



## The Relationship Between Self-Efficacy, Motivation And Critical Thinking Disposition To Achievement Of Sandwich Degree Students

### Abstract

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**Key words:** Self-efficacy, Motivation, Critical thinking, Achievement and Attitude, Students expose to PowerPoint.

This study examines the relationship between Self-efficacy, Motivation, and Critical thinking disposition to Achievement and Attitude of Sandwich Degree students of University of Ado Ekiti during their 2010 contact lecture when they were exposed to PowerPoint lecture. The researcher who is also the instructor adopted PowerPoint to deliver lecture on EGC 410 to the purposive sample of 162 students that enrolled for the course. Five instruments were utilized in this study they were (i) instrument used to measure motivation (ii) Self efficacy instrument by Riddle (iii) Engagement Maturity and Innovativeness (EMI) Critical Thinking Disposition Inventory, (iv) the Achievement post-test developed by the researcher and (v) the Attitudinal instrument. Data collected were analyzed using descriptive statistics of canonical and regression analysis. Results indicated that motivation and computer proficiency tend to influence attitudes and that motivation and prior knowledge influence achievement.

### Introduction

In a face-to-face class, the instructor gains knowledge through personal interactions with students, which provides a starting point for planning learning activities that are conducive to maximizing students learning. In contrast, the separation of students from the instructor in a distance-learning environment often limits this interaction and feedback from students (Twigg, 2001). As such, instructors have difficulties recognizing when a learning activity is not reaching students. Compounding this issue is that fact that distance-learning activities are often planned and created in advance with limited knowledge of the students who will enroll in a class in a one-size-fits-all approach. However, this does not need to be the case. Distance education, particularly online education, can be individualized or personalized to meet the needs of individual students. However, this means moving away from teaching and learning ideas that begin with the thought that “all students need .....” (Twigg, 2001).

The Sloan Consortium, which is a group of institutions and organizations dedicated to providing quality online education, also advocated creating an individualized or personalized learning environment (Moore, 2002). A key to success identified in Elements of Quality: The Sloan-C Framework was the “opportunity to personalize learning in

innovative ways through approaches that emphasize the uniqueness of individual learners” (Moore, 2002). Thus, according to the Sloan Consortium, the characteristics of each student can be used to identify appropriate learning activities.

This ability to individualize, or personalize, instruction allows online education to produce the highest quality learning outcomes for all students. Upon enrolling in an online education course, a student can take an assessment that will determine the learning activities that will best meet his or her needs. The instructor may then assemble the appropriate learning activities for each student (Twigg, 2001). So what activities are best for what students?

Delivering content PowerPoint learning can take many forms and utilize many learning activities. These learning activities can be synchronous or asynchronous. One such learning activity available in an online learning environment is an illustrated web lecture (Simonson, Smaldino, Albright, & Zyacek, 2003). This asynchronous learning activity seeks to closely mimic the traditional lecture that dominates higher education classrooms. It consists of a text-based presentation, such as PowerPoint, with an audio recording of the instructor presenting the lecture.

## Theoretical Framework

Some involved in distance education have called for the establishment of distance education as a separate, distinct discipline, distinct from the mainstream educational discipline (Moore, 1994). As such, these individuals insisted that a separate theoretical framework was necessary for distance education. Other scholars have argued that the teaching and learning processes are the same, regardless of the separation of teacher and students (Keegan, 1986; Shale, 1988). For education, this latter philosophy seems plausible.

Many scholars have proposed theories and models for distance education that are consistent with Mitzel's model. For example, when proposing his Theory of Interaction and Communication, Holmberg (1989) made the assumption that distance education is an interaction (process variables) between learners (context variables) and teachers (presage variables). He further indicated that student learning determines effectiveness (product variables). Wedemeyer (1981) proposed a model for distance education that is compatible with Mitzel's model. In his model, Wedemeyer outlines four essential elements in a teaching and learning situation. They are a teacher, a learner, a communication system, and something to be taught (content). In relation to Mitzel's model, the teacher is represented as presage variables, the learner as context variables, and the communication system and content are represented in the process variables. Missing from Wedemeyer's model are the product variables.

This study sought to determine the influence of student characteristics (context variables) on student achievement and attitudes (product variables) while holding constant the teaching method (process variable) and instructor (presage variable). The student characteristics examined in this study were motivation, self-efficacy, critical thinking disposition, and demographic variables. As such, relevant research studies on these student characteristics (context variables) and their influence on student achievement and attitudes (product variables) in a distance-learning environment were consulted.

