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Star Question: Gamification of a Reviewing Process Using Self-Setting Question and Game Mechanism in Undergraduate Education

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Abstract: Reviewing a course and preparing for a term exam are very stressful processes for most students. As explained by Csikszentmihalyi, a proper challenge level could be used, as an effective motivation for the students to review and prepare a term exam. However, the students face with undue stress and do not think that reviewing a course and preparing for a term exam are interesting in a considerable proportion of cases. To provide a fun experience in reviewing a course and preparing for a term exam is the purpose of this study. To make a reviewing process fun, this study suggests a gamified reviewing process based on a gamification theory. This study validates the gamified reviewing process using a case study. The proposed reviewing process using a gamification theory could be used, as an effective tool which lessens the stress level of the students in education environments.

Key words: Gamification, review, undergraduate education, game mechanism, validate

INTRODUCTION

Flow is the positive psychology concept proposed by Mihaly Csikszentmihalyi. Flow is the mental state that a person is fully immersed, energized and enjoying the performing an activity when a person doing something (Csikszentmihalyi, 1990). In education environments, flow theory has close relation with the concept of intrinsic motivation. Chan and Ahern (1999) describes that the activity with context of challenge, goal, feedback, concentration and control has major influences on intrinsic motivation. Kim and Ko (2013) shows that engineering students have various needs on fun and pleasure which could be provided in gamified class. According to Papastergiou (2009), to improve students knowledge and to motivate the students in classroom, the gamified approach may be used in education environments. Kim (2013) validates that the gamification can be used, as a new tool which is more effective for motivating the learning desire, improving the level of communication and understanding and reducing the learning stress in engineering education.

This study aims to provide flow experience to the students for reviewing a course and preparing a term exam in undergraduate class. Among the related contexts with flow theory, this study focuses on challenge and feedback to provide some fun factors that the students usually expect in classroom. To suggest the new process for reviewing a course with flow theory and some game mechanisms is the purpose of this study.

REVIEWING PROCESS USING GAMIFICATION

The overall process of the study is shown in Fig. 1. Firstly, the lecturer introduced the new reviewing process based on a self-setting question and a gamification theory. Secondly, the gamified reviewing process was executed. Each student wrote 1 question, respectively. There were 52 students and thus 52 questions were written by the students. Each student read 51 questions written by other students and rated the suitability of each question with 5 stars. There were comment columns to

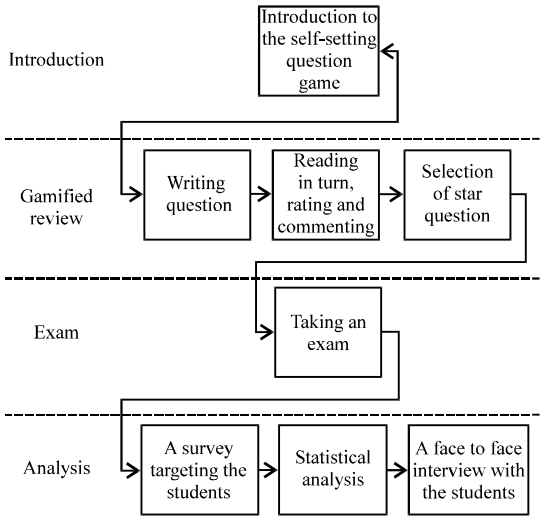

Fig. 1: Process of the survey

write down how they feel about each question. Based on the ratings and comments provided by 52 students, the lecturer chose some star questions which have relatively high ratings and positive comments. Thirdly, the 52 students took the exam which includes 5 star questions that they had written. Finally, a survey targeting 52 students was conducted. The survey results were statistically analyzed using SPSS software.

Self-setting question game: Bunchball (2010) describes major game mechanisms could be used in gamification, such as points, levels, challenges, trophies, badges, achievements, virtual goods and leaderboards. The positive effects of rating and commenting system are validated by Singer and Schneider (2012). This study, uses the rating and commenting system for reviewing others questions. To select the valuable questions among the questions written by the students, the star question system similar to badge system is applied. Figure 2 shows the format of gamified reviewing process. B3 sized papers printed with the self-setting question, rating and commenting box were used.

Introduction to the survey: The survey which explores the gamified reviewing process, consists of 10 questionnaires. Questionnaires are categorized into 3 questionnaires on the characteristics of respondent, 4 questionnaires on the learning effect, 2 questionnaires on a fun experience and the reduced level of stress and 1 questionnaire on proper portion of self-setting question to be included to the term exam. Questionnaires on the characteristics of respondents survey the grade (Q1), gender (Q2) and average grade of each student (Q3). Questionnaires on the learning effect are as follows:

Q4: Seriousness of setting questions: Do you think that you are serious for setting question?
Q5: Seriousness of evaluating others questions: Do you think that you are serious for rating and commenting the questions written by other students?
Q6: Effectiveness of understanding own level of understanding: Do you think that the gamified reviewing process is helpful for you to understand your level of understanding?
Q7: Effectiveness of reviewing the course: Do you think that the gamified reviewing process is helpful for you to review the course?

