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Research Articles

**Effects of using simulation in e-learning programs on misconceptions
and motivations towards learning**

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Yas A. Alsultanny^{1*}, Ahmed M. Nouby² and Tala T. Al-Enazi¹

Full Length Research Paper

Effects of using simulation in e-learning programs on misconceptions and motivations towards learning

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The aim of this paper is to measure the effects of using simulation in e-learning programs on misconception and motivation towards learning for the college of education students in University of Kuwait. The course of Environmental Education was used as a case study. Experimental method was used in this study to answer the research questions. Three measurements were used in testing the research hypotheses: misconceptions measured by achievement test, student's motivation towards learning measured by motivation Questionnaire, and student's motivation towards the subject matter measured by a second questionnaire. The Blackboard was used in simulating chapters seven and eight of the course that was used in the case study. The study implemented by using two groups; the first group is the experimental group, which consists of 34 students and the control group of 35 students. The results indicated that by using simulation for e-learning the misconceptions of the students were decreased; as a result achievement levels were raised. Findings showed no differences between the two groups; the experimental and control in terms of motivation towards learning the course of Environmental Education.

Key words: Motivations towards learning, misconceptions, e-learning, simulation.

INTRODUCTION

E-learning applications are very important as an integral part of learning and teaching by using the information and communication technology. Today, there is no development without using computers and applications. Simulation is one of the tools used for finding solutions to everyday problems. It helps students and teachers in the educational field through interactive multimedia. Simulation can be used effectively in preinstructional and exploratory activities. They elicit and challenge students'

alternative conceptions (Dwyer and Lopez, 2001). Simulation also serves to "bridge the gap between complex mathematical theories and experience; it creates new visual representations phenomena that aid in building scientific intuitions" (Jackson, 1997). Simulation model which is scientific helps to prepare students in building their models into their own hands. It is difficult or impossible to study it in the laboratory" (Gabel, 2004). Simulation is used to improve complex learning and

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difficult concepts at a lesser time than traditional learning. Simulation re-creates a real or an artificial real-life situation; and in e-learning simulation can be used to improve the skills of individual students, as well as their cognition, emotion and decision-making ability (Eylon et al., 1996).

There are many researches on using simulation in e-learning, but the researches on using simulation in e-learning in the Arab region is not available till date. Also, there are limited studies on the ways of increasing achievement and reducing learners' confusion in understanding concepts. It is necessary to use the rapid development of information technology to improve implementation of e-learning by using simulation. This will increase the students' interaction with material of study, thereby increasing their motivation. This in turn will reduce their confusing in understanding concept and increase their educational achievement.

Experience of using E-Learning

E-learning has been common in several countries (Ravenscroft, 2001), since its inception. It involves using Virtual Learning Environments (VLE) to design, develop, support, and provide e-courses with interactive teaching systems, such as simulation, development of teaching methods and, content delivery systems for learners. E-learning (Wentling et al, 2000) facilitates the infusion, distribution and acquisition of knowledge by using electronic media, based on computer networks (Driscoll, 2002); it is a type of instruction provided through electronic means (Stockley, 2003). Computers and electronic devices are used in e-Learning (example, mobile phones) to provide training and learning materials.

E-learning entails using a virtual learning environment for delivering content to students via universities' websites. Barojas and Vázquez (2002) discussed what the teachers do when they behave as architects of knowledge and promote e-learning in order to create learning communities of students. The aim of their project was to provide an understanding of the kind of physics problems that can be faced and solved through e-learning by a community of high school girls. Majority of the girls come to school after reading the website and describe the physics problems at least to know the day's activities. Their results indicated that about one-third of the girls changed their attitudes towards the importance of using e-learning to simulate physics problems in demonstrating different phenomena. The researchers recommend that the roles of teachers as catalysts of learning communities be made known.

