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The effects of teaching styles on student knowledge

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THE EFFECTS OF TEACHING STYLES ON STUDENT KNOWLEDGE

BY

Ryan DeVries

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

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CHARLESTON, ILLINOIS

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YEAR

I HEREBY RECOMMEND THAT THIS THESIS BE ACCEPTED AS FULFILLING
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ABSTRACT

This study analyzed the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ. The study examined the effects of the independent variable (learning through instruction style) on the one dependent variable: knowledge (gained and retained).

Traditional educational methods often vary between instructors, even when those instructors teach the same course. Teachers' objectives are to present the course information in a way that will be the most beneficial to the student. The teachers have to consider situational factors, goals for the course, learning styles, and level of learning. "In general when professors put together their curriculum they select a textbook for that course and skim though it noting important topics. Then they prepare lectures or projects depending on their desired class structure." (University of Oklahoma, 2006, p. 1)

Data collection for this study was done through the use of multiple quasi-experimental testing apparatuses: pretest, posttest, and delayed posttest. The study consisted of two sections of a Computer-Aided Engineering Drawing course, taught at Eastern Illinois University (EIU) in Charleston, Illinois during Spring Semester 2009.

Based on the analysis performed, with regards to knowledge gained and retained during the different learning modules, neither teaching styles had a statistically significant role in increasing the knowledge obtained.

ACKNOWLEDGMENT

I am grateful to those who have helped me with my goal of attaining a master's degree. My family has sacrificed a lot in order for me to reach my educational goals. I want to thank my wife Alyssa who has blessed my life in ways that I cannot describe. I extend my thanks to my parents Glen & Sue DeVries who pushed me when I needed it and helped me when life got too hard. It is not only I who has worked hard to finish my education, but my family has worked hard supporting me. I am truly blessed.

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Ryan DeVries

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CHAPTER I

INTRODUCTION

In 1997, research was conducted on the effectiveness of classroom instruction in a computer-aided design and drafting course. That research focused on the classroom concept of "what is learned rather than what is taught" (ABET, 2005). "The study analyzed the effects of individual-based assignments pertaining to knowledge gained and retained, skills developed, and students' attitudes relative to these different learning experiences." (Melton, 2006, 1).

In 2006, research analyzed the effects of group- and individual-based assignments pertaining to knowledge gained and retained, skills developed, and students' attitudes relative to these different learning experiences. This study examined the effects of the independent variable (learning through assignment) on the three dependent variables: knowledge (gained and retained), skills (developed), and attitudes (student preference).

Research shows that different people have different learning styles; some students prefer to learn on their own while other students require a structured learning environment. Instructors are tasked with structuring courses to deliver information in a way that will benefit all different learning styles.

This study analyzed the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ. The study examined the effects of the independent variable (learning through instruction style) on the one dependent variable: knowledge (gained and retained).

Traditional educational methods often vary between instructors, even when those instructors teach the same course. Teachers' objectives are to present the course information

in a way that will be the most beneficial to the student. The teachers have to consider situational factors, goals for the course, learning styles, and level of learning. "In general when professors put together their curriculum they select a textbook for that course and skim though it noting important topics. Then they prepare lectures or projects depending on their desired class structure." (University of Oklahoma, 2006, p. 1)

This section will describe the design of the study, which includes the following topics: (a) Purpose and Objectives; (b) Procedures; (c) Research Questions; (d) Definitions of Terms; (e) Limitations of the Study; (f) Assumptions of the Study.

Purpose and Objectives

The purpose of this quasi-experimental study was to determine if student knowledge and skills in the Computer-Aided Engineering Drawing course were significantly affected when teaching styles differ. Additionally, the purposes will be satisfied with the following objective: If a given teaching methodology is provided, what will be the measurable effectiveness of knowledge gained and retained in a Computer-Aided Engineering Drawing course.

Procedures

Data collection was done through the use of multiple quasi-experimental testing apparatuses: pretest, posttest, and delayed posttest. The study consisted of two sections of a Computer-Aided Engineering Drawing course, taught at Eastern Illinois University (EIU) in Charleston, Illinois during Spring Semester 2009.

The pretest, posttest, and delayed posttest were provided on day one, day seventeen, and day thirty-seven respectively. The pretest and the delayed posttest were the same test to ensure the accurate measure of knowledge learned.

Section 1 (Professor A) instructed the students using a self-based learning approach. There was a very low level of instructor/student interaction. Section 2 (Professor B) instructed the course with a high level of instructor interaction. Professor B provided examples weekly through lecture and demonstration. Both instructors used the same textbook and assessment tools. A third professor was available to both sections to answer questions.

A pretest was administered to provide a base line of student's current knowledge and skill level of Computer Aided Engineering Drawing. On the seventeenth day, a posttest was administered to measure the knowledge and skills retained from the treatment. The posttest provided data on the amount of knowledge and skills that were retained from the treatment. On the thirty-seventh day, a delayed post test was administered that evaluated the knowledge and skills retained since the end of the treatment. A demographic information form was used to gather additional data.

Principle Research Question

What is the importance of the instructor being involved in the student's learning process? Specifically how is a students' learning affected in regards to different interactions between the instructor and the student?

Limitations of the Study

The study was limited to a single semester of undergraduate course work. The course used for this study was INT 2043, Computer Aided Engineering Drawing, taught at Eastern Illinois University during the spring semester of 2009. The core student participants enrolled in the course were from the School of Technology. The Computer Aided Engineering laboratory is located in Klehm Hall room number 3135 and is equipped with 24 workstations. Each workstation has SolidWorks 2008 for students' use.

Assumptions of the Study

The following assumptions were made regarding the research for this study.

1. Students in the course participated voluntarily in the study.
2. The research sample has limited knowledge of Computer Aided Engineering Drawing.
3. The research sample has limited knowledge of the curriculum for the course including visualization procedures, sketching, orthographic projection, dimensioning, 2-D and 3-D drafting, and Solidworks.
4. All conditions for completing assignments for both groups are identical.
5. All students participating in the study are encouraged to complete the assigned work for the course.
6. The instruments used in the study accurately measured knowledge and skills.
7. The control and treatment groups used the same text and assignments throughout the study.

