the fact that the means are statistically similar. The F-value indicates the analysis of variance. All five values are not significant, therefore a single analysis can take place. A complete summary of the raw data of each set induction is found in *Appendix C.*

Table 1

Statement	**F**	**Sig.**
I found the activity to be interesting.	1.81	.313
The intro showed me something that I had not seen before.	.942	.492
The teacher was enthusiastic about teaching the activity.	1.384	.203
It was clear to me what the intro was trying to teach.	.878	.547
The introduction made me want to learn more about the topic.	1.423	.187

Exact Probability Value = .0500 at .05 level, .0100 at .01 level
Critical Value = 1.96 at .05 level, 2.575 at .01 level

Response Means

Table 2 displays the response means to the level of agreement with each of the statements on the survey for the individual set inductions. Forty-seven of the fifty response items scored at the 3.00 or higher level. The range of response means was from a low of 2.83 to a high of 3.83. For each of the response statements the range of means was as follows: The response means of the statement *I found the activity to be interesting* scored a range of 3.08 to 3.83. *The introduction showed me something that I had not seen before* scored 2.83 to 3.54. *The teacher was enthusiastic about teaching the activity* scored 3.00 to 3.67. *It was clear to me what the introduction was trying to teach* scored 3.08 to 3.67. *The introduction made me want to learn more about the topic* scored 2.85 to 3.73. These levels suggest a high level of favorable reaction to set induction activity.

Table 2

	I found the activity to be interesting	The intro showed me something that I had not seen before	The teacher was enthusiastic about teaching the activity	It was clear to me what the intro was trying to teach.	The intro made me want to learn more about the topic.
Packaging Shipping	3.50	3.18	3.67	3.58	3.27
Air Transportation	3.58	3.42	3.25	3.67	3.17
Bernoulli's Principle	3.31	3.31	3.45	3.54	3.42
Drafting	3.21	2.93	3.07	3.33	2.85
CAD Dimensioning	3.08	2.92	3.30	3.46	3.17
Photography - Thirds	3.46	3.00	3.38	3.33	3.31
Model Rocketry	3.62	3.18	3.23	3.42	3.25
Fixed Route Vehicles	3.83	3.54	3.67	3.08	3.73
Bridge Structure	3.21	3.21	3.00	3.08	3.46
Basics of Torque	3.15	2.83	3.33	3.15	3.54

Ranking of Response Means

Table 3 ranks the response means of the set inductions of each statement. Keep in mind that the difference in means between the "most" and "least" favorable responses for each statement is minimal.

Table 3

	I found the activity to be interesting	The intro showed me something that I had not seen before	The teacher was enthusiastic about teaching the activity	It was clear to me what the intro was trying to teach.	The intro made me want to learn more about the topic.
Packaging Shipping	4	5	2	2	6
Air Transportation	3	2	7	1	9
Bernoulli's Principle	6	3	3	3	4
Drafting	8	8	9	7	10
CAD Dimensioning	10	9	6	4	8
Photography - Thirds	5	7	4	6	5
Model Rocketry	2	6	8	5	7
Fixed Route Vehicles	1	1	1	9	1
Bridge Structure	7	4	10	10	3
Basics of Torque	9	10	5	8	2

Findings

The findings of this study show a high level and a similarity of responses. This includes the levels of influence of teacher enthusiasm and clarity, prior knowledge and the overall favorable level of the responses to set inductions. The similarity of the responses allows for conclusions to be drawn about set inductions as a whole.

Acceptance of the Hypothesis

As stated earlier, *the research hypothesis for this study is that the use of set inductions in Technology Education will foster the students' interest in the topic.* The

hypothesis for this study is accepted as the results demonstrate a statistically significant level of agreement between the mean responses and the hypothesis.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was based on a previous study conducted in a science classroom. The study of anticipatory sets (set inductions) in a science classroom setting indicated that "student interest in science was increased by demonstrations that have unexpected results, unusual results, and those that involve rapid stimulus changes" (Oman, 2001). The purpose of studying set inductions in technology education was to determine if set inductions create interest and motivation in this discipline.

Restatement of the Problem

Motivation to learn academic content usually does not occur as the product of an extrinsic system or grades. A need occurs "…to explore more systematically the conditions under which students are motivated to think" (Dill, 1990, p. 31). Minimal research exists that suggests why successful set inductions conducted in a Technology Education classroom promote students' interest and motivation to learn.