Simulation in learning

Reiber (1996) defined simulation as a model of something and an attempt to imitate a real or virtual situation in environments or systems. Yildiz and Alkins (1996) described simulation as an operational training tool that enables students to learn how to perform some tasks in a systematic way. Allen et al. (1998) described simulation as an attempt to design a model for the real world or a semi-real world system in a simple form. Moreover, Sutherland et al. (2003) defined simulation as a real operation model or a proposed system for an environmental process by using modern communication networks to reach that virtual world. Simulation has simple systems for reality (McCarty, 2001), and is used for understanding the true purpose of a specific system. Simulation is a model developed through electronic specialized computer software that helps to approximate the real or abstract world to students' minds and give them chances for learning. It can activate scientific and operation skills for students as well as fundamental skills in scientific research (Roth and Roychoudhury, 1993).

Darabi and Nelson (2004) examined the effects of various teaching strategies for treating deficiency and shortcomings in computer-based simulations in a chemical treatments factory. Results indicated the effectiveness of experimental, functional examples as a basic teaching means because it causes changes in long term memory by gaining new information. Chance et al. (2000)'s study aimed at examining the role played by simulation technology in helping students to understand, integrate, and apply basic statistical concepts such as "Sample Distribution Program".

Sottile and Dallas (2004) used simulation in Human Development course for teacher education. Simulation determines topics and apparent features related to pre-service teacher development in various educational fields. This research attempts to answer this question: 'What are the prominent topics and salient characteristics of effective simulation used in human development programs in the courses of pre-service teacher education, sports counseling and training?' Results indicated that simulation helps in problem solving, information exchange, cooperation, increases motivation, achievement, participation and self efficiency.

Level of details can be obtained by learners from simulation that cannot be directly measured from one experiment. Simulation gives learners enough time to be retrained and retested several times for the event and learners see the results of actions quickly, thus giving them more time to learn additional things. It is economical in that learners do not need new equipment every time

they are retrained (Thompson et al., 1996).

Simulation-assisted learning is a valuable experience and source of learning for students. This was stated in a study on comparing the effects of training in work websites and simulation-based training on acquiring new functional skills among supported employees with autism (Latimore, 2006).

Simulation used for training helps trainees by providing interactive, reasonable, and precise representation of the environment and learning some principles and relationships through a recreational, interactive tool (Batson, et al., 2006).

Simulation of the environmental education course

Chapters seven and eight of the environmental education book are simulated. This book was used at the College of Education in Kuwait; it is a college of female students. The simulation of the two chapters takes three months continuous work, starting from design to implementation and lastly, the revision.

The simulation was implemented by using "*Blackboard learning system*". The *Blackboard* was used, because it had multimedia that enable staff faculty to design their websites to show the content of their subject in active and attractive method.

Website content objectives

The aims of designing the two chapters of the environmental learning book by using *Blackboard* are:

1. To increase the motivation of the students in learning by using black board.
2. As an alternative to the book to increase motivation.
3. To show the phenomena of the environment in attractive methods like the weather forecasting plants growing ... etc.
4. To be made available to the students at any time.
5. To increase the capabilities of student in learning and understanding.
6. It can give the links of the Internet that are related to subjects of study to increase the students' knowledge.
7. To use the facilities that are available in the *Blackboard* system, such as counting the number of the student, using the website, closing the subject till the teacher arrived.

Implementation of experimental group

The experimental method was used by mixing traditional

method of teaching with that of using *Blackboard*. This was done by assigning user name and password to each student. The method of implementation started by:

1. Giving a short workshop to the student to learn how to use and deal with *Blackboard*.
2. Giving the student an introduction to the contents of the two chapters of the environmental education.
3. Showing the titles of the chapter that are designed with simulation method to give short descriptions of the content of the chapter as shown in Figure 1 (note: the chapter is in Arabic language).
4. The manual of the *Blackboard* is available to the students.
5. The manual of how to use chapter seven was designed and made available to the student as shown in Figure 2.

