Effectiveness of Road to Success (RoSE) Game: a Pilot Study

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Abstract— **It is argued that a well-designed educational game can have the potential to influence students' acceptance towards their learning. This paper practically evaluates the effectiveness of a game-based learning tool named Road to Success (RoSE) to improve students' awareness of the importance of academic excellence. A pilot study was conducted before this game is proposed to be widely used among the Faculty of Business and Management students. Using a questionnaire study which was designed based on the ARCS Motivation Model, survey data were collected from 13 low academic achievement students from this faculty. Results indicate that RoSE has a positive impact on these students' motivation. Hence, it is believed that RoSE can help these students to increase their motivation to study harder as they will be well prepared with better study strategies. Furthermore, RoSE can also be applied to other students such as the new intake (part 1) students as they are not familiar with the university life. This game will help them a lot in familiarizing the academic concept in the university so that they will be mentally ready to succeed in their study.**

Keywords—academic excellence, game-based learning, motivation, RoSE game, students

I. INTRODUCTION

It is well recognized that self-motivation is important in our daily life. As for the students, motivation may help them to succeed, especially in their study. Many efforts were done in UiTM Pahang such as motivational talk, seminars, and modules to increase their motivation to study harder. Due to many factors, some of these programs which indirectly caused all the ineffective efforts obviously could not attract their attention anymore. .Due to this matter, an application, which is a game-based learning, namely Road to Success (RoSE) is used in creating a new motivational program to the low academic achievement students.

RoSE is created based on its purpose, which is to show students the road (path) of academic success in the university. There are few important objectives considered in creating this game. The objectives are 1) to expose students to the real life in the university and 2) to embrace them with few cognitive fun-based games so that they can learn something new while they are having fun with the game. Applying the concept of a snake and ladder game, RoSE has been added with more creative and strategic mini-game concepts for each pit stop prepared at each stage. Furthermore, this game applied the Constructivist Theory [1] as a fundamental guideline in creating RoSE. Hence, there were two (2) aspects taken into consideration while creating RoSE, which were active involvement and fair evaluation by students. For each pit stop, students should think properly to score higher within the time given to ensure that they can successfully move from the novice to the higher level. Finally, all scores will be cumulated from each stage to generate the final marks. The final marks designate the Cumulative Grade Point Average (CGPA) concept applied in the university academic system.

Basically, the usage of a game-based tool in education is not a new idea, which provides a better advantage compared to the traditional way of teaching. Furthermore, it is believed that a well-designed game-based tool can stimulate students' motivation in their learning process [2-3]. In claiming so, [4] conceptually reviewed the literature on the game-based learning and motivation as well as proposing the RoSE game to be used in one of the motivational programs conducted by the Faculty of Business and Management in UITM Pahang.

This paper provides a pilot study on RoSE game with the aim of investigating its relevance to be widely applied in the university. The discussion part will provide details on the study findings and finally, this paper is concluded with some implications and research limitations.

II. LITERATURE REVIEW

A. Constructivist Theory

Constructivist Theory is used as a foundation in creating RoSE as it concerns the learning active process in which learners construct new ideas or concepts based upon their current/past experiences [1]. Furthermore, this theory was incorporated into RoSE conceptualization based on several reasons. First, this theory applies a different focus compared to the traditional learning method. In the constructivist method, the focus is on students while the teacher (facilitator) asks questions. In other words, students will play their active role in ensuring the way on how they grab the knowledge, while facilitator will perform their part in guiding students to grasp as much knowledge as they can. Secondly, this theory postulates that there are many methods on how students can learn, which not solely depend on one "normal" way that may not suit their academic background. It is

well understood that UiTM students come from different academic backgrounds which may affect their learning styles. Therefore, varieties of methods can be applied to ensure that they can learn according to their capability. Based on this affirmation, RoSE was created with the combination of meaningful objectives to expose students to the real life in the university as well as expose them to few cognitive fun-based games so that they will learn something new while they are having fun with the game. Finally, this theory was chosen as it recognizes active and fair treatment among students.

