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Student-led Gamification in the Undergraduate Design History Course

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Abstract

History lessons are usually perceived by students as "boring" in classroom settings, thus effective teaching and learning strategies for this subject matter are commonly linked to fun, engaging and motivating approaches. This paper presents an account of a student-led gamification practice in an undergraduate Design History course. The purpose of this action research study was to improve the teaching practice, while affording the students to enjoy the process of developing content knowledge and historical thinking skills in the history lessons. The research process was planned before the semester started, in which four types of fun activities were mapped against the 14-week lessons of Design History. Reflection of teaching and learning activities was recorded at the end of every lesson; while meta-reflection was made during the mid-semester break, in which the outcomes were referred to refine learning practices on subsequent weeks. Apart from reflections, students' motivation was observed through their engagement in the class, and course evaluation at the end of the semester. All 83 students were able to gamify their knowledge gained in the Design History lessons. They designed, developed, playtested and revised 21 tabletop games using a set of gamification tools. The students were highly motivated to take part in interactive lecture, gamification activities in groups, and the playtesting session. In particular, the best tabletop game won awards in competitions, and subsequently funded by the university for commercialization. In terms of learning evaluation, the students rated 92.66 out of 100 and expressed gratitude for the overall learning experience. In conclusion, the student-led gamification practice was fun and engaging, while affording students to attain intended learning outcomes.

Keywords Design history; Student-led gamification; Tabletop game; Participatory Action Research

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Introduction

Empirical studies on history as a subject matter in formal educational settings revealed that history lessons were usually perceived by students as "boring" (Seixas & Peck, 2004; Sharifah Nor, Nooreiney, & Tak, 2010). Such negative perception prompted a need to motivate students when learning history in classroom settings. Therefore, instead of spoon-feeding historical events, the subject matter of history should gear towards the development of historical thinking (Seixas & Peck, 2004), while effective teaching and learning strategies are commonly linked to fun, engaging and motivating lessons. Hence, the genesis of an action research study on teaching an undergraduate Design History course through a gamification strategy. The purpose of this study was to improve the pedagogy, while affording the learners to enjoy the process of developing historical knowledge and historical thinking skills associated to design. This paper presents a reflective account of this student-led gamification practice in the course.

In education, gamification is a creative process of converting non-game activities into game playing activities for learning purposes (Haas & Tussey, 2020). The purpose of gamification practice is to make learning fun and engaging, while attaining the intended learning outcomes (Tan, 2020). When practicing gamification, the 4Keys2Fun model proposed by Lazzaro (2004) can be used to bridge learning to gamification in order to make a subject matter lively and fun. Lazzaro (2004) presented four types of fun in game playing—serious fun that provides meanings and value; easy fun that offers a vehicle for imagination; hard fun that occurs upon the mastery of knowledge and skills; and people fun that establishes social bonding among players. There are at least two ways of bridging fun to learning through gamification (Tan, 2015). The first involves designing, developing and validating serious games for use in serious contexts like education, military, healthcare and business to achieve certain objectives (Mildner & Mueller, 2016). When a teacher or lecturer takes part in the serious game production, he or she could be attempting to gamify the course contents, scenarios and teaching and learning activities. So this can be considered as a form of teacher-led gamification, in which the output of the gamification is a serious game that can be used in bridging fun to learning (e.g. Tsay, Kofinas, & Luo, 2017). Another way of bridging fun to learning is denoted as learning through game making (Tan, 2015). In this practice, the students create a game to demonstrate what they have learned in a course, a lesson or a few lessons. The students could be attempting to gamify the course contents in order to showcase their content knowledge (CK) and technological skills (TS). Hence, this could be considered as a form of student-led gamification. Figure 1 shows a continuum that delineate two ways of gamification in education.

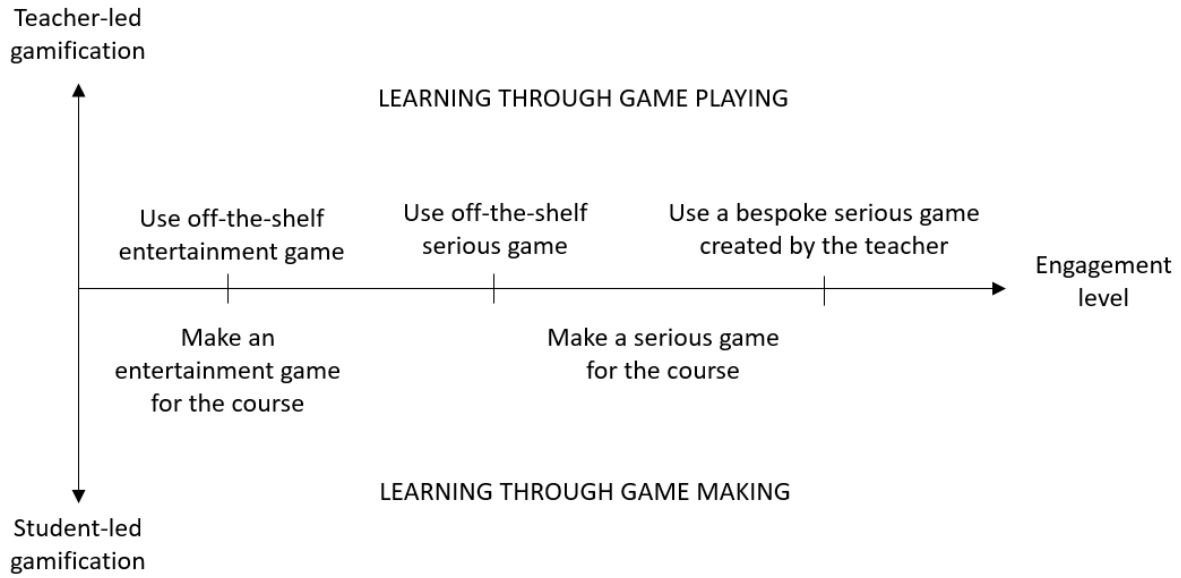


Figure 1 A Continuum of Gamification in Education. Adapted from Tan and Hayati (2019)

Apart from the continuum of gamification depicted in Figure 1, there are various existing models established by researchers and practitioners to inform how gamification may be practiced in educational contexts. For instance, Tan, Mohd Noor and Wang (2016) adopted the idea of constructive alignment introduced by Biggs and Tang (2011) when designing a digital game for teenagers to learn principles of inventive problem solving. The alignment connects three learning components to three structural elements of games. In particular, the observable behaviours in learning are aligned to the game goal; the conditions of attainment are matched to game rules; while the degree of attainment is linked to feedback information (Tan et al, 2016). A similar model was proposed by Huang and Hew (2018) for postgraduate flipped courses, and they named the model as goal-access-feedback-challenge-collaboration (GAFCC) gamification design model. Through quasi-experimental studies, this model was found effective in enhancing the quantity and quality of work among postgraduate students (Huang & Hew, 2018). Nonetheless, most gamification models, included the above mentioned examples are teacher-led in nature, as elaborated in Figure 1. In contrast to these models, this paper presents an instance of student-led gamification that bridges fun to game making. It depicts how four types of fun advocated by Lazzaro (2004) were actually bridging fun to learning in an undergraduate Design History course.

The Design History Course

In Sultan Idris Education University (UPSI), the MSR3033 Design History course is conducted by the Creative Multimedia Department for undergraduate students from three Bachelor of Design (BD) with

honours programmes, specifically BD in Animation, BD in Advertising and BD in Digital Games. The course is one out of nine common core courses, in which all BD students are required to take the course in the first semester of the first year. In other words, the negative perception held against history as a formal subject matter in secondary school may still be carried forward to the first semester of their undergraduate experience.

The Design History course is a three credit-hour course, contributing 2.4% of the total 125 credit hours requirement for earning a bachelor degree. In UPSI, one credit hour would attribute 40 hours of student learning time or SLT, thus every student is expected to spend 120 hours of learning time on Design History throughout the semester. In a standard 14-week semester, the student should spend 8.57 hours or approximately 8 hours 34 minutes every week to study Design History. By default, the weekly SLT includes a 3-hour face-to-face learning from the lecturer in a designated lecture hall. The remaining 5.57 hours would either be self-directed learning, working on assignments, or reviewing lessons for taking in-class quizzes or tests. In other words, the Design History lecturer should plan for suitable learning activities ahead before starting a semester.

In terms of learning contents, the Design History course aims to "prepare students with knowledge and understanding of design evolution, theories and prominent personalities in the design world from the Post-impressionism era to the present. The understanding will give students the capability to analyze and appreciate their work (Faculty of Art, Computing & Creative Industry, 2018)." As an effort to make the course meaningful for the students, historical thinking skills associated to design are developed throughout the semester, alongside with the acquisition of historical knowledge (Seixas & Peck, 2004). The course has four intended course learning outcomes (CLOs) as listed below:

- Identify and comprehend the history and the era of design creation.
- Understanding the consequences of global evolution and its effect towards design.
- Recognize various techniques through media and concepts used in design history.
- Research in design history through text references and website.

Method

The conduct of teaching, learning and assessment in the Design History course was planned as a form of participatory action research (PAR) study. PAR is grounded on inclusion principles that engage people, both the researcher and surrounding actors, to participate in a context with intervention which directs collective social and behavioural changes (adopted from Setty and Witenstein, 2016).

The study involved two forms of data: the lecturer's reflection and meta-reflection; and the students' engagement and learning evaluation. Reflection of teaching and learning activities was recorded in a blog at the end of every lesson; while meta-reflection was made twice, the first during the mid-semester break and the second at the end of the semester. As a form of reconnaissance in action research (Norton, 2018), the outcomes of the first meta-reflection were referred in order to refine the gamification practice on remaining weeks. These reflective accounts were analyzed to depict the settings and the participants of the study. Meanwhile, the students' engagement was observed through their participation in student-led gamification activities. The descriptive statistics of these data were triangulated with the students' learning evaluation and feedback that covered six constructs: planning, learning, student participation, coursework, soft skills, and course description.

The Settings and the Participants

The study took place in the first semester of the 2018 / 2019 academic year, where 83 undergraduate students registered for the Design History course. There were only four students from the BD in Digital Games, and most of the students were female (55 out of 83), especially in the BD in Advertising programme. The youngest students were 20 years old (11 out of 83), while the oldest were 23 years old (2 out of 83), but majority of the students were 21 years old (52 out of 83). The demographic profile of the students is shown in Table 1.

Table 1 Demographic profile of students who took the Design History course

	Gender		Total
	Male	Female	
BD in Animation	21	19	40
BD in Advertising	6	33	39
BD in Digital Games	1	3	4
Total	28	55	83

Teaching and learning of the Design History course began with four weeks of mass lecture sessions, as shown in Figure 2. Lecture, especially lecture with interactive technology was found to be the most economical approach to build foundation content knowledge (Kola, 2017). In-between each mass lecture, interactive activities were planned to allow students to play the roles of different historical figures while appreciating the values of Design History.

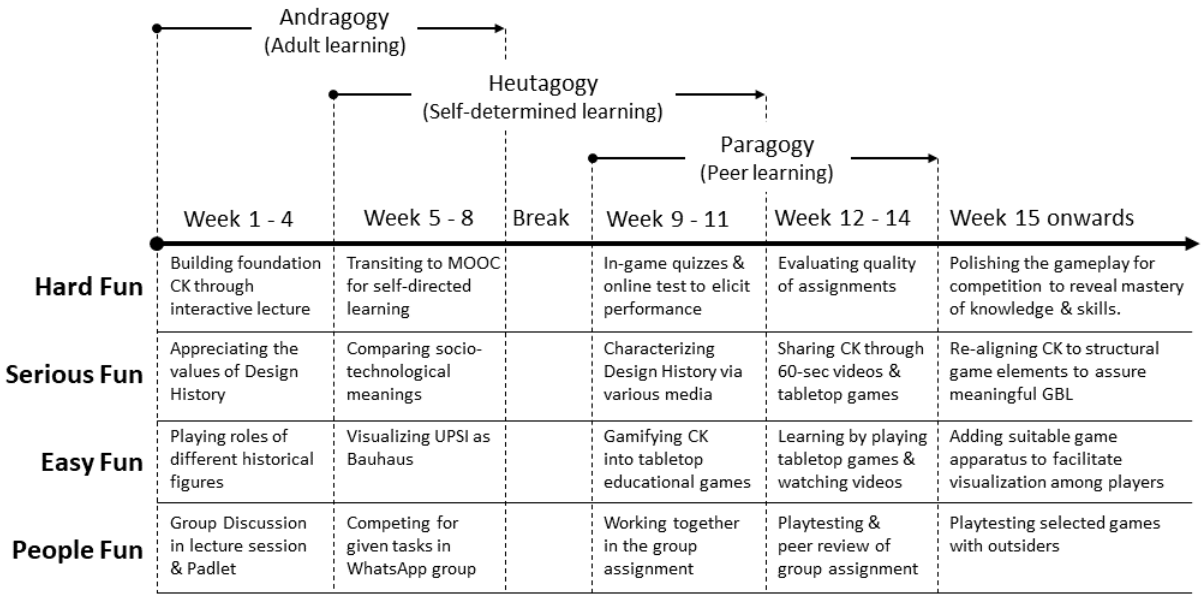


Figure 2 Planning Four Types of Fun Activities in a 14-Week Semester

Formative assessment was carried out in the lecture hall through group discussion and Padlet (Fisher, 2017). Upon mastering the foundation CK and TS, the students were guided to audit a massive open online course (MOOC) entitled Ideas from the History of Graphic Design. This four-week MOOC was offered by California School of Arts via Coursera, where the students completed the course at their own pace. In addition, a WhatsApp group was set up by the students to compete among themselves upon online tasks. The students were directed to visualize and imagine UPSI as a possible instance of Bauhaus, by comparing their socio-technological meanings.

A Guiding Instrument for Student-led Gamification

The student-led gamification activities were planned as the group assignment that carried 40% of the total course score. The assignment required students, in a group of four, to gamify CK and TS of Design History into a playable tabletop game. To cultivate historical thinking skills, students were facilitated to improvise how they like future history of design to be. The outputs of this improvisation were presented in Week 3. After the presentation, a crash course on gamification was delivered to the students in Week 4. They were given a guiding instrument called Seven Steps of Gamification (see Figure 3). The instrument was supported by an online training module called Utopian Pedagogic School of Innovation, accessible at https://sites.google.com/a/fskik.upsi.edu.my/gamification/ (see Figure 4).

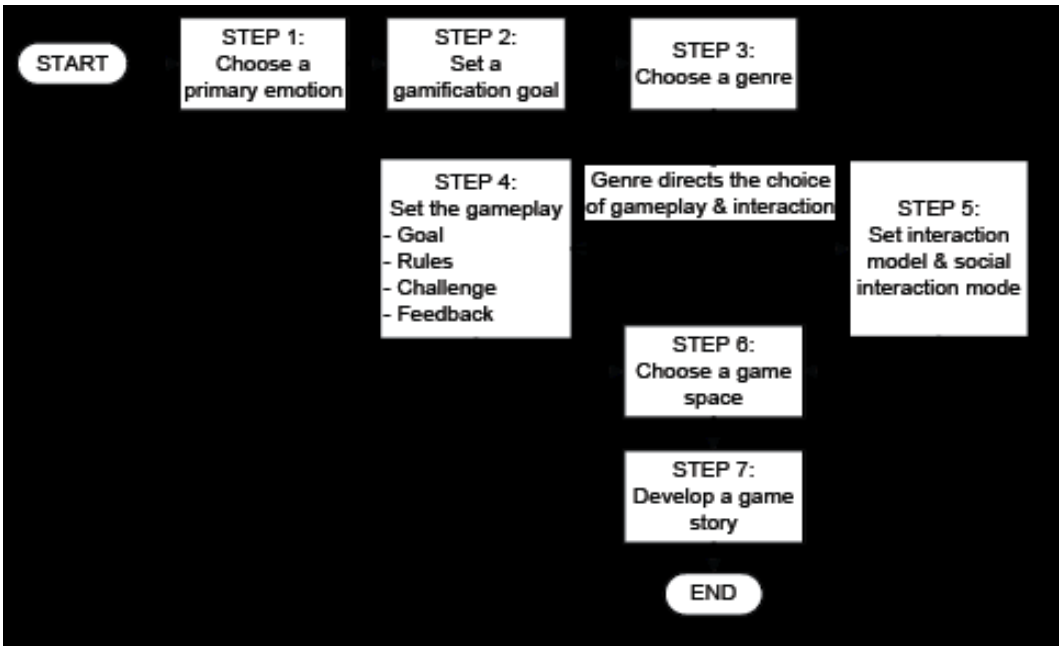


Figure 3 The Flow Chart of Seven Steps in The Student-Led Gamification

Figure 4 Utopian Pedagogic School of Innovation is a Physical Multiplayer Role-Playing Game that Features Gamification Training (Tan, 2020)

First of all, every group leader drew one out of six primary emotions, and the students were judged whether they can incur this particular emotion among targeted players at the end of a game playing session. As stated in the James-Lange theory of emotions (Brogaard & Chudnoff, 2016), human beings shared six primary emotions, which are sadness, happiness, fear, anger, disgust and surprise. Compared to social emotions which are developed upon the action, feelings and thoughts of other people in a specific socio-cultural context (Burkitt, 2018), primary emotions were more suitable to drive game players to achieve specific goals (Baharom, Tan & Idris, 2014).

Next, the students set a gamification goal that defined specific topics or aspects of the Design History course for a tabletop game. They also described what players must do in order to acquire the CK or TS, and to what extent their players were expected to perform in the game world. This in turn would prompt the students to choose a suitable game genre for the tabletop game. In practice, their choice would shape the format of the game, which could either be a dice game, a card game, a board game, a story-driven game, or a combination of several formats.

The chosen genre and format limited their choice of gameplay and interaction. Each group of the students developed the gameplay that encompasses four elements—game goal, game rules, challenges and feedback. Based on the gameplay, the students chose an interaction model that matched the social interaction mode (Adams, 2014). Once the gameplay and interaction were finalized, the students chose and optimized a game space to cater the needs of their tabletop game. For students who wanted to have a story for their game, they proceeded to the seventh step to create a game story, else the gamification process ended at the sixth step. The students conceptualized and visualized their gamification ideas into a gamification design document (GDD).

In Week 10, all 21 groups of the students presented their design documents, demonstrating how they planned to develop tabletop games. They also listed down materials needed to build the game. Formative assessment of their gamification progress was carried out, ensuring every group was actually on track.

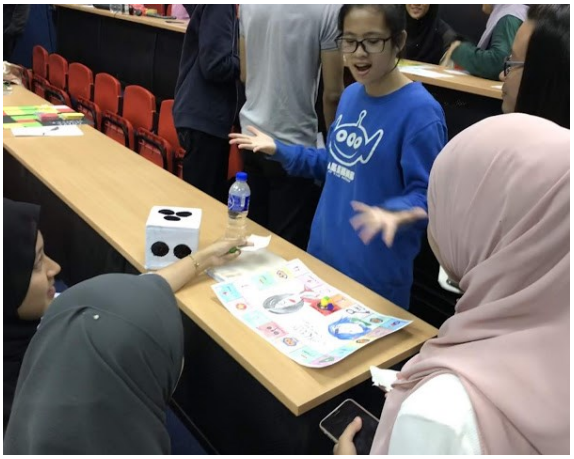
Playtesting Tabletop Games as Peer Learning

In Week 13, all students participated in a playtesting session held in the class (see Figure 5). Every game was playtested by four peer players, using a gamification review form that covered four assessment criteria: 1) alignment to Design History; 2) gameplay; 3) representation; and feedback design. After the playtesting session, the students revised the games according to the feedback given by their peers. Finally, they submitted their games on Week 14 in the class.

Game title: Adventure of Sarjan Hassan

Game title: Hyperione

Game title: Mannaro



Game title: Caroline

Figure 5 The Playtesting Session on Week 13

Findings

In the anonymous online learning evaluation, 81 out of 83 students responded to the scoresheet in the UPSI learning management system, which was known as MyGuru. Nine of these respondents also left their comments and suggestion. As a whole, the students showed positive attitudes in the class throughout the semester. The students were motivated to participate in interactive lecture, gamification activities in groups, and the playtesting session. In particular, they seemed to like the gamification approach very much. When giving comments and suggestions at the end of the semester, they expressed gratitude to the lecturer by saying they enjoyed the class very much, hoping the lecturer to keep it up. They also perceived the learning approach as interesting and entertaining.

The students rated 92.66% in the learning evaluation (see Table 2). The overall mode mark for all 30 items of the evaluation was 3 marks (out of 3); while the overall mean mark was 2.78 (out of 3). The student participation construct gained the highest score (93.42%), followed by the planning construct (93.17%) and the coursework construct (92.92%). The remaining three constructs—course description (92.67%), learning (92.02%), and soft skills (91.77%), scored at least 91%.

Table 2 Students' learning evaluation at the end of the semester

Criteria	**Items**	**Count of Score** (N = 81)			**Mode**	**Mean**
		1 mark	**2 mark**	**3 mark**		
Planning	1. Pro Forma of this course was explained at the beginning of teaching and learning sessions.	1	16	64	3	2.78
	2. The learning materials listed in Pro Forma were relevant to the content of the course.	0	14	67	3	2.83
	3. Soft skills were listed in Pro Forma.	3	15	63	3	2.74
	4. Learning materials were uploaded to MyGuru.	1	14	66	3	2.80
	5. Learning sessions included the whole course content.	0	14	67	3	2.83
	Sub-score	**5**	**146**	**981**	**-**	**-**
	Average score	**1132/1215 x 100% = 93.17%**				
Learning	1. Variety of learning methods were applied in teaching and learning sessions.	0	13	68	3	2.84
	2. Teaching and learning sessions stimulated me to think critically and creatively.	0	18	63	3	2.78
	3. Teaching and learning sessions helped me understand my course content.	1	18	62	3	2.75
	4. Teaching and learning sessions emphasized the relevance of the theory and its application in everyday life.	1	20	60	3	2.73
	5. Teaching and learning sessions motivated me to study this course.	3	18	60	3	2.70
	Sub-score	**5**	**174**	**939**	**-**	**-**
	Average score	**1118/1215 x 100% = 92.02%**				
Student Participation	1. I was given chance to ask during the teaching and learning session.	0	17	64	3	2.79
	2. Lecturer asked specific questions to encourage my involvement.	1	19	61	3	2.74
	3. I was given chance to discuss with my friends.	0	10	71	3	2.88
	4. The activities planned in teaching and learning session encourage my participation.	0	13	68	3	2.84
	5. I was given the opportunity to give opinion during the teaching and learning session.	4	11	66	3	2.77
	Sub-score	5	140	990	-	-
	Average score	1135/1215 x 100% = 93.42%				
Coursework	1. Assignments given are related to course content.	2	11	68	3	2.81
	2. Assignments given are suitable with my learning time.	2	17	62	3	2.74
	3. Assignments given help me to relate the course content with the real world.	2	12	67	3	2.80

	4. Assignments were monitored and responded by lecturers throughout the teaching and learning process.	0	19	62	3	2.77
	5. Assignments were evaluated on the basis of process and results.	1	13	67	3	2.81
	Sub-score	7	144	978	-	-
	Average score	1129/1215 x 100% = 92.92%				
Soft Skills	1. My lecturer provides opportunities to play different roles in the teaching and learning process.	2	18	61	3	2.73
	2. My lecturer reminded us on punctuality to class.	0	14	67	3	2.83
	3. My lecturer gave opportunity to communicate effectively.	0	20	61	3	2.75
	4. My lecturer reminded us on healthy and responsible ways to social.	3	18	60	3	2.70
	5. My lecturer encouraged problem solving approach throughout teaching and learning process.	1	18	62	3	2.75
	Sub-score	6	176	933	-	-
	Average score	1115/1215 x 100% = 91.77%				
Course Description	1. Course content corresponds to the credit hour.	0	15	66	3	2.81
	2. The duration of the course corresponds to its credit hours.	0	15	66	3	2.81
	3. The contents of this course are relevant to my programme.	0	18	63	3	2.78
	4. The course is very important for my programme.	3	15	63	3	2.74
	5. Overall I am satisfied with this course.	1	18	62	3	2.75
	Sub-score	4	162	960	-	-
	Average score	1126/1215 x 100% = 92.67%				
Total score		6755/7290 x 100% = 92.66%				

Overall, the respondents were satisfied with the planning and conduct of this Design History course. In particular, they believed the course content corresponded to the credit hour, and the duration of the course corresponded to its credit hours. They found the course contents relevant to and important for their Bachelor of Design programmes.

In terms of learning, they acknowledged the variety of learning methods applied in the course. To most of them, teaching and learning sessions not only stimulated them to think critically and creatively, but also motivated them to study Design History. The sessions helped them understand the course content, while emphasizing the relevance of the theory and its application in everyday life.

With regard to student participation, the students were given chance to ask questions, discuss with their friends, and give opinion during the teaching and learning session. The activities planned for the session encouraged their participation. Also, the lecturer asked specific questions to encourage individual students' involvement.

In connection with coursework, the students believed that assignments were related to course content and suitable with their learning time. The assignments also helped them to relate the course content with the real world. They were aware that the assignments were monitored and responded by the lecturer throughout the teaching and learning process, in which the evaluation was done on the basis of process and results.

In the matter of soft skills, the students reckoned that their lecturer gave them opportunities to communicate effectively and play different roles, while encouraging problem solving approach throughout the teaching and learning process. The lecturer also reminded them on punctuality to class, and health and responsible ways to social.

Discussion

A Successful Case of Student-led Gamification Practice

From 21 tabletop games, Designers of War received the highest score and it was highly recommended by its playtesters (see Figure 6). The game was chosen to participate in two competitions, where it won a gold medal in the Penang International Invention, Innovation and Design, and subsequently ranked the third place in the UPSI Downing Entrepreneurship Award. The game was funded by UPSI for commercialization. Therefore, the game became a successful case of the student-led gamification practice.

Figure 6 Designers of War Card Game

Designers of War is a multiplayer tabletop game created for undergraduate students to practice creative thinking and critical thinking in product design among undergraduate students. As a product of the Design History course, the students developed a fictional setting of the Second World War for the game, positioning players to think about design from a specific historical timeframe. In each game session, two to four students play the role of professional designers who are called in by a fictional militant government to invent things. Herewith the beginning of the game story:

> "You are a famous inventor and professional designer, living in the time of World War II. The militant government recruits you to invent products for medical professionals, civil defence force, frontline soldiers, or war room military officers. If your invention failed to impress the militant, your family and you are in danger."

As assigned in the first step of gamification, players are expected to feel sad after playing the game. To assure that would be the case, both winners and losers of the game read aloud one of 16 different heart-touching endings. The game goal was geared towards understanding two product design approaches—vernacular design (before the first industrial revolution) versus modular design (afforded by the industrial revolution), a topic of Design History taught in Week 4. Table 3 shows the constructive alignment between observable behavior, conditions of attainment, and degree of attainment of the game.

Table 3 Constructive alignment between CK and gameplay

Overall Statement: To acquire knowledge on two product design approaches (vernacular versus modular)		
Observable behavior (OB):	**Conditions of attainment (CA):**	**Degree of attainment (DA):**
OB1: Use the Item card as the basis...	CA1: ...to develop a prototype that...	DA1: ...meets all the requirements within the given constraints.
OB2: Apply product-oriented problem solving method...	CA2: ...to solve specific problem generated from the cards players received randomly...	DA2: ...in order to meets all the requirements within the given constraints.
OB3: Use Nine Windows for evolutive brainstorming...	CA3: ...to develop futuristic product design that...	DA3: ...meets all the requirements within the given constraints.
OB4: Pitch design of a prototype...	CA4: ...by following the diamond structure...	DA4: ...in order to cover all features of upgrade cards / additional objects that meet all the requirements within the given constraints.
OB5: Describe how a prototype can be evaluated using DUMBS model...	CA5: ...based on the score they received from the judging	DA5: ...in order to relate the quality of their prototype to the requirements of the challenge.

When a player starts to play Designers of War, the ideation for problem-solving involves two thinking processes at different timeframes. This feature is an excellent example of how historical thinking was applied in designing the game. The use of evolutive brainstorming through Nine Windows would encourage players to generate as many solutions as possible, hence creative thinking at work (Mann, 2001). Table 4 is an example for inventing a chair (item card) for use by civil defence officer (field card). After the brainstorming, the player should think critically when choosing the best possible solution. The critical thinking can be supported by using the doable-usable-marketable-bankable-sustainable (D.U.M.B.S) invention evaluation tool (Tan & Yong, 2018). Figure 7 is an instance of game playing in action.

Table 4 Nine windows for evaluative brainstorming

Super-system • Users • Environments • Other systems	Frontline war elephant Unpaved road Shield Weapon holders	Civil defence officer Unpaved road Wheels for chairs Bell that informs civilians	Civilians Air space Remote controller Loud speakers Drone system
System	Chopped wood stool	Chair (item card)	Flying Chair
Sub-system	Seat Legs	(upgrade cards) Seat Legs Rest Nails	Seat Rest Hovers Electronic components
	Past	Present	Future

Figure 7 A Player Showed His Invention of Table for Medical Officers at the End of a Game Session

Conclusion

The findings of this action research study indicated that student-led gamification practice in the undergraduate Design History course can make history lessons fun, engaging and motivating. The students enjoyed the teaching and learning process by transferring their CK and TS into the design, development and assessment of their tabletop games.

To assure quality of the student-led gamification practice, the lecturer planned all Design History lessons ahead, mapping weekly activities against four types of fun advocated by Lazzaro (2004). Reflection and meta-reflection should be documented chronologically to refine learning practices in the middle of a semester and for upcoming semester.

Nonetheless, despite having the potential to contribute to the collection of best gamification practices in education, the PAR design of this study inherits the cyclical nature and limitations of action research, specifically its small sample size.

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