Effectiveness of Character Based E-Learning Model to Improve Student Creative Skills

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Abstract. The development of science and technology has changed class-based learning into internet-based learning (e-learning). Currently, e-learning has been widely used in several educational institutions as learning aids. Through e-learning, learning is not limited to time and space. This study aims to determine the effectiveness of the application of character-based e-learning learning models in improving students' creative thinking skills in linear program subjects. This research is a type of experiment with the design of One Groups Pretest-Posttest. Data collection instruments include questionnaire sheets, and observation sheets and tests of creative thinking skills. The technique of analyzing the effectiveness of the data was by using the completeness test, the effect test, and the average difference test. The results of the study indicate that learning by using e-learning media is effective in improving students' creative thinking abilities. The results show that there were 26 (93%) of students declared complete, and 78% of respondents stated that independence and responsibility affect the ability of students to think creatively. The application of e-learning can increase the value of students' creative thinking abilities by 13%. The normalized gain is g = 0.37 with medium criteria. Therefore, it can be concluded that the character-based e-learning model can effectively improve students' critical thinking skills.

Keywords: character, creative thinking, e-learning, independence, responsibility,.

1 Introduction

The development of Information Technology has brought changes in all fields of life, education is no exception. Conventional learning that relies on face to face has many weaknesses [1], [2]. The weaknesses of face-to-face learning can be overcome by applying online learning. E-learning which is a form of online learning is a transformation of learning in schools or colleges into digital forms that are bridged on the internet [3]. The application of e-learning makes learning more flexible and unlimited with time and space [4], [5]. E-learning learning can make interactions between lecturers and students more effective.

Based on observations made at the Mathematics Education Department, Universitas Muhammadiyah Semarang, found that many students study while working. This condition causes many students not to take lectures, so the material delivered by lecturers cannot be accepted by students. The fact is that learning is carried out using conventional methods face to face in class. This method results in a lack of communication between students and lecturers [6]. The character of students who are embarrassed to ask the teacher when class and the limited time lecturers in teaching in class cause conventional methods are less appropriate

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to the condition of students. The learning that can solve the above problems. Laws in face-to-face learning can be minimized by applying online facilities that utilize the internet.

E-learning is a way to teach online learning using electronic devices, especially computers [7], [8]. In its development, the implementation of e-learning is strongly supported by other technical services such as telephone, audio, videotape, satellite or computer transitions. E-learning is the result of technological development that is applied in learning which is currently widely used to overcome the problem of education in various countries [9], [10]. The choice of e-learning is due to the flexible nature of e-learning where lecturers and students can interact without any limitations on space and time. Besides teaching materials can be stored in a computer so students can study independently without having to attend lectures conducted by the lecturer [7]. The use of the internet in learning e-learning allows students to access teaching materials in full on the internet, so as to increase student independence in learning activities. Some of the benefits of using e-learning are as follows [7], [9], [10]: (i) e-learning can facilitate the communication of lecturers and students without limited distance, place, space and time, (ii) Lecturers and students can use teaching materials or study instructions that are structured and scheduled through the internet so that they can assess each other from both directions, (iii) Students can study or review teaching materials wherever and whenever needed, (iv) Students can complete the required teaching materials through internet access, (v) Lecturers and students can hold joint discussions through the internet with many participants, (vi) students become more active in learning, (vii) learning by using e-learning more effectively and efficiently.

The lacking quality of students is caused by the application of learning which only focuses on hard skills, which is only to prepare students who are quick to graduate and get a job. While learning that is oriented to creativity, independence, responsibility, discipline, tolerance, and hard work has not been widely applied. In addition, the lecture method applied by lecturers in teaching causes students to lack independence and a sense of responsibility in learning [11]. This results in the low value of character possessed by students. A method of student-centered learning is needed so that the responsibility, independence, and creativity of students can be increased.

This study aims to evaluate the application of character-based e-learning models. The effectiveness of the learning model is tested and discussed in relation to improving students' creative thinking abilities in mathematics.