CHAPTER II

REVIEW OF LITERATURE

In a study completed at the University of Oklahoma's Program for Instructional Innovation, and entitled 'Ideas on Teaching' (2006) we find that feedback is the most important factor in student development.

Three different kinds of feedback are needed. First, the learner needs feedback on the effectiveness of his learning: "How well am I learning?" Second, the teacher needs feedback on the effectiveness of his teaching: "Are my learning goals for students being met? Are my teaching activities working effectively?" Third, sometimes individuals or organizations outside the immediate learning situation need information about how a given student performed in a course or program; that is the reason for grading procedures (University of Oklahoma Program for Instructional Innovation, 2006).

> When teachers plan the curriculum for their course, they have a desire to enhance the learning experiences for their students. They are choosing projects and activities for the students that will expose them to experiences that they might not have in other courses. If the teacher decides primarily to make the course a small group structured class, then the student will not be able to experience a lecture style course. On the other hand, if the teacher makes the course a lecture focused course, then the students will miss the interaction with their fellow students by not working in teams. (University of Oklahoma et al., 2006, p. 1)

Teachers' objectives are to present the course information that will be the most beneficial to the student. They have to consider situational factors, goals for the course,

learning styles, and levels of learning. "In general, when professors put together their curriculum, they select a textbook for that course and skim through it noting important topics. Then they prepare lectures or projects depending on their desired class structure." (University of Oklahoma, 2006, p. 1)

This approach is relatively easy for the professor. However, there is one important aspect of the educational process that is not considered in this method of course design and that is the desired student learning. There is a more systematic approach to the challenge of designing learning experiences for others, whether the teaching is being done in a college classroom, in a corporate training program, a community development project or whatever (University of Oklahoma 2006 p.1). The following model (Figure 1) shows the basic elements of Instructional design.

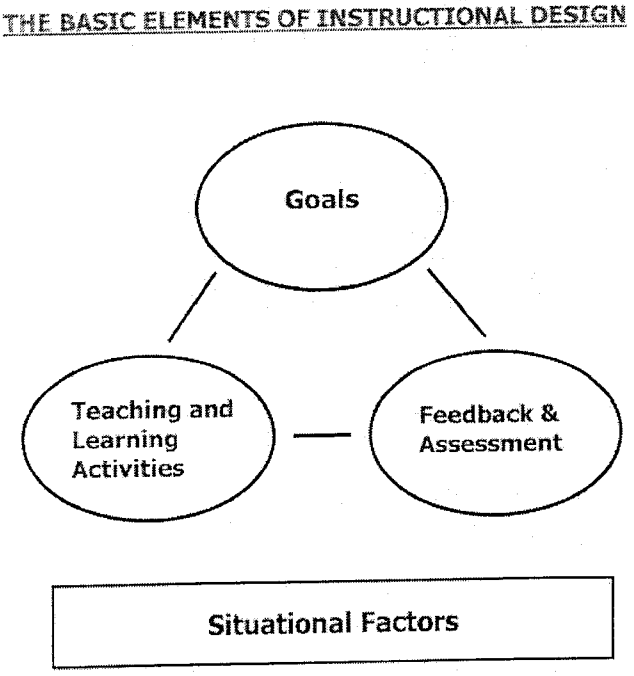


Figure 1. Situational Factors (University of Oklahoma, 2006.)

The circles represent that decisions that the teacher needs to make. While the box of

"Situational Factors" represents the information that needs to be gathered. This model is not geared towards integrating the 4 different aspects but, rather to have the 4 aspects reflect each other. The University of Oklahoma (2006) suggests that there are 4 key aspects that need to be considered when the teacher is gathering and making their decisions about the course:

1. Gather information on any important situational factors;
2. Formulate the learning goals for the course;
3. Select the Teaching/Learning Activities needed for these goals; and
4. Formulate the kinds of feedback and assessment needed.

Situational factors that teachers might have to consider range from a general context of the learning situation to the characteristics of the teacher.

A. General Context of the Learning Situation: This focuses on the learner and his other responsibilities outside of his role as a student such as a career or family. This also addresses factors such as is the course is required or is just an elective?
B. Nature of the Subject: This is the background of the subject. It addresses the subject from the perspective of if it is directed towards a single right answer or if it works towards multiple answers.
C. Characteristics of the Learner: This has a broad range of factors that would be considered. There are things like the student's study habits, initial impression of the subject and learning styles.
D. Characteristics of the Teacher: This can include mannerisms, tone of voice, initial impression of the teacher from the student, and physical appearance.

Research states that children get their motivation from different sources. "Parents are mentioned most frequently, students also talked about sibling, aunts and uncles, cousins, and

grandparents as sources of influence on their motivation to achieve in school" (Urdan, Solek, & Schoenfelder, 2007, 17). Urdan, et al. (2007) mentioned that there are different categories of parental influences that have an effect on the student's motivation (e.g., level of involvement, amount of structure provided, and autonomy supportiveness), parental cognition (i.e. perceptions of a child's competence, expectations for performance, and parental values), and parental affect (i.e. attachment and closeness, family obligation and self-definition in relation to parents).

To summarize their research on parental behaviors it appears that parents who are willing and able to provide support to their children, but don't become coercive or controlling in their influence, produce academically motivated children. However, some of their research is contradictory. They also state that the effectiveness of these parental behaviors might include some cultural factors that need to be considered.

> Research examining parental influences on student motivation and achievement has sometimes reported different effects for different cultural and ethnic groups. For example, Dornbusch et al (1987) found that authoritarian parenting styles were associated with lower achievement for Caucasian students but was associated with higher achievement among Asian students in the study. Mau (1997) found both Asian immigrants and Asian Americans spent more time on homework and perceived higher parental education expectation than did Caucasian students. Caucasian students, however, reported more parental involvement in school activities than did Asian American students, most likely because of immigrant parents' struggle with English language and their unfamiliarity with the American school system. (Urdan, Solek, & Schoenfelder, 2007, 9).

