The Study of Achievement and Motivation by e-Learning–A Case Study

Hong-Min Lin, Wan-Ju Chen, and Shu-Fen Nien

Abstract—With the rapid development of information systems and the Internet technology, there has been a lot of progress in the multi-media and the Internet industry. It has also brought innovation in the mode of educational learning. This study was designed for freshman students of college in the e-learning method of an accounting course, so as to investigate different achievement and motivation implementation of this method. The study applied quasi-experimental design, divided into an experimental group and a control group. Learning effect evaluation was done by using pre-test and post- test. In order to achieve the purpose of the study, the experimental group applied e-learning strategy and the control group applied traditional learning style. After a six week period, we examined the effectiveness of learning in the experimental group. The results were two-fold: firstly, e-learning strategy is not different from the traditional learning method in terms of achievement in accounting for freshman students in college; secondly, e-learning strategy is superior to the traditional learning method in terms of learning motivation.

Index Terms—E-learning, learning effectiveness, learning achievement, learning motivation.

I. INTRODUCTION

The fast development of information systems and the Internet technology not only makes a lot of progress in multi-media and the Internet industry, but it also affects innovation in the educational learning style. Because of technology development, e-learning will develop a particular learning style. Learner and educator will confront new teaching and learning methods [1]. In order to improve learning effectiveness, the government proposed the idea of a technology plan for National E-learning. Diversified content, learning experience and the Internet convenience will be accepted by schools nowadays.

The traditional learning style is based on a teacher as the center of learning and the classroom as the center of any learning activities. But, because information is rapidly spreading, and knowledge is renewing faster, the traditional learning style is no longer sufficient for learners. Computer assistance learning with websites combines into The Internet learning. The learning method will improve one way or another from static to active. With e-learning, the learner and teacher can be in different places and interact at different times.

The teacher supplies learning content to learners via electronic flat screen or the Internet, and the learning activities for students are also done through the same form [2]. In e-learning, the teacher's role is guidance. Teachers are not in the role of explaining course content. And the learners become more active. Therefore, e-learning changes the responsibility of learning from teachers to learners. E-learning is participation learning which emphasizes the learner as prime. At the same time, e-leaning can provide students with an opportunity to learn how to learn, translation into lifelong learning, cooperation learning, and active learning. From the educational point view, the e-learning method is a new and fast way of the acquisition of knowledge, experience and skills. At present, every school plans to utilize e-learning advantages to develop students' desired learning content and provide students with a new way to learn.

As the above-mentioned shows, this study focuses on the different learning accounting methods of college freshman students to prove the variance in achievement and motivation of learning.

II. THE RESEARCH PURPOSE

This study investigates the following,
1) Application of e-Learning Method to a Traditional Learning Accounting Course.
2) If E-Learning of Accounting Course can Result in a Higher Learning Achievement.
3) if e-learning of accounting course can result in a higher learning motivation

This study also aims at,
1) Addressing Specific Suggestions about e-Learning.

III. LITERATURE REVIEW

A. E-Learning

E-learning can construct a new learning style through the Internet. E-learning is not restricted by space and time ; it provides individual multi-interaction, so it can make up for inadequacies of teaching activities in a traditional classroom [3], [4]. The definition of e-learning, the essence of e-learning is learning with the "e" as the only learning tool; that is the way of electronic learning, online learning or the Internet learning. Through the "e" learning method, learners

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can find understanding anytime and anywhere [5]. E-learning can be achieved through digital instruments – whether by computer, the Internet, satellite broadcast, compact disk or interactive TV [6]-[8].

E-learning will be in the mainstream of learning in the future and will create a lot of advantages [9]-[12]. The advantages are first, the source of learning is sharing so no more space limitation. Second, no more time limitation if the teaching platform server and the Internet channel function normally, which means learners can learn anytime online. Third, learning materials can be re-used over and over. Fourth, teachers can use multimedia to express the content meaning of e-learning. Fifth, e-learning is individual teaching and learning; the teacher can ascertain each learning situation so as to assist the learner. Sixth, e-learning can enhance learning interests because the teaching style is more active. In short, the advantages of e-learning are that learners can obtain more abundant and colorful materials and instructors can understand the focii and situation of learners.