2 Method

2.1 Research Design

This research was conducted using a one-group pretest-posttest pre-experimental design. Before being given treatment, the test class students were given a questionnaire about their sense of responsibility and independence, as well as a pretest about the ability to think creatively. A pretest was conducted to determine the initial ability of students before being given treatment. Then learning is done by applying the e-learning model by instilling the values of character independence and responsibility at each meeting. After being given 7 treatment sessions, students were given a posttest to find out the student's final ability so that the effectiveness of the character-based e-learning model can be seen in improving students' creative thinking abilities.

2.2 Research Sample

The population in this study consisted of 105 students from the Mathematics Education department of a private university in Semarang. While the sample of 28 students in the second semester took the Professional Teacher and Education Personnel courses. The sample is determined using puroosive sampling, namely the determination of the sample with certain considerations.

2.3 Data Collection and Data Analysis

Data collection on the character of independence and responsibility uses a questionnaire whose content is in the form of positive and negative questions. This is intended to get variations of the same answer. Before being given a questionnaire, a validity and reliability test was carried out to determine the accuracy of the questionnaire in the measurement. While the value of the results of students' creative thinking abilities is obtained through tests of creative thinking abilities. Indicators of the ability to think creatively studied include fluent, flexible, original, and elaborative thinking. Before being used, validity, reliability, difference power, and the level of difficulty of the test on the creative thinking ability test instrument were tested. Then a normality and homogeneity test was performed using Kolmogorov-Smirnov One-sample and Levene's Test of Equality of Error Variances, respectively [12], [13].

To determine the effectiveness of the implementation of the e-learning model, completeness test was done using One Sample t-test, influence test using multiple linear regression test, and pretest and posttest different test using paired t-test. The level of improvement in students' creative thinking skills is obtained through a normalized gain test with the formula [14]:

$$g = \frac{posttest\ score - pretest\ score}{100 - pretest\ score} \quad (1)$$

The gain score for low, medium, and high categories is $0 \leq g < 0.3$, $0.3 \leq g < 0.7$, and $0.7 \leq g < 1.0$, respectively.

3 Results and Discusion

The feasibility analysis of the test items through the validity test, different power, the level of difficulty and reliability of the creative thinking ability test instrument shows that from the 10 items tested 8 items were declared valid and 2 items were invalid. The difficulty level classification of the 10 questions that are tested is easy, moderate, and difficult with the number of questions 3, 5, and 3, respectively. Meanwhile, the difference in power of questions is 4, and 6 items with sufficient, and good category, respectively. While the reliability of the items obtained which means the questions have high reliability ($r_{11} = 0{,}630$). Analysis of the questionnaire responsibility data with 20 items tested was obtained 18 questions fulfilling

valid criteria with reliability values of $r_{11} = 0{,}56$. While from the 25 items of questionnaire independence 21 questions were declared valid with reliability values of $r_{11} = 0{,}48$.

Analysis of the normality test results obtained Asymp. Sig = 0.711 before treatment and Asymp. Sig = 0.625 after treatment. This result shows that the data of the test of creative thinking ability before and after the treatment is normally distributed. Homogeneity test results indicate that the value of sig = 0.543 > 0.05 which means that both samples have the same variance. The average student questionnaire scores before and after the application of the e-learning model were 62.7 and 76.5, respectively. The distribution of responsibilities for each indicator after applying the e-learning model is presented in **Figure 1**. The indicators include submitting assignments on time, doing according to instructions, doing assignments based on their own work, doing assignments and homework properly, and are responsible for each action.