Method of teaching the course

The following methods are used to help students learn the course:

Motivation

The simulated chapters are designed in a way that each student can deal with the contents of the simulated chapter alone to increase his/her capabilities to learn more. And this will increase the motivation of the students. Figure 3 shows the structure of chapter seven. This figure gives a fast description of the content of the chapters to the student as well as a full view of the content of this chapter.

Other motivation factors are designed such as figures, sketches of the environmental phenomena, questions concerning the material, feedback button to return to the material to find answers: list of definitions ...etc.

Teaching goals

It is important for the students see the goals and activities of the subjects. Figure 4 shows the goals of the subject.

Sequence of lessons

The course title is divided into chapters. The two chapters used in this study are designed in a hierarchical way that each chapter has many lessons and each lesson has many subjects.



Figure 1. Introduction of chapter seven.



Figure 2. Window interface showing the manual of using chapter seven.

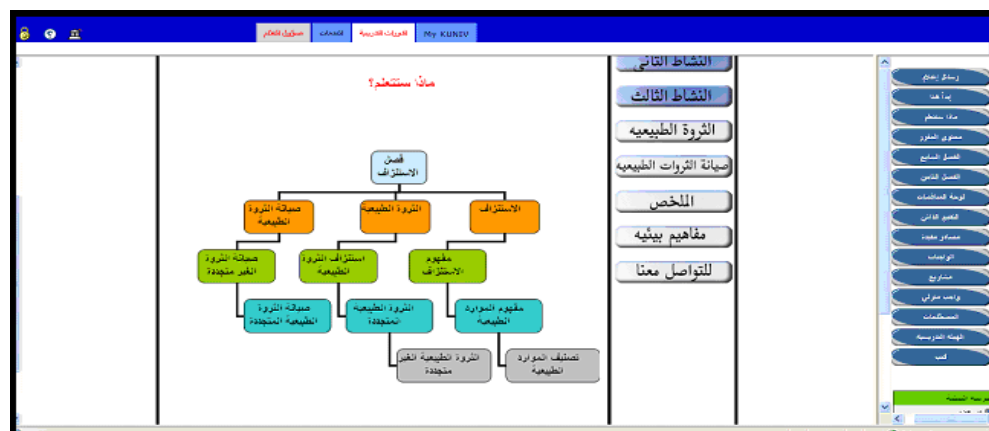


Figure 3. Structure of chapter seven.



Figure 4. Goals of chapter seven.

EXPERIMENTAL DESIGN

The experimental and quasi-experimental methods are used in this study, due to the nature of our students. They need an assistant to be familiar with this type of study; since it is the first time they are using e-learning. The quasi-experimental method was used in this research to decrease misconceptions. The design in this study was implemented to fit the post measure in terms of measuring achievement in misconceptions, weighing motivation towards instructional materials, using Course Interest Survey (CIS). This design consists of two groups: experimental group and control group. The former received treatment by using a suggested technique while the latter received a traditional treatment. Both groups were tested on the dependent variable after treatment. This study will answer the following questions:

1. What is the effect of using e-learning by simulation on misconceptions in the course of Environmental Education?
2. What is the effect of using e-learning by simulation on motivation towards learning in the course of Environmental Education?
3. What is the effect of using e-learning simulation on motivation towards the subject in the course of Environmental Education?

Research instruments

This study employed both quantitative and qualitative

research methodology. Three sources of data were collected to answer the research questions:

1. An achievement test;
2. Motivation towards Learning questionnaire CIS;
3. Motivated Strategies for Learning Questionnaire (MSLQ).

In order to develop the study instruments, relevant existing instruments and literature were reviewed. Validity of the instruments was determined by Content-Related Validity. In general, the content-related evidence demonstrates the degree to which the items on an instrument are representative of a domain or universe of content. To establish content validity for this study instrument, a panel of professors from the School of Education reviewed each item, to ensure the instrument reflects the domain of interest. Suggestions for modifications on some of the items and scaling were provided by the panel. This included rephrasing items and deleting others that seemed repetitive. After carrying out the necessary modifications, the panel reported that the instruments were appropriate for the study and that the language was clear.