Motivation is the process whereby goal-directed activities are instigated and maintained (Schunk, 2000). A student with a high degree of motivation towards success in a course will likely be more successful. Student motivation

has been shown to influence student attitudes and achievement in a distance-learning environment (Berg, 2001; Shih & Gamon, 2001). However, a deficiency exists in research that examines student motivation as it relates to attitude and achievement when PowerPoint is used to deliver lecture.

Self-efficacy is a student's beliefs about his/her capabilities to succeed or perform at an appropriate level (Schunk, 2000). Research on this variable has generally shown that self-efficacy affects student achievement and attitudes (Lim, 2001; Riddle, 1994). However, no studies have been found that examined self-efficacy as it relates to achievement and attitudes toward a specific learning activity, such as PowerPoint as medium of delivering lecture.

Another student characteristic, critical thinking dispositions, has recently gained attention in research related to student attitudes and achievement (Jenkins, 1998). Critical thinking dispositions are approaches of life that contribute to critical thinking (Facione, 1990). No studies were found that examined the influence of critical thinking dispositions on student attitudes and achievement in a distance-learning environment.

Numerous studies have investigated how other student variables influence achievement and attitudes in a distance-learning environment. For example, Dutton, Dutton, and Perry (2002) reported that student employment and a negative impact on performance. Age is also related to student attitudes in a distance-learning environment (Berg, 2001; Brouard, 1996). The influence of gender is inconclusive (Lim, 2001; Oxford, park-Oh, Ito & Sumrall, 1993). A student's previous experience with distance education is also inconclusive (Cheung & Kan, 2002; Lim, 2001). The effects of student characteristics related to computer proficiency and computer usage are also uncertain when trying to predict student achievement and attitudes in a distance-learning environment (Dutton et al., 2002; Sexton, Raven & Newman, 2002).

## Research Questions

Two research questions guided this study. They are

- (i) Is there statistical relationship between various characteristics of Sandwich degree students

- exposed to PowerPoint lecture delivery?
- (ii) Is there statistical relationship between motivation, self-efficacy and critical thinking disposition to achievement attitudes in the presence of student demographic characteristics?

### Objectives

Based on a review of the literature, a research deficiency exists that could explain the influence of motivation, self-efficacy, critical thinking disposition, and student demographics on students attitudes and achievement when PowerPoint lecture is used as learning activity. Therefore, the purpose of this study was to fill that void. The objectives of this research are:

- (1) To describe the characteristics of students in a PowerPoint lecture delivery Environment and
- (2) To describe the relationship between motivation, self-efficacy, and critical Thinking disposition to student achievement and attitudes in the presence of student demographic characteristics.

### Method

#### Design

This study is part of a larger study that used a causal-comparative design (Gall, Gall, & Borg, 2003). The independent variables were already present in the subjects of this study, and as such, random assignment and manipulation of variables was not achievable.

#### Population

The population of this study were all students enrolled for Sandwich degree programme of university of Ado Ekiti in Nigeria. A purposive sample of 162 students was used. This sample was deemed to be representative of the population based on enrollments of this course.

#### Sample

The data collection period for this study was 12 weeks during the 2010 contact year. Students of Nursery and Primary Education (NPE) who enrolled for EGC410 were samples of the study. All data collection and informed consent procedures occurred using PowerPoint. The instructor who is also the researcher administered the achievement post-test, which also served as the second examination in the course. Great effort was taken to integrate the data collection of this study with regular instructional activities of the course.

### Instruments

The instrument used in this study to measure motivation was used in a similar study by Shih and Gamon (2001). The instrument utilized nine statements designed to assess the degree to which a student instigates and sustains goal-directed behaviour. A Likert-type scale accompanied each statement. Reliability was assessed post hoc using Conbach's alpha ( $r = .77$ ).

The self-efficacy instrument was developed by Riddle (1994). This instrument was developed specifically for use in distance education. Based on work by Bandura, and a thorough review of existing literature, Riddle developed 17 Likert-type items that explained a student's self-efficacy towards success in a distance-learning environment. Post hoc reliability analysis yielded a Cronbach's alpha for this instrument of .89.

Critical thinking dispositions were assessed using the Engagement, Maturity and Innovativeness (EMI) Critical thinking Disposition Inventory (Ricketts, 2003). Face validity of the instrument was established by an expert in the are of measurement and evaluation. Construct validity was established by using the original work of Facione (1990). Post hoc reliability analysis yielded a Cronbach's alpha for this instrument of .85.

