

Effects of Gamification on Lower Secondary School Students' Motivation and Engagement

Goh Yung Hong, Mona Masood

Abstract—This paper explores the effects of gamification on lower secondary school students' motivation and engagement in the classroom. Two-group posttest-only experimental design were employed to study the influence of gamification teaching method (GTM) when compared with conventional teaching method (CTM) on 60 lower secondary school students. The Student Engagement Instrument (SEI) and Intrinsic Motivation Inventory (IMI) were used to assess students' intrinsic motivation and engagement level towards the respective teaching method. Finding indicates that students who completed the GTM lesson were significantly higher in intrinsic motivation to learn than those from the CTM. Although the result were insignificant and only marginal difference in the engagement mean, GTM still show better potential in raising student's engagement in class when compared with CTM. This finding proves that the GTM is likely to solve the current issue of low motivation to learn and low engagement in class among lower secondary school students in Malaysia. On the other hand, despite being not significant, higher mean indicates that CTM positively contribute to higher peer support for learning and better teacher and student relationship when compared with GTM. As a conclusion, gamification approach is flexible and can be adapted into many learning content to enhance the intrinsic motivation to learn and to some extent, encourage better student engagement in class.

Keywords—Conventional teaching method, Gamification teaching method, Motivation, Engagement.

I. INTRODUCTION

Malaysian teachers today still face difficulties in keeping their students engaged and motivated to learn in the classrooms. Reference [1] found that most of the teachers in Malaysia are still bound to conventional teaching methods (CTM) and very much preferred the teacher-centered approach which resulted in negative impact on students' intrinsic motivation and engagement to learn within the classroom walls. Not to mention, [2]'s study found that Malaysian students' motivation and interest towards classroom activities were generally below average.

Furthermore, [3] found that the preferred CTM which incline towards teacher-centered learning tends to adopt a one-way communication proved to be ineffective when it comes to developing students' thinking abilities and inhibits them from exploring their true potential.

Goh Yung Hong, was a graduate student of Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia, 11800 Penang, Malaysia but currently attached with Multinational Corporation's Training Department (phone: +6016-4850860; e-mail: yuunjac@gmail.com).

Mona Masood is with the Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia, 11800 Penang, Malaysia (phone: +604-6532619; fax: +604-6576749; e-mail: msmona@usm.my).

Reference [2] identified that the source for most education issues comes from the educators and students' attitude especially with the teaching methods and students' intrinsic motivation & engagement to learn in class. Furthermore, the consequences of low learning motivation & engagement will eventually lead to low performance at the tertiary education level and eventually negatively affect their employability in the industry and the nation in the long run [4]. This issue eventually manifests itself as of year 2012 indicate most tertiary graduates from Malaysia formed a large cohort of up to 27% of the entire unemployed population [4].

Thus, several suggestions in reforming the education system were brought forward including the promising gamification teaching method (GTM) [5]. Several scenarios as highlighted by [6] in his study had shown positive effects of gamification in motivating and inspiring certain behavior as well as keeping them interested and willingly engaged with their learning environment.

Despite that, [7] stated that the conventional teaching method with rote learning is still relevant and are the easiest as well as the most efficient way to instill knowledge so it forms a strong foundation on which to build an intellectual mental structure. While both teaching methods garner individual potential in specific circumstances and have its use, there is still a lack of understanding between both teaching methods with local students.

While gamification is widely known in other context, it is still relatively a new concept in the education world [6], [8]. Unfortunately most existing research was of descriptive in nature therefore unsuitable to make inferences about gamification towards the general population [9]. Thus the assumption that gamification teaching method is better than conventional teaching method in effecting learners' intrinsic motivation and engagement in the classroom is merely an unproven assumption. In the effort to determine the actual impact of the gamification teaching method compared with conventional teaching method on students' motivation and engagement, a quasi-experiment need to be conducted on lower secondary school students and analyzed through inferential statistic.

II. REVIEW OF THE LITERATURE

A. Gamification Teaching Method (GTM)

According to [10], gamification can be defined as "the use of game design elements in non-game contexts in order to achieve desired outcome or behavior". Going further, [6] define gamification as the utilization of game elements; a goal, an obstacle, and collaboration/competition in learning contexts

that originally had no link to game-related elements to achieve a desired learning outcome and behavior.