Achievement test

An achievement test for the 7th and 8th teaching chapters was developed and applied to the experimental group during the mid-semester exams. It was also given to the control group students. Both groups (control and

experimental groups) are taught the same course by the same teacher. They were tested on the same lesson days, so that comparison can be made between the results of the two groups. Misconceptions test was done with the aim of measuring the academic achievement in the content, including facts, concepts, principles, theories, generalizations, and rules.

The topics to be included in the test were determined; they were the academic chapters taught during the 2nd half of the 1st semester. A cognitive analysis was done on chapters 7 and 8, as well as facts, concepts, rules, theories, and figures. The reason for developing the test and analysing the content of the components is to ensure that it is a balanced and comprehensive test. Items were grouped based on the previous step, and put in a form of a test; they were modified and selected in order to achieve the purposes of the content. A test was developed and prepared in collaboration with the course teacher; it included 40 items covering two types of questions: multiple choice questions (10 items) and True or False questions (30 items). The test was submitted to a panel of professionals in curricula and science. Some modifications were made based on the professionals' recommendations, and this judgment was to verify the test validity. To confirm the reliability of the achievement test, namely internal consistency, the SPSS was used to measure the Cronbach Coefficient Alpha. The examination sheet consists of 40 questions (N=40). The reliability of the response (Exam answers) is 0.72 and is calculated by Cronbach Coefficient Alpha. This value indicates that the test has an acceptable reliability degree, because it is larger than 0.7.

Learning motivation scale

A questionnaire was developed to measure the motivation towards learning the course of Environmental Education through simulation in distance e-learning programs.

Course Interest Survey (CIS)

The CIS is a tool inspired in John Keller's (1979) Motivation Model ARCS (Attention, Relevance, Confidence and Satisfaction). This questionnaire was designed by consulting CIS of John Keller for measuring the student's answers to the instructional materials. The questionnaire consists of 34 items and four components:

1. Attention
2. Relevance

3. Confidence
4. Satisfaction

The sample consists of five options that ranged from 'Not true' to 'Quite true' based on Likert - five point scale. Number 1 means the statement does not apply to the students' state, whereas number 5 means the statement applies to the students' condition.

CIS Validity

Inter-judges validity: For the purpose of confirming the test validity, Al Salem (2008) presented its final version to a team of experienced professional judges in the field of psychology, measurement, evaluation, guidance, counselling, special education and linguistics. Results showed that all judges agreed on the relevancy and categorization of statements under their dimensions. According to their viewpoints and suggestions, the original version of the scale was used without any modification or omission.

Internal Validity: The internal validity of sub-dimensions was confirmed; these sub-dimensions constitute the Instructional Material motivation scale through determining Pearson's correlation coefficients between the sub-dimensions for the experimental sample responses to the post-test and the total score of the dimensions Al Salem (2008). Correlation coefficients between the sub-dimensions of the Instructional Material Motivation scale (*Attention, Relevancy, Confidence, and Satisfaction*) and the total score indicated statistically significant differences at the 0.01 level. That is to say that the scale has a highly significant validity.

Reliability: The reliability of Instructional Materials Motivation scale as internal consistency was confirmed by using Cronbach Correlation Alpha by finding reliability coefficients for each of the four dimensions (Attention, Relevancy, Confidence, and Satisfaction) and the total score in all dimensions for the experimental group population on the post-test. Reliability coefficient results for the composite sub-dimensions of the Instructional Materials Motivation Scale and the total score ranged from 0.56 to 0.91; the suggested scale has good reliability.

Motivated strategies for learning questionnaire (MSLQ)

This scale 'MSLQ' is the second tool the study used for

measuring motivation. It was developed by professional team at the National Center on Learning and Teaching Development in the USA for measuring learning motivation in students (Al Salem, 2008). This instrument contains 81 items on Lickert-7 point scale ranging from "quite agree" to "quite disagree". This instrument was designed at Michigan University in 1991 titled "Questionnaire of the Motivated Strategies for Learning Manual for Use". This tool consists of two parts: Motivation and Learning Strategy. Motivation part includes 31 items on 6 dimensions.

