Web-Based Triage Game Application Development as a Disaster Triage Learning Tool During The COVID-19 Pandemic for Nursing Students

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Abstract

Introduction: The current COVID-19 pandemic has an impact on every aspect of people's lives, including education. Restrictions on outside activities cause the current learning process to be carried out at home using online methods. This method is also applied in nursing colleges, especially in disaster nursing courses. In order for the learning process to be well-absorbed by students, creative and effective learning tools are needed in the form of a web-based triage game application. The purpose of this study was to develop a Web-Based Triage Game application, to determine the effectiveness of its use as a learning tool and to determine student assessment of the application as learning media.

Methods: this study uses the research and development method that applies the ADDIE model. This web-based triage game application was developed using PHP (personal home page tools). Evaluation of the effectiveness of the application in the form of student learning outcomes was tested on 139 undergraduate nursing students who were divided into the treatment group and the control group. The student learning outcomes data were then analyzed using the IBM SPSS 22 using the Wilcoxon test**.**

Results of the research on web-based triage game applications developed well, the application proved effective (N Gain Score >75%) in improving student learning outcomes and more than 50% of students stated that triage game applications were creative and innovative and could increase learning motivation.

Conclusion: _Web-Based Triage Game Application has proven to be effective as an emergency nursing learning tool during a pandemic to increase student comprehension of disaster triage learning materials

Keywords: Student, nursing; COVID-19; Triage; Disaster; Games.

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INTRODUCTION

Indonesia is currently being hit by a global pandemic, namely the COVID-19 virus which has been declared by the World Health Organization (WHO) as a public health emergency that is troubling the world (Gusty et al., 2020). This has a major impact on aspects of people's lives, including the world of education. The program of the Minister of Education in responding to this has provided guidelines in the implementation of education, especially in universities during the pandemic, namely "Freedom to Learn: Independent Campus," that provides flexible learning opportunities and with online learning models (Gusty et al., 2020). The key to the effectiveness of successful online learning is that a teacher must be creative to present online learning that is fun and easy to understand by students (*Gusty et al.,* 2020).

The development of learning content that is in accordance with learning objectives is a very important thing to do, especially by the teacher, so that what is conveyed can be well-received by students (Praherdhiono et al., 2020). Since the pandemic period, health education institutions, especially nursing majors, have also used online learning in teaching and learning activities. Some of the existing nursing courses have a practicum load to increase students' understanding of the material presented. However, the current situation does not allow face-to-face meetings, so teachers need to provide learning media that can reach the third cognitive domain, namely Application. The Application Domain based on Bloom's taxonomy is to use procedures to carry out exercises or problem solving, one of which is applying a procedure to a recognized task (Anderson and Bloom, 2001).

Disaster Triage is one of the core materials of nursing courses for undergraduate nursing and nurses who use case studies in their learning method, namely reviewing cases by observing case conditions and using existing algorithms to solve problems (AIPNI, 2015). The process of providing disaster triage materials is carried out online in the form of Asynchronous Learning in the form of asynchronous (collaborative), which is the absence of face-to-face online with the teacher so that students carry out learning independently with the material provided (Sudarsana et al., 2020). Providing interesting and easy to understand learning methods is very important to prepare. To increase students' interest and attention to disaster triage material, it is necessary to develop learning media that combines interesting educational simulation application concepts with disaster triage material content. Based on this, the researchers conducted research in the form of developing a web-based triage game application as a learning tool for disaster triage learning materials for undergraduate nursing students. The purpose of this research is to develop a web-based triage game application as a disaster triage learning medium and to assess the effectiveness of the application as a learning tool in improving student learning outcomes about disaster triage learning materials.

METHOD

Quantitative research design with research and development methods (Research & Development) uses the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) which aims to develop a product, in this case is a web-based triage game application as a learning tool. The population in this study was undergraduate nursing students totaling 600 students. The sampling technique used purposive sampling with two inclusion criteria consisting of nursing students who had received emergency nursing materials and nursing students who were currently undergoing lectures with disaster nursing course materials. Based on this, the sample that met the inclusion criteria in this study was 139 people who were divided into two groups consisting of a treatment group and

a control group. The instrument in this study was a questionnaire (Likert scale) which was made in the form of a Google Form which was used to determine student assessments of the triage game application and which included aspects of software engineering, aspects of learning design and aspects of visual communication. Test questions were used to assess student learning outcomes who have used web-based triage game application learning media.