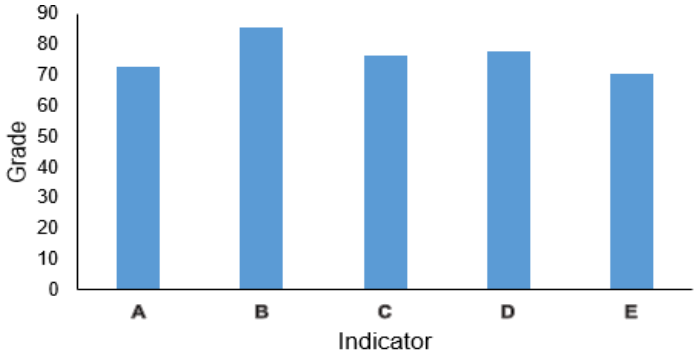

Fig. 1. Value of student responsibility on each indicator. Where indicators A, B, C, D, and E are submitting assignments on time, doing according to instructions, doing assignments based on their own work, doing assignments and homework properly, and are responsible for each action, respectively.

The average scores of student independence questionnaire before and after the implementation of the e-learning model are 64.8 and 78.5, respectively, with the distribution of scores for each indicator as presented in **Figure 2**. The indicators of independence include the desire to learn, the ability to make decisions and initiations to deal with problems, responsibility for what is done, and confidence and carry out tasks independently.

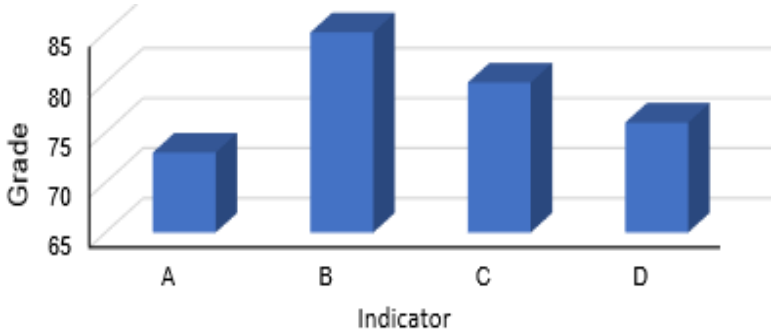

Fig. 2. Value of student independence. Indicators A, B, C, and D represent the desire to learn, the ability to make decisions and initiations to deal with problems, responsibility for what is done, and confidence and carry out tasks independently, respectively.

Individual completeness analysis of the value of students' creative thinking abilities was obtained by one-party test with a significance level of 5%. From the test obtained t_{count} = 5.341 is greater than the value of t_{table} (2.03). This means that the average test scores of students' creative thinking skills after treatment reached completeness, with a set completeness limit of 73. The classical completeness analysis of 28 students reached 26 or 93% completeness. Test the proportion of one party with a significant level of 5%, obtained z_{count} = 2.27 greater than z_{table} = 0.497, meaning that the proportion of students getting a value of 73 is more than 80%. The acquisition of creative thinking abilities test scores is presented in **Figure 3**.

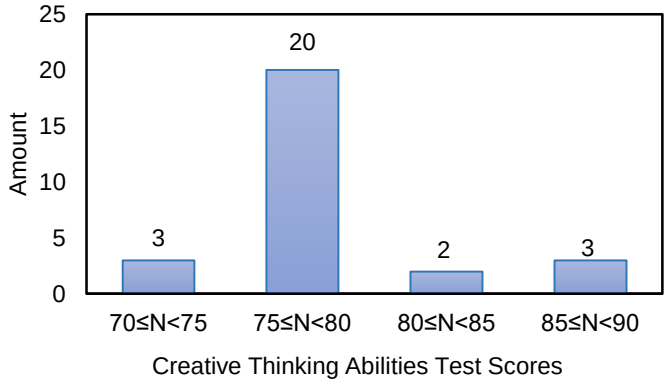

Fig. 3. The value of the ability to think creatively

A double linear test on the effect of responsibility and independence on the creative thinking abilities of students obtained a relationship Y = 0.513X1 + 0.753X2 + 34.115. This shows that each addition of the responsibility variable (X1) by one unit will increase the value of creative thinking ability (Y) by 0.513. Also, each addition of independence variable (X2) by one unit will increase the value of the creative thinking ability test (Y) of 0.753. The influence of responsibility and independence on the ability to think mathematically creative is 78%, while 22% is influenced by other factors.

