Article

The Avaritia: Entrepreneurship Practice to Understand the Problem of Information Control through Gamification

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Abstract: Information control creates inequality in society, and thus, widens the wealth gap. This study aimed to develop entrepreneurship education gamification to understand problems of information control and developed a gamification called "The Avaritia". To verify the effectiveness of the game, pre/post-questionnaire responses were verified. The results indicate that The Avaritia helped us understand the social problems of information control and had a positive effect on the cognitive change of learners. The results of this study suggest the need for entrepreneurship education using gamification and emphasize the importance of social entrepreneurship.

Keywords: gamification; social problem; sustainable learning; gamified learning; gamification in learning

1. Introduction

Information denotes facts about specific situations, individuals, or events [1]. It handles intangibles that need to be understood from the messages used in our life contextually from the perspectives of using and interpreting from the viewpoint of producing messages [2]. From the past until now, information has become a great influencer in people's lives, from trivial decision-making to corporate profits and, even further, the direction of national development. In particular, along with ICT (information and communication technologies) technology development, the quantity of information has increased, spreading faster and farther, which may threaten humanity [3]. Evidently, information exerts a great impact on people's lives. Simultaneously, human beings are exposed to a great number of problems related to information. According to Salvaggio [4], previous social problems caused by information encompassed personal information infringement, information unfairness, information control, and information misuse. Among them, this study focused on information unfairness and information control. Kulba et al., Ref. [5], indicated that information control was a socially implicit and indirect action, which can be used to control the behavior of the target by utilizing the information for the control target. They also explained that information control was an activity that has existed for a long time and has had a great impact on the growth of humankind. Information with a great impact on humankind has begun to create inequality in line with technology development. This is because the right to access information was determined by the speed of technological development, called the digital divide [6]. As the digital divide increased, the difference between groups with easier access to information and those without became clearer. Figure 1 shows the international digital economy and society index published by the EU European Commission 2020 [7]. The index has been published annually by the European Commission since 2014, and is mainly measured for EU member states. It is derived mainly based on connectivity (status of broadband communication connection and uses), human capital (level of technology required for internet users), the use of the internet (status of internet services and online transaction levels of users), the integration of digital technology (status of e-commerce and e-business), and the level of using e-government.

The digital economy and society indices of developed countries were in the top ranks, but those of developing countries were difficult to confirm. Some groups have difficulties in information access even in developed countries [8]; to solve such a global issue, most countries focus on Sustainable Development Goal (SDG) No. 9 [9].
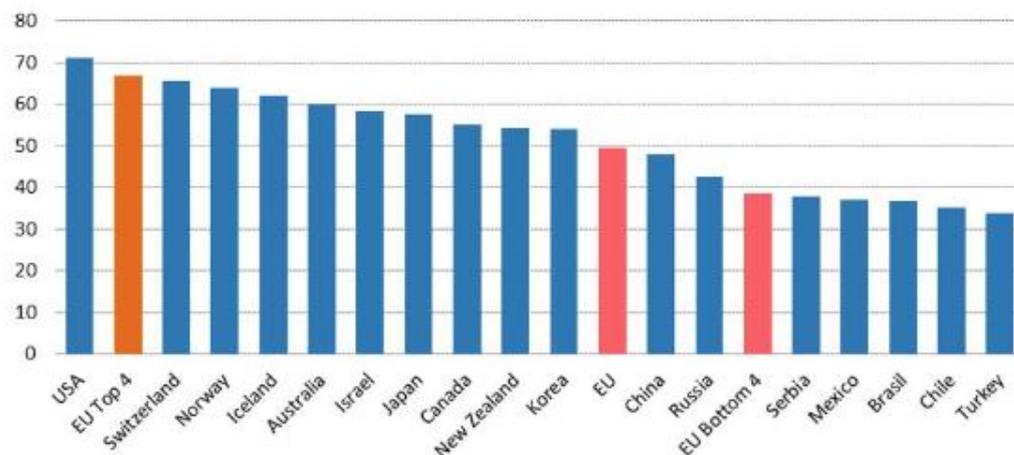

Figure 1. International digital economy and society index in 2018 [7].

The need for information literacy education due to the digital divide is steadily increasing in the education field. Buzzetto-Hollywood et al., Ref. [10], highlighted that the information gap and educational inequality caused by the digital divide were social issues. Particularly, they mentioned that some college students had competence difficulties for the digital and information literacy required for the college level and that this could be solved through more integrated solutions and institutional support.

Today's era is one of entrepreneurship often exercised to solve social issues of information unfairness and information control. This is because understanding the elements of entrepreneurship necessary for a society wherein existing elements of entrepreneurship (e.g., risk tolerance and creativity) and other elements can be developed and have the capacity to solve relevant issues is crucial [11]. Among the methods for solving social issues, most researchers have indicated that an entrepreneurship approach is realistic and effective. Diverse approaches to solving social issues exist: corporate social responsibility (CSR), creating shared value (CSV), and non-governmental organizations (NGOs). However, the limitations of these approaches, such as a perception of simple donation as an unsustainable way, have driven the need for entrepreneurial innovations tailored to social problems. Consequently, an attempt has been made to acknowledge the existence of social entrepreneurship that solves social issues based on objective indicators of social impact by achieving a social mission [12]. Therefore, possessing competencies to solve social problems, in addition to existing entrepreneurship competencies, is necessary. This study determined the importance of understanding social entrepreneurship based on entrepreneurship to comprehend such social problems as information unfairness and information control.

This study focused on the gamification of a method for fostering entrepreneurship. An important value in entrepreneurship education is to develop entrepreneurial competencies to seize opportunities, take risks, and create value in uncertainty [13]. However, existing entrepreneurship education comprises traditional lectures and experiential learning (e.g., business plans and case studies). Moreover, developing entrepreneurship competencies is not realistic owing to time and resource constraints. Therefore, a gamification approach wherein time and resources can be efficiently utilized through experiential learning is required to overcome such a problem [14]. Gamification refers to a technique that applies game elements (e.g., points, badges, leaderboards, and avatars) to non-game contexts (e.g., marketing, management, and education) [15]. Applying gamification to entrepreneurship education has a positive effect on learners' understanding of entrepreneurship, from the construction of real ideas to more than just real business imitations [14]. The current main

learners are Generation Z, who prefer gameful experiences because they are familiar with mobile devices [16]. Therefore, this study developed gamified entrepreneurship learning contents to practice information control and information gap issues for learners. Furthermore, the educational effects of the developed gamification were verified. Through the verification process, such as in previous studies, the educational method using gamification suggests the applicability of a wide range of educational content regarding entrepreneurship.

The following two research questions were established to conduct systematic research:

Research Question 1 (RQ1). Does entrepreneurship education content with gamification convey such content as information control and information gap to learners?

Research Question 2 (RQ2). Does gamification have a positive effect on entrepreneurship education?

2. Background

2.1. Gamification and Gameful Experience in Education

Since its definition in 2012, gamification has been applied in educational environments to motivate learners and improve learning attitudes and performance [17]. Gameful experience is one of the reasons that gamification can have a positive effect on learners. The experience refers to "an experience as if playing a game in an unexpected timing and space" [18]. The experience allows users to experience enjoyment, absorption, creative thinking, absence of negative affect, activation, and dominance through a "game-like experience" [18]. The reason that gameful experiences are viewed as important from the education and training perspective is that "learning" is a goal-oriented social activity determined by motivational factors [19]. Therefore, various attempts have been made to achieve "effective learning," one that has recently attracted attention is the method of a gameful experience; gamification has become a representative method to deliver a gameful experience. The method of applying gamification to educational environments, and influencing learners' learning motivation, learning attitude, and performance improvement is called gamification in education [17]. The basic structure of educational gamification is displayed in Figure 2.

Figure 2. Gamification in the basic education process.

First, the learner checks the mission/quest set by the instructor. After checking the achievement goals and rewards per mission/quest, the learner assesses whether they can solve it. The learner who has the mission/quest solves it by demonstrating their abilities. In this case, the instructor provides set rewards. The paid rewards may vary among players who solve the same mission/quest based on different results, which is a differential payment for the results. By continuously accumulating rewards, the learner can exchange the rights or actual items (e.g., practice books, pens, and priority rights for presentation). In this process, the mission/quest provided by the instructor to the

learner induces the learner's learning. Therefore, gamification can promote the learners' motivational affordance [20]. Rewards can be used as a feedback device for learning activities. Let us assume that Learners A and B, after completing Mission/Quest C, received 10 points and 8 points, respectively. Learner B checks the fact that Learner A received 10 points through the leader board and wonders why they received a lower score than Learner A. Thus, Learner B devises a strategy for obtaining higher scores in the next activity. The compensation-based feedback loop functions in this manner [21]. The reason for exchanging actual items with accumulated rewards is to induce learners' immersion in learning based on the self-determination theory. The theory's main framework is the internalization of extrinsic motivation. Physical rewards stimulate the learner's extrinsic motivation. Continuous extrinsic rewards should be better than existing rewards in giving greater stimulation. However, by designing a reward structure with the same structure as in-game rewards, behaviors driven by extrinsic rewards are converted into intrinsic motivation over time [22].

2.2. Entrepreneurship and Gamification

In entrepreneurship, gamification is established as an effective educational method. According to Isabelle [14], entrepreneurship education is necessary to transfer the knowledge required for starting and managing a business (e.g., problem-solving, including company operation and market analysis), along with an entrepreneurial mindset. However, they pointed out that existing traditional methods have not been effective for current learners and mentioned the necessity of entrepreneurship education through gamification. Furthermore, as entrepreneurship is considered a direct influencer on global development, a great number of investments in entrepreneurship at the individual, corporate, and organizational levels exist. Gamification has attracted attention in entrepreneurship education because it can provide an "experience similar to reality" [14]. In gamification in entrepreneurship education a condition exists wherein players should have an edge over other players within given rules and components to win the game. For the given rules and components, actual business operations, start-ups, and problem-solving processes are introduced. Players set necessary strategies to solve given problems, and derive outcomes by employing required resources for implementation; as they can have realistic experiences, gamification is effective in entrepreneurship education [23]. Thus, entrepreneurship education that applies gamification does not deliver academic value similar to traditional education. To present an arbitrary situation (story) to the learner and solve the mission/quest in a situation, learners undertake such activities as knowledge acquisition, social interactions with other learners, and skill acquisition. Accordingly, the learner receives educational value when the mission/quest is solved [24].

Sidhu et al. Ref. [25] mentioned the need for entrepreneurship education for those who misunderstood entrepreneurship as the advancement of commercial activities. They conducted a study by designing a curriculum that incorporated games at the college level. Sidhu et al. [25] selected 10 core entrepreneurship factors and developed gamification for each element. Breuer et al. [26] developed gamification for innovation and entrepreneurship education. They also suggested that users can play based on card-shaped components and game rules, derive ideas for innovative items, and cultivate entrepreneurship elements through discussion with other players.

2.3. Unfairness, Entrepreneurship, and Social Problem

Entrepreneurship is essential to solve unfair issues that hinder the growth of the world. The world only emphasizes the grand image of rapid growth, but in reality, this leaves many scars behind the scenes. Representative unfair issues include child labor, low wages, high-risk work, and destruction of local environments. Global corporations have earned profit by investing in facilities and equipment in areas where labor costs were relatively lower to gain high profits. A representative case is Coffee Bean Labor. There is often news of unfair child labor in the coffee industry and inappropriate working hours and

conditions [27]. However, many companies do not pay attention to environmental or social problems in the area they invest in. The UN has adopted various Sustainable Development Goals (SDGs) [28] targeting human rights violations caused by inequality.

Some SDGs handle environmental, infrastructure, regional disparities, and peace issues that were excluded from the previous version, the Millennium Development Goals. Since the establishment of SDGs in 2015, the world began to systematically strive to achieve the SDGs. Moreover, social entrepreneurship began to attract more attention to achieve the SDGs by solving social issues. Previous entrepreneurship focused on creating new values that did not exist previously, whereas social entrepreneurship focuses on solving social issues along with the value created by past entrepreneurship [29].

Social entrepreneurship is the entrepreneurial mindset necessary to identify the inherently unfair problems that particular individuals and groups suffer because of financial, political, cultural, and environmental problems or shortages, and to both solve these problems and achieve growth for individuals or groups [29]. Social entrepreneurship is different from the approaches of CSR, CSV, and NGOs, and focuses on alleviating social problems. Specifically, it is necessary to have the capacity to seize opportunities, conceptualize, and execute, centering on the "social mission" to solve social problems [30]. Rapid and selfish growth has caused injustice, and the resultant unfairness has created social problems. Now is the time for social entrepreneurship to solve these problems.

3. Study Design and Methods

3.1. Study Design

To achieve the study goal, this study was designed based on the following procedure. It targeted 30 students who took the "Entrepreneurship" course in the Department of Engineering B (a university in Korea) in the first semester of 2022. Students' consent was obtained to proceed with the study. Furthermore, to conduct this study, a traditional offline lecture was planned before the semester started, and "The Avaritia" gamification content was developed. In the 4th week of the course in April, 2022, the topics of information unfairness and information control were handled in the class, and the class lasted a total of 3 h. During the class, the learners did not engage in any special activities and followed a traditional lecture type. After the class, we conducted the survey on the level of understating of the lecture content. The participants played the Avaritia in the 1st week of the course in May 2022. They were divided into six groups of five players, and the total play time was 2 h. After playing the game, additional surveys were conducted, such as a pre-questionnaire and the gameful experience survey. Additionally, activities were conducted in which each person could write their own opinions about the game and game content. After completing the pre/post-questionnaire, the effectiveness was verified by executing the paired *t*-Test on the results of measuring the understanding and motivation for the learning content. We performed regression analysis by setting the gameful experience and item results of the post-questionnaire as independent variables, and the understanding of learning content and motivation results as dependent variables. Subsequently, we analyzed the causal relationship between the two variables and compared the causal relationship between gamification and entrepreneurship education with the results of previous studies.

3.2. The Avaritia

"Avaritia" means "desire" in Latin. The Avaritia was designed to be played by a team of a maximum of five members, in total, six teams of a maximum of 30 members (Figure 3). It is a type of big game in which players win by understanding the interactions between players, components, and game rules within a specific space [17]. Before starting the game, the player checks the game story. In 2060, since the Earth's population of 8 billion can no longer survive on planet Earth, a space station is developed as a habitable area. The people who are living in this area are categorized into Spacenoids, and those on Earth are Earthnoids. Nevertheless, humankind wants to continue to develop, and a Space Engineering Research Institute discovers resources called "Avaritia" of a planet named AR-222.

Figure 3. Avaritia brand image.

Avaritia is a chemical and biological combination of undersea volcanoes and undersea plankton from AR-222. Because its proton–neutron structure is closer to that of minerals, it is treated as such. Therefore, Avaritia is a more efficient semiconductor than conventional rare earth.

Some developed countries have invested in AR-222 and Avaritia. However, the Space Federation Government starts controlling mining to avoid the mining complications that happened on Earth, happening on AR-222. It also established a trade association and information exchange for AR-222. To stabilize the market price of Avaritia, it purchased resources at the government level and supplied them to humankind and published a supply report on the AR-222 planet's resources.

Six countries were granted permission to mine Avaritia on AR-222 by the Space Federation Government. The question is whether Avaritia will help humanity or become a poison to humanity.

After each team has chosen one of the six countries, they can start digging to mine Avaritia. The basic capital for operation on the AR-222 planet, as well as the sea zone ownership of the Avaritia-capable area are granted by the Space Federation Government. They receive different types of diggers, funds, and sea zone ownership depending on their chosen country. The reason that resources are provided differently per country is to partially project the difference between developed, middle-income, and developing countries on Earth.

The playtime of Avaritia is 90 min, with 9 rounds of 10 min each. The team with the most funds before the end of the game is the winner. The funds can be secured by mining Avaritia with the basic capital players and by selling it to a trade association, or the acquired information can be secured by selling the sea zone ownership to another country.

Once the game starts, each country can only place its digger in its sea area (Figure 4). The sea area is divided into Grades S, A, and B; the closer the sea area to Grade S grade, the more it is possible to mine Avaritia. The number of times it can be mined is also determined for each area. For example, in the case of Grade A, Avaritia mining is possible for up to five turns, and resources cannot be mined in the area after the 6th turn.

Furthermore, the closer the sea area to the Grade S, the higher the quality, and the higher the price. The game has three NPC (non-playable characters), each of whom plays a role in the Space Federation Government. It also prevents safety accidents that may occur during the game.
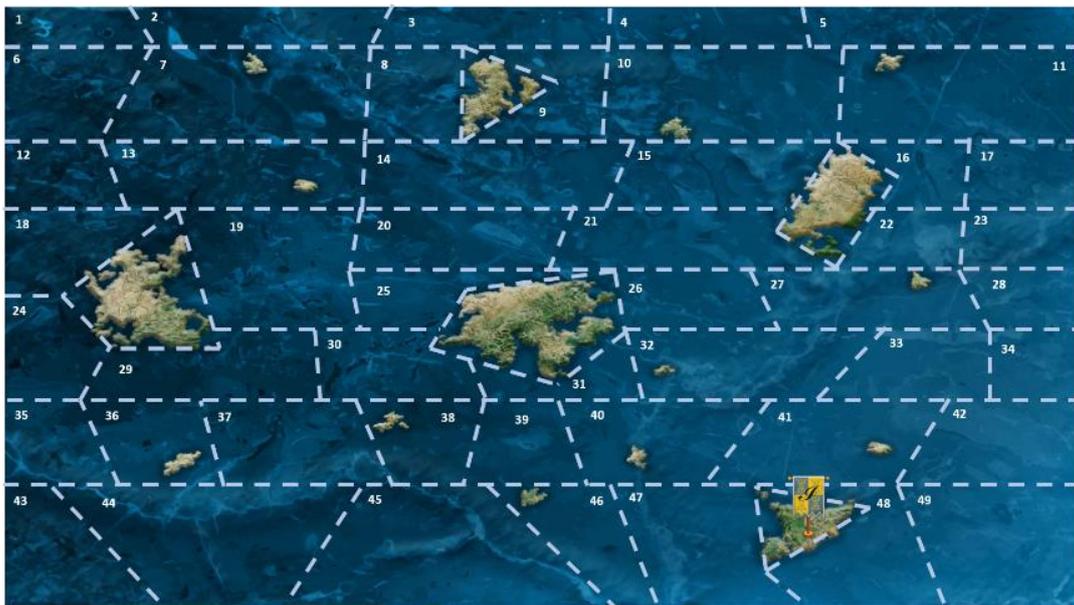
Figure 4. AR-222 planet ocean area map.

The Space Federation Government branch: on every turn, each country (player) checks its diggers and sea zone ownership and provides Avaritia (in the form of tokens) that match the digger grade and sea zone grade. Trade Center: each country sells mined Avaritia, whose market price fluctuates from round to round, but the price information is not revealed until each player asks.

Information Center: the government reports the sea zones that are sold within AR-222 to the information center, as they are Avaritia-related information. The information exchange sells a total of six types of reports in the order of Grades Z, S, A, B, C, and D. The closer to Grade Z a report is, the more direct information on Avaritia mining and market price it contains, but the more advanced the information, the higher the price (Figure 5).

Figure 5. Report of advanced information. This image describes how to obtain a higher grade mining that can be used on the planet.

Once the game starts, each country receives Avaritia tokens every turn by installing diggers in its sea zone, along with the sea zone ownership. Funds can be secured by selling the received Avaritia tokens to the trade association. Avaritia can be can further mined by purchasing diggers with the secured funds or by purchasing the sea zone ownership from another country (Figure 6). Since each country has different diggers and funds, the level of securing the mined Avaritia differs per country. In the case of developed countries, since they can quickly raise funds to purchase the information reports of the information exchange, they can obtain advanced information, and then, secure more funds, retain information as a secret, or spread false information on the market. Meanwhile, developing countries cannot rapidly grow owing to limited resources, capital, and information.

Figure 6. Avaritia token trading.

3.3. Development of the Survey Tool

The questionnaire consists of items that can measure the understanding of unfairness and information control, as well as gameful experience. We also attempted to secure validity, reliability, and generalizability of the research results by using previously verified questionnaire tools for use in the research. To confirm the educational value of unfairness and information control that Avaritia aims to deliver, we focused on a questionnaire tool measuring "learning motivation" among previous studies, and applied the Science Motivation Questionnaire II (SMQII), which is a questionnaire tool measuring motivation for science learning [31]. SMQII consists of five constructs: intrinsic motivation, self-determination, score motivation, and job motivation. Developed in 2011, it has been used in numerous studies (Table 1).

Table 1. Previous studies related to SMQ II application.

Country	Subject	Research Subject	Purpose of Utilization	Ref.
Indonesia	Science	984 junior high and high school students	Verification of validity, reliability, and generalizability as a scientific motivational learning tool in the country	[32]
Japan	Scientific writing	203 college students	Verification of the effectiveness of the scientific writing program for first years	[33]
Greece	Science	330 middle school students (163 male and 167 female)	Verification of validity, reliability, and generalizability as a scientific motivational learning tool in the country	[34]
Japan	Pharmacology	165 students in the 4th–5th grade of pharmacology	Measurement of pharmaceutical education learning motivation	[35]
Korea	Basic economics	91 college students	Measurement of motivation for economic education of engineering students, and verification of effectiveness	[16]

As a questionnaire to measure gameful experience, GAMEX(GAMeful Experience scale) [18] is applied. Developed in 2018, GAMEX is a survey tool that can measure gameful experience through gamification. The questionnaire tool consists of six constructs, namely enjoyment, absorption, creative thinking, activation, absence of negative affect, and dominance. Since its development, verification has been performed in several previous studies. Therefore, since we judge the GAMEX questionnaire to be suitable for measuring gameful experiences, we adopt its questions for the development of our survey tool.

The final developed questionnaire consists of three constructs of pre-questionnaire (i.e., intrinsic motivation, self-determination, and self-efficacy) and six constructs of post-questionnaire (i.e., intrinsic motivation, self-determination, self-efficacy, enjoyment, creative thinking, and activation). Among the five constructs of SMQ II, the constructs of intrinsic motivation, self-determination, and self-efficacy are applied because the designed curriculum and developed content in this research is aimed solely at entrepreneurship education, rather than higher test scores or inspiring the motivation to search and understand the job. Therefore, score motivation related to test scores and career motivation related to employment are excluded.

4. Results

4.1. Results Analysis

A questionnaire tool analysis was conducted on a traditional entrepreneurship class on unfairness and information control, and the class using the Avaritia. The SPSS ver. 23 software was used to analyze the questionnaire responses. Since SPSS is a statistical software program developed by IBM, it was judged to be a validated tool for use in this study. First, the descriptive statistics for the questionnaire responses are as in Table 2. Pre-questionnaire responses were obtained from 29 college students (19 male and 10 female; 13 second-year students, 12 third-year students, and 4 fourth- or higher-year students).

Table 2. Descriptive statistics of survey responses.

	N	Min	Max	Mean	S.D.	Skewness		Kurtosis	
			Statistics			Statistics	S.D.	Statistics	S.D.
Motivation-Pre	29	3	7	5.621	0.834	−0.668	0.434	2.296	0.845
Self-Determination Pre	29	3	7	5.299	1.078	−0.071	0.434	−0.824	0.845
Self-Efficacy-Pre	29	3	7	5.678	0.875	−0.498	0.434	0.504	0.845
Motivation_Post	31	4	7	6.301	0.64	−0.637	0.421	−0.002	0.821
Self-Determine_Post	31	4	7	6.043	0.833	−0.581	0.421	−0.522	0.821
Self-Efficacy_Post	31	5	7	6.247	0.672	−0.248	0.421	−1.51	0.821
Gameful Experience	31	2	7	6.186	1.051	−2.387	0.421	7.584	0.821

For post-questionnaire responses, 31 students responded (21 male and 10 female; 13 second-year students, 13 third-year students, and 4 fourth- or higher-year students). Skewness and kurtosis were used to provide the rationale for proceeding with the regression analysis. According to Kline [36], data for causality analysis should basically assume a normal distribution; to check the normality of variables, the skewness should not exceed the absolute value criterion of 3, and kurtosis should not exceed the absolute value criterion of 10.

A Cronbach's alpha test was conducted to confirm the reliability of the respondents' responses to the questionnaire developed in this study. As the pre- and post-questionnaires have the values of 0.9 and 0.95, which was close to 1, the reliability was secured. By verifying the statistical difference between the traditional teaching method and the Avaritia's intrinsic motivation, self-determination, and self-efficacy, the effectiveness of the pre/post education on the Avaritia's unfairness and information control was verified. The results are shown in Table 3.

Table 3. Correlation and *t*-test result.

Correlation Analysis Result	N	Correlation	*p*
Motivation (Pre-Post)	29	−0.16	0.407
Self-Determination (Pre-Post)	29	−0.191	0.322
Self-Efficacy (Pre-Post)	29	−0.31	0.101

t-Test Result	Mean	Std. Deviation	Std. Error mean	95% Confidence interval of the difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Motivation (Pre-Post)	−0.701	1.142	0.212	−1.136	−0.267	−3.307	28	0.003
Self-Determination (Pre-Post)	−0.77	1.486	0.276	−1.335	−0.250	−2.791	28	0.009
Self-Efficacy (Pre-Post)	−0.586	1.256	0.233	−1.064	−0.109	−2.514	28	0.018

Based on the results of the questionnaire analysis, the correlation coefficients between the pre- and post-questionnaire responses were −0.16 for intrinsic motivation, −0.191 for self-determination, and −0.31 for self-efficacy. Since the significance levels of all three constructs were greater than 0.05, they were statistically insignificant. From the paired *t*-Test analysis, for intrinsic motivation, the average of the pre- and post-questionnaire responses was 5.6207 and 6.3219, respectively. The *t*-test result for both results was t = −3.307 (significance probability is 0.003), and the significance level was lower than 0.01 (0.003). Therefore, a statistically significant difference exists. The average of the pre-questionnaire responses for self-determination was 5.2989, and the average of the post-questionnaire responses was 6.069. As a result of the *t*-test for two missing values, the t-value was −2.791; since the significance level was lower than 0.01 (0.009), no statistically significant difference exists. The average of the pre-questionnaire responses for self-efficacy was 5.6782, and the average of the post-questionnaire responses was 6.2644; as a result of the *t*-test for two missing values, the t value was −2.514, and the significance level was 0.018. Therefore, the missing values of the pre/post questionnaire responses showed a statistically significant difference.

To verify the causal relationship between gameful experience and educational effects measured in the post-questionnaire responses, gameful experience was set as the independent variable, and intrinsic motivation (post-questionnaire), self-determination (post-questionnaire), and self-efficacy (post-questionnaire) were set as the dependent variables. The first result shows the effect of gameful experience on intrinsic motivation (Table 4). According to the ANOVA result, the regression model is judged to have no problem (F = 24.268, *p* < 0.01). The regression analysis indicates that the gameful experience has a positive impact on intrinsic motivation (B = 0.411, non-standardization = 0.675, t = 4.926, *p* < 0.01); self-determination (F = 16.875, B = 0.481, non-standardization = 0.607, t = 4.108, *p* < 0.01); and self-efficacy (F = 8.025, B = 0.298, non-standardization = 0.466, t = 2.833, *p* < 0.01).

Table 4. Regression analysis results.

Independent Variable	Dependent Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		Beta	Std. Error	Beta		
Gameful Experience	Motivation	0.411	0.083	0.675	4.926	0.000
	Self-Determination	0.481	0.117	0.607	4.108	0.000
	Self-Efficacy	0.98	0.105	0.466	2.833	0.008

4.2. Discussion

4.2.1. Analysis of RQ1

From the statistical analysis of the questionnaire responses, the average score of the questionnaire responses to the gamification-applied teaching method was higher than that of the questionnaire responses to existing traditional teaching methods. The Avaritia is a game designed to help players indirectly experience the unfairness and information gaps that exist in reality. The results indicate that the educational value of entrepreneurship projected in the game was properly delivered to the learner. Specifically, in traditional teaching methods and the teaching method using Avaritia, the average score of the post-questionnaire responses was higher than that of the pre-questionnaire responses in terms of intrinsic motivation, self-determination, and self-efficacy. Therefore, the results suggest that learners preferred classes in which gamification was applied over the traditional teaching method (RQ1 and RQ2). Furthermore, gamification has a positive effect on learners' intrinsic motivation, self-determination, and self-efficacy. According to Manzano-León et al. [37], based on a literature review of 750 studies on gamification in education from 2016 to 2020, educational factors closely related to gamification are learning motivation, performance, higher cognitive ability, engagement, and improved participation attitude. Although "engagement" is not an academically defined term, it can be regarded as a social factor: how learners undertake school activities and interact with other learners while participating in learning activities and facing problems. When learners engage in learning activities, they tend to undertake activities by themselves to achieve sustainable achievement despite obstacles; such a tendency is called engagement [38]. Therefore, engagement is connected to learners' autonomy, execution, social, delivery, participation, collaboration, cooperation, questioning, organization of the environment, and fun [39]. Gamification stimulates the abovementioned elements of engagement, making learners recognize learning as a necessary element for life rather than an object of observation, inducing continuous learning activities.

The following results were obtained in this study. Through gamification, learners engage in topics that they are not normally interested in, leading to cognitive changes. Such cognitive changes arouse interest in learning motivation and content. Additionally, this study confirmed the finding of a review of previous studies on entrepreneurship and gamification; that is, entrepreneurship applied with gamification delivers realistic experiences to learners through simulation, leading to learning.