Multi-media material contents illustrate the richness and diversification that combines sound, image, picture and motion picture, and words. The material contents of e-learning morph from static to active. E-learning sheds light on the diversified materials, assists learning and cognitive construction, provides suitable learning, enhances autonomy of learning, breaks through learning environment limitations, pushes resource-sharing and increases communication and interaction [13]. By importing the concept and technique of e-learning, and utilizing the characteristics of the Internet, multi-media interaction and personal learning process, can create a life-time learning model in which the learner is the center of activities and can study at anytime and anywhere [14].

IV. METHODOLOGY

A. Research Structure

This is an experimental study. The students are divided into two groups–an experimental group and a control group. The variables include the students' ability and the teacher's ability. The independent variable is the effect of accounting e-learning. The dependent variable is the control group and experimental group with learning achievement and motivation at difference learning mode.

B. Sample

The study is based on a class at one private college and used as a unit. The study sample is a total of 31 students divided into two groups: 16 students are in the experimental group and 15 students are in the control group.

C. Measurement

The study applied quasi-experimental design that is division into the experimental group and control group. Learning effect evaluation was done using pre-test and post-test. In order to achieve the purpose of the study, the experimental group applied e-learning strategy and the control group applied traditional teaching style. The study proceeded for 6 weeks. The experimental design model is presented in Table I.

TABLE I: EXPERIMENTAL DESIGN MODEL

group	pre-test	treatment	after-test
Experimental group	Y_1	X	Y_2
Control group	Y_3	--	Y_4

Y_1 , Y_3 : pre-test

Y_2 , Y_4 : after-test

X : treatment

D. E-Learning Systems

This system was divided into three interfaces: students, teacher and administrator. The teacher interface is personal digital learning so the teacher is also the administrator. The explanation is as below:

1) Student interface

This system displays through the homepage. Students depending on their needs can review the static or active curriculum material. So students can watch the static curriculum and class information. Students can also watch the active curriculum, new announcements, personal grades, learning situation, and online test or exercise. The interaction which provides electronic notes and discussion is another way to have interaction between the teacher and learners.

2) Teacher interface

The system provides three functions including curriculum management, material management and online interaction. In curriculum management, the teacher can build system data, revise or check student information, and manage students' grades. Online teaching material provides teachers with diversified methods to design homework exercises. Online interaction provides discussion and communication between teacher and students in an asynchronous system. Online tests provide the teacher with a way to understand each student's learning situation.

E. E-Learning Content Design

According to Clark [15], the key to e-learning is not the media or technology, but the design strategy or what method is used in the media technology. The study applied ADDIE strategy, that is that the teacher should decide the learning goals, analyze the learners' capabilities and learning content, design the learning strategy and activities, develop material and media, implement learning, check the evaluation, and correct the comprehension in order to achieve the learning goal and allow for an acceptable learning effectiveness.

F. Research Instrument

This research tool includes e-learning material and three scale forms: basic ability scale form, the achievement scale form on the learning strategy for e-learning of accounting, and the motivation scale form on e-learning learning strategy.

1) Basic ability scale form

Each question includes two parts based on the ratio of different learning hours and the degree of curriculum involvement. The scale form is based on expertise validity.

2) E-learning achievement scale form

A learning achievement test is based on learning goals, material content and a learning hour ratio. Two detailed parts

are based on the ratio of different learning hours and the degree of curriculum involvement. The scale form is based on expertise validity.

