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Differences in Learning Motivation among Bartle's Player Types and Measures for the Delivery of Sustainable Gameful Experiences

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Abstract: Gamification is one of the methods used for delivering gameful experiences to Generation Z learners. The player-type theory must be reflected to effectively design gamification. This study aims to analyze the differences in learning motivation among different player types and to propose methods that can deliver effective gameful experiences. The study was conducted on 91 university students who were instructed to attend a class that utilized gamification. Based on the results, there were no statistical differences in the motivation among the different player types. Accordingly, constructing environments that can establish gameful experiences, rules, and strategies preferred by each type of player is proposed as an important factor in gamification design.

Keywords: experience; gameful experience; gamification; metaverse; human–computer interface

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1. Introduction

COVID-19 has changed our daily lives. Most traditionally offline activities have been converted into online alternatives, particularly in the field of education, where offline classrooms have been transformed into online learning environments. Online classes are now held through online video teleconferencing programs, such as ZOOM or Google Meet. As the shift toward online education becomes increasingly prevalent, the need for research on learner characteristics has been suggested. Individuals born after the mid-1990s are called "Generation Z" because they exhibit characteristics that are different from existing learner characteristics. According to Turner [1], Generation Z learners became familiar with information and communications technology (ICT) at an early age and are highly capable of using multimedia, such as YouTube or Vimeo. Generation Z learners are also known to be accustomed to using social network services to obtain information and communicate with others. Thus, they do not prefer face-to-face communication, unlike other generations [1]. The metaverse has taken a step further by enabling simple online communication to evolve into online interactions where emotions and culture are shared. Generation Z individuals interact among themselves within the metaverse, and a new world is created through the expansion of the knowledge frame based on the information they exchange [2].

Hence, educators have begun to research different methods for effectively conveying educational value to learners using materials suitable for Generation Z in an online environment. Castro and Tumibay [3] analyzed 50 studies related to the effectiveness of online educational programs based on the analysis, design, development, implementation, and evaluation model: an instructional design methodology. According to the research results, online learning environments should enhance the accessibility and flexibility of learners, prolong the convenience of the learning environment, and support learners so that they can receive sustainable education.

As such, gamification is gaining attention as a way to assist Generation Z learners in receiving sustainable education. Gamification refers to the application of game mechanics;

elements that make up a game, such as point badges, leaderboards, and virtual goods; and even non-game contexts, such as business management, education, and healthcare [3]. Gamification is particularly popular in the field of online education because it has the potential to improve learners' motivation and immersion in learning by delivering gameful experiences to learners [4]. As in an actual game, learners are rewarded for their learning activities, and this process can encourage learners to be fully engaged in the activities on their own [5,6].

However, many factors need to be considered to effectively design gamification, among which is the player type. Each player type prefers a different gameful element [7], and these elements convey different experiences to each player [8]. Furthermore, gameful experiences affect learners' academic motivation [9]. Therefore, the online educational environment should be configured so that gameful experiences can be efficiently delivered. This objective can be achieved by positioning gameful elements to satisfy every player type and positively influence the academic motivation of learners.

This study aims to identify the relationship between player type and academic motivation. By deriving meaningful factors applied to the relationship between the two factors, gameful experiences can be effectively delivered to Generation Z learners in an online learning environment. To achieve the research objective, differences in academic motivations among different player types should be deduced. If such a difference exists, then each player type would have clear preferences for their favorite gameful elements. By contrast, if no such difference exists, then the gameful experiences delivered to the player by the gameful elements would not correlate with specific player types, and new measures to appropriately deliver gameful experiences to learners in an online environment would need to be considered. Accordingly, in this study, experimental groups were established, and the player type and academic motivation were measured using surveys that were previously verified. The player types covered in this study are the four types presented in Bartle's taxonomy of player types commonly used in gamification [10]. This study sets up research questions to conduct systematic research and aims to provide the necessary grounds for researchers who study game experience and learn while looking for their answers.

Research Question 1: Are there any differences in learning motivation among Bartle's player types?

Research Question 2: If there are differences among player types, what gamification design strategy should be applied to deliver a sustainable game experience based on the results derived?

Research Question 3: If there are no learning motivation differences among player types, what is the reason for this, and what strategies should be applied to deliver a sustainable game experience?

