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The effects of blended learning environment on the critical thinking skills of students

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Abstract

The aim of educational system which changes according to the enhancements in educational technology is to make students more active in the learning process, as well as make them as people who have skills such as critical thinking, problem solving etc. Critical thinking is a thinking skill which consists of mental processes of discernment, analysis and evaluation. Blended Learning is learning which combines online and face-to-face approaches. By means of online discussion forms, teachers can monitor the class discussions. These discussions help teachers identify topics that need clarification or that have captured the interest of students, and they can use the insights gained by them to structure class time. Also, if teacher use the Web discussion area to address some of the more straightforward student questions, they can make better use of class time. In this sense, the purpose of this study is to examine the effects of blended learning environment which supports the course management system on the critical thinking skills of students. The model of the study is pre-test, post-test single group model. There are 44 Students who attending the course of Design And Use Of Instructional Material in the Department of Computer and Instructional Technology Education of Ankara University in third grade who constitute the study group. In this study, Watson-Glaser Critical Thinking Appraisal Test, which consists of 100 items, was used to collect data. This test is composed of a series of test exercises in which the application of the important abilities in the critical thinking is involved. This test includes five sub-tests which are listed as; Inference, Recognition of Assumption, Deduction, Interpretation, Evaluation of Arguments. The test was developed in 1964 by Googwin Watson ve Edward M. Glaser. The test was translated into Turkish by Assoc. Prof. Dr. Nükhet Çıkrıkçı – Demirtaşlı in 1996. Analysis results indicated that the range of internal consistency of the subscales are interval from .20 to .47 and the total correlation coefficient is .63. The course consists of 5 weeks throughout the semester. At the beginning of the semester, student' WGCTA scores were obtained. In the environment of blended learning, the course is supported to chat rooms and forums. After 5 weeks, students were asked to do the test again and the critical skills of the students were examined. The data was analyzed through paired sample t-test to compare the results of pre-test post-test scores, as well as descriptive statistics. There was no significant difference between pre-tets and post-test results.

Keywords: critical thinking skills, blending learning,critical thinking appraisal .

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1. Introduction

Blended learning has been referred to as the "third generation" of distance education systems. The first generation was correspondence education which utilized a one-way instructional delivery method, including mail, radio, and television. The second generation was distance education with single technology, such as computer-based or web-based learning. The third generation is blended learning, characterized as maximizing the best advantages of face-to-face learning and multiple technologies to deliver learning(Phipps & Merisotis, 1999; as cited So, Brush).

In general, blended learning means any combination of learning delivery methods, mostly including face-to-face instruction with asynchronous and/or synchronous computer technologies. Hybrid learning is another term which has been used synonymously with blended learning (So, Brush, 2008).

Owston et al. (2006) examined two one-year Professional Development Programs for 133 middle school mathematics or science/technology teachers that employed the blended model (TeL—Teacher eLearning Project). The implementation model of the program employed 2–3 modules. Each module had a specific theme and consisted of face-to face sessions followed by online sessions. Special expert teachers were hired to facilitate the online discussions. The results indicate that the program positively affected teachers' attitudes, content knowledge and motivation to transform practice. Nevertheless, while there was a general feeling that the face-to-face component was extremely valuable, there was a mixed reaction towards the online sessions, with a weak participation rate in reflective biweekly task.

In the information era with the changing life conditions, in all aspects of life especially in the business world, critical thinking skills have gained great significance. Critical thinking is not a luxury but a requirement that should not be neglected. One of the greatest experiences for students in higher education is to have the opportunity to think freely and challenge other students' ideas with their own. Aim of the higher education is to teach and develop student's critical thinking skills. Gough (1991) indicated the significance of teaching thinking skills as (as cited in Cotton, 2001):

Perhaps most importantly in today's information age, thinking skills are viewed as crucial for educated persons to cope with a rapidly changing world. Many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information.

Most philosophers can agree that one aspect of critical thinking is the ability to analyze, understand, and evaluate an argument. Our first hypothesis is that our students actually are improving their abilities on online discussions, chat, and face to face discussions. Critical thinking may be difficult but it certainly is not impossible (Gelder, 2005).

Watson-Glaser (1980), defined critical thinking as a composite of attitudes, knowledge and skills which includes attitudes of inquiry that involve an ability to recognize the existence of problems and acceptance of general need for evidence in support of what is asserted to be true knowledge of the nature of valid inferences, abstractions and generalizations in which the weight or accuracy of different kinds of evidence are logically determined and skills in employing and applying the above attitudes and knowledge (as cited Evancho, 2000).