3) Learning motivation scale form

This scale form is based on literature review and refers to the learning motivation scale form of Keller and Ciou [16], [17]. According to our study needs, the first questionnaire draft was made. Moreover, six experts made a revision based on the first draft and an advisor verified it. Finally, the pre-test sample questionnaire was built by excellent expert validity. Pre-test applied consistent Cronbach α coefficient. The α coefficient of total questionnaire is 0.932. The final pre-test questions were decided by principal component analysis, *Eigen* value is bigger than 1 and bigger than 0.3 of factor load is a significant load. Accumulated explanation variance is 59.045%.

G. Data Analysis

In order to reach the purpose of study, the measurement is:
1) To analyze basic ability scale form depending on independent t-test based on mean and standard deviation.
2) To understand the differentiation of different styles for students learning accounting depending on ANCOVA and pre-test grades as covariance.
3) To understand the differentiation of different learning styles for students' motivation depending on ANCOVA and pre-test grade is covariance.

Those statistics are considered possible type I and type II error and the significance level of type I is .05.

V. RESEARCH RESULTS

A. The Differentiation Analysis of Learning Achievement of Different Learning Styles

1) The differentiation analysis of basic ability (pre-test)

Table II illustrates the descriptive data for the basic ability (pre-test) *t* –test analysis of each group. The data shows that it does not reach significance level ($t=1.825$, $p>.05$). That means that the mean of basic ability test of these two groups does not make a difference.

TABLE II: THE SUMMARY OF BASIC ABILITY (PRE-TEST) T–TEST ANALYSIS

group	number of students	mean	standard deviation	t value
control group	15	57.266	12.109	1.825
experimental group	16	64.437	9.702	

2) The differentiation analysis of students' learning achievement of different learning strategies

Table III presents regression coefficient homogeneity that does not reach significance level ($F=3.333$ $p>.05$). That means the slope of two teaching methods are the same. That matches the assumption of in-group regression coefficient homogeneity. Therefore, it can apply ANCOVA.

TABLE III: THE SUMMARY OF TWO LEARNING METHODS ON LEARNING ACHIEVEMENT REGRESSION HOMOGENEITY TEST

the source of variance	SS	DF	MS	F value
between groups(regression coefficient)	16.693	1	16.693	3.333
In-group(error)	154.460	27	5.721	

TABLE IV: THE SUMMARY OF TWO TEACHING METHODS ON LEARNING ACHIEVEMENT TEST COVARIANCE

the source of variance	SS	DF	MS	F value
between groups	1.471	1	1.471	0.237
In-group(error)	173.527	28	6.197	

**p<.01

Table IV explains covariance analysis results. After taking out the covariance of the effect of basis ability (pre-test grade), the two learning methods on learning achievement test do not reach significance level ($F=0.237$, $p<.05$).

TABLE V: THE SUMMARY OF TWO LEARNING METHODS ON LEARNING ACHIEVEMENT TEST MEAN, STANDARD DEVIATION, AND MEAN AFTER ADJUSTMENT

group	the number of students	mean	standard deviation	mean after adjustment
control group	15	61.933	13.630	65.786
experimental group	16	68.937	9.405	65.326

Table V shows analysis results. After taking out the covariance of the effect of basis ability (pre-test grade), the two learning methods on the learning achievement test show the same result for the experimental group of e-learning strategy (mean after adjustment =65.326) and for the traditional learning style (mean after adjustment =65.786).

B. The Differentiation Analysis of Learning Motivation of Different Learning Strategies

1) The differentiation analysis of learning motivation (pre-test)

TABLE VI: THE SUMMARY OF T-TEST OF LEARNING MOTIVATION

group	the number of students	mean	standard deviation	t value
control group	15	2.369	0.437	0.823
experimental group	16	2.487	0.361	

Table VI shows two groups of descriptive data of pre-test of learning motivation. The data shows it does not reach significance level ($t=0.823$, $p>.05$). That means that the mean of learning motivation test of these two groups does not reach

significance level. So the learning motivation of these two groups before the experiment is not different.

