



Gamification: Learning Outcomes with Game Elements

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Abstract. The games that have existed since the dawn of mankind have been proven to have a significant effect on the development of students. A teaching resource that makes learning more permanent and retainable is educational games that are used as part of the academic process. Educational games are a fun way for students to learn. Games are used in non-game settings to motivate and engage participants through gamification. The method has been identified by researchers as a promising method to improve students' engagement, which may result in increased academic achievement. During this study, gamified learning activities are assessed for their effectiveness and engagement appeal in Tata Boga 2 courses. The study also examined which gamified learning activities students found most appealing. This study employed a sequential explanatory mixed-methods approach. The data collected and analyzed included logs, questionnaires, and pre-and post-tests. A moderate improvement in student engagement in gamified learning activities and learning outcomes was found as a result of the evaluation. A gamified learning activity targeted at Tata Boga 2 courses was evaluated for its effectiveness and engagement appeal in this study. The 21st century generation prefers learning that combines traditional models with learning through gamification and the use of technology and internet devices. As a result of the Final Test, it is evident that the control group or Control Group achieved the lowest or minimum score of 50, with an overall average score of 68.39. In contrast, the lowest score or minimum score in the experimental group or the Experiment Group, the lowest score or minimum score was 70, with an overall average score of 78.73.

Keywords: Gamification · learning outcomes · Tata Boga 2 Courses

1 Introduction

Digital technology has developed, the world of education has begun to use digital technology in teaching and learning. The 21st century is an era where the development of science and technology occurs very rapidly in various countries, not only developments in the field of science and technology but also in global competition that spreads to various fields such as economics, social, politics and education is no exception Digital learning is no longer foreign, but its use in education is increasing and expanding [1] especially at

the tertiary level [2]. This shows how important digital learning is in helping the teaching and learning process. UNESCO has It is recommended that the quality of learning can improve from time to time in line with current technological developments. There are various digital learning terms such as internet-based training, web-based training, online learning, networking learning and distance learning [3, 4], Digital learning is any educational activity that uses technology to enhance student understanding [5] refer to digital learning as the utilization of knowledge and communication technology through open and distance learning. Digitization should not be considered as e-learning because online teaching and learning is just a digital shift towards a higher level education [6]. In general, digital learning is a teaching and learning process that uses.

Technological media such as video, e-learning, web-based, augmented reality, and virtual reality and gamification. It helps improve students' understanding and more affordable, engaging and appropriate to their needs and learning styles. Digital learning is a platform for the teaching and learning process in accordance with the suitability of time and place while improving students' abilities learning quality [3, 7]. Apart from the impact of technological developments, digital learning has helped teachers in schools and lecturers in tertiary institutions to convey learning more effective. Digital learning is very important in education.

The digital learning process involves complex and multiple processes. The author describes it as a process of conceptualization involving techniques and incoming information combined with experience [8]. There is no doubt that individual motivation for learning plays a significant role in the process of knowledge construction [1, 9]. Motivation and involvement of students in the learning process are essential components of education. Motivating students to engage in academic activities, both inside and outside the classroom, is one of the most important factors determining their ability to achieve academic success. Students who are motivated work faster and invest more effort and time than those who are not motivated.

The vast majority of lecturers, especially at universities, are aware that not everything depends on the teacher's attitude, no matter how much effort they put into good teaching and knowledge transfer. Motivating students is one of the most serious problems in teaching. Positive emotions have been linked to a student's motivation to learn in a number of studies [10]. Additionally, emotions have been identified as one of the most important components of student motivation [8, 11] Happiness and vitality have been found to be correlated with intrinsic and extrinsic motivation [12].

The widespread use of digital technology, particularly video games, The Internet, and social media, and their ability to attract attention and create dependency make their presence a significant part of our everyday lives. I find this to be a very positive advantage due to its ability to provide access to a variety of types of information as well as the ability to interact with a large number of people in a way that is not possible otherwise.

Beyond the apparent dependence that these technologies and social media have created, to the great so far superficial and synthetic, is the subjective acceleration of the passage of time and need to receive immediate gratification. Today's students may have difficulty connecting with class rhythm as a result of these factors. In addition to dynamic educational adjustments, adjustment of the learning objectives of Tata Catering

2 Courses with the new demands of the job market is also needed, in particular more interesting techniques.

There is a considerable educational benefit to be gained from the use of games under these boundary conditions. Numerous studies have shown that game-based elements and teaching methods can be effectively translated to encourage the acquisition of complex concepts. This concept exists in multiple parts of the Catering 2 course [13]. The organization also provides implementation and feedback, information on progress, and rewards to encourage progress [14]. The application of game-based elements in non-entertainment contexts is called gamification [8, 15]. As a consequence, gamification is the process of integrating game elements (points, prizes, prizes, etc.) into non-recreational or entertainment-oriented activities, such as in the case of this paper, universities education, in order to achieve Catering 2 Course's proposed objectives.