Reference [11] stressed that the three basic game characteristics of having a goal, obstacles, and collaboration or competition will create the initial feeling of getting hooked with the learning progress which brings out the intrinsic motivation that keep students engaged with learning. Moving beyond the basics, [12] claimed that at its root, gamification is the process of integrating 'game dynamics' and 'game mechanics' into the delivery of contents that is able to drive the participation and engagement. Therefore, GTM can be defined as the utilization of game elements in learning contexts that originally had no link to game-related elements to deliver a lesson or content in order to achieve a desired learning outcome and behavior.

While both terms are closely related and even interchangeable at times, 'game mechanics' are the diverse actions, behaviors and controlling mechanisms used to "gamify" an activity [12]. Once synergized, it will create a compelling engaging user experience, and enhanced learning. Game mechanics tend to include pointing system, concept of leveling, challenges, leaderboards, and gifts or charity. This compelling and motivational nature experienced due to game mechanics is the result of desires and motivations called 'game dynamics' which include reward, status, achievement, self-expression, competition, and altruism [12].

Commonly compared with serious games (also known as game-based learning), gamification sets itself apart from the others by the in-depth focus on game elements and not of the play factor. However, it was assume that the design of gamified applications will often give rise to playful behaviors and mindsets. While games are usually played, it represents a different and broader category than games. Serious games often present itself as a complete whole game for non-entertainment purposes, while gamified applications only uses the elements of games that do not give rise to the entire game [11]. From this, it is clear that any learning content once applied with game elements is considered gamification with a focus towards learning rather than having fun playing for entertainment.

Reference [6] conducted a study on the impact of gamification and found an effective use of leaderboards, badges, level systems, achievement, rewards and geolocation services as an effective gamification element which will be used in present study for GTM lesson.

B. Conventional Teaching Method (CTM)

In agreement with [3] and [13], the present researcher defines CTM as a teacher-centered approach in delivering the knowledge/content with a focus on teacher presentation, demonstration, rote learning, and immediate feedback. The study also stressed that from the pedagogical point of view, this teaching practice is similar with the old curriculum policy that emphasized on rote learning methods [14], [15]. Due to the various terminology used and ease of understanding, rote learning within the context of this research will be considered as CTM.

According to [14], the basic idea of the CTM approach was the emphasis on the memorization technique based on repetition which involves putting students through the same basic drills over and over again until factual knowledge becomes ingrained. Reference [7] support this notion stressing that such repetition is the easiest and efficient way to learn something and often it was the only way to learn it.

According to [14], factual knowledge is crucial for "turbo-boosting" human information processing and analytic capabilities. In comparison, human long-term memories were capable of storing a great deal of information while the working memory, where all the thinking was processed is more limited with no more than seven distinct elements being processed simultaneously [14]. Thus it is very important to accumulate and store facts in the long-term memory so that the cognitive processes can reduce the limitations of the working memory and to effectively solve problems. Reference [7] stressed that rote learning is still important because the true purpose of rote memorization in education is to create autonomy where the students can response automatically and immediately after receiving a cue. This supports the psychological needs of engagement particularly the dimension of autonomy highlighted by the Self-Determination Theory [15].

After all, there are some facts that need rote memorization without substitute such as vocabulary and arithmetic facts, where by the knowledge is essential to perform the arithmetic functions such as adding, subtracting, multiplying and division [7]. The researcher agrees with [14] and [7] that striking the balance with a level of exposure to CTM is required for a better learning but not using it as the sole delivery method.

C. Intrinsic Motivation / Self Determination Theory

According to [16], motivation is a process that initiates, guides and maintains goal-oriented behaviors which causes us to act in order to obtain a desired outcome and intrinsic motivations are motivators that arise from within the individual that are often intangible and subjective such as solving a complicated cross-word puzzle purely for the personal gratification of solving a problem. In addition, [17] defines intrinsic motivation with three basic needs of autonomy, competence, and relatedness in which when fulfilled will be an internalized motivation that lead to higher quality of engagement and learning. As such, intrinsic motivation is the focus of this study and seen as the process that initiates, guides and maintains goal-oriented behaviors driven by the basic needs of autonomy, competence, and relatedness to achieve the desired outcome.