2. Materials and Methods

2.1. Bartle's Taxonomy of Player Types

Bartle [10] derived four player types by analyzing the characteristics of game players who play multi-user dungeons (MUD), during which two criteria were suggested. The first criterion is the factor in the game in which the player is interested—whether they are interested in the virtual environment or other players in the game. The second criterion is the mode of activity that the player takes in the game—whether they prefer to play alone or interact with other players. The results of the analysis led to the establishment of four player types:

- Achievers: They are highly interested in the virtual environment within the game and prefer to play the game alone. When they set a goal within the game, they invest time and effort to achieve such objectives. They also enjoy improving their in-game capabilities;
- Explorers: They prefer the virtual environment over other players within the game, but are interested in interacting with other players. They prefer to play the game

using their instincts, and they are highly interested in new areas, episodes, and events within the game;

- Socializers: This group prefers interacting with other players in the game. They get along with other people easily, try to talk to others, and make more friends;
- Killers: They are interested in other players within the game but act alone. They try to exert their superiority over other players by bullying or defeating them with methods that other players do not expect.

Park et al. [11] used data clustering, an unsupervised learning algorithm, to validate a relatively accurate player-type theory among others that were reported. The comparison targets were the four player types based on gamification. The results were consistent with Bartle's 4 player types.

2.2. Gameful Experience

A gameful experience refers to an experience in which one is not playing a game but feels as if they are within a game in a non-game context [12]. Gameful experiences provide users with enjoyment and immersion in situations they are not normally interested in, and this enjoyment and immersion evolves into motivation. Recently, fusion with ICT has enabled gameful experiences to be experienced in various places [12]. Gameful experiences begin in systems or contexts to which gamification has been applied. According to Landers et al. [13], gamification provides gameful experiences to users, and the experience affects the psychological characteristics of the user. Psychological characteristics are largely divided into three main characteristics: the first characteristic is to perceive the proposed achievement objectives as attainable rather than trivial; the second characteristic is to trigger motivation to pursue objectives even under arbitrary and intended constraints; the third characteristic is that the user's actions are spontaneous when the intended constraints are applied.

The gameful design must be properly connected to gamification to deliver an effective gameful experience to users. The gameful experience delivered to users leads to changes in psychological characteristics, which further lead to changes in behavior. However, the individual characteristics of users, such as pleasure, enjoyment, and motivation [14], have been shown to regulate the effectiveness of gamification influenced by the gameful design [13]. According to Park and Kim [5], gameful experience improves the learning attitude of the learner and suppresses negative perception of learning, thereby inducing sustainable learning. This is because it is not compulsory learning under the supervision of teachers or parents, but it helps learners to realize the necessity of learning themselves and to learn for a long time by gameful experience. Thus, gameful experience helps to realize the necessity of learning and sustainable learning by suppressing the negative perception of learning that learners recognize.

2.3. Methods to Measure Player Type and Academic Motivation

Experimental groups for the survey were established to proceed with the study. The survey used in this study was derived from previously created surveys. By applying surveys that have previously been verified, the reliability and validity of the research process and the research results were partially secured.

The recruitment of participants was conducted during the first week of July 2019, and the experiment was conducted in the second week; there were no restrictions on the recruitment of participants, except that students majoring in economics/management were excluded. Students majoring in engineering at University A in Korea were selected to form the experimental groups. Participation in the study was promoted for two weeks, and 91 students voluntarily participated. Educational content on gamification, which was barely related to engineering, was selected. The reason for this was to verify the educational effectiveness of gamification; therefore, content relatively unrelated to their profession was chosen, and related gamification contents were developed. The content chosen for

education was an economics topic called supply and demand. The developed contents were in the form of a board game, which was judged to be fairly approachable.

Participants were advised in advance that the program would take around four hours. The experimental procedures and the curriculum designed for the experiment are presented as follows:

1. Course introduction: The content selected for gamification to be applied was explained through supply and demand, which is a basic economics principle;
2. Explanation of the gamification content rules: The game rules of the developed gamification contents were explained;
3. Gameplay: The game was played for approximately one hour;
4. Debriefing: Further explanation and teaching of supply and demand outlined in the developed gamification contents were provided;
5. End of the course and survey: The course was closed, and the students completed the survey.

The participants were given a description of the program, and they gathered in the lecture room to receive an explanation of the game. The purpose of the study was explained to the participants after the game in order to clear any prejudices that could affect their responses to the questionnaire.