A research-developed instrument was used to gather demographic data. Face and content validity were determined by an expert from the department of Guidance and Counselling University of Ibadan. Reliability was not an issue on this instrument. The questions did not elicit demands for considerable time, thought, nor variation and therefore posed no reliability risks (Dillman, 2000).

The researcher developed the achievement post-test. The researcher created a parallel form to use as the achievement pre-test. Art et al. (2002) defined a parallel test as one that is as similar as possible in content, difficulty, length, and format. Both tests were evaluated for face validity by an expert from the department of Guidance and Counselling University of Ibadan. The instructor of the course evaluated the instruments for content validity. Post hoc reliability analysis yielded a Kuder-Richardson-20 score of .84.

The attitudinal instrument was developed by Shih and Gamon (2001). The instrument used 11 Likert-type items to assess student attitude towards PowerPoint instruction. Shih and Gamon reported acceptable content and face validity. Slight wording changes were made in this instrument to focus on an illustrated PowerPoint. Post-hoc reliability analysis yielded a Cronbach's alpha of .87.

Response rates were 87% for the motivation instrument, 87% for the self-efficacy instrument, 87% for the critical thinking disposition instrument, 87% for the demographic instrument, 76% for the achievement pre-test, and 81% for the attitudinal instrument. The achievement post-test was administered face-to-face by the instructor, which allowed for a 100% response rate. Therefore, the generalizability of the finding of this study is limited.

### Data Analysis

Data collected were analyzed using descriptive statistics of canonical and regression analysis.

### Findings

The first research question of this study was to describe the characteristics of students exposed to Power Point lecture. The following data were found.

Almost four over five of the respondents in this study were female (78%).

The average age of participants was 32.33 year old (SD = 5.43). Self-reported grade point averages ranged from 1.97 to 4.2. The mean grade point average was 3.19 (SD = 518). Over half of the participants (n = 83,51.2%) were employed.

The number of distance or online classes that participants had previously taken ranged from 0 to 15. The mean of this distribution was 1.72 (SD = 2.35). Almost 84% of the participants in this study (n = 136) had taken no previous online or distance education courses.

Participants in this study were also asked to indicate their self-perceived computer proficiency on a scale from 0 to 100. Responses ranged from 5 to 100. The mean was 47.77 (SD = 7.35).

The mean self-efficacy score was 72.40 (SD = 8.82). The possible range for self-efficacy scores was 17 to 85. Observed scores ranged from 24 to 86. The mean motivation score was 28.79 (SD = 3.37), and ranged from 14 to 35. The possible range for motivation scores was 7 to 35. The mean score for Critical Thinking Dispositions was 95.03 (SD = 11.69). The possible range for critical thinking disposition scores was 25 to 125. Observed scores ranged from 44 to 121.

Achievement was assessed using pre-test measures. The maximum possible score for each assessment was 100. Achievement pre-test scores ranged from 15 to 75, with a mean of 36.01 (SD = 11.38). Scores on the achievement post-test ranged from 23 to 74.

The mean score was 58.13 (SD = 8.30). Score on the attitudinal instrument ranged from 15 to 55, with a mean score of 38.79 (SD = 7.47). The possible range of scores was 11 to 55.

The second research question in this study was to describe the relationship between motivation, self-efficacy, and critical thinking disposition to student achievement and attitudes in the presence of student demographic characteristics.

This research question was processed by using the canonical correlation procedure. Attitudes and achievement post-test scores were the dependent variables. Motivation, self-efficacy, critical thinking disposition were the independent variables.

Computer proficiency and achievement pre-test were also included in the analysis and were chosen based on their correlation with the dependent variables (Ary et al., 2002; Stevens, 1992)

**Table 1: Descriptive Statistics of Context and Product Variables in Canonical Correlation Analysis**

Variables	Correlations							
	Y <sub>1</sub>	Y <sub>2</sub>	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	M
<i>SD</i>								
<i>Dependent Variable Set</i>								
Achievement Post-test Score (Y <sub>1</sub> )	--	.180	.250	.196	.131	.040	.259	58.13
9.20								
Attitude Score (Y <sub>2</sub> )		--	.142	.120	.073	.203	.149	38.79
7.47								
<i>Independent Variable Set</i>								
Motivation(X <sub>1</sub> )			--	.487	.454	.047	.157	28.79
3.37								
Self-Efficacy(X <sub>2</sub> )				--	.687	.089	.087	72.40
8.82								
Critical Thinking Score (X <sub>3</sub> )					--	.140	.050	95.03
11.69								
Computer Proficiency(X <sub>4</sub> )						--	.046	78.77
14.30								
Achievement Pre-Test Score(X <sub>5</sub> )							--	36.01
11.38								

As shown in Table 1, low correlations were found between attitude and motivation (r = .142), attitude and computer proficiency (r = .203), and attitude and achievement pre-test scores (r = .149) (Miller, 1994). The achievement post-test scores had low correlations with motivation (r = .250), self efficacy (r = .196), critical thinking disposition (r = .131), and achievement pre-test scores (r = .