The research procedure includes the development of a web-based triage game application. After that, a trial was conducted on undergraduate nursing students. The student group was divided into two treatment groups, namely those who received learning methods using the triage game application and a control group who received conventional learning methods (lectures and discussions). The results of the trial are in the form of student learning outcomes from the two groups, namely the treatment group and the control group.

The data obtained were analyzed by using SPSS IBM 22 by using the Wilcoxon test. The N Gain score test was also carried out to see the effectiveness of the triage game learning media in the treatment group. The ethics of research conducted by researchers include the control group, which in this case is not given a triage game application learning media during research, and the next day is given the opportunity to use the application. Confidentiality of student identity is maintained when assessing game applications and does not affect the final results of their studies. This study has also passed the ethical clearance test with a serial number LB.01.01/7.1/005624/2021.

RESULT

This research was conducted at the Muhammadiyah University of East Kalimantan from June to September 2020. The research subjects were all 7th semester Nursing S1 students totaling 139 students who were divided into three major classes, namely class A (46 people), class B (44 people) and class C (49 people). The sample was divided into three groups, namely treatment group 1 (P1), treatment 2 (P2) and one control group. Determination of the class that will be the treatment and control groups is by using a random table to get P1 (class B), P2 (Class A) and K (class C).

Analysis Stage

In this analysis stage, a needs analysis is carried out related to the problems and characteristics of student learning during the COVID-19 pandemic. The learning media used during the pandemic are modules that are uploaded to the Learning Management System (LMS) owned by the university and also learning through online meeting media, like Zoom/Google Meet, etc. From the questionnaires distributed to students about suggestions and input for online learning, various answers were obtained. Most of them want more creative learning media such as educational games so that they can increase their motivation to learn and understand the existing lecture materials. Some students also said that online media meetings were felt to require more use of internet quota and a strong network.

Design stage (design)

The stages of media design include making flowcharts, making overall media designs (storyboard), preparing guidelines, preparing questions, collecting and making backgrounds, images and buttons.

Flowcharts

The flowchart consists of certain symbols that explain the steps of the triage game application development procedure.

