

# Station Rotation Gamification in Education to Increase Students' Engagement Levels

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## Abstract

This paper aims to explore the level of engagement in Station Rotation Gamification. An innovative approach has been introduced by researchers to teaching and learning strategies to fill the gap of unstructured gamification that has been witnessed in many previous gamification approaches by many researchers. The observation was administered quantitatively to the 35 students via an experimental design approach on the gamification platform Talentlms.com to accomplish the task. to support the findings. The study comprises of 10 weeks teaching and learning with the 2 most difficult topics being Database and Networking. Qualitative data is also been collected with ten students participating in the semi-structured interview for the study. The interview's findings are categorized into themes and subthemes. The degree of involvement when using the Station Rotation Gamification for learning varied depending on the subject matter and the student. The result of engagement level is fluctuating according to the topics, this was pertinent and discernible in the current investigation, particularly during the first three weeks of the intervention. The gamified platform increase students' engagement however the level of engagement fluctuated based on the topics. In conclusion, while SRG may not consistently address the engagement issue (due to topical fluctuations), it offers a viable solution to mitigate engagement problems.

**Keywords:** Gamified, Gamification, Blended Learning, Station Rotation, Engagement, And Higher Education

## Introduction

The technology in digital society has been rapidly changed. The education world is moving towards digitalization. Any educational process may be made much more engaging and rewarding by implementing strategies and tactics based on active methodologies, where the utilization of modern technologies is crucial. In class, teachers integrate technology in delivering lessons to students. However, the use of minimal technology like presenting slides contributes to the mundane and passive situation. One of the major challenges is when students have a low retention rate, and refuse to participate in class due to low motivation, hence contributing to low achievement according to (Osatuyi et al., 2016; Krause et al., 2015). Teachers have to be creative and innovative in delivering lessons to Generation Z.

Gamification is one of the options offered in class that infuses game design elements in non-gaming activities that enable the changes of interaction in class as well as their motivation and cognitive level. (Manzano-León et al., 2021). It is a technique whose goal is to boost both intrinsic and extrinsic motivation and engage participants in the activity through ludic activities (Buckley & Doyle, 2016). Extrinsic motivation involves incentivizing individuals through the acquisition of reinforcers while intrinsic motivation refers to engaging in an activity for the sheer enjoyment and satisfaction derived from the activity itself, rather than for external rewards or pressures. (Fischer et al., 2019). It involves an individual's internal desire, curiosity, or interest in the task at hand. Intrinsic motivation is driven by personal enjoyment, curiosity, a sense of challenge, or the inherent satisfaction derived from the activity. When developing gamification strategies, it becomes crucial to identify intrinsic motivations that can effectively maintain user engagement. This concept is intricately linked to the Self-Determination Theory (SDT) (Earl, 2019), emphasizing three psychological needs: autonomy (indicating the extent to which an individual's actions originate from their interests), competence (the sense of capability in performing a task to a certain degree), and connection with others (Trigueros et al., 2019).

Gamification has lately been introduced into a teacher's teaching style based on earlier studies. Many researchers give various definitions. Gamification, according to Hamari (2017); Sebastian et al (2017), is the application of game elements in settings other than the actual game. Gamification in Information Technology, according to Irwin et al (2015), can encourage voluntary continual practice. It might increase students' enthusiasm and commitment to their academic attempts. Gamification increases students' motivation and engagement in class activities by allowing them to assess their performance and encouraging non-obligatory constant practice (Hamari et al., 2014). According to Shernoff et al (2017), students are believed to be able to boost their involvement by extending their limits via consistent feedback.

Despite its benefits, several academics and researchers have questioned the approach's efficacy, questioning whether its negatives outweigh the advantages (Doherty et al., 2017). The study found that the gamification approach in particular may use changes to better its structure and organisation. The success of gamification in education is explained in great detail in a great number of published research studies. Researchers have run into several difficulties when implementing gamification into learning, though. Gamification needs to be improved immediately in light of the unfavorable conclusions from past studies and stressed in their research that the ineffectiveness of gamification was apparent due to the execution of actions flaws in the analysis. According to Çakiroğlu et al., (2017), Prior research often either implemented a class intervention without administering a pre-test or carried out a two-class comparative study without evaluating students from the same course.