The Self-Determination Theory proposed by [15] suggests that humans possess three central psychological needs which are *relatedness*, *competence* and *autonomy*. Reference [18] summarized these needs as people are inherently motivated to feel connected to others within a social environment (relatedness), to function effectively within that environment (competence), and to feel a sense of personal initiative in doing so (autonomy). According to [19], the Self Determination Theory suggests that humans have an innate

inclination to develop the needs but they do not develop automatically and must be furnished by the environment which works either by promoting the growth or impede it. Consequently, in this study, the environment would be the gamified lesson and conventional lesson class respectively applied in the context of a Geography lesson.

Several studies have shown positive findings that gamification had an impact on students' motivation and engagement level across different contexts [6], [23], [8]. There were also subtle hints that motivation to learn positively correlates with student engagement [17]. However, when compared with the CTM, the past finding had shown unfavorable impact on students' motivation and engagement in the classroom [1].

D. Engagement

According to [24], student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that the learner display when learning occurs which extends to the level of motivation they have to learn and progress in their education. Reference [25] summarized that student engagement can be view as a four-part typology of which the students are required to be engaged at academically, behaviorally, cognitively, and psychologically level. Thus the researcher opines that student engagement is the malleable degree of which a student's attention, curiosity, interest, optimism, and passion is developed under the effects of academic, behavior, cognitive, and psychology.

Behavioral engagement refers to involvement in educational and extracurricular activities which includes indicators such as school attendance and participation in class activities [26], [27]. Cognitive engagement on the other hand refers to the student level of investment toward learning which includes aspect such as perceived relevance and sufficiently challenged coursework, appropriate application of learning strategies, self-regulation, perceived competence, and the willingness to churn out necessary effort to master tough skills [20]. Psychological engagement which is also known as affective engagement in some literatures address the learner's perceived connection with the school environment and significant individuals within the school context. This includes positive and negative response toward the school environment, teachers, and classmates [26], [20].

The four engagement dimensions are common variables in engagement research and found to correlate with many desirable academic and behavioral outcomes [20], [21]. However, only on the cognitive engagement and psychological engagement is considered. This is because the data supporting the inferences on students' levels of academic and behavioral engagement are often available within schools' existing data systems, readily observable and may accurately measure using teacher-report and various available observational measures [22]. Furthermore [26] argue that cognitive and psychological engagement on the other hand were internally represented constructs, less observable and therefore less agreeable to third-part report. Since the present study's participants were assumed to possess close

homogeneity of their behavior and academic engagement, and the focus of the study is on students' motivation and engagement instead of academic performance, the need to focus on the cognitive and psychological engagement are emphasized.

III. OBJECTIVES AND RESEARCH QUESTIONS

This research seeks to draw a better statistical inference of both teaching methods in affecting the learners' motivation and engagement in the classroom.

A. Research Questions

1. Is there a significant difference between students who attend a gamified lesson and students who attend the conventional lesson on students' level of intrinsic motivation?
2. Is there a significant difference between students who attend a gamified lesson and students who attend the conventional lesson on students' level of engagement?

B. Research Hypothesis

- H₀₁ There is no significant difference on students' level of intrinsic motivation between students who attend a gamified lesson and students who attend the conventional lesson.
- H₀₂ There is no significant difference on students' level of engagement between students who attend a gamified lesson and students who attend the conventional lesson.

IV. METHODOLOGY

The researcher employs two-group posttest-only experiment design where one group receives the gamification teaching method (GTM) while the other group gets the conventional teaching method (CTM) and a comparison was made between them.

A. Population and Sampling

Non-probability sampling was employed in this research to select participants from the population of lower secondary school level students. A national government sub-urban secondary school in North Seberang Perai, state of Pulau Pinang was selected to participate in this research. Majority of the students in this school share a very close baseline such as social-economy status, family background and culture. Furthermore all the participants are from the same village and were neighbors outside the school in addition to sharing the same religion.

To further streamline the baseline, the group division effort is randomized with either one of the top two form one class in the school grouped and classified as either group A or group B. Group A was taught using the conventional teaching method while group B was taught with gamification teaching method. Both groups consists of 32 registered student but on the day of experiment, only 31 students from Group A and 29 students from Group B attended school making the total participants of only 60 from both classes.

B. Instruments

The research instrument used in this research consists of a hardcopy questionnaire that has three parts: Section A consists of simple instructions, gender demographic, and the adopted Student Engagement Instrument (SEI) questionnaire; Section B consists of the adopted Intrinsic Motivation Inventory (IMI) questionnaire; a brief glossary of selected words and its Malay language translation as a separate sheet for the participants' reference.