The game developed by this study was designed to provide participants with a direct experience of the demand and supply curves of economic principles. Each player used the same card as shown in Figure 1. There were four types of fruits, with numbers from 1 to 10 written on them; high-number cards are high-quality, and low-number cards are low-quality. Each player started with ten fruit cards according to the game rules, and put fruit cards in places that serve as the "market" in the middle of the players' gathering.

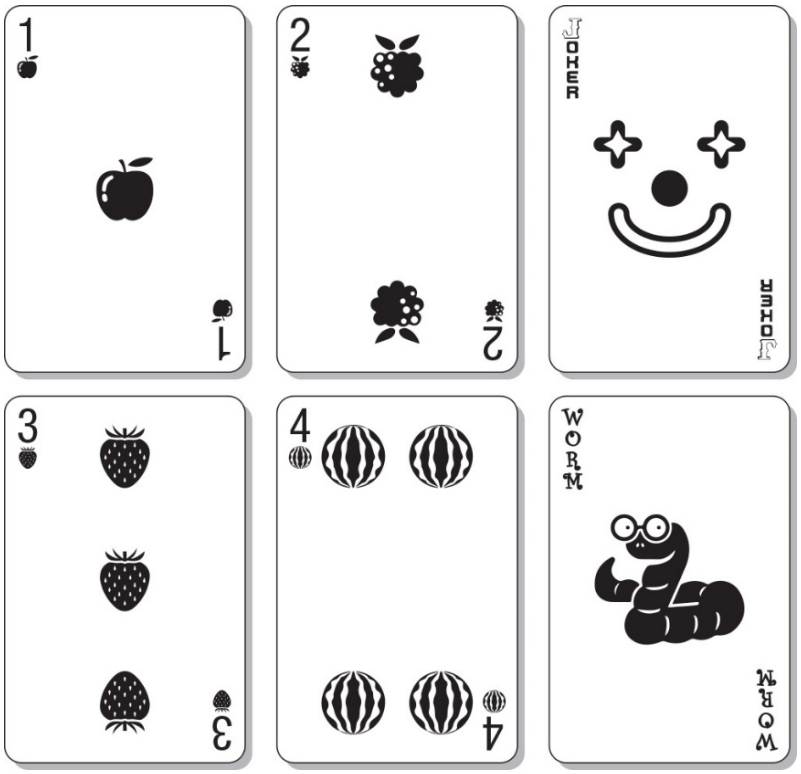

Figure 1. Component example of the developed gamification contents.

At that time, if there were many fruit cards of the same type on the market, the value (score) of the fruit would be low due to the high supply. Conversely, if there were few fruits of the same kind in the market, the lack of supply would increase the value of the fruit. However, the player could replace the cards in their hand, as well as the cards placed on the market according to the game rules; the fruit cards were changed through the card replacement.

After 10 rounds, the player with the most points would be declared the winner of the game.

After the game, there was a debriefing to check whether the participants learned properly through the game and to give them an opportunity to provide feedback on the detailed learning contents that were not covered in the game.

The survey used to gather player types and academic motivation for each participant in the study was derived from a previously developed survey. To gather player type information, the player type survey developed by Kim [15] and Park and Kim [16] was used. Existing surveys were used as templates since they entail a history of developing the characteristics of the four player types presented by Bartle in the form of a survey; these existing surveys were applied to the research accordingly.

The survey template for measuring academic motivation was borrowed from the questions in the Science Motivation Questionnaire II (SMQII) developed by Glynn et al. [17]. SMQII is a survey developed to measure learners' motivation for learning science, a method which has secured effectiveness, validity, and reliability through several verifications and related research. In this study, the questions in SMQII were used to measure the academic motivation of learners. The measured aspects were intrinsic motivation, self-determination, and self-efficacy.

In addition to the player type and academic motivation, the extent to which learners understood the contents of education and the level of enjoyment they perceived from the gamification contents were measured. Hence, questions regarding these aspects were developed and added.