B. The ARCS Motivation Model

The ARCS Model was developed by educational psychologist John Keller in the 1980s [5]. ARCS stands for attention, relevance, confidence, and satisfaction, which represents the four components that need to be engaged by students in new material or new courses. This model is important and widely used in the educational environment since motivation seems to be a key factor that determines students to complete their study and mostly applied as a guideline for developing effective motivational strategies [6]. This model requires designers and instructors to gain learners' attention, demonstrate learning relevance, ensure learners are confident in their own success and provide opportunities for learners to experience satisfaction from their learning [5].

The ARCS Model was applied in many studies to incorporate the model with the level of motivation [7-9]. [7] conducted a case study to describe how instructional librarians began to incorporate the ARCS Model into library instruction. The study revealed that ARCS Model was practical for improving student engagement during information literacy instruction. They also suggested that lecturers may integrate the model into their teaching practices to improve student motivation during information literacy sessions. Furthermore, [8] did a study on the use of a set of ARCS-oriented certified digital general educational informational literacy materials for the higher education initiated by the Ministry of Education in Taiwan. The purpose of the study was to determine the motivation for learning in a blended learning environment. The result revealed that there was a motivation to study determinedly in a blended learning environment and also strongly supported the validity of the four motivational elements in the ARCS Model.

[9] also examined the ARCS Model by incorporating the model into the studies of face-to-face and online library learning environments. The result of the study discovered that the use of ARCS Model can provide a good impact on student learning and achievement. [10] implemented the ARCS Model as a foundation for four aspects of instruction that affect motivation to study the relationship between student motivation and the classroom atmosphere in information literacy courses in the University at Albany, USA. The finding exposed that students who are actively engaged with the course material will find themselves to be more confident learners and have a better understanding of the courses. [11] explored the motivational aspects of information literacy and skills instruction delivered by librarians in community college libraries by using ARCS Model. The study found that the use of this model had a positive impact on student motivation. They also summarized all four components and sub-categories as 1) Attention - perceptual

arousal, inquiry arousal and variability, 2) Relevance - goal orientation and motive matching, 3) Confidence - learning requirements, success opportunities and personal responsibility, and 4) Satisfaction - intrinsic reinforcement, extrinsic rewards, and equity.

C. The Use of Motivational Games to Improve Students' Motivation and Academic Performance

According to [12], motivational or educational games are designed to increase the understanding of concepts and knowledge and improve problem-solving skills when they play the games. Normally motivational games are widely used in the educational environment. The use of motivational games could help students to improve their understanding of the teaching and learning process and their motivation to study persistently. In addition, the benefits of using motivational games in the teaching and learning process allow the students to apply what they have learned, build their skills and competencies, develop critical thinking skills, and provide engaging and effective experiences that students are more likely to use than other materials [13]. Many researchers found that the use of motivational games can improve students' academic performance [14-16]. Furthermore, students may also be motivated as the game or activities create competition and teamwork challenges, where some quick and specific feedback enables students to figure out the right way to succeed [16].

[14] investigated the effects of playing an educational game on students' motivation on 106 respondents at a public elementary school in the Midwestern USA. They revealed that students are more motivated to learn while playing an educational game because it can increase their intrinsic motivation or self-satisfaction. [15] examined the relationship between the collaborative game-based learning in learning performance and intrinsic motivation of 254 secondary school students in Taiwan. The result proved that there was a relationship between game-based learning in learning performance and intrinsic motivation. It shows that the collaborative game-based learning in learning performance had a good implication in increasing students' motivation and in turn improving academic performance.

[17] did a study on 235 undergraduate business students at an Australian university. The purpose of the study was to examine the relationship between the use of board game in a Marketing subject and the level of motivation towards the subject. They found that the use of a board game to introduce a brand-related topic in marketing subject can increase students' motivation towards the subject. [18] also examined the impact of engagement and motivation on learning in game-based learning environments among 134 high school students in eleven classrooms in the USA. The results showed that the use of game-based learning had a positive effect on engagement and motivation to learn harder. The result also recommended that the challenge of the game should be able to keep up with the learners' growing abilities and learning in order to endorse continued learning in the game-based learning environments.