Questionnaireson a fun experience and the reduced level of stress are as follows:

Q8: Fun experience of gamified reviewing process: Does the gamified reviewing process make you fun and motivate you for learning?

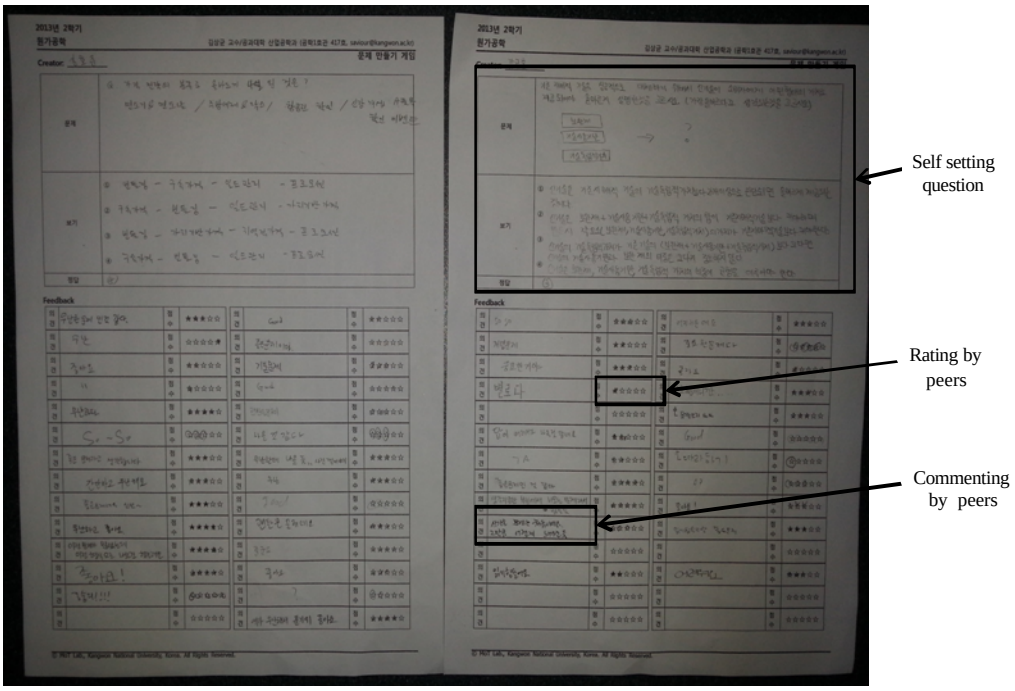

Fig. 2: Gamified self-setting question

Q9: Reduced level of stress for reviewing process: Does the gamified reviewing process reduce the level of stress for preparing a term exam?

The respondents of this survey are undergraduate students at engineering school of K university. There were 52 students in that class, 35 male and 17 female students. The 52 students in that class were served as survey respondents. The questionnaires each, excepting 3 questionnaires on the characteristics of respondent and 1 questionnaire on proper portion of self-setting question to be included to the term exam were surveyed using a 5 point Likert item which consists of strongly disagree (point 1), disagree (point 2), neither agree nor disagree (point 3), agree (point 4) and strongly agree (point 5).

ANALYSIS OF THE GAMIFIED REVIEWING PROCESS

Table 1 summarizes the one-sample statistics results for students response on Q4-9 using SPSS software. Table 2 summarizes the one-sample test results for students response on Q4-9 using SPSS software. The test value for one-sample test is 3 which means neither agree nor disagree, as defined by Likert scale. The test value stands for that there are no meaningful effects of the gamified reviewing process.

Based on the statistical analysis results provided in Table 1 and 2, the effects of the gamified reviewing process are summarized.

Q4; seriousness of setting questions: The t-value of Q4 is 16.241, so it can be believed that the students wrote the questions seriously without mischief. At the face to face interview with some students, the students told that they should be serious on setting the questions because they knew that other students and the lecturer would read the question.

Q5; seriousness of evaluating others questions: The t-value of Q5 is 9.724, so it can be believed that the students rated and commented others questions seriously. At the design stage of the gamified reviewing process, the lecturer worried that some students would rate and comment others questions with mischief or unpleasantness because they rate and comment anonymously. However, most students regarded the gamified reviewing process, as an important process of the course and they did not want to ruin the course.