3. Results

The results of the survey were analyzed after the completion of the experiment, and the results of the descriptive statistical analysis are shown in Table 1. Of the total participants, all participants responded to the survey. The survey consisted of 40 questions: 24 on player types, 3 on intrinsic motivation, 4 on self-determination, 3 on self-efficacy, 3 on the understanding of content, and 3 on enjoyment. IBM SPSS Statistics 26 software was used to analyze the survey results. A Cronbach's alpha analysis was conducted to confirm the reliability of the survey, resulting in a score of 0.908, which implies high reliability. The participants were composed of 60 first-year students, 6 second-year students, 22 third-year students, and 3 fourth-year students, with 79 males and 12 females. The distribution of Bartle's four player types among the respondents showed that achievers and socializers had the highest proportion with 23 and 36 individuals, respectively. The results of 36 socializers, 30 explorers, 23 achievers, and 2 killers showed that the distribution was similar to that of a previous study [18].

Table 1. Demographic analysis results.

Grade	#	Percentage
1	60	66%
2	6	7%
3	22	24%
4	3	3%
Gender	**#**	**Percentage**
Male	79	87%
Female	12	13%
Player Types	**#**	**Percentage**
Achiever	23	25%
Socializer	36	40%
Explorer	30	33%
Killer	2	2%

The descriptive analysis results of the survey are shown in Table 2, and the variance analysis results are shown in Table 3. According to Table 3, there are no statistically significant differences between the types of players, including intrinsic motivation, self-determination, self-efficacy, understanding of content, and enjoyment.

Table 2. Descriptive analysis of the survey results.

Item	Grade	N	Mean	S.D.	Min	Max
Intrinsic motivation	1	23	6.09	0.91	4.00	7.00
	2	30	6.00	1.18	4.00	7.00
	3	36	5.90	1.04	4.00	7.00
	4	2	4.50	3.06	2.33	6.67
	Total	91	5.95	1.11	2.33	7.00
Self-determination	1	23	6.17	0.91	4.00	7.00
	2	30	6.07	1.03	4.00	7.00
	3	36	5.99	1.01	4.00	7.00
	4	2	4.25	3.89	1.50	7.00
	Total	91	6.02	1.09	1.50	7.00
Self-efficacy	1	23	6.14	0.90	4.00	7.00
	2	30	6.19	1.00	4.00	7.00
	3	36	6.12	1.01	4.00	7.00
	4	2	5.00	2.83	3.00	7.00
	Total	91	6.12	1.02	3.00	7.00
Understanding of contents	1	23	5.67	0.90	4.00	7.00
	2	30	5.61	1.10	4.00	7.00
	3	36	5.44	1.10	3.67	7.00
	4	2	4.83	3.06	2.67	7.00
	Total	91	5.54	1.09	2.67	7.00
Enjoyment	1	23	6.23	0.91	4.00	7.00
	2	30	6.20	1.05	3.67	7.00
	3	36	5.97	1.08	4.00	7.00
	4	2	4.67	3.30	2.33	7.00
	Total	91	6.08	1.09	2.33	7.00

The variance analysis of intrinsic motivation resulted in F = 1.31 and Sig = 0.28, which is higher than the significance level of 0.05, indicating that there were no statistically significant differences. Self-determination resulted in F = 2.01 and Sig = 0.12, which is higher than the significance level of 0.05, indicating that there were no statistically significant differences. Self-efficacy resulted in F = 0.85 and Sig = 0.47, indicating no statistically significant differences. The understanding of contents and enjoyment resulted

in F = 0.53 and Sig = 066, and F = 1.53 and Sig = 0.21, respectively, both of which showed no statistically significant differences as they were both higher than the significance level of 0.05.

Table 3. ANOVA analysis results.

Item		SS	df	M.S.	F	Sig.
Intrinsic motivation	Between groups	4.81	3.00	1.60	1.31	0.28
	Within groups	106.29	87.00	1.22		
	Total	111.09	90.00			
Self-determination	Between groups	6.92	3.00	2.31	2.01	0.12
	Within groups	99.79	87.00	1.15		
	Total	106.71	90.00			
Self-efficacy	Between groups	2.66	3.00	0.89	0.85	0.47
	Within groups	90.81	87.00	1.04		
	Total	93.48	90.00			
Understanding of contents	Between groups	1.91	3.00	0.64	0.53	0.66
	Within groups	104.48	87.00	1.20		
	Total	106.39	90.00			
Enjoyment	Between groups	5.37	3.00	1.79	1.53	0.21
	Within groups	101.65	87.00	1.17		
	Total	107.02	90.00			

4. Discussion

This study focused on the gameful experience delivered to learners through gamification. One must consider the different types of players in the process of developing gamification, as each type of player has different preferred game elements. Among the research questions set by this study, questions 1 and 2 were rejected. The answers to research question 3 are as follows.