In addition, a pilot study by [19] towards twenty one undergraduate students' from Universiti Teknologi Malaysia (UTM) Kuala Lumpur found that majority of the students were

very interested in educational games and stated that the game creates the Programming subject more interesting and fun. This in turn makes them more motivated to learn Programming and score in this subject. The above findings were congruent with the study by [20] who investigated students' motivational level towards Arabic language vocabulary learning after following the teaching and learning process which was applied language games as a teaching method. Respondents involved in this study were 60 students from a primary school at Kelantan. The results of descriptive analysis showed that the overall level of students' motivation in learning Arabic language was very high. Furthermore, [21] investigated the effect of game-based learning activities on children's positive learning and prosocial behaviours or voluntary behavior intended to benefit others by using quasi-experimental towards 47 pre-school pupils from two rural national schools in Miri, Sarawak. The results revealed that game-based learning is effective in nurturing children's positive learning and prosocial behaviours. Furthermore, a study on a group of Malaysian undergraduates found that a computer programming educational board game is able to motivate and stimulate some basic programming knowledge while the students play the game [22]. The students appreciated the board game as they gain some amount of programming knowledge and motivation of learning from this game.

Conversely, the study by [23] found a negative relationship between the use of motivational games in teaching and learning process and students' academic performance. The result showed that the students' motivation was increased while playing the games, unfortunately, the use of motivational game did not influence students' academic performance. This was due to the fact that motivation also depends on the revision done by the students on the subjects. This result was also congruent with the finding by [24]. They found that there was no significant improvement in students' motivation towards the mathematics subject by using game-based learning. A study by [25] also found that there was no significant positive relationship between using games and student performance. This was due to the fact that game-based approach is considered very new and most students have not played any games for learning. In addition, [26] indicated that game-based learning did not seem to help improve students' performance. There is the possibility that some students were not used to the serious game learning approach that reflected the same performance despite the different learning method used. With regards to this matter, improvement and enhancement of educational games may improve students' motivation to study persistently. This was due to the fact that students will get bored with the identical educational game. Higher motivation and deeper strategy used were found in constructing a new game, rather than playing an existing game [27].

D. RoSE

RoSE was designed to focus on the tertiary path of the students' education. Applying snake and ladder game, RoSE is a game board having 50 numbered, gridded squares. In this game, students need to throw the dice. The number on dice represents the number of steps needed to move the chips on the RoSE. This motivational game highlighted the joyful moments such as passing the test and getting an excellent CGPA. Similarly, the unhappy moments such as missing the due date,

feeling restless, and having too many assignments were also included. The moments were used to let the players be familiar with the situations available in a route as a student to strive for academic excellence and gain experiences. ROSE has good potential to be commercialized as it is a good practice to motivate the players to reach the final score with additional advice to encourage motivation. It can also be used as one of the tools in any motivational series.

Students are divided into certain groups. The rationale of having more groups per game is to develop competition and comparison on the strategy used and skills to complete the game. However, if two or more games are played simultaneously, the leader should separate them with a line of tables or some other barriers as students must not cross from one game to another.

1.   First, the players should throw the dice to know the turn to start. If the number was the same as attained by other players, throw again.

2.   Then, start the game.

3.   If the player arrives at any pit stop of the challenge, he/she should complete the task accordingly. Each player must complete the task once only. If fail, the player will lose a turn.

4.   All marks from the pit stop will be transferred to the scorecard. The winner will be based on the highest marks achieved. Winner(s) will be given some rewards.

III. METHODOLOGY

This study involved 13 respondents who were listed in the low academic performance from the Faculty of Business Management. The researchers used a purposive sampling method to collect the data [28]. A set of questionnaire categorized into four parts with ten items in attention, eight items in relevance, eight items in confidence and four items in satisfaction was distributed. The researchers used a 5-point Likert scale that ranged from 1 = Strongly Disagree to 5 = Strongly Agree for both questions on Section B and C. The Statistical Package for Social Sciences (SPSS) Version 21.0 software program was used to analyze the data collected. The researchers used descriptive statistics to analyze the data which included frequencies, mean, and standard deviation.

IV. DISCUSSION

A. Reliability

Assessing reliability of the measurement scale is crucial, prior to conducting further analyses. The reliability of the instrument was measured using the Cronbach's alpha coefficient. Analyzing the 30 standardized items of the questionnaire, the value of the Cronbach's alpha was 0.946 indicating that the instrument is acceptable. The results of reliability test for all the constructs were also acceptable except for confidence (Table I). For construct "confidence", the Cronbach's alpha was 0.515 lower than the recommended minimum level of .70 [29].

