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ORIGINAL

Innovation in Digital Personalized Learning based on gamifications for learning in SMA during and post COVID-19 pandemic

Innovación en Aprendizaje Personalizado Digital basado en gamificaciones para el aprendizaje en AME durante y post pandemia por COVID-19

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ABSTRACT

According to the UNICEF 2020 through the U-Report channel survey, it was stated that over 4 000 students were polled in 34 Indonesian provinces, with 87 percent of students acknowledging that they prefer to study at school. Furthermore, according to the Unesco-Unicef case study report, up to 66 percent of the 60 million students at various levels of education admitted to not feeling comfortable studying from home during the Covid-19 pandemic. However, the solutions offered cannot be implemented because, even if E-learning is used properly, it cannot solve the problem unless it is supported by the readiness of mature human resources. The purpose of this study is to reduce learning loss among high school students during online learning due to the pandemic. Therefore, with the development of gamification-based learning media innovations, an exciting and fun learning environment can be created while students gain a thorough understanding of the material. Furthermore, the existence of this learning media innovation can direct high school students who enjoy playing games to be delighted to receive learning materials that are designed to play. The goal of this research is to eventually serve as one of the steps towards a solution to raise students' academic achievement standards in the midst of a pandemic. This research is critical in order to overcome the pandemic's effects on education in Indonesia.

Keywords: Digital Personalized Learning; Gamification; Covid-19; Pandemic.

RESUMEN

Según la encuesta de UNICEF 2020 (U-Report), se afirmó que se había encuestado a más de 4 000 estudiantes en 34 provincias indonesias, y que el 87 % de los estudiantes reconocía que prefería estudiar en la escuela. Además, según el informe del estudio de caso Unesco-Unicef, hasta el 66 % de los 60 millones de estudiantes de distintos niveles de enseñanza admitieron no sentirse cómodos estudiando desde casa durante la pandemia del Covid-19. Sin embargo, las soluciones ofrecidas no pueden aplicarse porque, aunque el aprendizaje electrónico se utilice adecuadamente, no puede resolver el problema a menos que esté respaldado por la disposición de recursos humanos maduros. El propósito de este estudio es reducir la pérdida de aprendizaje entre los estudiantes de secundaria durante el aprendizaje en línea debido a la pandemia. Por lo tanto, con el desarrollo de innovaciones de medios de aprendizaje basados en la gamificación, se puede crear un entorno de aprendizaje emocionante y divertido mientras los estudiantes adquieren una comprensión profunda del material. Además, la existencia de esta innovación de medios de aprendizaje puede hacer que los estudiantes de secundaria a los que les gusta jugar estén encantados de recibir materiales de aprendizaje diseñados para jugar. El objetivo de esta investigación es servir finalmente como uno de los pasos hacia una solución para elevar los niveles de rendimiento académico de los estudiantes en medio de una pandemia.

Esta investigación es fundamental para superar los efectos de la pandemia sobre la educación en Indonesia.

Palabras clave: Aprendizaje Digital Personalizado; Gamificación, Covid-19, Pandemia.

INTRODUCTION

A face-to-face learning process was inhibited as a result of the pandemic. All learning activities at that time were very dependent on technology, especially learning media. Online learning activities affect student learning outcomes and the student's interest in learning thus, students feel bored. This gamification-based learning media innovation was carried out to reduce learning loss for high school students and create a pleasant learning atmosphere.[1]

Based on data from UNICEF 2020 through the U-Report channel survey, it was stated that over 4,000 students were polled in 34 Indonesian provinces, with 87 percent of students acknowledging that they prefer to study at school. Furthermore, according to the Unesco-Unicef case study report, up to 66 percent of the 60 million students at various levels of education admitted to not feeling comfortable studying from home during the Covid-19 pandemic[a]. Clearly, these problems affect students' learning outcomes. In line with that, the Indonesian Child Protection Mission (KPAI) 2020 reported that as many as 76,7 % of students enjoyed offline learning and only 23,3 % of students enjoyed online learning.

It has a long-term impact, namely the loss of knowledge that affects prolonged gaps (Learning Loss).[1] In addition, the pandemic has also had a short-term impact, affecting the number of students dropping out of school. The high number of children dropping out of school at the SD, SMP, SMA, and SMK levels is due to online game addiction, marriage, and work.[2] The problem of Learning Loss is very worrying for high school students because this level conveys more study material than the SMK level. This means that high school students are prepared as graduates who are ready to continue their studies, while vocational high school students are prepared as graduates who are ready to work.[3]