According to Doherty et al (2017), one of the significant challenges faced by the industry is the absence of clear guidance on gamification methods and their effects. While lists of gamification methods are readily available, there is a notable scarcity of research demonstrating the most effective outcomes associated with each of these methods. Hence, an innovative solution called "Station Rotation Gamification" is introduced by researchers to reduce the flaws of existing implementation. The innovation of SRG is derived from gamification and station rotation in the blended learning environment to fill the gap of

unstructured gamification. Furthermore, the SRG is designed to cater to structured gamification with systematic learning objectives.

### **Literature Review**

Gamification seems to be significant in various industries. Many industries infused gamification as a tool to support goal-oriented behavior (Rabah et al., 2018). In education, gamification has been widely used by the majority of teachers learning (Da Rocha Seixas et al., 2016; Orhan Göksün & Gürsoy, 2019). This is because gamification is capable of improving students' engagement be it in class or outside of the class. Moreover, gamification injects a new paradigm into teachers' instructions by allowing game elements to be inoculated into the no-game situation (Zainuddin et al., 2020). Sailer & Sailer (2021) stress in their research that effectively adopting gamification may be quite helpful in both igniting motivation and sustaining it over time, as this element of play adds a playful element to learning. In their research, the findings support the use of gamified learning in education by demonstrating the positive effects of application-based knowledge that is impacted by learning process performance. Additionally, the results demonstrate how gamified in-class activities increase students' intrinsic motivation and social connectivity. According to the self-determination hypothesis, the satisfaction of desires for competence is unaffected. Alshammari (2020) reached a related finding in his research. In this study, primary school children taking an Arabic language course participate in a controlled experiment to examine the learning effects of gamification. The findings show that gamification improves students' learning objectives and fervor for information. This in line with findings by Andrés (2022) indicates that the students believed that the gamification-based techno-pedagogical design improved their learning and helped them achieve higher academic goals than they would have with alternative approaches that did not incorporate game-based or game-inspired strategies. Duggal et al., (2021) performed research on a group of 120 students by introducing a gamified framework, the result demonstrated that the group who were undergoing the treatment of gamification had a better level of participation. This result proves that gamification can be one of the best approaches to increasing students' engagement, motivation, and achievement.

### **Methodology**

The purpose of this study is to investigate the engagement level of executing the Station Rotation Gamification at a public college in Malaysia. The specific research question is "What is the level of student engagement in implementing Station Rotation Gamification (SRG) in higher learning education?". Quasi-experiments were employed in this study to explore students' engagement. The study involved 36 students in an experimental group. In the setting of station rotation, students rotate on the station freely regardless of the type of station. For each of the stations, students perform tasks via Talentlms.com as a platform of gamification. From the activities performed, the researcher collected data on the frequency of logging, duration spent in the session, and completion rate of each assignment. Additionally, to examine the engagement level of putting this strategy into practice, qualitative case studies were used. The methodology of qualitative case studies was chosen as a result of Yin's (2016) approach to researching actual circumstances and solving contemporary issues. Ten students participated in the study, and the research objectives guided the development of a semi-structured interview guide. Through the use of open, axial,

and selective coding procedures, the interview responses were examined and grouped into themes and subthemes. The ATLAS.ti 23 program was used to categorize the results.

### Games, Gamification, and Station Rotation

Computer games are becoming an increasingly important part of our culture and these days, computer games play a significant role in the leisure activities of the majority of kids and are becoming more and more ingrained in our culture. It can be defined as a fun sport or pastime, particularly one that is played by kids, or the tools required to perform it. While gamification has different meanings from games it brings tremendous impact on society similar to the games. Gamification is the use of various game components in situations or contexts outside of gaming. Points, leaderboards, levels, and badges are all part of this. Numerous researches have shown that gamification is beneficial in both online and offline situations. It might be as easy as the teacher giving the students candy when they finish an assignment. Gamification as a learning approach has been proven to be appealing, pleasant, and enjoyable. However, according to Sailer et al (2017), the gamification implementation process has not been well thought out or planned. Still, gamification's application has also been found to have problems. Unstructured gamification in the development and application of gamification is one of its major weaknesses. Station Rotation is one of the blended learning models comprised of many stations that utilize unique activities at each of the stations. Students will rotate on the fix station either online or offline learning. While station rotation is mostly used in primary education, implementing station rotation in higher education is also significant. Station rotation is a highly organized approach, while gamification offers fun and enjoyment in learning, thus infusing both strategies might boost the level of engagement, motivation, and engagement. Thus to fill the gap researchers have discovered an advancement in the gamification method known as Station Rotation Gamification (SRG). SRG's design considers every aspect that is required to guarantee a methodical approach to gamification-based teaching and learning. Table 1 below indicates the general idea of SRG as described below