C. Pilot Test

To ensure the questionnaire is reliable for the identified sample, the researcher runs a reliability test for internal consistency and found the instrument to have good reliability at 0.72 to excellent at 0.91. SEI has an overall consistency of 0.80 (Table I) while IMI reported an overall consistency of 0.84 (Table II).

TABLE I
 PILOT TEST OF SEI INTERNAL CONSISTENCY OF RELIABILITY

Subscales		α
Psychological	Teacher/Student Relationship (TSR)	0.75
	Peer Support for Learning (PSL)	0.78
	Family Support for Learning (FSL)	0.75
Cognitive	Control and Relevance of School Work (CRSW)	0.72
	Future Goals and Aspirations (FGA)	0.80
	Overall	0.80

TABLE II
 PILOT TEST OF IMI INTERNAL CONSISTENCY OF RELIABILITY

Subscales	α
interest/enjoyment (IE)	0.72
perceived competence (PCM)	0.78
effort/importance (EI)	0.85
felt pressure/tension (FPT)	0.72
perceived choice (PCH)	0.91
value/usefulness (VU)	0.80
Overall	0.84

D. Research Procedure

The researcher worked on the lesson with the geography teacher a week prior to the experiment date. The lesson plan guides and acts as a protocol for the teacher before and during the experiment as well as to ensure that the lesson delivery is coherent with the recommended gamification or conventional approach to deliver the same chapter of the geography subject.

To avoid participants from both groups interacting with each another and therefore risk affecting the experiment, group A (Conventional teaching method) was conducted first and followed immediately by group B (Gamification teaching method). Both experiment on group A and group B received the same length of lesson that runs approximately for 80 minutes including administration and collection of the questionnaires.

This schedule was planned to follow closely with the groups' typical class schedule so that participants will unlikely notice any difference from their usual class and are likely to assume the experiment as just another normal class for them.

This helps ensure a more accurate perception and opinion when filling in the questionnaires.

V. RESULTS

The descriptive statistics are reported first followed by the independent t-test. The independent t-tests were conducted to find the significant differences between i) the intrinsic motivation and ii) the engagement level of students who underwent the GTM and the CTM respectively.

A. Learning Method and Motivation

In all of the intrinsic motivation subscales, participants who attended the GTM lesson shows higher mean scores than those who followed the CTM lesson. Referring to Table III, from the descriptive statistic results, GTM participants (Mean = 5.81, SD = 0.89) shows more Interest/Enjoyment (IE) than CTM participants (Mean = 5.23, SD = 1.05). Similarly, GTM participants (Mean = 5.12, SD = 1.06) recorded higher Perceived Competence (PCM) than those from the CTM lesson (Mean = 4.40, SD = 1.29). Again, GTM participants (Mean = 5.76, SD = 1.07) was found to be higher in Effort/Importance (EI) than the CTM group (Mean = 5.47, SD = 0.98). Likewise, participants who went through GTM lesson showed higher means in Felt Pressure Tension (FPT), Perceived Choice (PCH) and Value Usefulness (VU) than the CTM group.

TABLE III
 DESCRIPTIVE STATISTIC OF TEACHING METHOD (MOTIVATION SUBSCALES)

	Teaching Method		Mean	SD	Std. Error Mean
	Method	N			
Interest/Enjoyment (IE)	CTM	31	5.23	1.05	0.19
	GTM	29	5.81	0.89	0.17
Perceived Competence (PCM)	CTM	31	4.40	1.29	0.23
	GTM	29	5.12	1.06	0.20
Effort/Importance (EI)	CTM	31	5.47	0.98	0.18
	GTM	29	5.75	1.07	0.20
Felt Pressure/Tension (FPT)	CTM	31	3.79	1.06	0.20
	GTM	29	3.85	0.64	0.12
Perceived Choice (PCH)	CTM	31	5.17	1.30	0.23
	GTM	29	5.28	1.56	0.29
Value/Usefulness (VU)	CTM	31	5.61	1.10	0.20
	GTM	29	6.29	1.02	0.19
Overall Motivation	CTM	31	4.94	0.65	0.12
	GTM	29	5.35	0.78	0.15

In order to look at the significant difference between both groups, an independent t-test was conducted to answer the hypothesis:

H₀₁ There is no significant difference on students' level of intrinsic motivation between students who attend a gamified lesson and students who attend the conventional lesson.