4.2.2. Analysis of RQ2

This study derived statistically significant results from the analysis of the causal relationship between gamification and entrepreneurship education motives. In summary, gamification has a positive effect on entrepreneurship education. This result is assumed to be predominant because of the characteristics of the study subjects, that is, Generation Z learners. As this generation has grown up with ICT technology since childhood, they can handle ICT skills well and have been exposed to a great amount of information. Furthermore, they have grown up handling smartphones, the aggregate of ICT technologies. As they have grown up being familiar with games, they do not have resistance to games; rather, games are their preferred manner of receiving lectures, which may be the cause of such results [16]. Additionally, in the context of gamification having a positive effect on education, this study derived the same results as previous studies, which strengthens the reliability of this study's result.

5. Conclusions

This study addressed the need for social entrepreneurship to properly tackle the issues of unfairness and information control in society. It was conducted to analyze the necessity of gamification in the educational process for nurturing excellent social entrepreneurs. Accordingly, we designed a training course of approximately 2 months and developed a game, the Avaritia, to help learners experience unfairness and information control. To verify

the effectiveness of the game, a questionnaire tool was created by adopting items from a previously developed questionnaire tool, and pre- post-questionnaire responses were analyzed through statistical tests. After analyzing the questionnaire responses, the teaching method using gamification was found to be more effective than the traditional teaching method for learners' intrinsic motivation, self-determination, and self-efficacy. These results suggest that gamification can help learners understand unfairness and information control. Additionally, gamification proved to have a positive effect on learners' intrinsic motivation, self-determination, and self-efficacy, thereby contributing to entrepreneurship education.

This paper proposes the following recommendations for more effective entrepreneurship education. The first method that was used was based on evidence of the necessity for an educational content development methodology or framework that revitalizes the entrepreneurship education ecosystem. Although gamified entrepreneurship learning already exists in numerous places, only gamification with the application of basic elements (e.g., points, badges, and leaderboards) is being implemented [40,41]. However, if even basic elements were used without professional knowledge, learning might be negatively affected. Therefore, more gamification elements or game rules should be available for more interactions and simulation-based entrepreneurship education. Therefore, researching and developing methodologies and frameworks that can apply gamification to existing entrepreneurship education programs or content are necessary so that not only Generation Z learners but others too can enjoy learning entrepreneurship.

The second method that was used was based on establishing a commercialization strategy for entrepreneurship education content with gamification. To spread entrepreneurship to more people and create more value, more content should be developed. Although demand for entrepreneurship education in the market is steady, most education is assumed to be based on traditional education methods or simple facilitation or recreation. However, if simulation-based entrepreneurship education is conducted, the satisfaction of instructors and learners could be enhanced, and the overall outcome indicators, such as educational value delivery and performance, would be improved. Accordingly, entrepreneurship education companies should develop more content and supply it to the market.

The third method that was used was based on extending entrepreneurship education to the metaverse. Since the start of the COVID-19 pandemic, the metaverse market has been growing rapidly, and a large number of Generation Z are active on the metaverse. Entrepreneurship education should be expanded to the metaverse in line with the times [42]. Games have created a lot of contact between the metaverse and users. Therefore, real-time simulation and interactive education should be conducted by developing gamified entrepreneurship learning content in the metaverse.

The limitations of this study are as follows:

- Analysis of the entrepreneurship education index is lacking;
- Additional research is needed for generalization of the results.

As this study focused on whether the developed gamification adequately delivered educational values, it concerns only the educational effectiveness of the developed gamification. Rather than directly applying it in the field of entrepreneurship education, we assume that it should be applied to the field after conducting additional research on educational effectiveness and reinforcing entrepreneurship competencies through additional research. By conducting additional research that utilizes entrepreneurship indicators, such as the Entrepreneurship Intention Questionnaire [43], further attempts should be made to expand the utilization plans and scopes of these results. Additional research should also target a larger number of subjects to make the results more generalizable. There should be more participants in the game and questionnaire to enhance reliability.

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Institutional Review Board Statement: This study was conducted in the entrepreneurship course of the first semester of 2022. Additionally, this study explained the gamification contents and survey in the lecture plan and curriculum. Moreover, this study explained the whole process to the participants before the lecture and survey with the corresponding gamification contents. In addition, the survey responses were included in the analysis only for volunteers. Additionally, this study was conducted for the purpose of verifying the effectiveness of 'Avaritia', a gamification contents developed by this study, so it did not impose specific conditions or responses on voluntary participants.

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