Teachers' ability to motivate a student is dependent on the child's history and family. Teachers and students need to work together to achieve success for the student. Research shows that there are two direct links to the success of the student. The two factors are immediacy (Christophel, 1990; McCrokey, Sallinen, Fayer, Richamond & Baraclough, 1996; Richmond, 1990; Richmond, Gorham & MCroskey, 1987) and credibility (Anderson, 1973; Teven & McCroskey, 1996). Research has also looked at other factors such as how a teachers' behaviors influences student motivation (Chesebro & Mcroskey, 2001 Christophel & Gorham, 1995; Frymier, 1993; Frymier & Shulman, 1995; Jaasma & Koper, 1999) and effective learning (Anderson, 1979; Chesebro, 2003; Kearney, Plax, Smith, & Sorensen, 1998; Plax, Kearney, McCroskey, & Richmond, 1986; Witt, Wheeless, & Allen, 2004).

Immediacy is defined as behaviors which increase psychological closeness between communicators, it is perhaps the most studied communication concept in instructional communication literature (Mehrabian, 1971). This could be the most important aspect of student motivation. Positive immediacy behaviors, such as smiles, head nods, and eye contact by instructors have been shown to increase student information-seeking strategies (Myers & Knox, 2001), extra-class communication (Fusani, 1994), and cognitive, affective, and behavioral learning (Witt, Wheeless, & Allen, 2004), Simultaneously it helps to decrease student apprehension (Ellis, 1995; Fraymier, 1993; Messman & Jones-Corley, 2001) and student resistance (Earney & Plax, 1991). There have also been some positive correlations between teacher immediacy behaviors and student perceptions of power (Plax et al., 1986), influence (McCroskey & Richmond, 1992) clarity (Chesebro & McCroskey, 2001) effectiveness (Anderson 1979) and credibility (Chamberlin, 2000; Jaasma, M. A., &Koper, R. J. (1999); Teven & Hanson, 2004; Teven & MCroskey, 1996; Thweatt & McCroskey,

1998).

There are three dimensions of Ethos or credibility of a speaker: intelligence, character and goodwill with respect to the audience. Researchers have found that instructors who are perceived as highly credible will increase student perceptions of cognitive learning (Anderson, 1973; Teven & McCroskey, 1996). Some highly credible teachers have demonstrated there ability to convey positive vocal cues to their audience.

Pratt (1988) used a 2 x 2 factorial experimental design in which teacher nonverbal immediacy (high and low) and teacher credibility (high and low) were manipulated. The dependent variables in the research consisted of student state of motivation and affective learning. There were two phases in their study: a manipulation check followed by the experiment. The first phase was designed to create manipulation for both the teacher nonverbal immediacy and credibility variables. Then subsequently test them to assure that the messages used to manipulate these two variables produced the desired response. Once adequate manipulation of key variables in the study was established, the second portion of this study was designed to test the hypothesized relationships.

The students were asked to read four different scenarios. Students exposed to a higher-teacher-immediacy condition read the following scenario: you are taking a class from a teacher who seems very relaxed, animated, and vocally expressive during class lectures and discussions. This teacher smiles frequently, engages in a lot of eye contact and is generally perceived as a friendly approachable.

Students exposed to a lower-teacher-immediacy condition read the following scenario: you are taking a class from a teacher who seems tense, reserved, and vocally unexpressive during class lectures and discussions. This teacher seldom smiles, avoids

looking directly at students and is generally perceived as remote, aloof and unapproachable.

Students exposed to the high-teacher-credibility condition read the following scenario: he/she can explain complex material well, can "do" what he/she is teaching, and has the ability to answer student questions. Additionally, he/she follows through on promises, gives immediate feedback and treats all students fairly.

Students that were exposed to teachers with low-credibility condition have difficulty explaining complex material, does not seem to be able to "do" what he/she are teaching and usually avoids answering student's questions. Additionally, he/she does not always follow through on promises or generally gives immediate feedback, and treats some students preferentially. Pratt's analysis supports a mean ordering. Affective learning was highest for the high-immediacy/high credibility condition, followed by low immediacy/ high credibility condition. This was followed by the high immediacy/low-credibility condition, and low immediacy/low-credibility condition, respectively.

Self directed learning can also be seen as self-teaching. Self-teaching implies that the learners are capable of taking control of the mechanics and techniques of teaching themselves (Brookfield, 1986; Candy, 1991). Self directed learning can also be viewed as personal autonomy, which Knowles states as taking control of goals and purposes of learning as well as taking ownership of one's own learning. However, the assumption that all adults have full capacity for self-teaching and personal autonomy in every learning situation is generally not accepted. Any particular learner in a particular learning situation is likely to exhibit different capabilities and preferences (Grow 1991). The table below outlines Grow's stages in learning autonomy. The table outlines the fact that self-directed is situational and that the role of the teacher is to match teaching styles with the student.

Table 1 *Grow's Stages in Learning Autonomy*

Stage	Student	Teacher	Examples
Stage 1	Dependent	Authority, Coach	Coaching with immediate feedback, drill. Informational lecture. Overcoming deficiencies and resistance.
Stage 2	Interested	Motivator, Guide	Inspiring lecture plus guided discussion. Goal-setting and learning strategies.
Stage 3	Involved	Facilitator	Discussion facilitated by teacher who participates as equal. Seminar. Group projects
Stage 4	Self-Directed	Consultant, Delegator	Internship, dissertation, individual work or self-directed study group.

It is important to note that when a learner is in a particular stage of learning they exhibit behaviors related to self-teaching skills, or personal autonomy or both. A person exhibiting stage one behaviors would be highly autonomous, but would not be able to learn particular material. One the other hand, the person's behaviors could suggest that they favor strong self-teaching skills paired with little autonomy. Again, the person could be a good self-teacher and have a high level of autonomy.

Garrison (1997) suggests that there are three core components for self directed learning: 1) self-management (control), 2) motivation (entering the task), 3) self-monitoring (responsibility). Garrison traditionally focused on the control of learning and self-management, which resulted in less attention to the actual learning process. However, he also suggests that the attention should be divided equally among motivation issues such as motivation in self-based learning, and that of completing tasks like self-directed learning. Finally, self-monitoring requires cognitive learning skills as well as metacognitive skills that a person needs to engage in self-directed learning.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine if the effect of teacher intervention in student learning has an impact on the performance of the student. The research instrument focused on the ability of the students to understand and create multi-view drawings. The study followed the schedule provided in Appendix A. The study covered one semester.