MSLQ Validity

Judge Validity: For the purpose of confirming the test validity, the final version of the scale was presented to a team of experienced professional judges in the field of psychology, measurement, evaluation, guidance, counselling, special education, and linguistics. Results showed that all judges agreed upon the relevancy of items and their categorization under the dimensions they belong to. According to the judges' recommendations and suggestions, the original scale was administered without any modifications or omission.

Internal Consistency: The internal validity of sub-dimensions was confirmed. These sub-dimensions constitute 'MSLQ' through determining Pearson's correlation coefficients between the sub-dimensions for the experimental sample responses to the post-test and the total score. Findings showed that Learning Motivation Strategy Scale was statistically positively significant to the composite sub-dimensions of the scale (internal motivation, external motivation, importance of topic, control of learning beliefs, and self confidence); but it was negatively related with the dimension of test anxiety at the 0.05 level.

Reliability: The reliability of 'MSLQ' as internal consistency was confirmed by using Cronbach Correlation Alpha by finding reliability coefficients for each of the six dimensions of the scale and the total score in all dimensions for the experimental group population on the post-test. The statistical analysis revealed that reliability coefficients for the six sub-dimensions and the total score ranged from 0.66 to 0.87. The scale has higher reliability, after judging the questionnaire and classifying each statement to its dimension.

Experimental processing

The ADDIE was used. It has five stages: *Analysis*,

Design, Development, Implementation, and Evaluation (ADDIE).

- i. *Analysis:* helps to identify the composite elements of this stage, and recognizing the existing relationships between such elements.
- ii. *Design:* developing the required procedures of transferring a printed content into an electronic form.
- iii. *Development:* teaching the electronic content that can be presented via the Virtual Learning Environment (Blackboard).
- iv. *Implementation:* At the end of each teaching chapter, it was necessary for students to practice self-evaluation through answering self-evaluation questions, and utilizing the feedback to insure the learning process.
- v. *Evaluation:* data from the students about the effectiveness of the program in achieving the present study objectives by using academic achievement tool (misconceptions) related to Environmental Education course for chapters seven and eight.

RESULTS OF THE STUDY

The results of the study come from the three questions, applied to two groups of female's students (Female college of Education):

1. Experimental group (34) students.
2. Control group (35) students.

Question One: *What is the impact of using simulation by e-learning on misconceptions in the course of Environmental Education?*

Results showed that simulation in e-learning reduced misconceptions in the Environmental Education course. The SPSS was used to verify the natural distribution of the achievement test for experimental and control groups by using Shapiro-Wilk Test (ALmokbil, 1994) (Table 1).

The table shows analysis outcomes: in the control group, there is a significant difference at the 0.01 level from the natural distribution for achievement test scores. According to these results, the hypothesis of natural distribution was broken and biased; hence, Mann-Whitney parametric test was calculated by SPSS to complete results analysis (ALmokbil, 1994). Table 2 displays Mann-Whitney test results, rank mean values for both groups (experimental and control), Z test statistical values, and observed significance. Analysis finding showed sig=0.019. This means that there is statistically significant differences at the 0.05 level between the performances mean scores of both group students in

Table 1. Shapiro-Wilk test results for natural distribution of achievement test scores.

Group	F	No of Students	Sig
Experimental	0.971	34	0.488
Control	0.834	35	0.01

Table 2. Mann-Whitney results for the differences between mean ranks in the achievement test.

Variable	Group	No of Students	Mean ranks	Ranks Sum	Z	sig
Achievement	Experimental	34	40.74	1385	2.355	0.019
	Control	35	29.43	1030		

Environmental Education course; achievement test - Z values for the experimental group students reached 2.355. The simulation showed a big difference between the means of the two groups: the experimental group mean=40.74; the control group=29.43. This means that simulation increases the achievements of the students.