Analysis of the results of the test of the average difference to the test scores of creative thinking skills before and after treatment obtained t_{count} = 8.63>2.03, meaning that the value of students' creative thinking abilities after treatment is better with their pretest and posttest scores is 67 and 78, respectively. Analysis of the test of increasing creative thinking ability on 28 students showed 14.3% of students had an increase in low ability, and 85% were moderate.

Based on the results of the analysis of the responsibility character obtained by the average value of student responsibility after the application of e-learning learning reached an increase of 13.8 points [15]. This is allegedly because e-learning model learning is learning that can be accessed anytime and anywhere [16], making it easier for students to access learning without having to come to campus, and students can collect assignments on time. Limiting the time collection of assignments to e-learning will also increase student discipline and responsibility towards themselves without relying on the help of others.

The results of the analysis of student independence after applying the e-learning learning model increased by 15.7 points. Learning by using e-learning models that can be done without having to face to face with lecturers requires students to be more independent [17]. Lecturers and students can hold discussions together so that they can increase the desire and desire of students to study without having to come to campus [18]. The limitations of student meetings with lecturers make students accustomed to making their own decisions and initiatives in dealing with problems so that students' creative thinking abilities increase.

Based on data analysis on the effectiveness of learning, it can be concluded that students have mastered learning material, because they have achieved mastery learning both individually and classically. This achievement is an implementation of learning e-learning models that are equipped with several facilities so that students are happy and easier to learn. The problem of students who cannot attend meetings with lecturers can be resolved, Learning material that can be opened at any time makes students able to use the time anytime and anywhere to study. In addition, the independence of students in doing the assignments of the lecturer makes student creativity increase.

The effect of responsibility and independence on students' creative thinking abilities is 78%. The magnitude of this influence is due to the nature of the e-learning learning model that demands students to be more independent and responsible towards themselves, so that more student creativity. Increased creativity will increase students' creative thinking abilities.

The results of the different test scores of the creative thinking abilities of students who were given learning by e-learning models were better than those who used conventional learning (before treatment) [18], [19]. This is because e-learning has advantages over conventional systems namely, saving time in teaching and learning, reducing travel costs, reaching wider geographical areas, and so on [20]. In addition, the application of e-learning can increase students' sense of responsibility and independence in learning [21]. This increase causes an increase in students' creative thinking abilities. Normalized gain test results show an increase of 3.7 in the medium category.

4 Conclusion

The use of effective character-based e-learning models can improve students' creative thinking abilities. This can be seen from:

a. The ability of students' creative thinking after applying the learning model of e-learning reaches completeness, with an average value of 78, with classical completeness of 93%.
b. The effect of responsibility and independence of students on the ability of creative thinking students, 78% while 22% is influenced by other factors
c. The average ability of students' creative thinking after applying the e-learning model is better than before the application or conventional learning, with a pretest value of 67 and posttest 78.
d. The magnitude of the increase in the ability to think creatively based on a nominal gain test of 3.7 with moderate criteria.

References

[1] Hasan, M.,Maarop, N.,Samy, G.N.,Baharum, H.I.,Abidin, W.Z and Hassan, N.H.: Developing a success model of Research Information Management System for research affiliated institutions,

pp. 1-6. International Conference on Research and Innovation in Information Systems (ICRIIS), Langkawi, (2017)