Methods and Procedures

The study took place in an introductory technology course at a rural Wisconsin high school of about 400 students. The researcher performed a set induction at the beginning of ten different class periods. There were 16 students enrolled in the course. Since the subjects were minors, they required parental permission to participate in the study. Only 14 returned their parental permission form so this became the subject pool. The students were surveyed immediately upon completion of each of the set inductions. The survey included five statements concerning student interest created from the set

induction, prior knowledge, teacher enthusiasm and clarity, and whether the set promoted further learning.

Major Findings

The responses generally scored above three on a four-point scale (1=low, 4= high). The responses also scored in a narrow range. A small amount of variability can be found in the results. The range of response means was from a low of 2.83 to a high of 3.83.

Conclusions

The conclusions for this study are based on the research questions that were stated in Chapter 1. Each conclusion will stem directly from its corresponding question.

1. *Are set inductions favorably received by students in the technology education discipline?* The results suggest that set inductions are received favorably. All of the response means to the ten sets scored higher than the "somewhat agree" level (3.00) for the statement *I found the activity to be interesting*. Of these results, the lowest scoring sets also ranked low in *the introduction made me want to learn more about the topic* category. *Student interest* scores were relative to the level of results for *teacher enthusiasm*. Two conclusions can be drawn from these results. First, if a student finds interest in a topic from viewing a particular set induction, they are likely to become more motivated to want to learn further about the subject. For example, in the set induction called "Bernoulli's Principle", the instructor demonstrated how fast moving air traveling around a ping-pong ball creates a low-pressure area above

the ball. As a result, the ball is suspended in air. From the results, this set induction produced a high level of interest and a high score of student motivation to want to learn more. Second, the level of student interest correlates with the amount of enthusiasm a teacher has for teaching the set induction. For example, teacher enthusiasm also scored high in the Bernoulli's Principle set induction. This suggests that when the teacher is enthusiastic, the students are more likely to become interested. It is possible that the inverse is true as well; as student interest increase instructor enthusiasm also increases. The set inductions that had the four highest response means to *teacher enthusiasm* also scored in the top six in *interest* in the topic.

2. *Do set inductions encourage further study of a topic on the part of students?* The *teacher enthusiasm* category ranked similarly to the *motivation to learn more* ranking. This indicates that how motivated to learn students become is relative to the amount of enthusiasm the teacher has. The clarity of the lesson did not correlate with their desire to learn more. The results were inconclusive as to whether clarity played a role in further learning. In conclusion, the high levels of scores indicate that set inductions should promote further learning about a topic. Other than teacher enthusiasm, the reasons for such high scores could not be determined from this study.

3. *What role does instructor enthusiasm and clarity play in the acceptance of a set induction by students?* As concluded above, the teacher's enthusiasm is relative to the level of motivation to learn more that a student has. The results were inconclusive as to whether clarity played a role in further learning.

However, one interesting finding was in the Fixed Route Vehicle; Brain Teaser set induction. The purpose of this set was to stimulate creative thinking in broad terms rather than introduce a specific technology concept. A simple brainteaser was used to change the students' mental gears. This was done in an entertaining, non-academic way. This set ranked highest in four categories; *I found the activity to be interesting*, *the introduction showed me something that I had not seen before, the teacher was enthusiastic about teaching the activity, and the introduction made me want to learn more.* In the, *it was clear to me what the introduction was trying to teach* category, it ranked ninth overall. Given that the goal of this set was attitudinal rather than topic competency-based, it is logical that the students would find the goal vague. This suggests that clarity of set inductions is not a major factor in the interest and motivation of students. It is, of course, critical that the instructor understands the goal of the set induction. Determining the influence of clarity is a suggestion for further study (see *Recommendation for Further Study #2*).

Recommendations Related to this Study

1. The highly favorable responses suggest using a variety of set inductions in educational lessons. Repetition of similar set inductions will prove to be less effective. Variety will give spice to a teaching lesson.

2. Instructor enthusiasm appears to play a critical role. Use enthusiasm while demonstrating a set induction. Regardless of the other factors that influence student interest, enthusiasm should be used when delivering a set

induction. As this study shows, enthusiasm is the biggest factor in a student becoming motivated from a set induction.

Recommendations for Further Study

1. The sample size for this study was fourteen. The fourteen subjects were taken from one class. For further study, sample multiple sections of a class. This will reduce the tendency of a pattern developing in the responses.