Accordingly, it can be noted that research data confirmed the accuracy of the first hypothesis. So, it can be said that using simulation in e-learning reduces misconceptions for students in the course of Environmental Education.

Question two: *What is the impact of using simulation in e-learning on motivation towards learning in the course of Environmental Education?*

Multivariate analysis of variance "MANOVA" was used in this study because Motivation variable includes six dimensions. So, the hypothesis of the natural distribution of Motivation dimensions was tested and verified first; also the total score of this variable for the students in both groups by using Shapiro-Wilk test. Table 3 displays the findings of this analysis. As can be noticed from the table, there are some values with sig>0.05. Accordingly, Mann-Whitney nonparametric test was used instead of the Shapiro-Wilk parametric test.

Table 4 shows Mann-Whitney test results. This table contains the rank mean values for both groups (experimental and control), Z test statistical values, and the observed significance. As can be seen from the table, there are statistically significant differences at the 0.05 level between the performance mean scores of the experimental and control groups for the dimension of Controlling Beliefs of the Learning Motivation Scale; the values of this dimension reached Z=2.673, indicating a

statistic significance in favor of the experimental group students; whereas there were no statistically significant differences on the other scale dimensions. This finding means that there are no witnesses or indicators about the effectiveness of the experimental treatment and its positive effects on Learning Motivation variable, except the dimension of Controlling Learner's Beliefs.

Question three: *What is the impact of using simulation in e-learning on motivation towards the subject in the course of Environmental Education?*

The Multivariate Analysis of Variance "MANOVA" was used in this study as the Instructional Materials Motivation variable contains four dimensions; so the hypothesis of natural distribution of motivation dimensions and the total score for both groups (experimental and control) was verified first by using Shapiro-Wilk Test.

Table 5 shows there is a statistically significant difference at the 0.05 level from the natural distribution for the scores of all dimensions in the responses of the control group except the dimension of confidence, and the responses related to the dimensions of Attention, Satisfaction, and the Total score of the experimental group. Accordingly, Mann-Whitney nonparametric Test was used instead of the parametric test.

Concerning Mann-Whitney Test, Table 6 displays the rank mean values for each group, Z test statistical values, and the observed significance. The rank mean scores for the experimental group exceed those of the control group in the four dimensions and total score. In addition, the analysis findings show that there are statistically significant differences at the 0.05 level between the mean performance of the experimental group students and that

Table 3. Shapiro-Wilk results of the natural distribution of the responses on Learning Motivation scale.

Dimensions	Group	F	df	Sig
Internal Motivation	Experimental	0.934	34	0.077
	Control	0.925	35	0.019
External Motivation	Experimental	0.809	34	0.000
	Control	0.847	35	0.000
Topic Importance	Experimental	0.964	34	0.311
	Control	0.932	35	0.032
Controlling Beliefs	Experimental	0.943	34	0.075
	Control	0.938	35	0.48
Self-Confidence and Competency	Experimental	0.949	34	0.114
	Control	0.937	35	0.046
Test Anxiety Scores	Experimental	0.956	34	0.184
	Control	0.912	35	0.009
Total	Experimental	0.946	34	0.091
	Control	0.953	35	0.140

Table 4. Mann-Whitney Test results on Learning Motivation Scale.

Dimensions	Group	Rank Means	Rank Sum	Z	Sig
Internal Motivation	Experimental	36.34	1235.50	0.584	0.583
	Control	33.70	1179.50		
External Motivation	Experimental	38.72	1316.50	1.531	0.126
	Control	31.39	1098.50		
Topic Importance	Experimental	36.69	1247.50	0.692	0.489
	Control	33.36	1167.50		
Controlling Beliefs	Experimental	41.53	1412.00	2.673	0.008
	Control	28.66	1003.00		
Self-Confidence and Competency	Experimental	38.71	1316.00	1.514	0.130
	Control	31.40	1099.00		
Test Anxiety Scores	Experimental	37.81	1285.50	1.149	0.250
	Control	32.27	1129.50		
Total	Experimental	39.31	1336.50	1.760	0.078
	Control	30.81	1078.50		

Table 5. Shapiro-Wilk results of the natural distribution of the responses on Instructional Material Motivation Scale.