Gamification in university education has been extensively studied, in particular with regard to Augmented Reality computer applications within game menus [14,18], the results of which have been consistently positive [14]. Researched the effect of the use of Augmented Reality in game menus on motivation and interest in learning by analyzing a survey. The work presented here was completed with "English for Media" students, and includes both theoretical and practical aspects. The results they obtained illustrate their effectiveness in encouraging and reinforcing learning on both dimensions [15]. Analyzes how Augmented Reality-based gamification activities implemented in the game menu of the second-year mandatory subject, Cateboarding 2 Courses, affect student motivation and learning.

Their findings suggest that this teaching technique improves students' understanding of certain concepts, increases their active participation in class, and motivates them to learn. A study based on the opinions of students from a variety of educational backgrounds [16], studied the effectiveness of gamified teaching methods with game in higher education. In this case, students expressed positive opinions about the use of these teaching techniques to help increase student motivation, especially when applied to self-study and self-evaluation. However, it was not considered that gamification methodologies would be more effective than other traditional approaches [17]. They found improvement in the teaching-learning process of students who use the tool, compared to the control group that does not use it. Academic results show improvement with improvement in the frequency of using Augmented Reality-based gamification in-game menus [18] aims to analyze the effect of gamification on Tata Catering 2 Courses with Augmented Reality in the game menu on the student learning process and emotions. According to the results obtained, this teaching method results in happier, more motivated, and more focused students in Catering 2 Courses.

Gamification design is done by making the front view, games, matching games and snakes and ladders games. The results of the media design are presented in Figs. 1, 2, 3 and 4.



Fig. 1. Opening Gamification



Fig. 2. Game



Fig. 3. The Game menu is matching

2 Methodology

Types of Research

Research conducted using experimental methods refers to the analysis of how one treatment affects another under controlled circumstances [16]. Research of this type is a quasi-experimental study with only posttest control. Experimental groups and control groups are not selected randomly in this design. Additionally, the results of the study were compared between the experimental and control groups [17] (Fig. 5).

Place and Time of Research

This research will be carried out in the Hospitality Management study program, Faculty of tourism and hospitality, with the research subject being students of the two-session



Fig. 4. The Game menu is snakes and ladders



Fig. 5. About Gamification

Catering course 2021111350105–2021111350110. And this research was conducted in January–June 2022. The complete details regarding the population can be seen in Table 1.

Samples

Data from two sample classes, one as an experimental sample and one as a control class, were used in this study. The sample selection was carried out using a non-probability technique with purposive sampling.

This design there are two groups. The group that was given the treatment (X) was called the experimental group (experiment group) and the group that was not given the treatment was called the control group (control group). The effect of the treatment (X) is (O1:O2). Data from the mid and final tests will be used as comparative data to determine the effectiveness of the gamification applied (Fig. 6).

All students taking the culinary course in the third semester of the 2021/2022 Academic Year consist of 6 groups where the number of students per class has been determined randomly. The following is in Table 1 details of the study population of 91 students.

Experiment Group	X (treatment)	O ₁
Control Group		O ₂

Fig. 6. Posttest Only Control Design**Table 1.** Population Table

Class	Total Student
2021111350105	15
2021111350106	16
2021111350107	14
2021111350108	15
2021111350109	16
2021111350110	15
Total	91

Calculate how many ideal samples are needed, the Slovin formula or the Slovin formula [17] is used, namely:

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

Note:

n = Total samples

N = population

e = error or tolerance error rate

The minimum sample size with a margin of error of 5% or a level of confidence of 95% is as follows:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{91}{1 + 91 \times 0,05^2} = \frac{91}{1 + 91 \times 0,0025}$$

$$n = \frac{91}{1 + 91 \times 0,05^2} = \frac{91}{1,2275}$$

$$n = \frac{91}{1,2275} = 74,13 = 74(\text{dibulatkan})$$

This study, it can be seen that the minimum number of samples needed is 74, but in order to facilitate research when implementing a true experimental design (posttest only control design), namely when grouping students into control groups and experimental groups, all research populations in Table 1 are used as samples in research (total sampling) namely 91 students who will be determined randomly.

Table 2. Control & Experiment Group

Group	Class	Total Student
Experiment (45)	2021111350105	15
	2021111350108	15
	2021111350110	15
Control (46)	2021111350106	16
	2021111350107	14
	2021111350109	16
	Total	91

This design there are two groups. The group that was given the treatment (X) was called the experimental group (experiment group) and the group that was not given the treatment was called the control group (control group). The effect of the treatment (X) is (O1:O2). Mid and final test result data will be used as comparative data to determine the effectiveness of the applied Blended Learning model and learning media.

The treatment (X) given is gamification. As shown in Table 2, the research sample consisted of two groups, an experimental group made up of three classes (45 students) and a control group made up of three classes (46 students).

3 Results and Discussion

The analysis stage, an analysis of needs, students, curriculum, and preparation of lesson plans and lecture materials is carried out. All students who were sampled in this study used smartphones, and had access to university wifi for free, and the lab class was connected to the internet, seeing the conditions of course it also supports the application of gamification learning. The two-course culinary learning material consists of 16 meetings (Table 3).

To find out the effectiveness of gamification with online learning classes using games using mid test and final test questions in the Experiment Group, for the Control Group a mid test and final test were also carried out without treatment (X).