Principle Research Question

What is the importance of the instructor being involved in the student's learning process? Specifically how a student's learning affected in regards to different interactions between the instructor and the student?

Design of the Study

The study utilized two sections of the undergraduate course INT 2043, Computer-Aided Engineering Drawing, taught at Eastern Illinois University (EIU) in Charleston, Illinois during Spring Semester 2009. The study used the Computer-Integrated Manufacturing Laboratory located in Klehm Hall.

The laboratory consisted of 24 individual student workstations. Each workstation has SolidWorks 2008 (© Copyright 2008 SolidWorks) software. Students used the textbook, *Engineering Design with Solidworks 2008* by David C. Planchard and Marie P. Planchard.

The instructors during the study played a key role in the data collected during the course. Both instructors are professors in the School of Technology at Eastern Illinois University.

Instructor Description

Professor A taught the course on a self-learning basis. There will be a very low level

of instructor/student interaction. He was available for questions and answers sessions, along with administration of the course. Students were required to complete three projects during the course of the research.

Professor B taught the course with a high level of instructor interaction. The professor played a key role in the learning of the student. This person provided examples and demonstrations as part of a lecture each week based on three projects that students are completing during the course of the research.

Population and Sample

The study utilized two sections of the undergraduate course INT 2043, Computer-Aided Engineering Drawing, taught at Eastern Illinois University (EIU) in Charleston, Illinois during Spring Semester 2009. Information regarding the scheduling of intervention, testing, data collection and the statistical tests used during the study is shown in Appendix A.

Data Collection

Student description. Students enrolled in the course are from either the School of Technology or Physics (Pre-Engineering) Department. Open enrollment at the university provides students, from all majors, the opportunity to enroll in this introductory to SolidWorks course.

Procedures. Students received an introduction to the research. The students will then received the following documents in the corresponding order:

- Letter of Consent – Appendix B
- A Demographic Survey – Appendix C
- The Skills Analysis Rubric – Appendix D
- Pre-Test – Appendix E

Pre-Test/ Post-Test/ Delayed-Post Test Procedures. The students received the test (Appendix E) with the Student Test ID Slip (Appendix G). The Student Test ID slip had a Test number pre-written on it so that the test scores can be tracked. The Student Test ID slip test number will have the same number pre-written on the test. The students are required to fill in the rest of the information (i.e. Name and Date). All of the test data will be averaged and will be organized in the Student Test Data Matrix.

Data Analysis. The student tests will be scored by three professors. All three individuals will use the Skills Analysis Rubric (Appendix D). The tests will be referenced using the test number that was pre-written on the test.

Student Informed Consent. The Internal Review Board (IRB) at Eastern Illinois University provided the approval for the study in December 2008. At the outset of this study, informed consent forms (Appendix B) were provided to each student in each section of the course. At that time, each student was informed that a study was being conducted with regards to different learning methodologies. The students were informed that they would be participating as a member of both a control and treatment group during the semester.

Evaluations and assessments pertaining to the modules presented in the study were performed by the students. They were completed in addition to the students' regular assignments and did not affect their final course grades. Each student was informed that participation in the study was voluntary and that personal information would be kept confidential as prescribed in the informed consent form.

Variables. This study analyzed the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ. This study examined the effects of the independent variable (learning through instruction

style) on the one dependent variable: knowledge (gained and retained).

Instrumentation

Knowledge test. A pretest-posttest-delayed posttest design was used to collect data to determine student knowledge gained and retained. Data was collected from the pretest administered before the learning module (Day 1); the posttest was administrated directly after the learning module (Day 17); the delayed posttest was given two weeks following the completion of the learning module (Day 37). Reliability of the instrument will be determined by the results of a standard T-Test.

Design

A quasi-experimental pretest-posttest, nonequivalent control group design was used during the study. This design is a popular approach to quasi-experiments (Creswell, 2003, p. 169). Due to the registration process, true randomization of the sample was not available in this study. Gall and colleagues (2002) stated the following about quasi-experimental: "This type of experiment, if carefully designed, yields useful knowledge" (p. 402).

Summary

The purpose of this quasi-experimental study was to determine if student knowledge and skills in the Computer-Aided Engineering Drawing course were significantly affected when teaching styles differ. Additionally, the purposes were satisfied with the following objective: If a given teaching methodology is provided, what will be the measurable effectiveness of knowledge gained and retained in a Computer-Aided Engineering Drawing course.

CHAPTER IV

RESULTS

The purpose of this quasi-experimental study was to determine if student knowledge and skills in the Computer-Aided Engineering Drawing course were significantly affected when teaching styles differ. Additionally, the purposes will be satisfied with the following objective: If a given teaching methodology is provided, what will be the measurable effectiveness of knowledge gained and retained in the Computer-Aided Engineering Drawing course.

A single research question was addressed in this study. What is the importance of the instructor being involved in the learning process relative to students learning in regards to different interactions between the instructor and the student?

This chapter is divided into three sections: description of the sample, results relevant to the research question, and summary of the data.

Description of the Sample

Table 2 provides the demographic information for the two sections used in this study. The sample consisted of 35 students from Eastern Illinois University. The sample's data was extracted from the course INT 2043, sections 001 and 002, Computer-Aided Engineering Drawing.

As shown in Table 2, there were 19 students in Group A and 16 in Group B. It can be seen that 33 (94.3%) of the students were male and 2 (5.7%) were female. The majority of students 91.4% in both groups were between the ages of 19 to 21 years old. Eighty percent of the sample population was full time students (28). Of the sample, 31 (88.6%) of the students were taking the course because it was a required course.