2. The set inductions in this study were designed with a variety of educational objectives. The objectives were directed at each of the statements that the students responded to in the survey. For further study, artificially alter the clarity of the directions. However, be sure not to hinder the students' opportunity to learn. Determine exactly how much this category affects student interest.

3. For further study, intentionally alter the level of enthusiasm exhibited by the teacher. Be sure not to hinder the students' opportunity to learn. Determine exactly how much this category affects student interest.

4. Identify the specific characteristics of effective set inductions that can be used by technology teachers. Understanding how interest is stimulated efficiently through a set induction would be extremely useful in terms of designing the actual set inductions. In essence, it may be helpful to discover what does and does not make for an effective set induction.

5. Identify what interests technology students the least and the most about set inductions. A teacher has to be able to adjust his/her lessons in order to communicate their message better the next time, if it did not go as planned.

Identifying these problems will enable the instructor to deal with them properly when they arise and make adjustments as they happen. On the other hand, knowing which characteristics are already effective in a lesson is beneficial.

Final Note From the Researcher

The researcher undertook the study of Student Perceptions of Set Inductions in Technology Education so that the effectiveness of set inductions could be determined. Set inductions have been used for several decades in education. Set inductions have been studied in other disciplines, however, minimal research exists that suggests the effectiveness of set inductions in technology education.

Set inductions appear to be an effective method for technology educators to use when beginning their lessons. Further studies are necessary to determine the least and most effective characteristics of set inductions in technology education.

References

Ausubel, D.P. (1960). The Use of Advance Organizers in the Learning and Retention of Meaningful Verbal Material. Journal of Educational Psychology. 267-72.

Dill, D.D. (1990) What Teachers Need to Know. San Francisco: Jossey-Bass.

Dole, J.A. and Sinatra, G.M. (1998), Reconstructing Change in the Cognitive Construction of Knowledge. Educational Psychologist, vol.33(2/3) 109-128.

Gardner, H. (2001). The Complete Tutor. Technos: Quarterly for Education and Technology. Retrieved June 14, 2001 from findarticles.com on the World Wide Web: http://www.findarticles.com/cf_0/m0HKV/3_9/66408221/print.jhtml

Gibboney, Richard A. (1987). A Critique of Madeline Hunter's Teaching Model From Dewey's Perspective. Educational Leadership, 46-50.

Glasser, W. (1997). A New Look at School Failure and School Success. Phi Delta Kappan. 597-602.

Herschbach, D.R. (1998) Reconstructing Technical Instruction. Journal of Industrial Teacher Education, vol, 36 no.1, 36-61 (Fall 1998). Retrieved June 20, 2001 from: Wilson Web.

Hunter, M.C. (1973). Teach for Transfer. El Segundo, CA: TIP Publications.

Hunter, M.C. (1976). Teach More – Faster! El Segundo, CA: TIP Publications.

Hunter, M.C. (1987). Beyond Rereading Dewey…What's Next? A Response to Gibboney. Educational Leadership, 51-3.

Hunter, M.C. (1995). Improved Instruction. Thousand Oaks, CA: Corwin Press.

ITEA. (2001). What is Technology Education? Retrieved June 28, 2001 from the World Wide Web: http://www.iteawww.org/A1.html

ITEA. (2001). What do students learn in a technology class? An Educational Imperative. [brochure] retrieved June 28, 2001 from the World Wide Web: http://www.iteawww.org/AdvocacyBro03.pdf p. 1-2.

Joyce, B. & Weil, M. (1986). Models of Teaching (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.

Keller, J.M. (1983). Motivational design of instruction. In C.M. Reigeluth (Ed.), Instructional design theories and models: An overview of their current status. Hillsdale, NJ: Erlbaum.

Kellough, R.D. et al. (1993). Middle School Teaching: Methods and Resources. New York, NY: MacMillan Publishing Company.

Krueger, M.L. (1954). Analysis of apprentice enrollments in Wisconsin schools of vocational and adult education, 1927-1953. Master's thesis, University of Wisconsin - Stout.

McIntyre-Birkner, R. & Birkner, L.R. (2001). Overcoming Roadblocks to Effective Learning and Communication. Occupational Hazards, 12-13.

The National Center for Research in Vocational Education (NCRVE). (1983). Introduce A Lesson. (2nd ed.). Columbus, Ohio: The National Center for Research In Vocational Education.