Dimensions	Group	F	df	Sig
Attention	Experimental	0.910	34	0.008
	Control	0.934	35	0.038
Relevancy	Experimental	0.940	34	0.061
	Control	0.918	35	0.013
Confidence	Experimental	0.966	34	0.368
	Control	0.967	35	0.365
Satisfaction	Experimental	0.981	34	0.819
	Control	0.903	35	0.005
Total	Experimental	0.915	34	0.012
	Control	0.899	35	0.004

Table 6. Mann-Whitney Test Results in responses on instructional material motivation scale.

Dimensions	Group	Rank Means	Rank Sum	Z	Sig
Attention	Experimental	42.06	1430.00	2.891	0.004
	Control	28.14	985.00		
Relevancy	Experimental	41.50	1411.00	2.663	0.008
	Control	28.69	1004.00		
Confidence	Experimental	37.82	1268.00	1.157	0.247
	Control	32.26	1129.00		
Satisfaction	Experimental	35.99	1223.00	0.403	0.687
	Control	34.04	1191.50		
Total	Experimental	40.46	1375.50	2.228	0.026
	Control	29.70	1039.50		

of the control in the dimensions of Attention, Relevancy, and the Total score derived from the Instructional Material Motivation Scale; Z values for these dimensions reached 2.891 and 2.663; all of them are statistically and significantly different in favor of the performance of the experimental group students.

Yet, the analysis results show no statistically and significant differences in both dimensions of Confidence and Satisfaction.

Conclusion

Results indicated statistically significant differences between the mean achievement scores of the experimental and control groups in favor of the experimental group, thus confirming the effectiveness of using simulation in e-learning programs to treat misconceptions. Simulation method used with the experimental group in the Virtual Learning Environment (VLE), that was

designed to suit and match the instructional objectives for each classroom provided that students can do the activity through watching simulation related to the teaching aims. This helps students when doing an achievement test and decreasing misconceptions in Environmental Education course. Simulation method used with the experimental group in the Virtual Learning Environment facilitated active learning, interaction with the content, and encouraged deep and self-learning. Interactive materials, aids, and activities in VLE encouraged students to practice active and efficient learning. Flexibility of e-learning programs allowed traditional teaching features and online learning, thus creating the optimal learning atmosphere.

Results indicated that there were statistically significant difference only in the dimension of Controlling Learners' beliefs from the Learning Motivation Scale between the experimental and control groups after completing the treatment. However, there were no statistically significant differences for the other dimensions of Motivation Scale between the students in both groups (experimental and control).

The course teacher and researchers were equally available for the students in both groups (experimental or control), suggesting its big role in the experimental group student's feelings that there was no change in teaching styles; thus giving equal motivations to students in both groups to the degree that there were no statistically significant differences between both of them. The students enrolled with the Environmental Education course see it as not important compared to other courses directly related to their majors, thus affecting their motivation towards learning that course. Results indicated that there were statistically significant differences between the motivation degree of the students in both groups towards the subject matter, represented in the dimensions of Attention, Relevancy and the total score of all dimensions.

However, results of the previous hypothesis showed no statistically significant differences in both students' motivation towards learning in Confidence and Satisfaction from the same scale. Concerning Confidence and lack of significance for this dimension between both groups (experimental and control), some students do not realize the demands of learning and performance. The criteria of evaluation in the experimental group entail utilizing given success opportunities so that successful learning can happen. Decreased personal responsibility of some students to relate successful learning to their efforts as well as their equal abilities was clear from the students' GPA. Satisfaction and lack of significance between both groups can be attributed to the presence of

the teacher always with the control group students, simplified concepts, paying attention to external rewards, continual encouragement to the control group that resulted in equal results for both groups.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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