Table 2 *Demographics Information of the Computer-Aided Engineering Courses*

		Sample		Group A		Group B	
Categories		*n*	%	*n*	%	*n*	%
Total *N*		35	100%	19	54.3%	16	45.7%
Gender							
Male		33	94.3%	18	54.5%	15	45.5%
Female		2	5.7%	1	50.0%	1	50.0%
Age							
	18	1	2.9%	1	5.3%		--
	19	9	25.7%	4	21.1%	5	31.3%
	20	15	42.9%	6	31.6%	9	56.3%
	21	8	22.9%	6	31.6%	2	12.5%
	22	1	2.9%	1	5.3%		--
	27	1	2.9%	1	5.3%		--
School status	Work part-time	7	20.0%	4	21.1%	3	18.8%
	Student only	28	80.0%	15	78.9%	13	81.3%
Reason for attending	Required Course	31	88.6%	16	84.2%	15	93.8%
	Elective	4	11.4%	3	15.8%	1	6.3%

Initially, there were 35 college students that participated in the study. Table 3 presents the mean and standard deviation of the samples' GPAs and ages. The students in Group A were from multiple class levels at the university (freshman, sophomores, juniors, seniors, and graduates). Students from Group B were only sophomores and juniors. The average age of the sample was 20.1 years old. The average age of each group was similar (20.5 for Group A and 19.8 for Group B).

Table 3 *GPA's and ages of Students*

	Sample		Group A		Group B	
Variable	Mean	*SD*	Mean	*SD*	Mean	*SD*
Age	20.1	1.46	20.5	1.87	19.8	0.66
GPA	2.85	0.50	2.75	1.87	2.95	0.53

The grade point average of the students (with standard deviation in parentheses) in Group B was 2.95 (.53) which was the higher GPA of the two groups, while Group 1 had a GPA of 2.75 (1.87). The grade point average of the sample was 2.85.

Results Relevant to Research Question

What is the importance of the instructor being involved in the learning process relative to students learning in regards to different interactions between the instructor and the student? It is hypothesized that students will obtain a greater level of knowledge upon the completion of a course when the teacher demonstrates a high level of teacher interaction.

Null hypothesis. There will be no statistical significance in knowledge gained and retained between students who participate in self-based learning courses compared to those who participate in elevated teacher interaction courses.

A test rubric (Appendix D) was used to score all three sets of tests. The rubric has a possible of 100 points that was scored by three different professors. The grading professors consisted of the two instructors that participated in the study along with an independent professor. All three professors were employed at Eastern Illinois University.

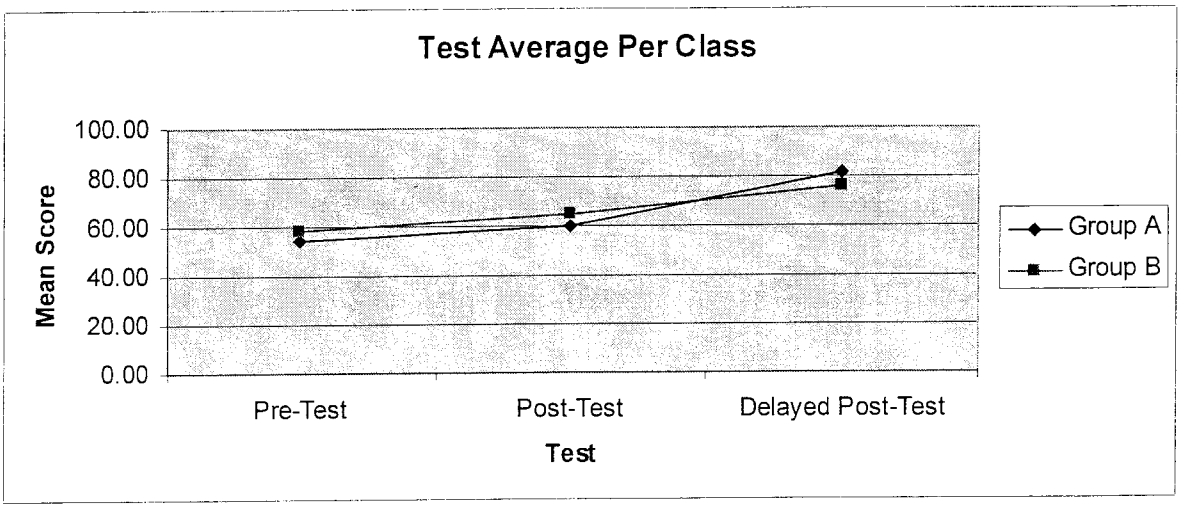
Table 4 *Descriptive Statistics of the Different Course Sections*

Variables	*M*	*SD*	*N*
Mean scores @ pretest			
Self-based activity (Group A)	54.14	20.93	19
High instructor interaction (Group B)	58.79	16.27	16
Mean scores @ posttest			
Self-based activity (Group A)	60.04	29.55	17
High instructor interaction (Group B)	64.98	23.03	16
Mean scores @ delayed posttest			
Self-based activity (Group A)	81.71	23.42	16
High instructor interaction (Group B)	76.31	18.58	15

Results in Table 4 show that students given a high level of teacher interaction (Group B) achieved higher mean scores (58.79, *SD* = 16.27) during the pretest than those students given the self-based assignments (Group A) (54.14, *SD* = 20.93).

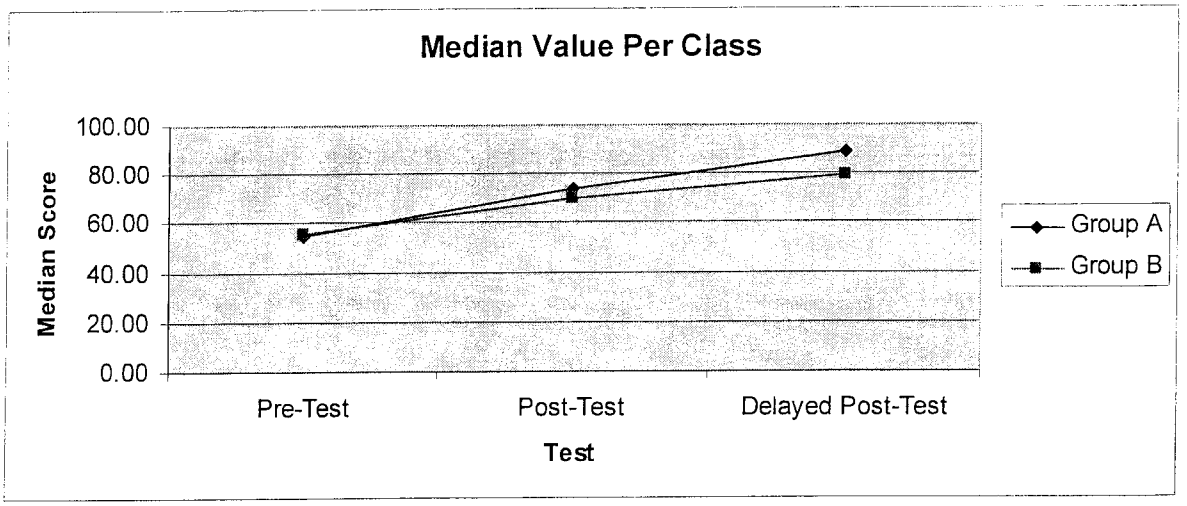
Students given a high level of teacher interaction achieved higher mean scores (64.98, *SD* = 23.03) during the posttest than those students given the self-based assignment (60.04, *SD* = 29.55). Students participating in the self based learning activity achieved higher mean scores (81.71, *SD* = 23.42) during the delayed posttest than those students who were given the high instructor interaction (76.31, *SD* = 18.58). Table 5 is a graphical representation of the results of the study.