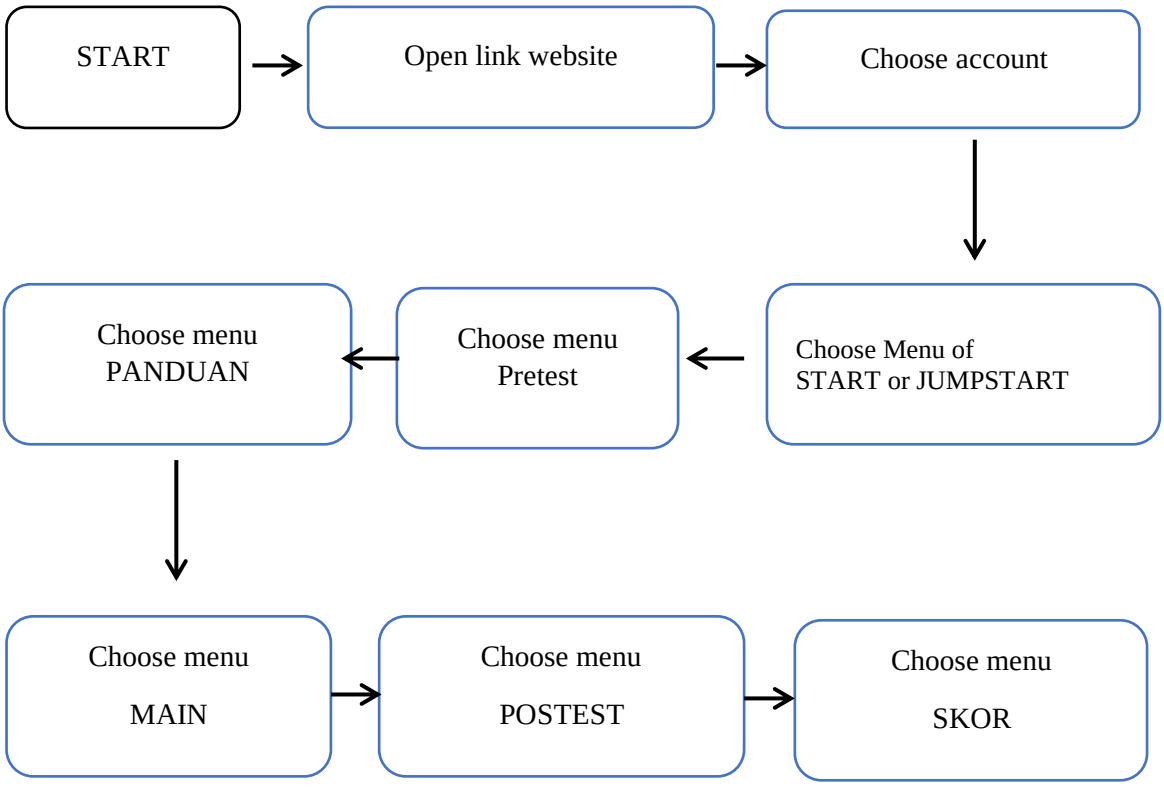


Figure 1. Flowchart of game triage application procedure

Making media design (storyboard)

Serves as a guide in the creation of media. The storyboard is as follows figure 2.

Preparation of guides and questions

A guide in completing the game is made based on disaster triage reference material sources. The guide is divided into two, namely a guide for START material and JumpSTART material. Made in the form of a 5-8 minute ppt video in the form of an explanation of the steps for implementing the START and JumpSTART algorithms (figure 3).

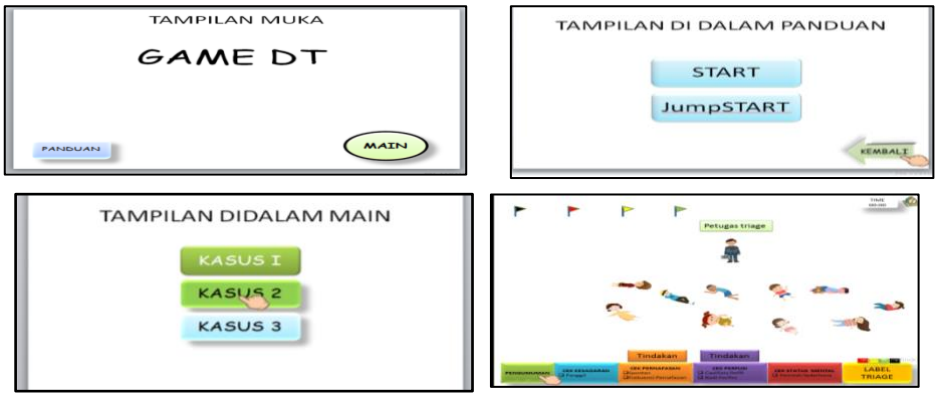


Figure 2. The Storyboard of The Triage Game Application

Development

The triage game developed is a web-based application, namely PHP (personal home page tools) hypertext pre-processor. The stages of making it involve four activities, namely loading the interface consisting of the initial page display, the main display of the results display, the next stage is coding, which is the process of translating the application design into a programming language, the next stage is the testing stage, which is tested using the process debugging, and the final stage is deploying, namely transferring files for the implementation process (figure 3).

