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Research paper

Multimedia educational game approach for psychological conditional

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Abstract

This study aimed to develop Multimedia-Based Educational game for junior high school students grade IX and investigate its effectiveness on student's learning psychological condition in facing computer-based National Exam it is called UNBK in indonesia. Population of this research is junior high school students grade IX Muhammadiyah 1 Medan. Sample using in this research were two class that amount 64 students chosen randomly. The result product verified by some experts showed that the multimedia–based educational game is appropriate to use as a learning medium for students in preparing Computer-based national exam. Then, the calculation of Independent samples t-test showed that sig. (2-tailed) was 0.000. It's lower than 0.05, it meant that there was significant effect by using multimedia-based national exam on student's learning psychological condition in facing computer-based national exam. Student had high motivation, stronger interest, and positive attitude in facing UNBK. Students claimed they had greater motivation to challenge UNBK, motivation to continue studies to high school. In addition to motivation, they also expressed greater interest in the particular tested sub-jects, an interest in choosing majors. Student attitude also more positive with more intense when discuss, review the mate-rial that has been presented, feel challenged and focus in learning.

Keywords: *Multimedia Game; National Exam; Student's Motivation; Experiment.*

1. Introduction

The National Examination is one of the requirements of graduation from educational unit as mandated by Government Regulation of the Republic of Indonesia Number 19 Year 2005 regarding National Education Standards Article number 72 paragraph (1) --- Students are declared to graduate from education unit in primary and secondary education after:

a) Completing the entire learning program;
b) Achieving a minimum score both on the final assessment for all subjects;
c) Passing senior High school examinations; and
d) Passing the National Exam---[1]

In school, students should be familiar with the assessment of learning outcomes done by teachers[2] and schools. This is because mandated by the Government Regulation of the Republic of Indonesia Number 19 Year 2005 on National Education Standards Article number 63 paragraph (1), Assessment of education at the level of primary and secondary education consists of Assessment of learning outcomes by:

a) Educators;
b) Educational unit;
c) Government.

Assessment of learning[3]–[5] outcomes by educators is done continuously to monitor the process, progress, and improvement of students' achievement in the form of daily assignment, midterm test, and semester final test. Assessment of learning outcomes by educators is used to assess the achievement of learners' competencies; preparation of reports of learning outcomes; and improve the learning process. Assessment of learning outcomes by educational institution aims to assess the achievement of graduate competency standards for all subjects. Assessment by the government in the form of National Exam aims to assess the achievement of national graduate competence on certain subjects in science and technology subjects. National examination is conducted objectively, fair, and accountable. National exam results are used as a consideration for: (a) mapping of program quality and / or educational unit; (b) the basis for entry test into the next level of education; (c) determination of students' graduation from education programs and/or units; and coaching and assisting the educational unit in its efforts to improve the quality of education.

Before 2015, the national exam in Indonesia was a paper-based test. However, in 2015, the Government began to apply the implementation of computer-based national exam for high school students. At that time, there were only a few high schools, which applied it due to the limitations of computer devices, and internet networks, while other schools still used paper-based test system. In 2016, the implementation of computer-based national exams gradually began to be implemented in several junior high schools. The use of a computer based test (CBT) system is an effort of Government to form honest, independent, responsible, disciplined, and perhaps also sportive characters in receiving test results, because with CBT, the students' cheating rate in doing the exams can be minimized [6]. By this system, the assessment is easier to do, so the government, schools committees, teachers and students immediately know the score of the national exam.

However, although the use of CBT has many advantages, the use of CBT also raises many problems. In addition to the problems of computer infrastructure and the internet network, another problem for students is the lack of effective learning media for them to practice computer-based national exams. Therefore, the researcher design multimedia-based educational games for students of grade IX junior high school as an interactive learning media for them in preparing for computer-based national exams. Moreover, through this research the researchers also investigate whether the educational game developed is able to improve student's learning motivation in preparing computer-based national exams.

Applying interactional media[7], [8] is able to increase student's motivation because of the interests to multimedia system which provides text, picture, video, audio, and animation [9], [10]. This statement shows that students are attracted to learn using interactive multimedia because of its interesting display and its support to learning activity. The combination of text, picture, video, audio, and animation can be students' source of learning. Another research proves that the result of multimedia plays a purpose for students to produce compromising and original ideas [11].

In preparation for National Examination, students not just study the subject test but also need to prepare in terms of psychological order to take UNBK optimally. Students' psychological factors can affect the learning process. Some of the main psychological factors affecting the learning process are students' intelligence, motivation, interests, attitudes, and talents [12] [13].

One of the factors that influence the learning psychological factors is media learning. Appropriate and interesting learning media can improve and direct the attention of the child so that it can create comfort and tranquility. Therefore, by implementing multimedia and animation media in learning, it increases students' interest and efficiency [14]. Several studies have also found the importance of using multimedia to work up students' learning attention and attitudes [15] [16].

Educational games are a fairly popular medium and are being developed to support the learning process in the classroom. Educational game is a game that aims to provoke interest in children's learning while playing [17][18][19]. Educational games actually refers more to the content and purpose of the game, not included in the genre of the actual game and aims to lure children's interest while learning.

In this digital era, the utilization of technology media in teaching and learning process properly can lead to student learning arousal and allow optimal interaction of students with teachers, so it can increase students' motivation in learning [20]. Psychology of learning such as motivation, interest, and attitude can develop even in anxious situations facing UNBK. Therefore media learning such as educational games can provide interesting and fun effects for students in the learning process is required.

2. Methodology

This research used two different methods, namely Research and Development[21]–[23] method to design multimedia-based educational game and posttest-only control group design to investigate whether the Education Game had effects for students' learning psychology condition in facing computer-based national exam. In the development of the educational game, it takes a lot of time to analyze and collect learning material to be put into the educational game. After the educational game was completed, the next step was to validate it to determine whether it was appropriate to use or not. After it proved to be valid, the educational game would be applied in the experimental class for about 2 months.

In posttest-only control group design, there is no pretest, and the experimental group gets treatment, while control group doesn't gets treatment [24]. The treatment is using multimedia-based educational game as learning media to prepare for computer-based national exam, while the control class only used conventional way. The data of this research was quantitative data supported by qualitative data. Quantitative data are obtained from questionnaire, while qualitative data is descriptive data obtained from the behavior of the people observed [25]. Population of this research is students of grade IX Junior High School in SMP Muhammadiyah 1 Medan. Sample is two classes that amount 64 students chosen randomly. In this research, class IX A was chosen as experimental group, and class IX B was chosen as control group. After applying the treatment, both classes carried out posttest. The procedures of the research are shown in the figure 1.

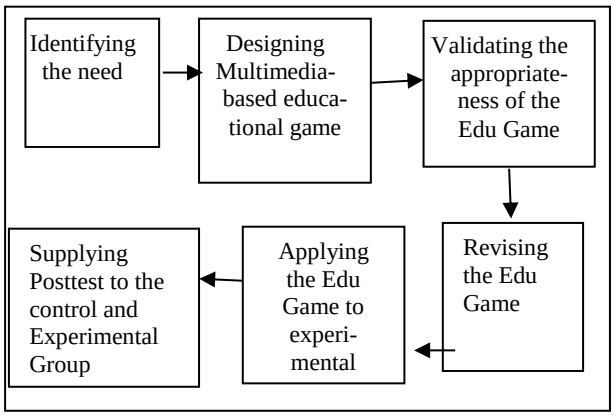

Fig. 1: Research Procedure.

To analyse data that it obtained from questionnaire, the researcher used likert scale to analyse data. Likert scale is used to measure attitudes, experiences, opinions, and perceptions of a person about social phenomena. Independent samples t-test was conducted because this study involved comparison of the mean score between two different groups, independent or unrelated to each other, and to see whether the differences occured between the two groups due to a treatment [26].

3. Results and discussion

In the analysis stages, the data collection was conducted to develop game. This analysis stages include analysis of learning material needed, hardware and software analysis, the development result of display. After the game was finished, validation and testing process are done to ensure the game is appropriate to use as a learning medium for student grade IX in preparing Computer-based national exam. Ater the development process, the educational medium is tested to verify the effectiveness on the learning psychology condition of grade IX students to face computer-based National Examination. In designing the educational game, it needs minimum specification requirement of computer:

a) Hardware (operating system Windows 7 or newer, Intel Core i3 for CPU or other comparable CPUs, 2 GB RAM, hard disc 500 GB, DVDs)
b) Software (Adobe Flash CS 6, Corel Draw X7)

In production stage, there are some design processes the researchers did, namely designing layout, designing storyboard, designing navigation diagram, designing game elements, and making script using action script 3. In making layout design, the researcher used Corel Draw X7 and size of the game layout was width: 1280px, height: 720px. Some layout design consisted of Input name, opening display, home display, lesson display, test display, guide display, score display. Attractive visual display of the game will provoke the interest of students to play it. Therefore, the elements of this game are made as detailed as possible, like logo, character, typography, button, background, picture, and animation. The animation of the game was made using software adobe flash professional CS6. The game displays can be seen in figure 2, 3, 4, and 5.

Fig. 2: Home Display.

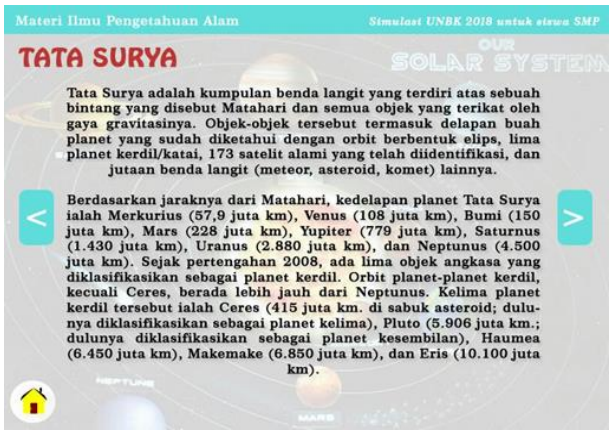

Fig. 3: Content.

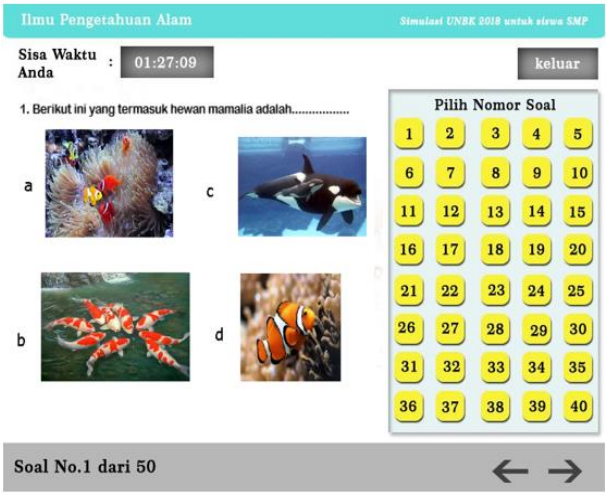

Fig. 4: Test Display.

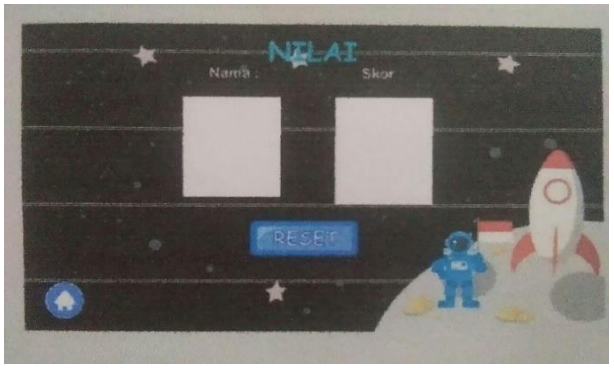

Fig. 5: Score.

To validate the appropriateness of this multimedia-based educational game, the researcher used 5 important assessment aspects, which is functionality, usability, efficiency, portability, and learning content. This validation involved 3 experts of multimedia, 12 experts of learning contents and students. Functionality, efficiency, and portability checking were done by 3 experts of multimedia, usability checking was done by 64 students of grade IX and learning content checking were done by 3 English teacher, 3 Math teacher, 3 Indonesian English teacher and 3 Science teachers. The all validators were given questionnaire to assess each aspect. Score obtained from the questionnaire was calculated using this formula:

$$Validity\ percentage = \frac{Score\ gained}{Maximum\ Score}\ x\ 100\%$$

The criteria of appropriateness percentage was shown in table

81%-100%	=	Very Good
61%-80%	=	Good
41%-60%	=	Enough
21%-40%	=	Low
0%-20%	=	Very Low

Table 1: Validation of Multimedia-Based Educational Game

No	Aspect	Percentage	Criteria
1	Functionality	80%	Good
2	Usability	84%	Very Good
3	Efficiency	85%	Very Good
4	Portability	83%	Very Good
5	Learning content	82%	Very Good
Total		414	
Average		82,8%	Very Good

The data in table 1 shows that appropriateness of multimedia-based educational game designed by researchers to be used as learning media for computer-based national exam is very good with average percentage 82.8 %. Overall, the validators affirmed the educational game had good quality. It means that it was proper to be used in experimental classroom in order to be verified the effectiveness on student's learning psychological condition in facing computer-based national exam.

To investigate the effectiveness of this multimedia-based educational game on student's learning psychological condition in facing UNBK, the post-test was conducted to the students. The score of students' post-test are then illustrated in figure 6.

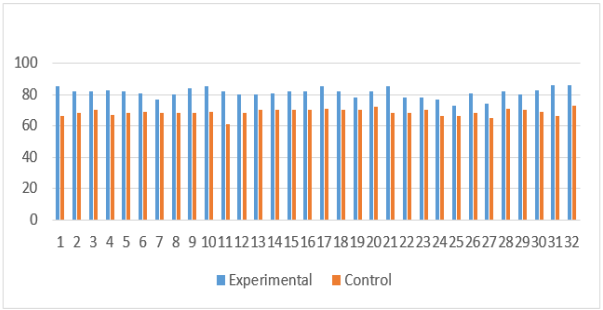

Fig. 6: The Post-Test Score of Experimental and Control Group

This proves that with the multimedia-based education game significantly influence the development of students' learning psychology, especially in the context of facing exams. Students claimed to have greater motivation to conquer UNBK challenge, motivation to continue their studies to high school level. In addition to motivation, they also expressed greater interest in the particular tested subjects, an interest in choosing majors. Then their attitude is also more positive with the more intense they discuss, review the material that has been presented, feel challenged and focus in learning. This can be achieved because they feel that learning is easy and fun especially with interactive and fun media. This study also supported a finding of another research that stated that digital game-based learning (DGBL) can be exploited as a useful and productive tool in effective learning, enhancing the classroom atmosphere so that it effected on students' problem solving, learn-

ing motivation, and academic achievement [27]. Therefore, through this finding, teachers and schools are expected to apply this educational game as a learning medium for students in preparing for computer-based national exams.

4. Conclusion

The development of multimedia–based educational game is appropriate to use as a learning medium for student grade IX in preparing Computer-based national exam. The findings also states that using multimedia-based educational game effect to students' learning psychological condition in facing computer-based national exam. It's known from calculation of Independent samples t-test that shows t-test was 18.216 and sig. (2-tailed) was 0.000. The sig value 0.000 was lower than 0.05. The psychological factors are students' motivation, interests, and attitudes. Learning motivation is power mental that encourages the learning process. Through the research, students seem to prefer and interested to study harder in facing for the final national exam. Then their attitude is also more positive with the more intense they discuss, review the material that has been presented, feel challenged and focus in learning.
Related to the results of this study, it is highly recommended for schools and teachers to be able to begin developing an interactive learning media by utilizing newest technology in order to intensify student's achievement.

References

[1] Republik Indonesia, *Undang-undang No 19 Tahun 2005 tentang Standar Nasional Pendidikan. Indonesia*, 2005.

[2] A. S. Ahmar et al., "Lecturers ' Understanding on Indexing Databases of SINTA , DOAJ , Google Scholar , SCOPUS , and Web of Science : A Study of Indonesians," *J. Phys. Conf. Ser.*, vol. 954, no. 1, p. 012026, 2018.

[3] E. Kartikadarma, T. Listyorini, and R. Rahim, "An Android mobile RC4 simulation for education," *World Trans. Eng. Technol. Educ.*, vol. 16, no. 1, pp. 75–79, 2018.

[4] T. Listyorini and R. Rahim, "A prototype fire detection implemented using the Internet of Things and fuzzy logic," *World Trans. Eng. Technol. Educ.*, vol. 16, no. 1, pp. 42–46, 2018.

[5] D. Napitupulu et al., "Analysis of Student Satisfaction toward Quality of Service Facility," *J. Phys. Conf. Ser.*, vol. 954, no. 1, 2018.

[6] BSNP, *Pos Penyelenggaraan UN TP. 2017/2018*. Indonesia, 2017.

[7] R. Rahim, I. Zulkarnain, and H. Jaya, "A review: search visualization with Knuth Morris Pratt algorithm," in *IOP Conference Series: Materials Science and Engineering*, 2017, vol. 237, no. 1, p. 012026.