Although it was reported that in all subscales, GTM was perceived generally as the preferred teaching method over CTM, the significant differences may suggest otherwise. Table IV of the Independent t-test shows a significant teaching method difference in IE $t(58) = -2.302, p = 0.03 (p < 0.05)$ at mean differences of 0.58. Similarly, there was a significant

difference found in PCM $t(58) = -2.37, p = 0.02 (p < 0.05)$ with a mean difference of 0.72. Another significant difference was found in VU $t(58) = -2.48, p = 0.02 (p < 0.05)$.

On the other hand, independent t-test shows no significant teaching method differences for EI $t(58) = -1.06, p = 0.29$

$(p > 0.05)$, FPT $t(58) = -0.29, p = 0.78 (p > 0.05)$ and PCH $t(58) = -0.29, p = 0.77 (p > 0.05)$ with respect to mean differences of 0.28, 0.07 and 0.11 despite the GTM indicate a higher mean than CTM.

TABLE IV
INDEPENDENT T-TEST OF THE MOTIVATION SUBSCALES

		F	p	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Interest/ Enjoyment (IE)	Equal variances assumed	0.75	0.39	-2.30	58	0.03	-0.58	0.25
	Equal variances not assumed			-2.32	57.48	0.02	-0.58	0.25
Perceived Competence (PCM)	Equal variances assumed	1.55	0.22	-2.37	58	0.02	-0.72	0.31
	Equal variances not assumed			-2.39	57.03	0.02	-0.72	0.30
Effort/ Importance (EI)	Equal variances assumed	0.50	0.48	-1.06	58	0.29	-0.28	0.26
	Equal variances not assumed			-1.06	56.58	0.29	-0.28	0.27
Felt Pressure/ Tension (FPT)	Equal variances assumed	5.48	0.02	-0.29	58	0.77	-0.07	0.23
	Equal variances not assumed			-0.29	49.84	0.77	-0.07	0.22
Perceived Choice (PCH)	Equal variances assumed	1.58	0.21	-0.29	58	0.77	-0.11	0.37
	Equal variances not assumed			-0.29	54.73	0.77	-0.11	0.37
Value/ Usefulness (VU)	Equal variances assumed	1.10	0.30	-2.48	58	0.02	-0.68	0.27
	Equal variances not assumed			-2.49	58	0.02	-0.68	0.27

Despite the mixed significant differences found between the six subscales, an overall motivation independent t-test is undertaken and found a significant teaching method differences in overall motivation to learn $t(58) = -2.20, p = 0.03 (p < 0.05)$ (Table V) with a mean difference of 0.41. Participants who gone through GTM lesson (Mean = 5.35, SD = 0.78) were reported generally higher motivated to learn than those who taken CTM lesson (Mean = 4.94, SD = 0.65) (Table III) with a strong statistical significant difference which contradict with the proposed null hypothesis. Therefore, the researcher failed to accept the proposed null hypothesis H_{01} .

TABLE V
INDEPENDENT T-TEST FOR OVERALL MOTIVATION

		F	p	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Motivation	Equal variances assumed	0.40	0.53	-2.20	58	0.03	-0.41	0.18
	Equal variances not assumed			-2.19	55	0.03	-0.41	0.19

B. Learning Method and Engagement

Descriptive statistic yield an interesting result with participants who attended GTM lesson reported lower in Teacher Student Relationship (TSR) (Mean = 3.22, SD = 0.36) and Peer Support for Learning (PSL) (Mean = 3.20, SD = 0.36) when compared with those from CTM lesson respectively TSR (Mean = 3.26, SD = 0.38) and PSL (Mean = 3.25, SD = 0.43) (Table VI). This vaguely indicates that participants from CTM were more engaged in TSR and PSL than participants from GTM.

On the other hand, participants from GTM lesson was reported higher in Family Support for Learning (FSL) (Mean = 3.76, SD = 0.23), Control and Relevance of School Work (CRSW) (Mean = 3.42, SD = 0.26) and Future Goals and Aspirations (FGA) (Mean = 3.83, SD = 0.21) than those from CTM lesson respectively with FSL (Mean = 3.67, SD = 0.28),

CRSW (Mean = 3.39, SD = 0.29) and FGA (Mean = 3.74, SD = 0.20). This loosely shows that GTM was perceived being more engaging than CTM as defined by these three subscales.