TABLE I.   RELIABILITY ANALYSIS OF CONSTRUCT

Construct	Number of Items	Cronbach's alpha
Attention	10	0.890
Relevance	8	0.825
Confidence	8	0.515
Satisfaction	4	0.801

In order to increase the value of α in construct "confidence" to at least 0.70, two questionnaire items (items 20 and 23) in the construct were deleted making it 0.839. With the deletion of two items in the construct "confidence", the Cronbach's alpha value of the instrument remained reliable (0.944) as well as for all the constructs. The results of reliability analysis after two items were deleted (Table II) showed that Cronbach's alpha was also reliable and consistent with respect to each construct separately.

TABLE II. RELIABILITY ANALYSIS OF CONSTRUCT AFTER 2 ITEMS DELETED

Construct	Number of Items	Cronbach's alpha
Attention	10	0.890
Relevance	8	0.825
Confidence	6	0.839
Satisfaction	4	0.801

B. Descriptive Analysis

Table III to VI presents descriptive statistics for each of the questionnaire items of the relevant research variables. There are 10 items covering on attention category, 8 items of relevance category, 8 items of confidence category and 4 items of satisfaction category.

Table III shows that the result for the attention items is high for the respondents, which is indicated by mean score from 3.92 to 4.62.

TABLE III. DESCRIPTIVE ANALYSIS FOR RoSE GAME ON ATTENTION

	Attention	Mean	Std. Deviation
Q1	The game can attract my attention and interest from the start.	4.23	0.59
Q2	The game is capable of attracting people's attention.	4.08	0.64
Q3	The content of the game can attract my attention successfully.	4.38	0.77
Q4	The way the game is expressed can keep my attention.	4.62	0.51
Q5	The game stimulates me to be more motivated in my studies.	4.08	0.95
Q6	Elements in the game are so specific that I can maintain my focus.	3.92	0.86
Q7	I can discover exciting and unexpected results from the game.	4.00	0.91
Q8	The various experiences and learning I gathered from the game held my attention.	4.00	0.82
Q9	The game is attractive and appealing.	4.08	0.64
Q10	The game includes many parts that are exciting to me.	4.15	0.69

Table IV shows that the mean score for RoSE game on relevance items is also high with a range from 3.54 to 4.69.

TABLE IV. DESCRIPTIVE ANALYSIS FOR RoSE GAME ON RELEVANCE

	Relevance	Mean	Std. Deviation
Q11	I understand the content of the game.	4.00	0.91
Q12	Conditions simulated in the game remind me that such conditions or situations do exist in real life.	3.62	0.77
Q13	After playing the game, I have realized its educational significance.	4.08	0.86
Q14	Instructions are explained how the game is played.	4.69	0.48
Q15	The content and design of the game make me want to understand it.	4.38	0.51
Q16	The game is suitable for my age.	3.54	1.01
Q17	I can find situations and incidents in my life that reflect those presented in the game.	3.85	0.90
Q18	The content of the game is very practical to me.	3.54	0.78

For 8 items of confidence category in table V, the mean of each item is greater than 3.46.

TABLE V. DESCRIPTIVE ANALYSIS FOR RoSE GAME ON CONFIDENCE

	Confidence	Mean	Std. Deviation
Q19	My impression is that the rules can be remembered easily after the game is introduced, even for the first time.	3.85	0.38
Q20	I consider many of the contents in the game to be easy for me.	3.46	0.78
Q21	I have confidence that I can find ways to motivate myself through the game.	3.85	0.80
Q22	I have confidence that I can learn to motivate myself from the material.	4.00	0.58
Q23	The game is easy to play.	3.92	0.95
Q24	I am more confident that I can achieve higher scores in my studies after repeated plays of the game.	4.08	0.76
Q25	I can understand the appeal of the material design.	3.85	0.55
Q26	The game has a good organizational structure and design; thus I am confident that I can master it.	4.00	0.58

Based on table VI, the mean score of respondents on each item in satisfaction category is quite high ranged from 3.85 to 4.31.