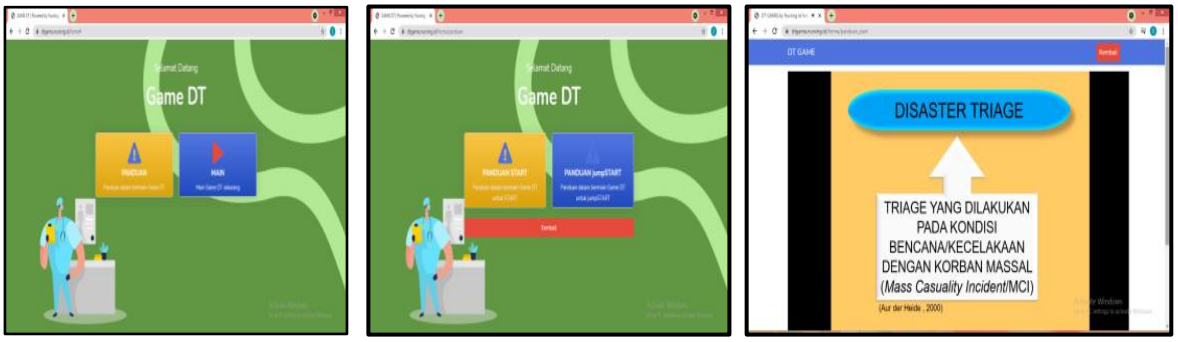


Figure 3. The Initial Appearance of The Game

Implementation

The application was tested on 90 undergraduate nursing students who were taking the seventh semester at the Faculty of Nursing, Muhammadiyah University, East Kalimantan. Students entered the triage game application link. To assess its effectiveness, an initial assessment (pretest) was carried out for all students who were tested. The pretest is already in the game so that students can fill it out directly. The next step is to enter the general triage guide display, namely the disaster triage assessment steps which are the basis for the developed triage game. After that, the students were directed to start playing the triage game. After finishing playing, all students will be directed to fill out the final assessment (posttest) which is also included in the triage game (Table 4).



Figure 4. The Main View (Play Stage) of The Triage Game Application

Evaluation of Student Learning Outcomes

Each treatment group (P1, P2) carried out a disaster triage learning method using DT game learning media (game triage) while the control group carried out conventional methods (PPT media with lecture teaching methods) via online. Initial assessment

(pretest) was performed on all groups (P1,P2, K) for the two algorithms, START and JUMSTART. Based on the results of the normality test of the data which states that they are not normally distributed, the data will be tested with the non-parametric test. The first parametric test is to do the Wilcoxon test on each sample (P1,P1,K) to find out whether there is a difference between the pretest and posttest scores in the group given the treatment. Based on table 1, it was found that in groups P1, P2 and K on START, there were differences in the results of the pretest and posttest in each with a Sig value of 0.000 (α < 0.005).

Table 1: Wilcoxon's test (START)

Data	N	Mean	Std. Deviation	Minimum	Maximum	Sig
Pretest P1 START	44	59.09	15.88	42.86	85.71	0.00
Posttest P1 START	44	58.69	16.00	28.57	85.71	
Prettest P2 START	46	49.27	15.45	14.29	71.43	0.00
Posttest P2 START	46	93.83	13.91	42.86	100.00	
Pretest K START	49	93.16	11.56	57.14	100.00	0.00
Posttest K START	49	86.29	13.35	57.14	100.00	

Based on the data from Table 2, it was found that in groups P1, P2 and K, there were differences in the results of the pretest and posttest in each with a Sig value of 0.000 (α < 0.005). Furthermore, the Mann Whitney test was carried out to see the difference in the posttest results between the Treatment group (P1&P2) and the Control group (K) on each START and JumpSTART.

Table 2 Wilcoxon test (JumpSTART)

Data	**N**	**Mean**	**Std. Deviation**	**Minimum**	**Maximum**	**sig**
Pretest P1 JUMPSTART	44	59.09	15.89	42.86	85.71	0.00
Posttest P1 JUMP START	44	58.69	16.00	28.57	85.71	
Prettest P2 JUMPSTART	46	49.27	15.45	14.29	71.43	0.00
Posttest P2 JUMPSTART	46	93.83	13.91	42.86	100.00	
Pretest K JUMPSTART	49	93.17	11.56	57.14	100.00	0.00
Posttest K JUMPSTART	49	86.29	13.35	57.14	100.00	

Based on the data in Table 3, it was found that there were differences in the results of the pretest and posttest between the treatment group (P1 & P2) and the control group (K) with a value of < 0.05.