Oman, M. D. (2001). Using Anticipatory Set Demonstrations to Promote Interest in Science: An Investigation into an 8th Grade Integrated Science Classroom. Unpublished master's thesis, University of Wisconsin – River Falls, River Falls, Wisconsin.

Magruder, K. (2001). Set induction and Closure. Retrieved June 14, 2001 from the World Wide Web: http://www.okbu.edu/academics/natsci/ed/398/set.htm

Miller, W.R. (1990). Instructors and Their Jobs. Homewood, IL: American Technical Publishers, Inc.

Mish, F. et al. (2000). Merriam-Webster's Collegiate Dictionary (10th ed.). Springfield, MA: Merriam-Webster.

Postlethwait, S.N. (1977). Exploring Teaching Alternatives. Minneapolis, MN: Burgess Publishing

Schell, J.W. & Rojewski J.W. (1993). Toward Vocational Thoughtfulness: An Emerging Program of Research. Journal of Industrial Teacher Education, 45-61.

Small, R.V. (2000). Motivation in Instructional Design. Teacher Librarian, June 2000, vol.27, Issue 5, p.29. Retrieved June 20, 2001 from Eric Digest.

Wolfe, P. (1998). Revisiting Effective Teaching. Educational Leadership, 61-4.

Appendix A:
Ten Technology Education Set Inductions

1.) Packaging Shipping Simulation
12 of 14 subjects present (9 male, 3 female)

Set Induction Objective: To show students something that they had not seen before.

The instructor began by holding up and displaying to the students a corrugated cardboard box, which had an egg inside of it. There was not any cushioning in the box for the egg. The students were not informed about the contents of the box. However, on the outside of the box was written “Fed Ex” and “Fragile”.

There were 4 large tables in the classroom, for which students used as desks. The front-left table contained two females. They were designated as the “Somerset, WI” table. In the back-left table, there were two males and one female. This table was designated as “Minneapolis, MN.” The front-right table contained four males. They pretended be in “Memphis, TN”. Finally, the back table contained three males and they were labeled “Orlando, FL”. The teacher pretended to be the mode of transportation between each of the hubs.

The box was to be shipped from Somerset, WI to Orlando, FL. The path of the box would be simulated as it passed through the various Federal Express hubs, St. Paul and Memphis. In Somerset, the sender handed the box to the other student. The teacher instructed her to handle it roughly, so she tossed the box to the instructor. This

simulated a Fed Ex worker tossing a box into the truck. The teacher now simulates the truck that drives the box to the Minneapolis table. The teacher, to simulate vibration from the road, bounces the box up and down. Now in Minneapolis, one of the students was instructed to slide the box along the tabletop and on to the floor. This demonstrated a conveyor belt. The other handled the box roughly before tossing it back to the instructor. At that point, the instructor is simulating the plane that takes the box to Memphis. The students at the Memphis table each had a chance to simulate rough handling and a conveyor drop. Again they tossed it back onto the plane (instructor) and it was flown to Orlando. Rough handling occurred once again. The receiver was given the package. He opened it and the egg was unharmed. The survey was immediately handed out.

2.) Introduction to Air Transportation
13 of 14 students present (10 male, 3 female)

Set Induction Objective: To demonstrate the upcoming project prior to any lecture on the topic.

The instructor built a wooden stand, for which a DC toy motor was to be mounted to. A propeller blade that the instructor also made of wood was mounted on the axle of the motor. Directly in front of the motor/propeller mount another stand was placed, which held an 8-1/2" x 11" sheet of paper. One edge of the paper was wrapped around a horizontal-mounted wooden dowel and taped so that it could rotate freely about the dowel. When a 12-volt DC battery engaged the motor, the propeller would turn and create airflow. The paper is intended to rotate about the dowel according to how much

airflow occurred from the motion of the propeller. Ultimately, the amount of movement by the paper serves as the measuring gauge for wind speed.

The students were told that they would be making airplane propeller blades later on in the class period. They took note of the motor and paper stands that were placed on the front desk. The instructor took the propeller off of the motor and explained what was about to happen. The blade was intended to create a draft by which air was to be pulled toward the blade. The students would be able to view the airflow by how much the paper sheet moved.

Next, the demonstration was performed. The paper sheet moved a considerable amount. The students could see the paper moved towards the blade. Immediately following the demonstration, the surveys were handed out. This led into a lesson on Bernoulli's Principle and how air pressure differences create "lift".