[2] Venkatesh, V.,Rabah, J.,Fusaro, M.,Couture, A.,Varela, W and Alexander, K.: Factors Impacting University Instructors' and Students' Perceptions of Course Effectiveness and Technology Integration in the Age of Web 2.0. McGill Journal of Education, Vol 51(1), pp. 465-673 (2016)
[3] Somayeh, M., Ghasemnegad, S.M., Dehghani, M., Hakimi, H., Mozaffari, F., Samaneh, B.: The effectiveness of E- learning in learning: A review of the literature, International Journal of Medical Research & Health Sciences, Vol. 5(2), pp. 86-91 (2016)
[4] Vrontis, D.,Viassone, M.,Thrassou, A.: The role and potential of social networks sites in tertiary education, Sinergie italian journal of management,Vol. 97(33), pp. 127-144. (2015)
[5] Idrus, Y., Arviana, R.: The Learning Device Assisted by CorelDraw Program to Improve Learning Outcomes of Fashion Design Student. Advanced Science Letters, Vol. 24(1), pp. 521-523 (2018)
[6] Poon, J.: Blended learning: an institutional approach for enhancing students' learning experiences, Journal of online learning and teaching, Vol. 9(2), pp. 271-288 (2013)
[7] Guri-Rosenblit, S.: E-Teaching in Higher Education: An Essential Prerequisite for E-Learning. Journal of New Approaches in Educational Research. Vol 7(2), pp. 93–97 (2018)
[8] Hubbard, P.,Levy, M.: Theory in computer-assisted language learning research and practiceg pp 15- 25 Taylor & Francis Group (2016)
[9] Damayanti, D., Dwiningsih, K.: Development of Learning Tools Oriented Blended Learning in the Periodic System Material of Element X Class Senior High School. UNESA. Journal of Chemistry Education . Vol. 6, No. 1, pp. 16-23 (2017)
[10] Lam, J.: The Context of Blended Learning: The TIPS Blended Learning Model. In: Cheung S.K.S., Fong J., Zhang J., Kwan R., Kwok L.F. (eds) Hybrid Learning. Theory and Practice. ICHL 2014. Lecture Notes in Computer Science, vol 8595. Springer, Cham (2014)
[11] Rienties, B., Brouwer, N., Lygo-Baker, S.: The effects of online professional development on teachers beliefs and intentions towards learning facilitation and technology. Teaching and Teacher Education. pp. 122-131. (2013)
[12] Tae Kyun Kim, T. K.: T test as a parametric statistic, Korean J Anesthesiol. Vol. 68(6), pp. 540–546 (2015)
[13] Lee, D.K. In J, Lee S.: Standard deviation and standard error of the mean. Korean J Anesthesiol. Vol. 68, pp. 220–223 (2015)
[14] Fadaei, A.S.: Comparing Two Results: Hake Gain and Dellow Gain, to Analyze FCI Data in Active Learning Process, US-China Education Review A, Vol. 9(1), pp. 31-39 (2019)
[15] Sulistyaningsih1, D., Mawarsari, V.D., Hidayah, I., Dwijanto: Manipulatives Implementation For Supporting Learning Of Mathematics For Prospective Teachers. Journal of Physics Conference Series 824(1):012047 (2017)
[16] Asiimwe, E.N., Örebro, Å.G.: MLCMS actual use, perceived use, and experiences of use. International Journal of Education and Development using Information and Communication Technology (IJEDICT), Vol. 11(pp), pp. 101-121 (2015)
[17] Mapotse, T.A.: Development of a Technology Education Cascading Theory through community engagement site-based support. International Journal of Technology and Design Education, Vol. 28(3), pp. 685–699 (2018)
[18] Noesgaard, S. S., Ørngreen, R.: The Effectiveness of E-Learning: An Explorative and Integrative Review of the Definitions, Methodologies and Factors that Promote e-Learning Effectiveness" The Electronic Journal of eLearning. Vol. 13(4), pp. 278-290 (2015)
[19] Purnomo, Subri, M., Setyarini, P.: Fracture development and deformation behavior of zeolite-filled high density polyethylene annealed composites in the plane stress fracture, FME Transactions, Vol. 46(2), pp. 165-170 (2018)
[20] Nguyen, T.: The Effectiveness of Online Learning:Beyond No Significant Difference and Future Horizons. MERLOT J. Online Learn. Teach.(2015)

[21] Geng, S., Law, K.M.Y., Niu, B.: Investigating self-directed learning and technology readiness in blending learning environment, International Journal of Educational Technology in Higher Education, 16, Article number: 17 (2019)