Based on research, the 2021 Learning Technology Empowerment has provided a solution to the impact of the pandemic on education in Indonesia, namely by implementing an E-learning learning system that provides benefits, namely reducing operational costs.[4] The use of E-learning facilitates the delivery of study material without being influenced by geographical constraints.[5] In fact, the solutions offered cannot be used as problem solvers because, even though they use E-learning properly, without the readiness of mature human resources, the solution cannot solve the problem.[6]

Based on these problems, researchers have initiated an innovation strategy for developing Gamification-Based Interactive Digital Personalized Learning media in the form of cloud learning. Gamification-based learning media, comprise learning methods that apply game dynamics and mechanics to improve the quality of learning outcomes. The innovation in learning media is designed as a game model that is integrated with materials according to the high school curriculum. Later, high school students can choose the media model through images, videos, and audio. This gamification of learning media innovation is designed to be fun, like playing a game, because there will be levels that users can choose from.

The purpose of this research is to reduce learning loss among high school students during online learning due to the pandemic. As a result of the advancement of gamification-based learning media innovations, an exciting and fun learning environment can be created while students gain a thorough understanding of the material. Furthermore, the existence of this learning media innovation may lead to high school students who enjoy playing games being pleased to receive learning materials that are designed to be fun to play. The preceding is consistent with the goal of this research, which is to improve the quality achievement of school students in the midst of a pandemic.

Our research is therefore extremely important for resolving the pandemic-related issues in Indonesian education. If the problem is not immediately addressed, it will become an obstacle to students' understanding of the material.[7] Student learning achievement is hampered due to learning loss.[8] Consequently, it will add a red flag to the quality of Indonesian student achievement. Later, with the development of gamification-based learning media innovations, it will improve student achievement and make it easier for teachers in schools to facilitate the learning process.[9]

METHODS

The research method used in this study was Design thinking.[10] This technique, which was created and used in the development and application of software with the principle of medium-term development lasting between one and two years[11], is primarily intended to find the most effective and efficient way to solve a challenging problem.[12] This method was also chosen because the development team and users will produce a balance and adjustment toward the target of this research. The stages of this research using the Design thinking

method are as follows:

A. *Empathize (Empathy)*: empathize (empathy), which is the process of understanding problems that arise and must be resolved right away by focusing on humans, in an effort to understand the problems encountered by users so that we may feel them and find solutions to them. Things that can be taken: interviews, observations, and combining observations and interviews.[13]
B. *Define:* determine the problem statement as a point of view or primary concern for research by defining it, which is to analyze and comprehend the outcomes of the empathize process. The aforementioned process of studying and comprehending the numerous insights that have been gained through empathy.[13]
C. *Ideate (Ide)*: which consists of moving from problem formulation to problem solving, focuses on coming up with ideas or using ideas as the foundation for developing prototype designs.[14]
D. *Prototype (Prototype):* referred to as the initial design of a product to be manufactured, is created in order to identify early mistakes and discover new opportunities. The first design created will be put to the test on users in its application to get the right input and reactions to improve the design.[14]
E. *Test*: Test or testing, is the process of gathering feedback from various final designs developed earlier in the prototype process. Despite being the final stage, this procedure has a life cycle that allows for looping and returning to the initial design stage in the event of failure.[15]

Experimental

The experimental design used in this study was a non-equivalent group pretest-posttest design in a quasi-experimental setting. Quasi-experimental is an experimental method of giving treatment and measuring results with controlled or non-random placement.

Data Collection Instruments Data

Collection tools were derived from evaluation questionnaires created by media and material experts. There is a score range of 1–5 for the Likert scale for evaluation during the validation stage.

a. If the learning resource is highly appropriate, very appropriate, and very simple, it receives a score of 5.
b. If the learning resource is appropriate and simple, it receives a score of 4.
c. If the learning resource is less accurate, less suitable, and less simple, it receives a score of 3.
d. If the learning resource is not acceptable, not appropriate, and not easy, it receives a score of 2.
e. If the instructional materials are extremely unsuitable, extremely inappropriate, and difficult, it receives a score of 1.

RESULTS

The following findings and discussions comprehensively cover the essence of the current study in response to two research problems: (1) efforts to reduce learning loss in high school students during a pandemic and (2) improving learning quality by developing learning gamification in high school.

Gamification personalized -based interactive

To address the issues raised by this investigation, the development of gamification-based interactive personalized digital learning media was undertaken. Figure 1 shows the display of the developed media.

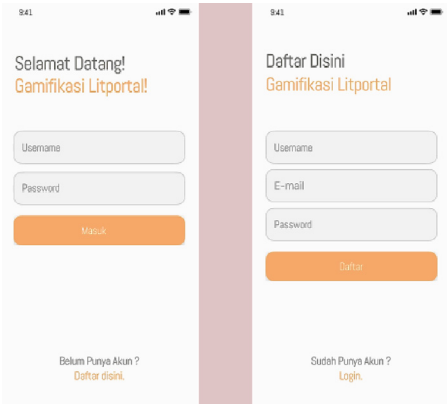

Figure 1. Login page

This product is based on developing Android applications and websites for the gamification process in high

school learning. This learning application based on gamification requires authentication features, especially for ranking accounts every day. Users can register and login through an account that has been registered.