3.) Bernoulli's Principle

13 of 14 students present (10 male, 3 female)

Set Induction Objective: To show students something that they had not seen before.

The set induction began with a hair dryer being turned on "high". The dryer was then pointed vertically, towards the ceiling. Now that the air was flowing upward, a ping-pong ball was placed into the line of airflow. The rushing of air around the ball caused the ball to suspend in "mid-air". After asking the students about what they thought was happening, the instructor provided a concrete answer. The faster moving air around the outsides of the ball contains the ball within the air stream, resulting in the suspension of the object.

Next, to further illustrate Bernoulli's Principle, the instructor held a sheet of paper by two adjacent corners, one in each hand. The included edge of paper of those two corners was then held up to the instructor's lower lip. Air was then blown over the top of the sheet. The paper began to rise. Some students responded by saying "weird". A few students visually seemed to understand that Bernoulli's Principle caused this. A brief explanation of how the faster moving air over the top created lower air pressure, resulting in the higher air pressure below the paper to push it up. At this point, the surveys were handed out. This led into a lesson on Bernoulli's Principle and the Forces of Flight.

4.) Introduction to Drafting
12 of 14 students (9 male, 3 female)

Set Induction Objective: To help students access previous knowledge by activating their schemata.

This approach primarily included the use of questions. A typical demonstration was not performed. A floor plan of a home was held up for display to the class for viewing.

This set induction was not performed immediately at the beginning of class. First, the students went into the lab where they finished a previous project. This was the testing of their "boat hull" designs. That was a positive experience for most, which generally yielded good attitudes. This was due to the excitement that it brought to the students and the fact that they had not done this project before. One student, whose hull performed very well, actively participated during this following set induction. When

this activity was finished, the group went back into the classroom to move on to the topic of drafting.

At this time, the set induction was performed. The dialogue went as follows: "Other than in this class, how many of you have ever done some form of measuring? (Hands rise) What did you measure? (Various responses came from the students) Which basic need are we trying to meet? (No one responded so I told them that it was 'Communication', which was discussed in earlier lectures)." At this point, the instructor brought out a floor plan for a one-story home and showed it to the class. Some students thought that it was impressive, probably due to its level of detail. After this layout was displayed, the survey was distributed.

5.) Dimensioning CAD drawings
13 of 14 students present (10 male, 3 female)

Set Induction Objective: To show students why it is important to have dimensions on a drawing.

The set induction began with the questions, "If I were to go out and build the subject in your drawings thus far, what else would I need in the drawings to do this?" After several guesses by students, someone finally answered "measurements". (The drawings that they had done thus far did not contain dimensions.) This was the correct response.

A floppy disk was used to illustrate why dimensions are important on a drawing. The instructor discussed with the students about how the person that patented the disk at 3M probably did not want to have to tell the person who was making the disks what the dimensions should be every time a disk was made. Therefore, dimensions are very

necessary on a drawing to communicate to someone how to make an object. The survey was handed out at this time.

6.) Rule of Thirds
13 of 14 students present (11 males, 2 females)

Set Induction Objective: To pique the students' interest to learn more about photography.

A series of questions were used to heighten student interest in the lesson. Materials included a digital photo, which did not comply with the "Rule of Thirds" and the same photo that was edited by the instructor to comply with the Rule of Thirds. The Rule of Thirds is a general rule of photography. It states that if a photo were divided equally into three rows and three columns, the subject of the picture would be situated at one of the four intersections of those rows and columns.

The series of questions included, "Take a look at these photos, (1) What differences do you see? (2) What is missing in the second photo?" Both photos were displayed at the same time for the students to see while the questions were posed. Some students provided a few educated guesses. Finally, one student responded by saying that the subject of the photo was not centered in the first photo, while the second one was centered. Rather, the subject was now 1/3 to the right and 1/3 closer to the top of the photo. Once they realized what happened, the instructor explained reiterated the differences. The surveys were handed out.

7.) Intro to Space Transportation; Model Rocketry
13 of 14 students present (10 male, 3 female)

Set Induction Objective: To demonstrate the upcoming lab activity that the students would be participating in during that class period.

The instructor used a model rocket that he had built as a prop for the demonstration. The same model was to be built by the students later on in the period.

The set induction began with the question, “How many of you have ever done any model rocketry before?” About a one-fourth of the group had. The teacher went on to state that the students would be continuing to learn about transportation technology. This exercise was in space transportation. Previously marine and air transportation were studied. This was also stated, in order to tie this upcoming subject with previous topics.