The following are the results of the mid test values from the Control Group and Experiment Group.

Based on the results of the Mid Test in Table 4, it can be seen that the control group or Control Group obtained the lowest score or minimum score of 50, with an overall average score of 65.20. While in the experimental group or the Experiment Group, the lowest score or minimum score was 65, with an overall average score of 79.50 as can be seen in Table 5.

The following are the results of the final test scores from the Control Group and Experiment Group.

Table 3. Meeting and Topic

Meeting	Topic
Meeting 1	Introduction to lectures Continental Food Processing Concept
Meeting 2	Foodstuffs and Equipment
Meeting 3	Dish Turns and Dish Serving
Meeting 4	<i>Cutting Method, and Cooking Method</i>
Meeting 5	Classification of Stock and Soup
Meeting 6	Classification of <i>Sauce and Salad</i>
Meeting 7	Describe Entree
Meeting n 8	Mid Test
Meeting 9	Describe <i>Main Course</i>
Meeting 10	Processing and serving Stock
Meeting 11	Processing and serving Soup
Meeting 12	Processing and serving Sauce
Meeting 13	Processing and serving <i>Salad</i>
Meeting 14	Processing and serving <i>Entree</i>
Meeting 15	Processing and serving <i>Main Course</i>
Meeting 16	Final Test

Table 4. Result *Mid Test Control Group*

Class	N	Max	Min	Avg.
2021111350106	16	75	50	65.20
2021111350107	14	80	50	
2021111350109	16	80	50	

Table 5. Result *Mid Test Experiment Group*

Kelas	N	Max	Min	Avg.
2021111350105	15	85	70	79,50
2021111350108	15	90	75	
2021111350110	15	90	65	

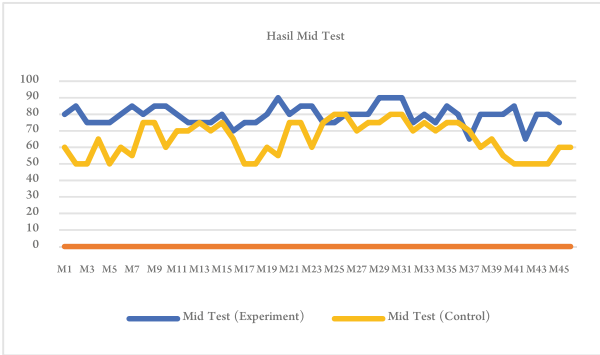


Fig. 7. Results Graph Mid Test Experiment & Control Group

Table 6. Result *Final Test Control Group*

Kelas	N	Max	Min	Avg.
2021111350106	16	75	50	68,39
2021111350107	14	80	60	
2021111350109	16	80	65	

Table 7. Result *Final Test Experiment Group*

Kelas	N	Max	Min	Avg.
2021111350105	15	85	70	78,73
2021111350108	15	85	70	
2021111350110	15	85	75	

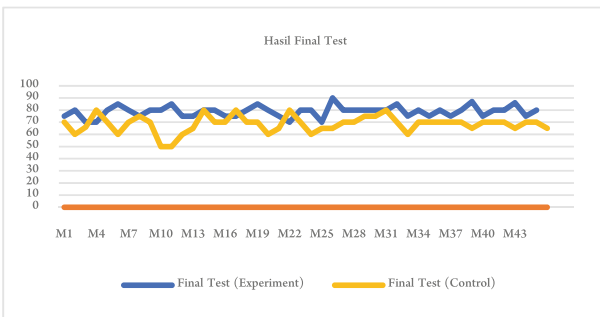


Fig. 8. Graph of Final Test Experiment and Control Group Results

Based on the results of the Final Test in Table 6, it can be seen that the control group or Control Group obtained the lowest score or minimum score of 50, with an overall average score of 68.39. While in the experimental group or the Experiment Group, the lowest score or minimum score was 70, with an overall average score of 78.73 as can be seen in Table 7.

Based on the graphs in Figs. 7 and 8, it is clear that the results of the mid-test and final test in the Experiment Group, which used Gamification in Catering 2 lessons, were better than those in the Control Group.

4 Conclusion

The games that have existed since the dawn of mankind have been proven to have a significant effect on the development of students. A teaching resource that makes learning more permanent and retainable is educational games that are used as part of the academic process. Educational games are a fun way for students to learn. In the context of gamification, game design elements are used in non-game settings to engage participants and improve desired behavior. A study has identified this technique as a promising method of improving student engagement, which could have a positive impact on their learning experience. Tata Boga 2 Courses have been evaluated for their learning effectiveness and engagement appeal through the use of gamified learning activities.

Learning that combines conventional models with learning through gamification with the use of technology and internet devices makes students as the 21st century generation prefer flexible learning. As a result of the Final Test, it is evident that the control group or Control Group achieved the lowest or minimum score of 50, with an overall average score of 68.39. In contrast, the lowest score or minimum score in the experimental group or the Experiment Group, the lowest score or minimum score was 70, with an overall average score of 78.73.

Acknowledgments. The authors wish to thank to Faculty of Tourism and Hospitality - Universitas Negeri Padang, Indonesia.

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