Table 3 *Mann Whitney* test

Data	**Treatment Group (P1&P2) = 90**		**Control Group (K)=49**		**Sig**
	Mean	STD	Mean	STD	
Pretest START	77.34	16.32	56.52	16.32	0.00
Posttest START	78.29	13.33	54.77	13.33	0.00
Pretest JumpSTART	75.13	10.73	60.57	10.73	0.03
Posttest JumpSTART	78.45	8.93	54.48	8.93	0.00

If there is a difference in pretest and posttest scores between the treatment and control groups, the N Gain score test is carried out to see the effectiveness of the triage game learning media; It was found that the N Gain score of the treatment group was higher than the control group, namely for START is 89.12 and JumpSTART is 82. 98. Based on the N Gain table, the value was > 75% so that the triage game learning media was included in the effective category in improving learning outcomes of students for disaster triage material.

Table 4 N Gain's Test

Data		Mean N Gain (%)	Minimum	Maximum
START	P1 & P2	89.12	33.34	100.00
	K	76.39	33.34	100.00
JUMPSTART	P1 & P2	82.98	33.33	100.00
	K	74.25	33.33	100.00

After conducting research activities, namely taking posttest data to the treatment group, then the 90 students filled out a questionnaire about student assessments of the triage game application. The questions cover three aspects, namely software engineering, learning design aspects and visual communication aspects. Based on Table 1.6, namely in the aspect of software engineering, it was found that > 50% of students agreed that this game had clear and easy operating instructions in the installation process. There were 60% of students who stated that the device does not hang when playing this game but 23% of students did not agree with this. In the aspect of learning design, 65.6% of students stated that the questions in the game were in accordance with the material, and 71% of students stated that this game could motivate them to learn. The next aspect is the visual communication aspect; data obtained from 58.9% of students stated that the display in this game is attractive, creative and innovative.

DISCUSSION

The development of web-based applications in the world of education has been widely carried out, as well as in the world of health. The advantages of developing web-based applications include easy development, easier server settings, much cheaper and more powerful and a more flexible interface compared to Android-based applications. The programming language used is PHP because it is easier to understand and there are many supporting web servers with relatively easier configurations (TIM EMS, 2016) The development of this website-based educational game application also allows everyone to access it wherever they are during the connection and an internet exists (Permana, 2017)

The use of applications as learning media is widely developed by educators in elementary schools and universities. This is an effort to present the material in a form that is easy to understand and fun for students. In nursing, many similar applications have been developed which have goals based on the competency achievements of each subject. With the application of learning media, it can improve understanding and also student learning outcomes. This was also expressed by Efroliza and Sukron (2020) who also developed applications as a nursing learning media and found that there was an influence on students' understanding of learning materials. Application development in the form of triage games aims to make the material received more enjoyable for students so that it will be easy to understand. This statement is also supported by Wijaya (2021) who also

developed learning media, namely game applications, stating that applications in the form of games can make students unencumbered in learning. The use of this game application is also very useful during a pandemic like today. This application is also equipped with an evaluation menu that can directly assess student learning outcomes and make it easier for educators to recapitulate the results. This statement is supported by Purba (2021) who used online evaluation applications such as Quizizz and who states that this form of evaluation is felt to be more effective and efficient in assessing student learning outcomes.

Based on the data from the questionnaire, most of the students stated that this application was easy to access. This is because web-based applications have the advantage that they do not need to be installed on computer hardware and are easily accessible as long as the browser is compatible (Suryainata, 2019). Some students (23%) stated that in their use they experienced that system stopped when playing the game. The cause of this may be internet network problems, because website-based applications rely heavily on an internet connection. If there is a problem with the connection, the application will also stop (Suryainata, 2019). From the results of the questionnaire related to the learning design aspect, students stated that this game application fosters learning motivation (64%). This is supported by Manurung (2020) that the development of interactive multimedia, including applications, is aimed at increasing learning motivation and also increasing the speed in understanding the information conveyed.

CONCLUSION

The web-based triage game application is effective as a creative and innovative learning tool in disaster nursing learning during the COVID-19 pandemic, especially for disaster triage learning materials. This application can also improve student learning outcomes in understanding disaster triage material compared to conventional learning methods that have been used previously.

ACKNOWLEDGMENT

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CONFLICT OF INTEREST

This research is purely for academic work and is worthy of public reading. There was no conflict of interest whatsoever in this study.

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