2) The differentiation analysis of learning motivation of different teaching strategies

TABLE VII: THE SUMMARY OF THE TWO LEARNING METHODS ON LEARNING MOTIVATION POST-TEST REGRESSION HOMOGENEITY TEST

the source of variance	SS	DF	MS	F value
between groups(regression coefficient)	0.003	1	0.003	9.836
In-group(error)	0.149	27	0.006	

Table VII shows that regression homogeneity test doesn't reach significance level (F=9.836, p>.05). That means the slope of two learning methods are the same. That matches the assumption of in-group regression coefficient homogeneity. Therefore, it can apply ANCOVA.

TABLE VIII: THE SUMMARY OF TWO LEARNING METHODS ON LEARNING MOTIVATION POST-TEST COVARIANCE ANALYSIS

the source of variance	SS	DF	MS	F value
between groups	1.236	1	1.236	170.533**
In-group(error)	0.203	28	0.007	

*p<.05

Table VIII explains covariance analysis results. After taking out the covariance of the effect of learning motivation (pre-test grade), the two learning methods on learning motivation after test reach significance level (F=170.533, p<.01).

TABLE IX: THE SUMMARY OF TWO TEACHING METHODS ON LEARNING MOTIVATION TEST MEAN, STANDARD DEVIATION, AND MEAN AFTER ADJUSTMENT

group	the number of students	mean	standard deviation	mean after adjustment
control group	15	2.369	0.437	2.436
experiment group	16	2.962	0.451	2.840

Table IX shows analysis results. After taking out the covariance of the effect of learning motivation (pre-test grade), the two learning methods on learning motivation after the test are that using experimental group e-learning strategy (mean after adjustment =2.840) is superior to using traditional narration (mean after adjustment =2.436).

VI. DISSCUSSION

A. The Learning Achievement Analysis of Different Groups

The post-test results reveal that the learning achievement of experimental group and control group do not reach significance different level. That means the grades in the experimental group and control group are the same. This result echoes with relevant researches [18], [19] and is also similar to Song's research [20]. But this result is different from the results of Lin [21] and Chen's study [22]. The reason could be that in our study this is the first time for students to use e-learning, so they are not used to it. From dealing with the cognitive process view, listening is more salient than reading or speaking [23]. That means that students remember the information from listening easier than information from reading or narrating. Although the results of the two different learning styles don't reach a significant difference level, the empirical evidence proves that e-learning still matches the learning effect of traditional learning. However, e-learning should be taken seriously because e-learning works through sound, image and motion picture to enable learning and can be repeated in this way.

B. The Learning Motivation Analysis of Different Groups

The post-test results of experimental group and control group reveal that the learning motivation does reach a significance difference level. The experimental group grade is superior to the one of the control group. This result echoes with the relevant research carried out in Taiwan [24]. Similarly, Chen's [25] and Lin's research [21] pointed out that e-learning can enhance learning motivation. Syu and Jhang' results [26] also proved that different learning media had different learning motivation. The motivation of learning with the Internet is higher than the motivation of learning with a blackboard and projector. The presumed reason is that e-learning exists in a high interaction environment and multi-sense stimuli. Therefore, e-learning can enhance learning motivation.

VII. CONCLUSION AND SUGGESTION

The conclusions of this study are that first, e-learning strategy is not different from traditional learning method at accounting learning achievement for freshman students in college. Second, e-learning strategy is superior to the traditional learning method at accounting learning motivation.

According to the conclusion of this study, we provide some suggestions: first, if students have computers and the Internet, they can learn anytime and anywhere, use materials repeatedly, and study the difficult part by themselves. Second, a college teacher should use e-learning strategy to strengthen students' learning motivation. Moreover, teachers should improve their skills in using e-learning strategy to enhance learning effectiveness. The school should have a plan for teachers to conduct e-teaching seminars or conferences and to invite e-learning experts to make speeches and demonstrations to enhance the teachers' capabilities and share experiences. In short, e-learning strategy facilitates student participation and communication. Therefore, teachers should develop e-teaching skills so as to encourage students in the use of e-learning activities.

In the future, continued research should focus on e-learning styles and receptiveness of students to the topic of e-learning.

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