TABLE VI
DESCRIPTIVE STATISTIC OF TEACHING METHOD (ENGAGEMENT SUBSCALES)

	Teaching Method	N	Mean	Std. Deviation	Std. Error Mean
Teacher/Student Relationships (TSR)	CTM	31	3.26	0.38	0.07
	GTM	29	3.22	0.36	0.07
Peer Support for Learning (PSL)	CTM	31	3.25	0.43	0.08
	GTM	29	3.20	0.36	0.07
Family Support for Learning (FSL)	CTM	31	3.67	0.28	0.05
	GTM	29	3.76	0.23	0.04
Control & Relevance of School Work (CRSW)	CTM	31	3.39	0.29	0.05
	GTM	29	3.42	0.26	0.05
Future Goals & Aspiration (FGA)	CTM	31	3.74	0.20	0.04
	GTM	29	3.83	0.21	0.04
Overall Engagement	CTM	31	3.46	0.21	0.04
	GTM	29	3.49	0.19	0.04

To investigate if there are any statistical significant differences between both groups, an independent t-test was conducted on:

H_{02} There is no significant difference on students' level of engagement between students who attend a gamified lesson and students who attend the conventional lesson.

Despite the result from the descriptive statistic, independent t-test reported no significant teaching method differences in both dimensions of the psychological and cognitive engagement. Table VII shows that the psychological engagement which consist of three subscales shows no significant differences in TSR $t(58) = 0.45, p = 0.65 (p > 0.05)$, PSL $t(58) = 0.45, p = 0.65 (p > 0.05)$ and FSL $t(58) = -1.34, p = 0.19 (p > 0.05)$ with respective to minor mean differences of 0.04, 0.05 and 0.09. Similarly, the Cognitive engagement

which consist of two subscales reported no method differences for CRSW $t(58) = -0.44, p = 0.67 (p > 0.05)$ and FGA $t(58) = -1.75, p = 0.09 (p > 0.05)$ with respective to low mean differences of 0.03 and 0.09.

To understand the overall engagement level, the researcher run another independent t -test and found no significant teaching method differences in the overall engagement $t(58) =$

$-0.470, p = 0.640 (p > 0.05)$ (Table VIII) with a minor mean differences of only 0.03. Although participants who had gone through the GTM lesson (Mean = 3.49, SD = 0.19) were reported showing slightly higher overall engagement than those from CTM lesson (Mean = 3.46, SD = 0.21) but the differences is not statistically significant (Table VI). Therefore, the proposed null hypothesis H_{02} was accepted.

TABLE VII
INDEPENDENT T-TEST OF THE ENGAGEMENT SUBSCALES

		F	p	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Teacher/ Student Relationships (TSR)	Equal variances assumed	0.02	0.88	0.45	58	0.65	0.04	0.10
	Equal variances not assumed			0.45	57.94	0.65	0.04	0.10
Peer Support for Learning (PSL)	Equal variances assumed	0.17	0.69	0.45	58	0.65	0.05	0.10
	Equal variances not assumed			0.46	57.13	0.65	0.05	0.10
Family Support for Learning (FSL)	Equal variances assumed	1.01	0.32	-1.34	58	0.19	-0.09	0.07
	Equal variances not assumed			-1.35	56.60	0.18	-0.09	0.07
Control & Relevance of School Work (CRSW)	Equal variances assumed	0.05	0.82	-0.44	58	0.67	-0.03	0.07
	Equal variances not assumed			-0.44	57.94	0.66	-0.03	0.07
Future Goals & Aspiration (FGA)	Equal variances assumed	0.01	0.92	-1.75	58	0.09	-0.09	0.05
	Equal variances not assumed			-1.75	57.63	0.09	-0.09	0.05

TABLE VIII
INDEPENDENT T-TEST FOR OVERALL ENGAGEMENT

		F	p	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Engagement	Equal variances assumed	0.01	0.94	-0.47	58	0.64	-0.03	0.05
	Equal variances not assumed			-0.47	57.99	0.64	-0.03	0.05