Table 5 *Average Test Scores per Class*



Results in Table 6 show the median results of the study. Students participating in the self based learning study (Group A) achieved higher mean test scores (Post-Test = 73.67, and Delayed Post-Test = 88.83) than did those students given the self-based assignments (Post Test = 69.83, and Delayed Post-Test = 79.33). Students participating in the high level of teacher interaction achieved a higher mean test score (Pre-Test = 55.83) than did those students given the self-based learning study (Pre-Test = 55.00).

Table 6 *Median Test Scores per Class*



Reliability Test Results (T-Test)

An independent-sample t-test was conducted to compare the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ for the pre-test.

Table 7 *Pre-Test Group Statistics*

	Prof	N	Mean	Std. Deviation	Std. Error Mean
Pre-Test Average Score	A	15	55.0000	19.33949	4.99343
	B	15	58.9778	16.81858	4.34254

Table 8 *Pre-Test Independent Sample Tests*

Pre-Test Average Scores	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.022	.884	-.601	28	.553	-3.97778	6.61755	-17.53322	9.57767
Equal variances not assumed			-.601	27.471	.553	-3.97778	6.61755	-17.54499	9.58944

Table 7 and 8 show that there was no significant difference in the scores between professor A and professor B. Professor A M= 55.00, SD= 19.33 and Professor B M= 58.97, SD= 16.81; t= -.601.

An independent-sample t-test was conducted to compare the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ for the post-test. Table 9 and 10 show that there was no significant difference in the scores between professor A and professor B. Professor A M= 66.53, SD= 24.72 and Professor B M= 64.77, SD= 23.82; t= .198.

Table 9 *Post-Test Group Statistics*

	Prof	N	Mean	Std. Deviation	Std. Error Mean
Post Test Average Score	A	15	66.5333	24.72284	6.38341
	B	15	64.7778	23.82798	6.15236

Table 10 *Post-Test Independent Sample Tests*

Post-Test Average Scores	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.089	.768	.198	28	.844	1.75556	8.86563	-16.40487	19.91598
Equal variances not assumed			.198	27.96	.844	1.75556	8.86563	-16.40598	19.91709

An independent-sample t-test was conducted to compare the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ for the delayed-post test. Table 11 and 12 show that there was no

significant difference in the scores between professor A and professor B. Professor A M= 87.04, SD= 9.96 and Professor B M= 76.31, SD= 18.57; t= 1.972.

Table 11 *Delayed-Post Test Group Statistics*

	Prof	N	Mean	Std. Deviation	Std. Error Mean
Delayed-Post Test Average Score	A	15	87.0444	9.96571	2.57313
	B	15	76.3111	18.57694	4.79654

Table 12 *Delayed-Post Test Independent Sample Tests*

Delayed-Post Test Average Score	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	3.653	.066	1.972	28	.059	10.73333	5.44315	-.41645	21.88312
Equal variances not assumed			1.972	21.442	.062	10.73333	5.44315	-.57213	22.03880

Summary

This quasi-experimental pretest-posttest-delayed posttest study consisted of 35 college students. The majority of the students who participated in the study were male (33) compared to female (2). Only 20% of the participants worked part-time during the research semester. The majority of the participants (86.6%) took the course because it was a program requirement. The average age of the participants was 20.1 with a mean GPA of 2.85 on a 4.00 scale.

CHAPTER V

CONCLUSION

This study analyzed the effects that the instructor has in determining if student knowledge of a given subject is significantly impacted when teaching styles differ. This study examined the effects of the independent variable (learning through instruction style) on the one dependent variable: knowledge (gained and retained). The principal research question evaluated students' knowledge gained and retained as a result of a differing teaching styles.

Based on the data analysis results from students' mean scores of the pretest, posttest, and delayed posttest administered during the study, there was no statistical significant difference between the mean scores of students receiving the learning through instruction and self-based learning on the pre-test and the delayed-post test. There was a statistical difference between the mean scores of students receiving the learning through instruction and self-based learning on the delayed post-test.

Summary

This research study evaluated and analyzed the effects of the difference between students who participated in self-based learning courses compared to those who participate in elevated teacher interaction courses. This study looked for: Statistical significance between outcomes relative to self-based learning courses and the elevated teacher interaction courses.

Based on the data analysis results from students' mean scores of the pretest, posttest, and delayed posttest administered during the study, and the T-Test results > .05 show that there was no statistically significant difference between the mean scores of those who participated in the self-based learning course compared to those who participated in the elevated teacher interaction courses. Mean scores were used to test the null hypothesis.

The principal research question evaluated students' knowledge gained and retained as a result of the instructor being involved in the learning process.

What is the importance of the instructor being involved in the learning process relative to students learning in regards to different interactions between the instructor and the student?

1. There was no statistically significant difference in the student mean scores on the pre-test. Pre-test mean scores of the students receiving an elevated level of teacher interaction were higher than those that participated in the self-based learning course. The T-Test results support the lack of statistically significance.

2. There was a statistically significant difference in the student mean scores on the post-test. Post-test mean scores of the students receiving an elevated level of teacher interaction were significantly higher than those students participating in the self-based learning course.