From there, the teacher demonstrated the stages that a model rocket goes through from beginning to end: Ignition, Liftoff, Burnout, Apogee, Momentum, Ejection, and Landing. The locations of those stages in the flight path of the rocket were noted throughout the demonstration. The survey was handed out immediately.

8.) Intro to Land Transportation; Brain Teaser
13 of 14 students present (11 males, 2 females)

Set Induction Objective: To obtain the students’ attention, but not directly towards the topic at hand.

The instructor began by asking the class to take out a sheet of paper because they were going to be doing a brainteaser with the person sitting next to them. The instructor proceeded by asking the question, “How can you cut a doughnut into 12 pieces using only 3 cuts?”

The students were allowed to ponder this question for about 6 minutes before they were given a clue (since no one had figured it out yet). The clue was that the cuts do not have to be perfectly straight. Curved cuts are an option. They seemed to regain

interest in the problem at this point. After about 10 minutes, they were told to think about the third dimension since most of them were working with a 2-dimensional drawing on their paper. One group was able to solve the problem. The other 6 groups were able to get 8-10 pieces, but not 12. The successful group was instructed to put their answer on the board. The instructor put his answer on the board. The survey was handed out.

9.) Bridge Structures
13 of 14 students present (10 males, 3 females)

Set Induction Objective: To show something to the students that they had never seen before.

There were some VCR problems during the first ten minutes of class. Finally, when a different TV/VCR system was retrieved the set induction started. The instructor began by saying that he found this upcoming video to be “pretty cool”. Someone in the class responded under their breath by saying, “All teachers say that.” Someone else said, “Yeah, but he’s younger.”

The set consisted of a 2-minute video segment, which showed footage of the Tacoma Narrows Bridge. This bridge was famous for how it swayed in the wind due to its solid construction. The video showed this swaying action as well the final collapse of the bridge. The video was stopped and the survey was dispersed.

10.) Basic Energy: Torque
14 of 14 students present (11 males, 3 females)

Set Induction Objective: To demonstrate a concept that the students have previous experience with.

The instructor asked for a volunteer to help with the set induction. The teacher asked the class, “Is anyone here going out for track this year?” Two people raised their hands. Those two students were asked, “Do you know how the outside lane is longer than the inside lane? This student is going to try to keep up with me. The teacher walked a small circle in the class while the student, who was about an arm’s length away from the teacher, tried to keep up by walking a further distance around in a circle. The student had to walk slightly faster in order to keep up.

After that, the teacher walked another small circle in the middle of the room while the same student tried to keep up walking around the perimeter of class. He had to go much faster that time. The point was proven. The instructor commented on how the student had to expend more energy and move a lot faster in order to keep up that time. I handed out the survey.

Appendix B:
Student Survey of Set Inductions

Respond to the following statements according to the level of agreement that you have with them. Please do not compare this introduction to the other introductions that you have seen in this class. DO NOT put your name on this.

1. I found the activity to be interesting.

____ Strongly Agree
____ Somewhat Agree
____ Somewhat Disagree
____ Strongly Disagree
____ No Opinion

2. The introduction showed me something that I had not seen before.

____ Strongly Agree
____ Somewhat Agree
____ Somewhat Disagree
____ Strongly Disagree
____ No Opinion

3. The teacher was enthusiastic about teaching the activity.

____ Strongly Agree
____ Somewhat Agree
____ Somewhat Disagree
____ Strongly Disagree
____ No Opinion

4. It was clear to me what the introduction was trying to teach.

____ Strongly Agree
____ Somewhat Agree
____ Somewhat Disagree
____ Strongly Disagree
____ No Opinion

5. The introduction made me want to learn more about the topic.

____ Strongly Agree
____ Somewhat Agree
____ Somewhat Disagree
____ Strongly Disagree
____ No Opinion

Appendix C:
Results of the Study

I found the activity to be interesting. (Number of respondents)

	N	0 No Opinion (Missing)	1 Strongly Disagree	2 Somewhat Disagree	3 Somewhat Agree	4 Strongly Agree
Packaging Shipping	12				6	6
Air Transportation	12	1		1	3	8
Forces of Flight	13	1	1	1	4	7
Drafting	14		3	5	6	6
CAD Dimensioning	12	1		3	5	4
Photography - Rule of Thirds	13				7	6
Model Rocketry	13		1		2	10
Fixed Route Vehicles	12	1			2	10
Bridge Structure	14		2	1	3	8
Basics of Torque	13	1	1		8	4