259). Substantial correlations were also discovered between self-efficacy and critical thinking disposition (r = .687). Moderate correlations were discovered between self-efficacy and motivation (r = .487) and motivation and critical thinking disposition (r = .454).

**Table 2: Canonical Correlation Analysis of Context and Product Variables**

Variables	Canonical Root 1		Canonical 2	
	B	S	b	S
<i>Independent Variable Set</i>				
Motivation	.563	.707	-.373	-.341
Self-efficacy	.236	.432	.432	-.020
Critical Thinking Disposition	-.179	.290	-.324	-.163
Computer Proficiency	.287	.296	.920	.885
Achievement Pre-Test	.641	.739	-.055	-.139
<i>Dependent Variable</i>				
Attitude	.436	.595	.919	.803
Achievement Post-test	.821	.901	-.603	-.429
PV		.583		.418
Rd		.082		.007
Rd <sub>t</sub>				.089
R <sup>2</sup> <sub>c(1)</sub> = .137 (p = .017); R <sup>2</sup> <sub>c(2)</sub> = .017 (p = .355)				

Note,  $b$  = standardized canonical coefficients (weights);  $a$  = structure coefficients,  $PV$  = proportion of variance in dependent variable set explained by dependent variate,  $Rd$  = redundancy,  $Rd_t$  = total redundancy.

Going through the results of the canonical correlation analysis, the independent variables of motivation, self-efficacy, and critical thinking disposition accounted for 8.8% of the variance in a linear combination of attitudes and achievement post-test (see Table 2). Only the first canonical root was significant  $R^2 c(1) = .137, p = .017$ ). According to Warmbrod (2003), any correlation greater than .3 is meaningful. Therefore, when examining the correlation of the independent variables to the first canonical root, achievement re-test scores ( $r = .739$ ), motivation

( $r = .707$ ), and self-efficacy ( $r = .432$ ) were the only meaningful variables.

Individual backward regressions were ran as a follow-up to the canonical correlation procedure to better explain the contribution of context variables to the product variables. This procedure was used because it utilizes all available variables to build a model that consists of only variables that contribute significantly to predicting the dependent variable (Agresti & Finlay, 1997).

**Table 3: Backward regression Analysis to Predict Achievement Post-test Score**

Variable	B	SE	B	T	P
Constant	33.055	4.743		6.969	<.01
Achievement Pre-test Score	.189	.055	.222	3.529	<.01
Motivation Score	.567	.159	.227	3.613	<.01

Motivation and achievement pre-test scores yielded the best model in predicting achievement post-test scores. Regression analysis revealed that a linear combination of motivation and achievement pre-test significantly predicted achievement post-test scores,  $F(2,235) = 15.15, p < .001$ .  $R^2$  for the model was .117, adjusted  $R^2$

was .109. Table 3 shows the regression coefficients for this model. Achievement pre-test scores ( $t = 3.529, p < .01$ ) and motivation ( $t = 3.613, p < .01$ ) contributed significantly ( $a = .05$ ) in predicting achievement post-test scores. These two variables accounted for 10.7% of the variance in achievement post-test scores.

**Table 4: Backward Regression Analysis to Predict Attitude Scores**

Variable	B	SE	B	T	P
Constant	21.459	4.847		4.426	<.001
Computer Proficiency Score	.113	.035	.193	3.151	.002
Motivation Score	.298	.137	.131	2.159	.032

Computer proficiency and motivation yielded the best model in predicting student attitude towards Power Point lecture. Regression analysis revealed that a linear combination of computer proficiency and motivation significantly predicted attitude,  $F(2,254) = 7.77, p = .001$ .  $R^2$  for the model was .059, adjusted  $R^2$  was .051.

Table 4 shows the regression coefficients for this model. Computer proficiency ( $t = 3.151, p = .002$ ) and motivation ( $t = 2.159, p = .032$ ) contributed significantly ( $a = .05$ ) to predicting student attitude. These two variables accounted for 5% of the variance.