After entering the home page, the user will be faced with the homepage of the application. Through this application, the user has four main menus: home (which displays favorite lessons that can be arranged), course list view, ranking display, and profile view. In the course detail view, there are classes that can be taken according to levels. Within those levels, there are games and quizzes that can be taken, and each game/quizz has points for completion. The number of points is displayed in the profile view, and the rankings are mostly limited to schools and regions (figure 2).

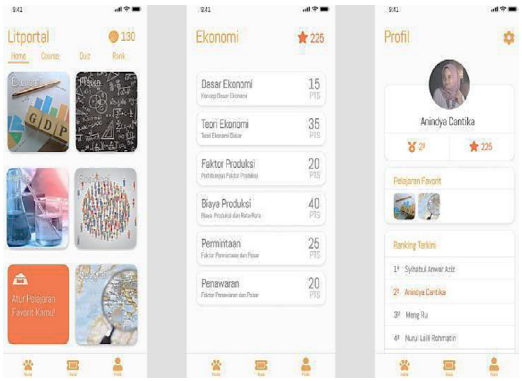

Figure 2. Homepage

A. Material Details

Display of study material information in the form of material descriptions and material lists per level to be taken in accordance with the chosen subtopics. In each subtopic, there is a list of materials and challenges that must be completed in order to receive the total points collected as grades that are processed daily (figure 3).

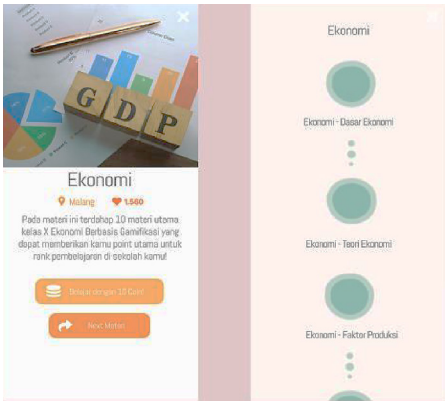

Figure 3. Display of study material details

B. Points

When you have finished the learning challenge on the selected subtopic, which contains related videos, audio, text, and quizzes, the student gets points. In this sense, gamification aims for the learner to get the maximum score(figure 4).

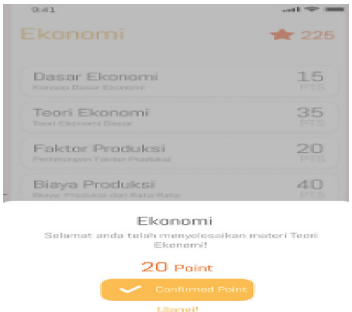

Figure 4. Display of points

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DISCUSSION

Usability-testing product

Usability is one of the most important things when developing media. The application of the appropriate media to the research objectives becomes the standard for research outcomes. Table 1 displays the validation results based on usability, material presentation, ease of access, and graphic presentation indicators.

It can be concluded that the developed digital media is very practical for use in a broader subject area based on the percentage data of the validation results discussed above. In terms of content, 98 % of the learning process is feasible, while 95 % is feasible in terms of digital media (Table 1).

Table 1. Percentage Validation

No	Indicator	Statement	Score				
			5	4	3	2	1
		Material Expert Validation					
1	Uses	a) Conformity with chievement standards learning	✓				
		b) Learning activities using media can improve of students competence	✓				
		c) The use of learning media can provide opportunities for students to practice independently	✓				
		d) Learning media can support learning activities	✓				
		e) Easy-access learning media	✓				
2	Presentation of material	f) The suitability of the material with the learning objectives	✓				
		g) Conformity of contents with menu and needs		✓			
		h) Conformity of learning media with materials	✓				
		i) The language used in the learning media is correct	✓				
		j) The language used in the learning media is easy to understand	✓				
Total Score					**49**		
Percentage		**((Σx/Σi × 100 %)**			**98 %**		
		Media Expert Validation					
1	Facilities	a. Easy access menu	✓				
		b. Easy of entering data		✓			
		c. Easy of editing data	✓				
		d. Easy of operation	✓				
2	Presentation	a. Compatibility of writing	✓				
		b. Color and typeface matching	✓				
		c. Image suitability		✓			
		d. Menu arrangement accuracy	✓				
		e. Between menus linkage	✓				
		f. Function suitability Icon		✓			
		g. Clarity of the flow of learning media usage	✓				
		h. Complete menu	✓				
Total Score					**57**		
Percentage		**((Σx/Σi ×100%)**			**95 %**		

b. Implementation of product distribution

The product Development of personalized digital learning is carried out online for high school (SMA) students.

c. Comparison of the results of previous studies (2)

According to Putri (2019), the implementation of the gamification method resulted in an increase in reading ability at the beginner level for children. Gamification can enhance student learning motivation by making the learning process more interactive. In addition, the application of gamification has an effect on students' interest in learning. This is demonstrated by students' eagerness to participate in the learning process.