Critical thinking is the art of analyzing and evaluating thinking with a view to improving it (Paul, Elder, 2006). Glaser (1942), Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends (as cited, Bonk, Smith,1998). It also generally requires ability to recognize problems, to find workable means for meeting those problems, to gather and marshal pertinent information, to recognize unstated assumptions and values, to comprehend and use language with accuracy, clarity, and discrimination, to interpret data, to appraise evidence and evaluate arguments, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations, to test the conclusions and generalizations at which one arrives, to reconstruct one's patterns of beliefs on the basis of wider experience, and to render accurate judgments about specific things and qualities in everyday life (as cited Fisher, 2001).

Angeli et al. (2003) investigated the quality of asynchronous discussion forums. The results of the study indicated that well-structured online discussions do not affect the students' critical thinking skills. There is no significance relations between well structured and ill structured online discussions.

Bradley and et al (2008), showed that whether different question types influenced the quantity and quality of students' online submissions. Limited focal and direct link question types generated the most words, followed by brainstorm and open focal question types. Application and course link question types generated the fewest words. Limited and open focal question types generated the most complete answers, followed by brainstorm type and then

direct link type. Application and course link question types generated the least complete answers. Course link, brainstorm and direct link question types resulted in higher levels of thinking than limited focal type. Open focal and application question types resulted in the lowest level of thinking.

Wang & Woo (2007) researched the effectiveness of class discussion in face-to-face and online settings have focused on how both settings have context-specific advantages. Face-to-face discussions tend to have greater efficiency, immediacy of feedback, no technological issues, greater perceived interactivity and important verbal and non-verbal communication cues present.

In a research that was conducted by Demirtaşlı-Çıkrıkçı (1996) on senior Science and Social Sciences students, it was aimed to compare the female and male students' points which they got from Watson-Glaser Critical Thinking Appraisal Scale. According to the findings of this research, there was not a significant difference between the students' grades on the basis of their gender and the programmes they were attending.

Çubukçu (2006) aimed to determine the disposition of critical thinking dispositions of the teacher candidates who were in the faculty of Education at Eskişehir Osmangazi University. According to the findings of this research, age, the high school they graduated, university exam entrance point type, the programmes they were attending, income level and social activities were influential on candidates' thinking power and their thinking skills as different variables.

Adam and et al (1999), designed a longitudinal study so as to find out if a difference existed in the scores of sophomore-level students and scores of the same students at the senior level The researchers found out that there was no statistically significant difference in the total Watson-Glaser Critical Thinking Appraisal raw scores and in each of the sub-tests of inference, recognition of the assumptions, deduction, interpretation, and evaluation of arguments between the students first at the sophomore level and again at the senior level (as cited, Dayıoğlu, 2003).

2. Method

One group pretest-posttest group design, Watson-Glaser Critical Thinking Appraisal is pre-tested at the begining of the course, implementing blended learning, and then again post tested at the end of the study. It would seem that any differences between the pretest and posttest measures would be due to how the critical thinking skills improvement. Students enrolled in course offered by the Computer and Educational Technology Department at a big university in Turkey, participated in the study.

There are serious weaknesses in this design. With the exceptions of selection and morality threat to internal validity, which are not factors due to the lack of a control group, this design is subject to five other threats to internal validity. If a historical event related to the dependent variable intervenes between the pretest and the posttest, its effects could be confused with those of the independent variable. Maturation changes in the subjects could also produce differences between pretest and posttest scores. If paper-and pencil measures are used on a pretest and a different test measure was used on the posttest, a shift of scores from pretest to posttest could occur resulting in a testing threat. Regardless of the measurement process utilized, instrumentation changes could produce variation in the pretest and posttest scores. Finally, if the subjects were selected because they possessed some extreme characteristic, differences between pretest and posttest scores could be due to regression toward the mean (Abrahams, 1997).

The *Watson-Glaser Critical Thinking Appraisal* consists of a series of test exercises which require the application of some important abilities involved in critical thinking. The exercise includes problems, statements, arguments, and interpretations of data similar to those which citizen in a democracy might encounter in his daily life as he works, reads newspaper or magazine articles, hears speeches, participates in discussions on various issues, etc (Watson, Glaser, 1964).

A form contains 100 items that can be completed in about 50 minutes. The five subsets are as follows (Watson, Glaser, 1964):

Test 1: I*nference* (20 items), Samples ability to discriminate among degrees of truth or falsity of inferences drawn from given data.

Test 2: Recognition of Assumptions (16 items), Samples ability to recognize unstated assumptions or presuppositions which are taken for granted in given statements or assertions.