### Conclusions, Implications and Recommendations

From the findings of this study, it was concluded that the average participant was highly motivated, exhibited high levels of self-efficacy, and had high critical dispositions. They also expressed a degree of high self-perceived computer skills, but had little previous experience with distance PowerPoint lecture.

Motivation is the process of instigating and sustaining goal-directed behaviour (Schunk,

2000). Although equivalent to fall and spring semester sections, the course section used in this study was conducted during the 2009 contact year. Since the learners enroll once a year for the programme, it is also reasonable to assume that participants enrolled with a goal of successfully completing this course.

The course used in this study was an introductory level of guidance and counseling course designed for students specializing in guidance and counseling. Historically, this course has had a high degree of student success. As such, it is reasonable to expect that the participants of this study entered into the course with a strong belief that they would be successful. Therefore, it is not surprising that participants in this study had a relatively high level of self-efficacy can be increased if the student observed a model that successfully completes the takes or learns the material (Schunk, 2000). Therefore, observing or having knowledge of other students that have previously been successful in this course, learning through PowerPoint lecture, can raise the observer's self-efficacy (Schunk, 2000).

The sample used in this study exhibited relatively high critical thinking dispositions. This finding contradicts earlier work by Rudd, Baker, and Hoover (2000), who reported differences in critical thinking dispositions between students of differing majors and lower critical thinking dispositions.

Based on the findings of this study, it was concluded that when PowerPoint lecture is used to deliver content, students with higher levels of motivation tend to exhibit higher achievement and more positive attitude toward PowerPoint lecture.

Theories of motivation postulate that higher motivation can produce greater achievements (Schuunk < 2000). As such, higher achievement would be expected for students that set goals and instigate behaviours designed to meet those goals. The findings of this study are consistent with this theory and consistent with existing research.

For example, in a study of web-based learning, Shih and Gamon (2001) found that motivation accounted for nearly one-fourth of the variance in achievement, as measured by course grade and Oxford et al. (1993) reported that motivation affected performance in a foreign language course delivered by achievement education.

Give the nature of the technology used to deliver a PowerPoint lecture, it is reasonable to expect that students with greater computer proficiency would have more favourable attitudes toward PowerPoint lecture. Previous research has shown that computer proficiency influences achievement in a distance-learning environment. For example, Dutton et al. (2002) indicated that a student's prior experience with computers improved their performance, as measured by course grades. Another possible contributing factor to attitude toward PowerPoint lecture was technical difficulties associated with the technology. Students with greater computer proficiency likely had fewer technical difficulties and were likely able to handle minor technical difficulties without assistance. As a result, students with higher computer proficiency had more favourable attitudes of an illustrated web lecture.

It is also reasonable to assume that students that enter into an educational setting with greater knowledge of the content will achieve at a higher level at the conclusion of instruction. The findings of this study support this premise, as indicated by the relationship between prior knowledge, as measured by achievement pre-test scores, and achievement, measured by achievement post-test scores.

In this study, self-efficacy was correlated to achievement post-test scores, however, it was also correlated to motivation. The relationship between self-efficacy and motivation is supported in the literature (Bandura, 1986). Given the relationship between these two variables, the model building procedure selected the variable that explained the greatest amount of the variance, motivation. With motivation in the model, self-efficacy did not significantly explain any more of the variance. It is reasonable to assume that a student's belief about their potential for success influences their success (Bandura, 1986).

Self-efficacy was not significantly correlated to attitudes; however, it was correlated to motivation. As such, it is reasonable to expect that when building a model to predict attitudes that both variables would not remain in the model. The findings of the current study are inconsistent with the findings of Lim (2001) and Riddle (1994) who reported that self-efficacy was related to attitudes. However, neither of these studies examined motivation. Perhaps if

these studies had included motivation, their findings would have been similar to the current study.

Previous studies that examined the effects of critical thinking dispositions on achievement in a distance-learning environment were not found to compare the results of the current study to. The instructor prepared achievement test employed in this study assessed mainly lower level recall information. Perhaps if participants were assessed at a higher level, critical thinking dispositions would have statistically contributed to predicting achievement. This proposition is supported to the findings of Cano and Martinez (1991).

A PowerPoint lecture is only one learning activity used to deliver content in a distance learning environment. This study should be replicated to see how motivation, self-efficacy, critical thinking dispositions, and student demographics influence achievement and attitudes when other instructional strategies or learning activities are used.

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