3. There was no statistically significant difference in the student mean scores on the delayed-posttest. Delayed posttest mean scores of the students receiving the elevated level of teacher interaction were higher than those that participated in the self-based learning course.

Based on the analysis performed, with regards to knowledge gained and retained during the different learning modules, neither teaching styles had a statistically significant role in increasing the knowledge obtained.

Further evaluation of the data shows that there is a consistent increase in knowledge for the students that participated in the high level of teacher interaction. Students participating in the self based learning experience had a significant spike in their amount of knowledge on the delayed-post test with respect to the pre-test and post-test of Group A.

Further more there were three students that dropped out of Group A study where there was only one student that dropped out of the Group B study.

Recommendations for Further Studies

Several recommendations can be made for further investigation of self-based learning courses compared to elevated teacher interaction courses. These recommendations go beyond the research questions and findings of this study. These recommendations are not just based on CADD and drafting specific courses, but should be considered foundational for engineering course work.

Based on the findings and conclusions of this research and study, the following recommendations for further investigation can be made:

1. Creating a long-term study to evaluate and determine the effectiveness of self-based learning courses among engineering students. Long-term would be considered a full year of coursework, instead of condensed instruction modules such as presented in this research.

2. Conducting a qualitative study where surveys, journals, and interviews are used to measure the perceptions of students with regards to self-based learning courses compared to an elevated level of teacher interaction.

3. Evaluating the effect of group-based assignments that use real-world activities tied to local companies, firms, and industries. The need would be to develop and build relationships with firms from around the community of the institute.

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APPENDICES

Appendix A

Master Plan Chart

Instrument	Schedule	Letter of Concent	Demographics	Rubrick	Pretest	Posttest	Delayed Posttest
Class Day	1	1	1	1	1	17	37
Classroom Objective	Appendix A	Appendix B	Appendix C	Appendix D	Appendix E	Appendix F	Appendix E

Initial Measure					x		
Pre- to Post-						x	
Post- to Delayed-							x
Attitude Survey							
No Measure Taken	x	x	x	x			

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Appendix B

Informed Consent Letter

INFORMED CONSENT
Practical Learning Experience through Teacher Interaction

Date Created: 1/11/2009

Introduction/Purpose:

Professor David Melton and Graduate Student Ryan DeVries in the Industrial Technology Department at Eastern Illinois University are conducting a research study to find out more about characteristics of student knowledge retention when the level of professor interaction varies. You have been asked to take part as a student within the INT 2043 course of instruction. There will approximate 30 participates at this site. Your participation represents involvement in research that maybe documented for further studies and journal publication.

Procedures:

If you agree to the study, the following will happen to you. The professors teaching styles are predetermined and assigned to a course section by the research team. You will participate in all test projects, quizzes, and activities. Class instruction could take up to 1 hour, 50 minutes each session.

New Findings:

During the course of this study, you will be informed of any significant new findings (either good or bad), such as changes in the risk or benefit resulting from participation in the research, or new alternatives to participation that might cause you to change your mind about continuing in the study. If new information is obtained that is relevant or useful to you, or if the procedures and/or methods change at any time throughout this study, your consent to continue participating in this study will be obtained again.

Risk:

Participation in this study may involve some added risks or discomfort. These include:

1. Sitting at a desk for undetermined period of time.
2. Using a computer for an undetermined period of time.

Benefits:

There potential could be direct benefits from your participation. These potential benefits include:

1. Understanding the dynamics of instructor teaching styles.
2. Participation in presenting data and documentation.
3. Develop additional skills in the use of 3D modeling software.

INFORMED CONSENT
Practical Learning Experience through Teacher Interaction

Date Created: 8/17/2011

Explanation and offer to answer questions

Ryan DeVries has explained this study to you and answered your questions. If you have other questions or research-related problems, you may reach Professor David Melton at 581-5762.

If you have concerns about the study or your rights as a participant, you can contact the Eastern Illinois University - Institutional Review Board @217-581-8453.

Voluntary nature of participation and right to withdraw without consequence

Participation in research is entirely voluntary. You may refuse to participate or withdraw at any time without consequence or loss of to benefits. You may be withdrawn from this study without your **consent** by the investigator at any time.

Participation or non-participation in this research will not jeopardize any status in the classroom structure or grading and in the request for future letter of recommendation.

Confidentiality

Research records will be kept confidential, consistent with federal and state regulations. Only the investigator and research assistant will have access to the data, and it will be keep secured. The data will be kept until the research is completed. Video and audio records will fall within the same explanation of confidentiality as other data collected.

Copy of Consent:

You have been given two copies of the Informed Consent. Please sign both copies and retained one copy for your files.

Investigator Statement:

"I certify that the research study has been explained to the individual, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered."

Signature of PI
Student Research Assistant

David Wayne Melton	Ryan G. DeVries
Principal Investigator	Student Research Assistant
(217)581-5762	(217)412-2572

Signatures of Subjects

Subject's Signature	Date

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Appendix C

Student Demographics Information

Student Demographic Information

Note: All of the requested information will be confidential and you will not be specifically identified with it by name. This information will be used to provide data about the class as a group.

Identify the characteristics that best describe you as an individual.

1. Male _____ Female _____
2. Age: _____
3. GPA: _____
4. Current work status:
    a. Full _____
    b. Part _____
    c. Student _____
5. Class Ranking:
    a. Freshman _____
    b. Sophomore _____
    c. Junior _____
    d. Senior _____
    e. Graduate _____
6. Student Status:
    a. Full-time _____
    b. Part-time _____
7. Why are you taking the course?
    a. _____ Program Requirement
    b. _____ Elective
    c. _____ Exploring different options
    d. _____ Other (please specify)_____
8. Major: _____

Appendix D

Skills Analysis Rubric

PRE/POST/DELAY-POST TEST RUBRIC

Concepts and principles of orthographic projection

Views are not aligned or in projection. A view is missing, Numerous lines are misplaced or missing. Precedence of lines not followed	Features are aligned or correctly projected between the views. Some visible or hidden lines are missing. Precedence of lines followed for most lines.	The views (visible & hidden edges) correctly describe the shape of the object. The views are oriented correctly. Features are aligned or correctly projected between the views. Precedence of lines correctly followed	Total Points
0-35 points	36-45 points	46-50 points	