Test 3: Deduction (25 items), Samples ability to reason deductively from given statements or premises; to recognize the relation of implication between propositions; to implication or a necessary inference from given premises is indeed such.

Test 4: Interpretation (24 items), Samples ability to weigh evidence and to distinguish between (a) generalizations from given data that are not warranted beyond a reasonable doubt, and (b) generalizations which, although not absolutely certain or necessary, do seem to be warranted beyond a reasonable doubt.

Test 5: Evaluation of Argument (25 items), Samples ability to distinguish between arguments which are strong and relevant and those which are weak or irrelevant to a particular question at issue.

The Ym form of Watson-Glaser Critical Thinking Appraisal was translated into Turkish by Assoc. Prof. Dr. Nükhet Çıkrıkçı – Demirtaş (Çıkrıkçı, 1993, 566). The appraisal was implemented in grade 9, grade 10 and grade 11 in a high school in Ankara. The KR-20 reliability coefficient ranged from .11 to .57. She explained that this coefficient was low since the homogenity of the subjects caused the decrease in the consistency level as a result of diminishing the variances.

Pre-test was conducted online with 55 students on 16 September, 2008 and post-test was conducted on 20 november, 2008 but the number of the forms returned was only 44. 11 students' most of the items in the form were not fulfilled. This study was conducted in 5 weeks during the academic year 2008-2009.

Both variables should be normally distributed. We checked for normal distribution with a Q-Q plot and Kolmogorov Simirnov test. The mean score of WGCTA on the pre-test was 57.61 (SD = 7.44) , the mean scores of subset 1, subset 2, subset 3, subset 4 and subset 5 on the pre-test respectly were 7.81 (SD=2.11), 9.22 (SD=2.53), 15.40 (SD=3.09), 16.84 (SD=3.34), 8,31 (SD=1.92). Pre-test KR-21 value was 0.75. The mean score of WGCTA on the post-test was 57.13 (SD = 7.59), the mean scores of subset 1, subset 2, subset 3, subset 4 and subset 5 on the post-test respectly were 7.35 (SD=2.20), 9.22 (SD=2.60), 15.59 (SD=2.60), 16.02 (SD=2.79), 8,54 (SD=1.60).

An paired-samples t test was carried out to evaluate the difference in the students' critical thinking levels in pre-test and post-test. There was no significant difference obtained in post-test and pre-test (t=.369 p=.714).

In the sub-test 1, there was a significant difference obtained, (t =.154 , p = .878) From the sub-test 1, Mean of the pre-test (M = 7.81 SD = 2.11) did not have significantly different scores than the Means of the post-test (M =7.75 SD = 2.20). In the sub-test 2, there was a significant difference obtained, (t =.00 , p = 1.00) From the sub-test 2, Mean of the pre-test (M = 9.22 SD = 2.33) did not have significantly different scores than the Means of the post-test (M =9.22 SD = 2.60). In the sub-test 3, there was a significant difference obtained, (t =-3.63 , p = .718) From the sub-test 3, Mean of the pre-test (M =15.40 SD = 3.09) did not have significantly different scores than the Means of the post-test (M =15.59 SD = 2.60). In the sub-test 4, there was a significant difference obtained, (t =1.417 , p = .164) From the sub-test 3, Mean of the pre-test (M =16.84 SD = 3.34) did not have significantly different scores than the Means of the post-test (M =16.02 SD = 2.79). In the sub-test 5, there was a significant difference obtained, (t =-.773 , p = .444) From the sub-test 5, Mean of the pre-test (M =8.311 SD = 1.92) did not have significantly different scores than the Means of the post-test (M =8.54 SD = 1.60).

3. Discussion and Conclusion

The result of the research indicated that there was no significant difference in the pre-test and post-test scores. As mentioned above, study would be a bit short to be able to improve of critical thinking skills. Another reason of this might be that online learning activitiy was not support face to face lesson enough. Because of the short period of time, the discussion forms couldn't be used to support critical thinking skills of students. Some students had difficulties to find computers for discussion forms. On account of these difficulties, researchers couldn't make synchronous discussions among students. With respect to the sub-tests in the critical thinking appraisal, the subjects got the highest score from Test 4, Interpretation. This showed that they were good at "weighing evidence and distinguishing between generalizations from given data and generalizations to be warranted beyond a reasonable doubt". However, the lowest mean was obtained from Test 1, inference. This revealed that they were not good at "discriminating among degrees of truth or falsity of inferences drawn from given data". To improve the critical thinking skills of students, the study can do in a long period and much more critical thinking acitivity can implement. For this, there can be much more synchronous and asynchronous discussions, forums etc.

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