Q6; effectiveness of understanding own level of understanding: The t-value of Q6 is 7.848, so it can be believed that the gamified reviewing process made the students understand their own level of understanding by setting and reading others questions. At the face to face interview with some students, the students told that the gamified reviewing process was very helpful to judge which parts of the course they understand well or not.

Q7; effectiveness of reviewing the course: The t-value of Q7 is 9.725, so it can be believed that the gamified reviewing process was helpful to review the course before the term exam. To write the question seriously, the students read the course materials repeatedly with their minds engaged and this process was helpful to them for reviewing the course.

Q8; fun experience of gamified reviewing process: The t-value of Q8 is 6.529, so it can be believed that the students had fun with the gamified reviewing process and

Table 1: One-sample statistics of gamified self-setting question

Variables	N	Mean	SD	SEM
Seriousness of setting questions	52	4.2308	0.54648	0.07578
Seriousness of evaluating others questions	52	3.9808	0.72735	0.10086
Effectiveness of understanding own level of understanding	52	3.8269	0.75980	0.10537
Effectiveness of reviewing the course	52	3.9615	0.71295	0.09887
Fun experience of gamified reviewing process	52	3.7885	0.87080	0.12076
Reduced level of stress for reviewing process	52	3.6731	0.85683	0.11882

Table 2: One-sample test of gamified self-setting question

	Test value = 3					
Variables	t	df	Sig. (2-tailed)	Mean difference	*Lower	*Upper
Seriousness of setting questions	16.241	51	0.000	1.23077	1.0786	1.3829
Seriousness of evaluating others questions	9.724	51	0.000	0.98077	0.7783	1.1833
Effectiveness of understanding own level of understanding	7.848	51	0.000	0.82692	0.6154	1.0385
Effectiveness of reviewing the course	9.725	51	0.000	0.96154	0.7631	1.1600
Fun experience of gamified reviewing process	6.529	51	0.000	0.78846	0.5460	1.0309
Reduced level of stress for reviewing process	5.665	51	0.000	0.67308	0.4345	0.9116

*The 95% confidence interval of the difference

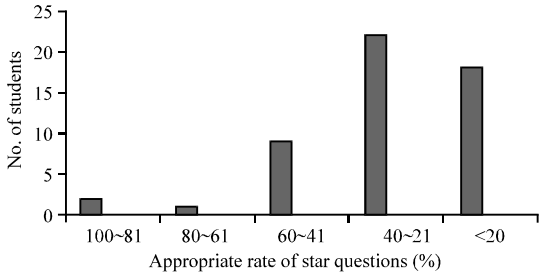

Fig. 3: Expected ratio of self-setting question

were more motivated to prepare a term exam. At the interview after finishing the survey, the students told that they experienced some kinds of fun, such as competition, expression and fellowship among 20 fun factors of PLEX Model (Korhonen *et al*., 2009). However it is not sure what kinds of fun, they felt most when executing the gamified reviewing process because fun factors that the students had experienced were not studied quantitatively.

Q9; reduced level of stress for reviewing process: The t-value of Q9 is 5.665, so it can be believed that the gamified reviewing process reduced the level of stress for reviewing the course and preparing a term exam. Most students regarded the gamified reviewing process, as a game not irritating job. Rating and commenting others questions and reading others comments on their question made them exciting.

Figure 3 shows the result of Q10 which asks how many questions the students want to be included to the term exam among the questions written by the students. Most students think that between 20 and 40% is appropriate.

CONCLUSION

This study suggests the gamified reviewing process which aims to reduce the level of stress for reviewing a course and preparing a term exam. To design the new reviewing process, this study uses a gamification theory mainly focusing on rating mechanism.

IMPLICATIONS

The implications of this study are summarized as follows:

- The proposed process reduces the level of stress for reviewing a course and preparing a term exam and makes the students fun
- It is not necessary to worry about the negative effects because there are no evidence of mischief or unpleasantness caused by the proposed reviewing process
- The proposed process helps the students to review a course effectively
- Executing the gamified reviewing process in class makes the students fun by providing competition, expression and friendship among 20 fun factors of PLEX Model (Korhonen *et al*., 2009)

LIMITATIONS

Limitation and further research issues are summarized as follows: It is not studied quantitatively what kinds of fun the students experienced most with executing the gamified reviewing process among 20 factors of PLEX Model including captivation, challenge, competition, completion, control, discovery, eroticism, exploration, expression, fantasy, fellowship, nurture, relaxation, sadism, sensation, simulation, subversion, suffering, sympathy and thrill (Korhonen *et al*., 2009).

Effects of additional game mechanisms for a reviewing process such as badges, level or points should be studied.

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