Accuracy and measurement

Numerous errors in measurements. Inappropriate scale used.	Some errors in measurement	When measured, the sizes of features and their locations closely agree with the given problem. Scale is correct	Total Points
0-14 points	15-18 points	19-20 points	

Line weight technique and neatness

Line weights not uniform. Numerous double lines. Intersections not correctly formed. Construction lines too dark. ANSI standards for thickness and darkness not followed. Missing or improperly placed centerlines	Some lines are not uniform. Some intersections are not formed correctly. Some lines do not meet ANSI standards. Some intersections for hidden lines not correct. Few misplaced or missing center lines.	Line quality is neat, clean, well-formed, and meets ANSI standards for thickness, darkness, and coding. Correct practices for hidden lines and center lines followed. Center lines are properly placed.	Total Points
0-14 points	15-18 points	19-20 points	

Layout and Balance

The drawing is not centered vertically and horizontally	The drawing is centered vertically but not horizontally (or horizontally but not vertically)	The drawing is centered within the working space	Total Points
0 points	3 points	5 points	

Dimensioning Text and Notes

Text style and size does not meet accepted standards. More that one spelling error	No more than one spelling error.	Text style and size meets accepted standards. Spelling is correct.	Total Points
0 points	3 points	5 points	

Total Score _____

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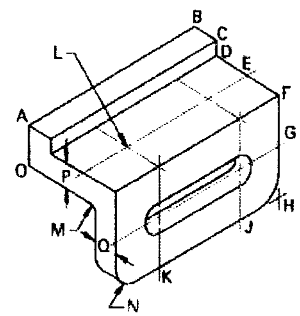
Appendix E

Pretest

In the space below, create three views of the adjustable stop. AB = 10.00", BC = 1.38", CD = .75", DE = 1.88", EF = 2.00", FG = 2.50", GH = 2.50", FH = 5.00", HJ = 2.50", JK = 5.00", L = Ø1.00", 2 holes, M = R.50", N = R1.25", AO = 2.00", P = 1.25", Q = 1.25", slot = 1.50" wide. Scale: As assigned.

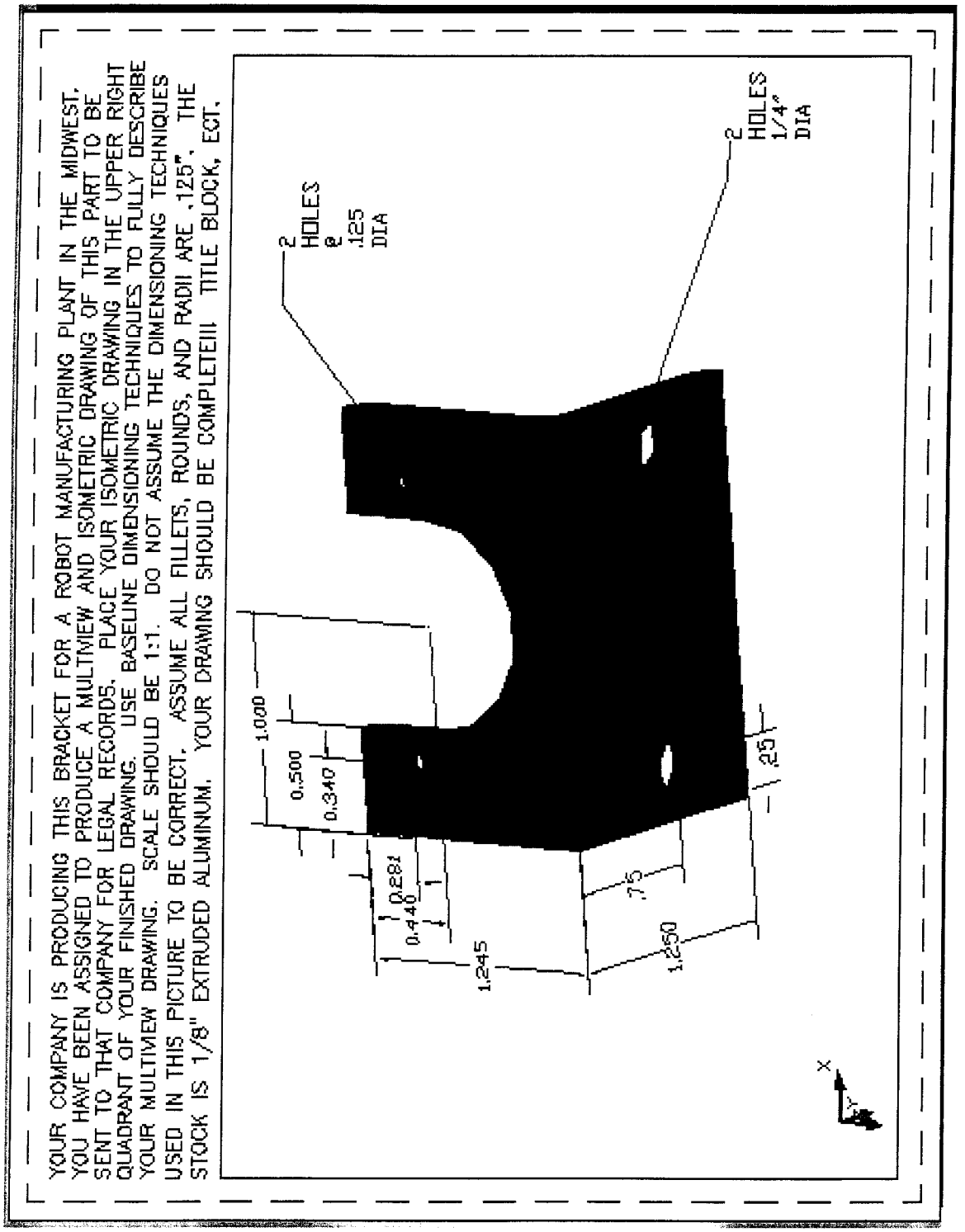


ADJUSTABLE STOP

Appendix F

Posttest and Delayed Posttest

Skills: Creating 3D Solid Model – Multiview Drawing



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Appendix G

Student Test ID Slip

Name:
Date:
Test #: