

Educational Game-Based Learning Media To Grow Learning Motivation In Computer And Basic Network Subjects In Vocational High Schools

Yoga Hanif Faiz ^{a,1,*}, Wendy Cahya Kurniawan ^{a,2}

^aFaculty of Engineering, Universitas Negeri Malang, Malang, Indonesia

^bAutomation Technology, National Taipei University of Technology, Taipei, Taiwan

¹*yogahaniffaiz.1805336@students.um.ac.id, ²t109618402@ntut.org.tw

*Corresponding author

Article Info

Article history:

Keyword:

Learning Media
Educational Games
Basic Computers and Networks
Learning Motivation

ABSTRACT

The use of technology in the learning process requires educators to be able to adapt to technology in the learning process. Based on the observations that have been made, in the Subject of Computers and the basic network of computer assembly shows that students are less motivated. To foster motivation to study computer assembly material, media was developed to discuss basic competencies regarding computer assembly tools. Researchers make Educational Game-Based Learning Media as Learning Media that adapts to digital technology. This media has many advantages, including being easy to operate, not limited by distance and space, not boring, and easy to understand. The purpose of this development research is to develop and determine the feasibility of Educational Game-based learning media to foster motivation to learn basic subjects of Computers and Networks in TKJ. The research and development method used is Design Thinking with the following stages: 1) Empathize; 2) Define; 3) idea; 4) Prototype; 5) Test. The types of instruments used are game test questionnaires and student learning motivation tests. The type of data in this study is quantitative and quantitative with data collection methods using questionnaires. The results of the research and development carried out produced educational game learning media for computer subjects and basic network computer assembly materials. Feasibility analysis on material validation 96.45%, media expert validation 96.46%, product trial 84.23%, learning motivation test 84.38%. Based on the results of the feasibility analysis of Educational Game learning media it is said to be "Valid" or Decent Enough. The results of the analysis of learning motivation are said to be high and can foster learning motivation. It can be concluded that Educational Game learning media can be used as a complement in the learning process and can foster student learning motivation.

I. INTRODUCTION

After the outbreak of the COVID-19 virus pandemic, it has made major changes in various areas of life, one of the areas affected is the field of Education [1]. After the COVID-19 pandemic required teachers to be creative in innovating the

use of learning technology. Changes in learning patterns after the COVID-19 pandemic posed new challenges for teachers, teachers had to adapt to a new learning system to carry out learning activities. The purpose of learning is to provide quality learning services in a network that is massive and open to reach more and wider study room enthusiasts [2]. To achieve learning

goals, teachers as educators must adapt to digitalization with the increasing use of technology [3]. To realize effective learning, teachers must be able to prepare teaching materials and learning methods that are easily understood by students. One solution, teachers are required to design learning media as an innovation by utilizing online media [4].

Based on research related to learning at several SMKs such as SMKN 1 Blitar, SMKN 3 Batu, SMKN 4 Malang, and SMK PGRI 1 Ngawi, the observations showed that 66.6% of respondents still experienced problems during learning. There are several obstacles in the implementation of learning in Computer and Basic Networks subjects including 1) The lack of practicum tools makes learning not run effectively, 2) the Lack of student motivation because learning is not supported by sufficient theoretical understanding, 3) During learning human error often occurs which results in damage to the components used, 4) Lack of understanding of material analysis, 5) Explanations that are difficult to understand. From the results of these observations, the author offers a solution, namely learning material in schools is presented in the form of games. Students replied that 93.6% of respondents agreed because this way learning would be more interesting.

Learning media is something that needs to be prepared by the teacher properly because with learning media the material will be more easily conveyed and can be re-studied by students. In the post-COVID-19 pandemic era, learning media is the main component in the learning process, so formal and non-formal learning processes in Indonesia are carried out optimally. The hope is that after the COVID-19 pandemic, the world of education will become accustomed to system changes as a learning culture in education [5]. Therefore, using digital devices such as SmartPhones plays an important role in supporting the use of digital learning media.

The development of information and communication technology also greatly influences the development of learning media, currently learning media has been developed in various forms such as games. Educational games are used in this teaching and learning process and often used in the world of education. This educational game has the goal of increasing student learning motivation in accordance with the material provided by the teacher by playing games so that students feel happy and not bored. This Educational Game is expected so that students can easily understand the material and learning simulations being taught.

Regarding the problems that have been described, the researchers developed learning media in this study with the title "Educational Game-Based Learning Media to Grow Learning Motivation in Computer and Basic Network Subjects in Vocational High Schools".

II. METHOD

The method used in this research and development is Design Thinking, this research focuses on the field of education, namely to develop an Educational Game-based learning media that is applied to SMK students. Design Thinking is a development method that is suitable for

application in the education sector, especially in the STEM (Science, Technology, Engineering, and Mathematics) field [6], because Design Thinking is a collaborative method of many disciplines, giving rise to many ideas for creating a product or obtain a solution to a problem [7]. The Design Thinking method has 5 stages of development, namely empathize, define, ideate, prototype, and test, as shown in Figure 1.

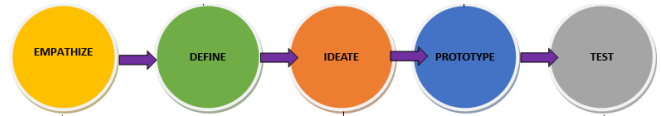


Fig. 1. Design Thinking Development Model Stages. Source [8].

After the educational game media has been developed, the next step is validation by experts. There are two validations in this development, namely media validation and material validation. The validation of media experts and math experts was carried out by lecturers in the electro & informatics engineering department, State University of Malang, and TKJ teachers at SMK PGRI 1 Ngawi. Media experts and material experts will be given a questionnaire which will be managed using the formula below.

Media and Material Expert validation calculation formula

$$V = \frac{\sum T_{se}}{\sum T_{sh}} \times 100\%$$

Information:

V = Percentage

$\sum T_{se}$ = Total empirical score (total score achieved)

$\sum T_{sh}$ = Total maximum score (expected total score)

After completing the validation of experts until validation is declared valid with criteria such as Table 1 [9]. Furthermore, the learning media will be tested on users. The users in question are students of class XII TKJ A and XII TKJ B SMK PGRI 1 Ngawi. In this trial process, there are two stages in its implementation. The first stage was a small group trial involving 10 students. Then the second stage was a large group trial conducted by 30 students. The assessment of this user trial is based on the eligibility criteria of learning media shown in Table 2.

TABLE I. LEARNING MEDIA VALIDITY CRITERIA

Percentage	Validation Criteria
85,01 – 100,00	Valid, or usable without revision
70,01 – 85,00	Valid enough, or usable but available small revision
50,01 – 70,00	Not valid, it is recommended not to use because it needs a major revision
0,01 – 50,00	Invalid or should not be use

Source : [9]

TABLE II. LEARNING MEDIA ELIGIBILITY CRITERIA

Percentage	Validation Criteria
81,01 – 100,00	Highly valid, highly effective, highly thorough, usable without revision or improvement
61,01 – 81,00	Valid enough, effective enough, complete enough, usable but there are minor revisions
41,01 – 60,00	Less valid, less effective, less complete, needs improvement large, it is recommended not to use
21,01 – 41,00	Invalid, ineffective, incomplete, unusable Very invalid, very ineffective, very incomplete, no
00,01 – 21,00	Can be use

Source : [9]

TABEL III. CRITERIA OF STUDENT LEARNING MOTIVATION

Criteria	Skor
High	61-100
Currently	31-60
Low	0-30

Source : [10]

III. RESULT

The results of the product developed are in the form of Educational Game-Based Learning Media, in computer subjects and basic network computer assembly materials. The developed media is operated on the Android operating system. This media is improved to foster students' learning motivation. This Educational Game learning media is named "Mobile G-Kom". The G-Kom Mobile Application is equipped with multimedia visualization in the form of images, audio, text and animation. The G-Kom Mobile Application can be accessed offline.

The development of this Learning Media uses several software including FIGMA, Construct 2, Web to APK, and Adobe Illustration. The material accessed is KD 3.2 (Implementing computer assembly), KD 3.3 (Implementing computer assembly testing), and KD 3.4 (Implementing BIOS configuration on a computer). -Com. The learning media developed can be seen in Figure 2 – Figure 5.



Fig 2. Main Menu



Fig 3. Game Instructions



Fig 4. Study Material



Fig 5. Game Play

TABLE IV. MEDIA EXPERT VALIDATION RESULT DATA

No	Assessment Aspects	$\sum T_{se}$	$\sum T_{sh}$	V (%)	Criteria
1	Potential effectiveness	48	50	96	Very Valid
2	Usability	47	50	94	Very Valid
3	Satisfactin	30	30	100	Very Valid
	Average			96,67	Very Valid

IV. DISCUSSION

After the development of instructional media, the next step is media expert validation. Media validation was carried out by two validators who are experts in their fields, namely lecturers from Malang State University and teachers from SMK PGRI 1 Ngawi. The validator will try the developed media to provide an assessment regarding the invalidity of the developed media. After trying the media validator provides an assessment with adjustments like table 2.

The results of the validation in Table 4, show that the percentage of developed media has a value of 96.67%. This

shows that the "Mobile G-kom" media can be categorized as valid and ready to be tested on students. There are suggestions from validator experts where the buttons when the media is run are less responsive. Therefore, before carrying out research trials, the media was repaired according to expert advice.

Furthermore, material validation was carried out by two validators who were experts in their fields, namely lecturers from Malang State University and teachers from SMK PGRI 1 Ngawi. The validator will try the developed media to provide an assessment regarding the validity of the content of the material in the developed media. After trying the media validator, it provides an assessment at the price given by the developer.

From the results of completing the questionnaire that was carried out by the material validator expert listed in Table 5. the material contained in the "Mobile G-Kom" learning media received a percentage value of 96.45%. Shows that the "Mobile G-Kom" media is ready to be tested on students at SMK PGRI 1 Ngawi.

TABLE V. DATA FROM THE VALIDATION OF MATERIAL EXPERT

No	Assessment Aspects	$\sum T_{se}$	$\sum T_{sh}$	V (%)	Criteria
1	Self-instruction	66	70	94,29	Very Valid
2	self contained	20	20	100	Very Valid
3	Stand alone	20	20	100	Very Valid
4	Adaptive	10	10	100	Very Valid
5	User friendly	9	10	90	Very Valid
				Average	96,45 Very Valid

The media is declared valid and feasible after being validated by an expert validator. The next step is to try out the product on students. The try-out was carried out at SMK PGRI 1 Ngawi with try-outs for students in class XII TKJ A and XII TKJ B. The try-out was carried out in two stages, namely small group try-out conducted by 10 students in class XII TKJ A and a large group try-out conducted by 30 class XII TKJ B students. The results of the small group trial will be shown in Table 6.

TABLE VI. DATA ON SMALL GROUP TRIAL RESULTS

No.	Aspek	Tsh	Tse	Va (%)
1.	<i>Accomplishment</i>	350	293	83,71
2.	<i>Challenge</i>	100	83	83,00
3.	<i>Competition</i>	150	127	84,67
4.	<i>Guided</i>	100	85	85,00
5.	<i>Immersion</i>	200	167	83,50
6.	<i>Playfulness</i>	200	169	84,50
7.	<i>Social experience</i>	150	128	85,33

Average

84,24

At the trial stage, the small group got a score with a total percentage of 84.24%. This shows that the media being developed is feasible to continue to be tested at a later stage. The second trial phase was in a large group trial with 30 respondents from class XII TKJ B at SMK PGRI 1 Ngawi. The results of the large group trial will be shown in Table 7.

TABLE VII. DATA RESULTS OF LARGE GROUP TRIALS

No.	Aspek	Tsh	Tse	Va (%)
1.	<i>Accomplishment</i>	1050	871	82,95
2.	<i>Challenge</i>	300	256	85,33
3.	<i>Competition</i>	450	374	83,11
4.	<i>Guided</i>	300	252	84,00
5.	<i>Immersion</i>	600	506	84,33
6.	<i>Playfulness</i>	600	509	84,83
7.	<i>Social experience</i>	450	383	85,11
Average				84,23

Based on the data shown in Table 7, the results of trials conducted by large groups were categorized as very feasible. This happens because the average value of all aspects is 84.23%. In addition, students also revealed that the media they made was interesting and fun to play. After students filled out the media questionnaire, in this large group trial, students were instructed to fill out a learning motivation questionnaire to find out whether student learning motivation would grow after using the "mobile G-Kom" learning media, and the results of the student's learning motivation response will be displayed in Table 8.

TABLE VIII. STUDENT LEARNING MOTIVATION DATA

No.	Aspek	Nk	K	Va (%)
1.	<i>Attention</i>	750	624	83,20
2.	<i>Relevance</i>	750	640	85,33
3.	<i>Confidance</i>	600	509	84,83
4.	<i>Satisfaction</i>	600	505	84,17
Average				84,38%

V. CONCLUSION

The results of the product developed are Educational Game-Based Learning Media, in computer subjects and basic network computer assembly material. The developed media is operated on the Android operating system. This media is improved to foster students' learning motivation. This Educational Game learning media is named "Mobile G-Kom". The materials accessed were KD 3.2 (Implementing computer assembly), KD 3.3 (Implementing computer assembly testing), and KD 3.4 (Implementing BIOS configuration on computers). This media gets a value from the Media expert validator of 96,67% and is classified as very valid. As with media experts, material experts also provide a very valid assessment of this

learning media. This is evidenced by the percentage obtained by 96,45%. Educational games are very appropriate to the characteristics of current students, this is shown in trials conducted on students in class XII TKJ A and XII TKJ B SMK

PGRI 1 NGAWI. The small group tryout got a score of 84.24% which was quite feasible and the large group tryout got a score of 84,23% which was also quite decent. This study also measured students' learning motivation and the results showed that students' learning motivation was high after using the learning media "Mobile G-Kom" as a supplement during learning. Shown by the acquisition of a percentage value of 84.38 in Table 8. It can be concluded that the learning media "Mobile G-Kom" can make learning interesting and can foster student learning motivation. In accordance with the opinion [11] that a learning media will be good if there is an element of entertainment.

VI. SUGGESTIONS

Here are some suggestions for further product development to get a more optimal product: Can use a larger Full HD resolution so that the images presented on game media look clearer and reduce the potential for noise, evaluation questions can be added to each material so that it is done after finishing accessing the game according to the selected material, computer assembly materials can be added to computer assembly simulation using a drag and drop game model, Can be given additional asset time and heal in each game to make it more attractive to students.

REFERENCE

- [1] Winandi, G. T. (2020). Perencanaan Pendidikan Pada Masa Pasca Pandemi Covid-19. In *Prosiding Seminar Nasional Pascasarjana (PROSNAMPAS)* (Vol. 3, No. 1, pp. 315-317).
- [2] Sofyana, I., & Rozaq, A. (2019). Pembelajaran daring kombinasi berbasis whatsapp pada kelas karyawan prodi teknik informatika universitas PGRI Madiun. *Jurnal Nasional Pendidikan Teknik Informatika (Janapati)*, 8(1), 81. <https://doi.org/10.23887/janapati.v8i1.17204>
- [3] Lase, D. (2019). Pendidikan di era revolusi industri 4.0. *Sundermann: Jurnal Ilmiah Teologi, Pendidikan, Sains, Humaniora dan Kebudayaan*, 12(2), 28-43.
- [4] Salmia, S., & Yusri, A. M. (2021). Peran guru dalam pembelajaran abad 21 di masa pandemik covid-19. *Indonesian Journal of Primary Education*, 5(1), 82-92.
- [5] Atsani, K. L. G. M. Z. (2020). Transformasi media pembelajaran pada masa Pandemi COVID-19. *Al-Hikmah: Jurnal Studi Islam*, 1(1), 82-93.
- [6] Malele, V., & Ramaboka, M. E. (2020). The design thinking approach to student's steam projects. *Procedia Cirp*, 91(i), 230-236. <https://doi.org/10.1016/j.procir.2020.03.100>
- [7] Sari, I. P., Kartina, A. H., Pratiwi, A. M., Oktariana, F., Nasrulloh, M. F., & Zain, S. A. (2020). Implementasi metode pendekatan design thinking dalam pembuatan aplikasi happy class di kampus UPI Cibiru. *Edsence: Jurnal Pendidikan Multimedia*, 2(1), 45-55. <https://doi.org/10.17509/edsence.v2i1.25131>
- [8] Kelley, D., & Brown, T. (2018). An introduction to design thinking. *Institute of Design at Stanford*, 6. <https://dschoolold.stanford.edu/sandbox/groups/designresources/wiki/36873/attachments/74b3d/modeguidebootcamp2010l.pdf>
- [9] Akbar, S. (2013). *Instrumen Perangkat Pembelajaran*. 1-172.
- [10] Arikunto, S. (2013). *Dasar-Dasar Evaluasi Pendidikan Edisi 2*. Jakarta: PT. Bumi Angkasa.
- [11] H. R. Kurniawan, H. Elmunsyah, and M. Muladi, "Comparison of the application of project based learning (PJBL) and think pair share (TPS) assisted teaching modules on independence and learning outcomes of network design," *JP (Education Journal) Teor. Dan Pract.*, vol. 3, no. 2, pp. 80-85, 2018.