Game elements do not provide the same gameful experience to every player because differences in experiences occur due to the player's characteristics or because interactions between game elements convey different gameful experiences to each player [13]. Therefore, this study focused on academic motivation, which is enhanced as a gameful experience is delivered. Gameful experience has been reported to influence the academic motivation of learners in previous studies.

Gameful experience affects the academic motivation of players, and the preferred gameful experience is different for each player type. Based on this information, it is necessary to verify whether there are differences in academic motivation that flourished through gameful experiences for each player type. If such differences exist, then customized materials for different learners can be created, leading to the effective development of learning content.

However, based on the findings of this study, there were no differences in the academic motivations among the player types. Although each player type has its own preferred style of gameful experience, factors in gamification that are delivered to the learner, such as enjoyment, immersion, and gameful experience, are thought to influence the nourishment of the learner's academic motivation [12]. The player experiencing gamification must move in the intended or specified order based on the components and rules of the game [19]. Through this process, players experience similar situations at different levels. In conveying knowledge contextually, gameful experiences encourage and motivate players to participate regardless of their player type [20], and this seems to be the reason why academic motivation is stimulated in every player.

Even in preceding studies, gameful experiences have been shown to directly influence players through game mechanics and game rules, which are considered during the configuration stages of gamification [13]. Furthermore, the findings of this study have verified that there is no difference in academic motivations among player types. Therefore, it is more

important to construct an environment in which gameful experiences, rules, and strategies preferred by each player type can be established, rather than setting the factors that can stimulate the academic motivation of each player type. Gamification grants the player the belief that they can participate and control according to their will, and it improves the learning attitude of the player based on their gameful experience [21]. If an environment that can establish gameful experiences, rules, and strategies preferred by each player type is created, then sustainable learning environments can be constructed by enhancing learner engagement [22].

5. Conclusions

This study was initiated to explore the conditions required to build a sustainable learning environment. To determine the appropriate conditions, the player type, one of the gamification design elements that deliver gameful experiences, was examined because each type of player has a different preferred gameful experience. Accordingly, in this study, Bartle's taxonomy of player types, a player-type theory that is widely used in gamification, was employed to identify conditions that can stimulate the academic motivation of each player type by checking the difference in academic motivations among the different player types. To experiment, gamification materials were developed by teaching basic economics to 91 engineering students. Previously developed surveys were used for the statistical analysis.

The analysis of the survey responses showed that there were no statistically significant differences in the academic motivation, understanding of content, and enjoyment among Bartle's four player types. Based on these results, it is deemed that an educational environment that can establish gameful experiences, rules, and strategies preferred by each player type should be created rather than factors that can stimulate academic motivation for each player type.

Gamification motivates all participants regardless of their player type. However, because different types of players have different preferences for gameful experiences, rules, and strategies, more attention should be paid to game elements other than those that stimulate academic motivation during the developmental phase of gamification.

Educators and businessmen who are considering gamification or delivering gameful experiences to learners to construct a sustainable learning environment are advised to utilize the results obtained in this study. Educators should endeavor to create environments in which Generation Z learners can establish their preferred gameful experiences, rules, and strategies by themselves and sustain an active learning system rather than a passive system [23]. Businessmen should try to develop an educational platform through which Generation Z learners can experience gamification or have gameful experiences. Learners' experiences, strategies, and rules should be made within the educational platform. However, if the degree of freedom is increased for learners, then the education itself could become a burden, so it is necessary to consider measures that give freedom to the learners within a specified range. The development of learning based on escape room games or educational content within the metaverse is proposed as a suitable method. Escape-room-based learning allows learners to freely act within the boundaries set by educators to acquire knowledge [24]. The metaverse allows active learning to occur as it can build problem-based learning environments for learners [25].

The limitations of this study and future research directions are as follows: This study is still at the elementary level. The sample size was statistically significant, but to generalize our findings, experimental groups across all majors and ages should be formed, and their respective results should be analyzed. Further research will also need to be conducted using player-type theories other than Bartle's taxonomy of player types for the generalization of results. If identical results are produced by applying several other player-type theories, then the reliability and validity of the findings could be confirmed.

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