Table 1

*Component of Station Rotation Gamification (SRG)*

Station	Task	Duration	Game Elements
Station 1	SE1	25 minutes	Points, badge, leaderboard
Station 2	SE2	25 minutes	Points, badge, leaderboard
Station 3	SE3	25 minutes	Points, badge, leaderboard
Station 4	SE4	25 minutes	Points, badge, leaderboard

For each of the stations, students access the platform of gamification via Talentlms.com. It is a platform of gamification with features that enable users to implement gamification online. Students collaborate in groups to explore the task given. In these stations, students are practicing active learning by implementing discussion, inquiry, and social interaction. However, the task must be completed individually, hence enabling the collecting of items such as points, badges, and certificates personally. The best part about this approach is when students complete the task according to the learning outcome. The objective is clear for each of the station. Station 1 named Goal is a compulsory station that introduces the learning objective of the overall topic with a concept explained by the teacher. At this station, students grasp the main idea of the learning for the particular topic. By introducing the idea that

learning can be started via a diverse approach, students are permissible to visit any station (except for station 1) regardless of the sequence. While one group continues at station 2, the rest have the option to resume at station 3 or station 4. Regardless of the sequence and learning outcome, the uniqueness of SRG when some of the students proceed to station 4 named 'access' by answering the test question. The best part is students are allowed to explore and investigate the sources to find the answer for the test or quizzes. Even though, in formal education, it is common that the test should be given at the end of the learning session. Here, the researcher integrates the idea of Inquiry-Based Learning where learning happens when there is inquiry. The questions from the test or exam are equivalent to a question when starting the inquiry. The strength of this approach is, that students will be familiar with the commonly asked questions in exams.

In general, there are significant activities about every station in Station Rotation Gamification (SRG). At Station 2 the task given related to basic understanding of the concept and key terminology of the topic. Among those activities assigned are exploring the meaning of the appropriate key terms, explaining the mechanism such as how it works, and elaborating on the features of the particular sub-topic. At this station, students can master and grasp a basic understanding of the sub-topic. While Station 2 emphasize on basic understanding of concept Station 3 focuses more on task requiring students to be competent at collaborating in achieving skills of evaluation and analysis. Tasks assigned in TalentLMS.com are writing reflections on videos, writing analyses of the issues, and synthesizing from diverse sources. Station 4 is designed to cater to the test and exam questions. The SRG's uniqueness is that students can start learning at any station. Although station four consists of questions, which is typically found as the final segment in traditional learning, the SRG is intentionally designed for open access at any point. This design aims to emphasize that learning can commence from any stage. Within this station, students engage in learning through the process of exploring answers to the provided questions. This learning process requires students to investigate answers based on the given questions. All of the above stations will require students to access the gamification platform via TalentLMS. Students will gain points, and badges and see the leaderboard for the task that has been successfully submitted and verified by teachers. At the end of the course, students will be awarded a certificate for the completed course. Figure 1 below indicates the task assigned in TalentLMS and Figure 2, Figure 3, Figure 4, representing the game elements.