Those results are in accordance with our research objectives to reduce learning loss and create a pleasant learning atmosphere. This is also supported by references that gamification presents game-based material and

uses technology. For that reason, this approach is appropriate to use in distance learning to improve learning outcomes, familiarize students with using technology in a positive way, and avoid the boredom felt by students when the learning process takes place.

CONCLUSIONS AND RECOMMENDATIONS

Our research aims to disseminate the topic addressed in this article not only among secondary school students, but also among vocational students.

NOTES

[(a)] https://www.unicef.org/eap/media/9326/file/Sit%20An%20-%20Indonesia%20case%20study.pdf

REFERENCES

1. Andriani W, Subandowo M, Karyono H, Gunawan W. Learning Loss in Online Learning in the Corona Pandemic Period. Semin. Nas. technol. Learning. 2021;1(1):1.

2. Cahyani A, Listiana ID, Larasati SPD. Learning Motivation of High School Students in Online Learning during the Covid-19 Pandemic. IQ of Al-Quran Science J Educator Islam. 2020;3(1):57. https://doi.org/10.37542/iq.v3i01.57.

3. Pratiwi W D. Dynamics of Learning Loss: Teachers and Parents. Jurnal Edukasi Nonformal. 2021;2(1):147-153.

4. Nu'man AZ. Effectiveness of application of the edmodo e-learning model in learning islamic religious education on student learning outcomes (Case Study: SMK Muhammadiyah 1 Sukoharjo). DutaCom. 2014;7(1):1.

5. Nadziroh F. The Analisa Efektifitas Sistem Pembelajaran Berbasis E-Learning. Journal of Computer Science and Visual Communication Design 2017;2:1–14..

6. Sagita M, Nisa K. Utilization of e-learning for educators in the digital 4.0 era. J Sos Hum Sigli. 2019;2(2):2. https://doi.org/10.47647/jsh.v2i2.169.

7. Adi NNS, Oka DN, Wati NMS. Positive and Negative Impacts of Distance Learning during the COVID-19 Pandemic. J Imiah Educator And Learning. 2021;5(1):1. https://doi.org/0.23887/jipp.v5i1.32803.

8. Nafrin IA, Hudaidah H. The Development of Indonesian Education in the Time of the Covid-19 Pandemic. Educative J Ilmu Pendidik. 2021;3(2):2. http://doi.org/10.31004/edukatif.v3i2.324.

9. Fauziyaturrosyidah A. Gamification method as a solution to learning loss phenomenon in online learning during the COVID-19 pandemic: A Literature Review. COLLAGE Creat Learn Studs element Educ. 2021;4(5):5.

10. Wrigley C, Mosely G, Tomitsch M. Design Thinking Education: A Comparison of Massive Open Online Courses. She Ji J Des Econ Innov. 2018;4(3):275-292. https://doi.org/10.1016/j.sheji.2018.06.002.

11. Edelman JA, Owoyele B, Santuber J, Talbot AV. Designing as Performance: Bridging the Gap Between Research and Practice in Design Thinking Education. In: Meinel C, Leifer L, eds. Design Thinking Research. Cham: Springer International Publishing; 2021:75-101. https://doi.org/10.1007/978-3-030-62037-0_3.

12. Linton G, Klinton M. University entrepreneurship education: a design thinking approach to learning. J Innov Entrep. 2019;8(1):3. https://doi.org/10.1186/s13731-018-0098-z.

13. Marantz Cohen R, Mule L. Collaborative Pedagogy in a Design Thinking Education Course. InSight J Sch Teach. 2019 Aug;14:29-42. https://doi.org/10.46504/14201902ma.

14. Novak E, Mulvey BK. Enhancing design thinking in instructional technology students. J Comput Assist Learn. 2021 Feb;37(1):80-90. https://doi.org/10.1111/jcal.12470.

15. Mosely G, Wright N, Wrigley C. Facilitating design thinking: A comparison of design expertise. Think Skiing Creat. 2018 Mar;27:177-189. https://doi.org/10.1016/j.tsc.2018.02.004.

CONFLICTS OF INTEREST

None.

FINANCING

None.

AUTHORSHIP CONTRIBUTION

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