[8] R. Rahim, A. S. Ahmar, A. P. Ardyanti, and D. Nofriansyah, "Visual Approach of Searching Process using Boyer-Moore Algorithm," *J. Phys. Conf. Ser.*, vol. 930, no. 1, p. 012001, Dec. 2017.

[9] D. Darmawan, *Inovasi pendidikan*. Bandung: PT Remaja Rosdakarya, 2012.

[10] R. Rahim, "Man-in-the-middle-attack prevention using interlock protocol method," *ARPN J. Eng. Appl. Sci.*, vol. 12, no. 22, pp. 6483–6487, 2017.

[11] H. Kassim, H. Nicholas, and W. Ng, "Using a multimedia learning tool to improve creative performance," *Think. Ski. Creat.*, vol. 13, pp. 9–19, 2014.

[12] R. A. R. Gurung, D. B. Daniel, and R. E. Landrum, "A Multisite Study of Learning in Introductory Psychology Courses," *Teach. Psychol.*, vol. 39, no. 3, pp. 170–175, 2012.

[13] E. Kim, F. B. Newton, R. G. Downey, and S. L. Benton, "Personal Factors Impacting College Student Success: Constructing College Learning Effectiveness Inventory (CLEI)," *Coll. Stud. J.*, vol. 44, no. 1, pp. 112–125, 2010.

[14] Riyanto, W and G. Gunahardi, "The Effectiveness of Interactive Multimedia in Mathematic Learning: Utilizing Power Points for Students with Learning Disability," *Int. J. Pedagog. Teach. Educ.*, vol. 1, no. 1, pp. 55–63, 2017.

[15] S. Nusir, I. Alsmadi, M. Al-Kabi, and F. Sharadgah, "Studying the impact of using multimedia interactive programs on children's ability to learn basic math skills," *E-Learning Digit. Media*, vol. 10, no. 3, pp. 305–319, 2013.

[16] G.-J. Hwang, P.-H. Wu, C.-C. Chen and N.-T. Tu, "Effects of an augmented reality-based educational game on students' learning achievements and attitudes in real-world observations," *Interact. Learn. Environ.* No. March 2016, 2015.

[17] A. Rahman *et al.*, "The Implementation of APIQ Creative Mathematics Game Method in the Subject Matter of Greatest Common Factor and Least Common Multiple in Elementary School," *J. Phys. Conf. Ser.*, vol. 954, no. 1, 2018.

[18] A. S. Ahmar and A. Rahman, "Development of teaching material using an Android," *Glob. J. Eng. Educ.*, vol. 19, no. 1, 2017.

[19] K. Jenkins, Henry & Squire, *Harnessing the Power of Game in Education*, 2004th ed. Insight, 2004.

[20] J. Keengwe and D. Georgina, "Supporting Digital Natives to Learn Effectively with Technology Tools," vol. 9, no. March, pp. 51–59, 2013.

[21] R. Rahim, S. Nurarif, M. Ramadhan, S. Aisyah, and W. Purba, "Comparison Searching Process of Linear, Binary and Interpolation Algorithm," *J. Phys. Conf. Ser.*, vol. 930, no. 1, p. 012007, Dec. 2017.

[22] R. Rahim et al., "Block Architecture Problem with Depth First Search Solution and Its Application," *J. Phys. Conf. Ser.*, vol. 954, no. 1, p. 012006, 2018.

[23] R. Rahim, H. Nurdiyanto, A. S. Ahmar, D. Abdullah, D. Hartama, and D. Napitupulu, "Keylogger Application to Monitoring Users Activity with Exact String Matching Algorithm," *J. Phys. Conf. Ser.*, vol. 954, no. 1, 2018.

[24] Sugiyono, *Metode Penelitian Kuantitatif, kualitatif dan* R & D. 2013.

[25] S. Arikunto, *Prosedur Penelitian*. Jakarta: Rineka Cipta, 2012.

[26] J. Larson-Hall, *A guide to doing statistics in second language research using SPSS*. New York: Routledge, 2010.

[27] Y. T. Yang, "Building Virtual Cities, Inspiring Intelligent Citizens: Digital Games for Developing Students' Problem Solving and Learning Motivation," *Comput. Educ.*, vol. 59, no. 2, pp. 365–377, 2012.