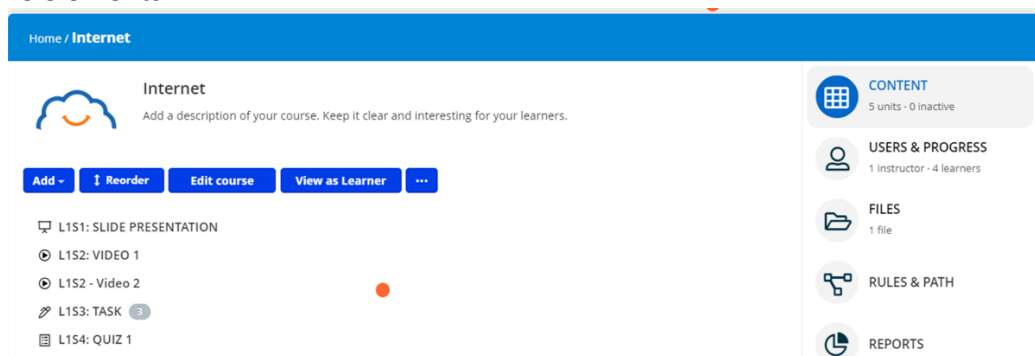


Figure 1: Task assigned in TalentLMS

**POINTS**  ON

- Each login gives  points
- Each unit completion gives  points
- Each course completion gives  points
- Each certificate gives  points
- Each successful test completion gives  points ?
- Each successful assignment completion gives  points ?
- Each successful ILT completion gives  points ?
- Each discussion topic or comment gives  points
- Each upvote on discussion comments gives  points

Figure 2: Game Element Points

**BADGES**  ON

- Activity badges (4, 8, 16, 32, 64, 128, 256, 512 logins)
- Learning badges (1, 2, 4, 8, 16, 32, 64, 128 completed courses)
- Test badges (2, 4, 8, 16, 32, 64, 128, 256 passed tests)
- Assignment badges (1, 2, 4, 8, 16, 32, 64, 128 passed assignments)
- Perfectionism badges (1, 2, 4, 8, 16, 32, 64, 128 tests or assignments with score 90%+)
- Survey badges (1, 2, 4, 8, 16, 32, 64, 128 completed surveys)
- Communication badges (2, 4, 8, 16, 32, 64, 128, 256 topics or comments)
- Certification badges (1, 2, 4, 8, 16, 32, 64, 128 certificates)

Figure 3: Game Element Badges

**LEVELS**  ON

- Upgrade level every  points
- Upgrade level every  completed courses
- Upgrade level every  badges

Figure 4: Game Element Levels

## Results

The main objective of this section is to present the findings based on a quantitative and qualitative approach through the implementation of SRG in class. Tables are used to display the quantitative data. The investigation from a qualitative approach yielded a conclusion from the viewpoint of the student. Both sections present newly discovered information about the level of student engagement in putting the "Station Rotation Gamification" (SRG) learning approach into practice.



Tables are used to display the quantitative results. The study's conclusions are drawn from the viewpoint of the experimental group's students. Nevertheless, to show how involved students are in putting SRG into practice, the quantitative data is carefully examined and displayed in tables. Data logs were calculated based on how frequently students used the gamified learning and entered into the system. This enhanced the research's ability to pinpoint what makes utilizing a gamified system engaging. The researcher and the teacher used these data logs to determine what kinds of incentives to provide the students based on their involvement in the learning process. This could incorporate game components like points for successfully performing tasks or badges that are covered in the gamified system intervention. Besides participation login, the time duration spent and completion rate are used to determine the student's level of engagement.

The students underwent a 10-week gamified intervention after completing the standard classroom instruction (offline classroom). The gamified intervention made use of the Talentlms commercial software internet platform. Points, badges, and leaderboards were all included in the platform because they were essential gamification components for the study. As a result, it was selected as the foundation for online gamified learning. The student Talentlms information is split into two primary sections: Networking and Topic Database. One class in the SRG learning environment lasts 100 minutes and consists of 4 stations where students must complete tasks. Students used Station Rotation Gamification (SRG) to access TalentLMS.com during the class intervention for the first topic, which was networking. Aside from the first, all stations require students to log onto TalentLMS.com and complete the provided gamification tasks.

Table 2

*Time spent in TalentLMS.com on Networking topic*

Topic: Networking					
Student ID	Time spent	Ranking	Student ID	Time spent	Ranking
SE5	29h 48m 51s	1	SE34	12h 21m 49s	19
SE24	25h 47m 35s	2	SE7	12h 15m 5s	20
SE12	25h 28m 19s	3	SE2	12h 14m 2s	21
SE20	25h 9m 10s	4	SE28	12h 11m 44s	22
SE23	25h 1m 37s	5	SE32	12h53m 21s	23
SE19	24h 58m 53s	6	SE27	11h 6m 2s	24
SE13	24h 7m 53s	7	SE6	11h 5m 20s	25
SE11	23h 59m 34s	8	SE35	6h 57m 38s	26
SE15	23h 59m 8s	9	SE18	6h 56m 49s	27
SE17	23h 29m 32s	10	SE4	6h 54m 58s	28
SE33	23h 19m 33s	11	SE22	5h 50m 32s	29
SE26	22h 33m 19s	12	SE16	5h 44m	30
SE30	12h 8m 52s	13	SE25	5h 40m 17s	31
SE14	11h 5m 56s	14	SE3	5h 39m 58s	32
SE21	12h 35m 4s	15	SE8	5h 26m 17s	33
SE1	12h 35m 20s	16	SE29	5h 26m	34
SE10	12h 30m 57s	17	SE31	4h 48m 51s	35
SE9	12h 22m 24s	18			