The intro showed me something I had not seen before. (Number of respondents)

	N	0 No Opinion (Missing)	1 Strongly Disagree	2 Somewhat Disagree	3 Somewhat Agree	4 Strongly Agree
Packaging Shipping	11	1		1	7	3
Air Transportation	12	1	1	1	2	8
Forces of Flight	13	1		2	5	6
Drafting	14			4	7	3
CAD Dimensioning	13			5	4	4
Photography - Rule of Thirds	12	1		3	6	3
Model Rocketry	11	2		3	3	5
Fixed Route Vehicles	13			1	4	8
Bridge Structure	14		2	1	3	8
Basics of Torque	12	2	1	3	5	3

The teacher was enthusiastic about teaching the activity. (Number of respondents)

	N	0 No Opinion (Missing)	1 Strongly Disagree	2 Somewhat Disagree	3 Somewhat Agree	4 Strongly Agree
Packaging Shipping	12			1	2	9
Air Transportation	12	1		1	7	4
Forces of Flight	11	3		6	5	3
Drafting	14		1	2	6	5
CAD Dimensioning	10	3			7	3
Photography - Rule of Thirds	13				8	5
Model Rocketry	13			2	6	5
Fixed Route Vehicles	12	1		1	2	9
Bridge Structure	13	1	1	1	8	3
Basics of Torque	12	2			8	4

It was clear to me what the intro was trying to teach. (Number of respondents)

	N	0 No Opinion (Missing)	1 Strongly Disagree	2 Somewhat Disagree	3 Somewhat Agree	4 Strongly Agree
Packaging Shipping	12				5	7
Air Transportation	12	1			4	8
Forces of Flight	13	1			6	7
Drafting	12	2		1	6	5
CAD Dimensioning	13			1	5	7
Photography - Rule of Thirds	12	1		2	4	6
Model Rocketry	12	1	1		4	7
Fixed Route Vehicles	12	1	2		5	5
Bridge Structure	13	1	1	7	4	1
Basics of Torque	13	1	2		5	6

The intro made me want to learn more about the topic. (Number of respondents)

	N	0 No Opinion (Missing)	1 Strongly Disagree	2 Somewhat Disagree	3 Somewhat Agree	4 Strongly Agree
Packaging Shipping	11	1			8	3
Air Transportation	12	1	1	1	5	5
Forces of Flight	12	2			7	5
Drafting	13	1	1	2	8	2
CAD Dimensioning	12	1		1	8	3
Photography - Rule of Thirds	13		1		6	6
Model Rocketry	12	1	1		6	5
Fixed Route Vehicles	11	2			3	8

Bridge Structure	13	1	2	3	8
Basics of Torque	13	1		6	7

Appendix D:
Parent/Guardian Consent Form to use Minors as Human Subjects

Parental Permission to Obtain Student Feedback of Lesson Introductions

My name is John Oman. I am a graduate student at UW-Stout in the Technology Education program. I will be student teaching in your son/daughters' Principles of Technology course at the high school. Throughout the third term of the school year, I plan to perform a variety of lesson introductions and have the students provide me feedback on the effectiveness of each introduction.

Their responses will be used as a part of my thesis research paper required for graduation from this program. The responses that they provide will be completely anonymous and will in no way affect their grade. The following questions will be given to the students upon viewing each introduction. They will be asked to respond according to their level of agreement with each statement.

1. I found the activity to be interesting.
2. The introduction showed me something that I had not seen before.
3. The teacher was enthusiastic about teaching the activity.
4. It was clear to me what the introduction was trying to teach.
5. The introduction made me want to learn more about the topic.

Student and Parent Understanding

I understand that my participation in this study is strictly voluntary and I may discontinue my participation at any time without prejudice. I understand that the purpose of this study is to investigate introductions to class lessons. I further understand that any information about me that is collected during this study will be held in the strictest confidence and will not be part of my permanent record. I understand that at the conclusion of this study all records, which identify individual participants, will be destroyed.

Signature of Student: _____ Date:_____
Signature of Parent or Guardian _____ Date:_____

If you have any questions, feel free to contact me at (715) 268-2487, j_oman@yahoo.com, or my research advisor Mike Nicolai at (715) 232-1346. Thank you for your cooperation.