TABLE VI. DESCRIPTIVE ANALYSIS FOR RoSE GAME ON SATISFACTION

Satisfaction		Mean	Std. Deviation
Q27	I feel that I have a sense of achievement after the game is played.	3.85	0.80
Q28	The facilitators assist us during the play, making me feel that it is meaningful when I participate in the game.	4.31	0.48
Q29	I feel happy because I can play the game.	4.23	0.44
Q30	I enjoy playing the game because of its elaborate design.	4.15	0.80

Table VII presents descriptive statistics for each of research construct namely attention, relevance, confidence and satisfaction.

Attention

The mean value of attention is 4.15. The mean value approached to agree in the Likert scale used. The mean value implied that the students agree that the RoSE game can attract and retain their attention and interest and stimulate their curiosity to study hard. The students tend to agree that the game able to attract and retain them to work hard in their studies as they are required to be focused in completing the tasks in the RoSE game.

Relevance

The mean value was near to agree level (3.95) in the Likert scale used. The mean value implied that the students considered RoSE game were important, useful and relevant to their study goals. The RoSE game is relevant to their study goals because in playing the game, the students need to come out with strategies that enable them complete the game tasks within short period of time.

Confidence

The mean value of confidence is 3.88. The mean value was near to agree level in the Likert scale used. The mean value implied that the students tended to be confident in using the RoSE game in motivating them to work hard in their studies. The students were confident that the RoSE game is capable of motivating them to work hard as they are required to use their ability and skills in completing the game tasks.

Satisfaction

The mean value of satisfaction is 4.13. The mean value approached to agree level in the Likert scale used. The mean value implied that the students tended to be satisfied in using the RoSE game to motivate them.

TABLE VII.   MEAN AND STANDARD DEVIATION FOR ALL CONSTRUCTS

Construct	Mean	Std Deviation
Attention	4.15	0.53
Relevance	3.95	0.48
Confidence	3.88	0.33
Satisfaction	4.13	0.52

C. Discussion

The aim of this study was to investigate whether the game based practice was able to motivate students to study hard in achieving academic excellence based on the ARCS model. Based on the analyses of RoSE game using ARCS motivation model [30], RoSE game has the benefit of improving the students' attention and interest to work hard in their studies. In the RoSE game, the students were required to use strategies, abilities, and skills not only in language but also calculation in completing the game tasks. The situations and tasks simulated in the game enabled the students to feel that the motivational process experienced from the game that gave them a sense of achievement. In addition, the hurdles in the game also enabled the students to familiarize themselves with the actual academic concept in the university so that they will be ready to succeed.

Games have always played a crucial role in human life, especially in entertainment, education, and motivation [31]. Some of the advantages of games are that they are attractive, novel, provide a better environment, and help players to focus on their tasks [32]. Using the game as a motivating medium makes the motivating process more enjoyable making the students become more receptive to the message intended to be delivered by the instructors [33]. As for the ROSE game, it had both practical and entertainment and stimulated players' attention related to motivation, therefore producing a high degree of satisfaction in motivating people. Thus, this study suggested that a motivational game board like RoSE may enhance students' motivation to succeed in their studies.

V. CONCLUSION

The RoSE game was developed to give an overview of the environment of university life to students. The elements of happiness, sadness, stress, and competition may reflect the students' motivation to study hard [34]. These emotions were included in RoSE game to give some attractive values to the students. RoSE is applying the characteristics that matched the ARCS motivational strategies which are attention, relevance, confidence, and satisfaction. These characteristics have been widely used in an educational environment which requires the designers and lecturers to gain learners' attention, demonstrate learning relevance, ensure the confidence, and experience satisfaction [5]. Based on the research result, the variables of ARCS (attention, relevance, confidence, and satisfaction) have been fulfilled in RoSE and support the students' need. Most of the students react positively towards RoSE as it can increase their motivation to study hard in achieving academic excellence. RoSE tested their skills to complete the tasks and challenges within the limited period and all the consequences of emotions. Indirectly, RoSE has instilled the importance of having a strategy in completing any tasks, especially in the academic field. For future research, a test with a larger sample size might be able to identify the significant correlation between RoSE and academic performance among students. The selection of respondents can also include the other students especially the new intake students as they are not yet familiar with the university life. This research may give benefits to students as it can increase students' motivation to study hard and their academic performance.

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