According to Table 2, the student with the highest grade, SE5, spent the most time on the activities—29 hours 48 minutes, and 51 seconds—followed by 25 hours, 47 minutes, and 35 seconds, and SE3 spent the least amount of time—5 hours 48 minutes and 17 seconds. The time difference between the two extremes is 24 hours, 0 minutes, and 34 seconds.

The results will reveal the degree of student involvement with SRG learning. The degree of student involvement observed when utilizing SRG in their learning is displayed in Table 3. "Increase completion rate" and "Increase enjoyment" are the two most significant strengths. From the conducted interview, 91.42 percent of respondents agreed that SRG contributed to spending less time completing tasks. One respondent acknowledged that the implementation of SRG enhanced their engagement in learning. Increased student engagement, in turn, boosts motivation and understanding, expediting the task-completion process. 82.86 percent of respondents agreed that SRG contributes to their increment in enjoyment while learning. When there is intrinsic and extrinsic motivation, the joy of learning increases, students are engaged in class, and they feel excited about doing the task assigned

This suggests that learning engagement is encouraged by the SRG. In the points or leaderboard categories, those with the most documented login attempts were placed higher. The competition between the students who scored highest can be the reason for the repetition among these students.

Table 3

*Positive impacts on the Level of engagement experienced by students in Station Rotation Gamification (SRG)*

<b>Construct</b>	<b>Code</b>	<b>Percentage</b>
Increase completion rate	<b>1</b>	<b>91.42</b>
Increase enjoyment	<b>2</b>	<b>82.86</b>
Increase participation	<b>3</b>	<b>77.14</b>
Increase points collection	<b>4</b>	<b>71.43</b>

Table 4

*Negative impacts on the level of engagement faced by students in Station Rotation Gamification (SRG)*

<b>Construct</b>	<b>Code</b>	<b>Percentage</b>
Exhausted in competing	<b>1</b>	<b>85.71</b>
Challenges in time management	<b>2</b>	<b>65.71</b>
Difficulty in solving the task given	<b>3</b>	<b>28.57</b>
Technical problem	<b>4</b>	<b>25.71</b>

Negative impacts are categorized according to Table 4 as follows: Exhausted in competing, Challenges in time management, difficulty in solving the task given, and technical problems. The highest percentage of negative impact is exhausted in competing with 86.71%. Since gamification requires students to compete in every single task assigned, students will feel all-embracing, besides finding the answer students have to compete with each other. Furthermore, other students who used the site were indirectly demotivated by these students' significant progress over the other group. As a result, rather than retaking the assignment to increase their point total and move up the leaderboard, these lower-ranked students decided to just finish it to receive a higher task score. Challenges in time



management contribute to the second-highest feedback from students. Competition means students have to be quick and fast. The tasks given require students to allocate time efficiently, while at the same time need to gain points, and badges and be at the top rank. The degree of student involvement with the gamified learning platform differed depending on the subject matter and individual student. Regarding topic-to-topic fluctuations, this was pertinent and evident in the current study, particularly during the first two weeks of the intervention.

### Conclusion

Several benefits of using SRG in teaching and learning show how effective it is in raising student motivation and engagement. For the most part, SRG does increase student engagement and contributes to many implications in the context of engagements. However, difficulties encountered during implementation might offer teachers helpful advice for enhancing the content and materials design in SRG. Every tactic or method can still be improved upon to increase its effectiveness and significance. In conclusion, gamification offers a variety of learning and development opportunities in organizational and educational environments. To fully fulfill this potential, however, there is an obvious need for research that provides insightful, useful guidance for future gamification activities. This study pioneers the gamification of higher education by going beyond the current means of applying gamification to a course.

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