VI. DISCUSSION

A. Teaching Method and Motivation

Null hypothesis H_{01} was not accepted because as a whole, a significant difference result indicates that participants who had gone through the GTM lesson were generally displaying and were experiencing a higher motivation level to learn compared with participants who went through the CTM lesson. This contradicts with [8]'s findings of a negligible insignificant positive correlation ($r=0.120, p=0.104, p > 0.05$) between past game experience and intrinsic motivation. The Self-determination theory may well explain the discrepancy of the findings. According to [17], for intrinsic motivation to be stimulated, the learning environment should instigate autonomy, competence and relatedness which fulfill the essential towards human needs. GTM provides the necessary learning environment with its game mechanics and game dynamics which were highly motivational and compelling in nature [12] that get students hooked and engaged.

The gamified geography lesson that GTM participants go through includes group activities that were collaborative in nature as gamification emphasize on shared goal and obstacles within a collaboration or competition environment [11]. This explains the findings of three motivational subscales (IE, PCM & VU) which indicate that participants from GTM reported higher interest and enjoyment in learning, perceived themselves more competence and perceived the gamified activity of value and usefulness more so than the participants from CTM. This finding is important for educators as it

suggest and infer that GTM does instigate interests and enjoyment in learning, assist students to feel competence in performing tasks, and most importantly instill the feeling of seeing the value and usefulness in participating in class activities.

Although GTM participants exert higher perceived choice than CTM participants, the differences was not significant. This finding is consistent with [8] where they found negligible significant positive correlation between gamification and perceived learning opportunities. This may imply that neither teaching methods have any nor equal biased influence toward students' perception of what they are able to learn. A possible explanation to this is that, despite GTM uses a different approach, the learning objective and goal of the lesson remained the same with CTM. Students do not feel that they have the flexibility of choice to learn what they want. This shows that gamifying a learning content simply add into it and does not change its learning objective; therefore supports the idea that gamification approach is a malleable. Reference [5] also supports this notion by implying that gamification is a more flexible way to impart knowledge due to unlimited combination of game mechanics when compare with other education approaches.

Interestingly, participants from the GTM reported a higher felt pressure and tension compared with participants from CTM although the differences were insignificant. This indicates a subtle hint that the collaborative and competitive nature of GTM may contribute to the negative participant experience. Reference [28] warns that technology these days

and the possibilities of gamification may promote anti-social behavior or isolates selected individuals. There is a possibility that GTM that requires more peer to peer collaboration and competitiveness give rise to a more pressured and high tension environment when compared with CTM that is more passive and focused on teacher-student relationship with lesser need of communication and group work. Naturally, another explanation would be participants were more familiar with the common CTM compared with the more unfamiliar GTM.

Not a surprise as the GTM participants reported higher efforts and view the task as more important when compared with CTM. Supporting [29] and [30] findings on different learning content, they pointed out that one of the strongest motivator; relatedness or the sense of belonging helps keep students motivated to put in effort and enhance the perception of the importance of the task at hand. Although the finding was not significant, it does illustrate some influence of the GTM over student's perception of effort and importance.

This suggests that the intrinsic motivator of feeling autonomous, competent and relatedness were better satisfied and developed within the GTM environment when compared to the current CTM environment. Gamification was also found to be flexible enough to suit most learning content and serve as a strong teaching method to keep student motivated in class.

B. Teaching Method and Engagement

Null hypothesis H_{02} was accepted because as a whole, the engagement level between participants from GTM and CTM were found to be not significant and therefore inconclusive. Although the reported mean for GTM is higher than CTM, the mean differences were minuscule to infer any causation but assumption can be made.

GTM creates competition and opportunity for collaboration [11] and [30] found in their studies that collaboration promotes better engagement in children. This may be a possible explanation to as why participants who attended GTM lesson are reported to be slight higher in engagement compared with those attended CTM lesson.

Despite all the engagement subscales reported non-significant differences, TSR and PSL subscales seem to favor CTM over GTM. An assumption can be made that CTM tend to emphasize on the relationship between teacher and student with learning occur mostly from teacher passing down knowledge to student. This creates a strong bond of support and connection between the teacher and student. Thus this may explain why participants in CTM reported higher mean than participants from GTM.

Surprisingly GTM were reported lower peer support for learning compared with CTM because the researcher was under the impression that GTM lesson which involves more group activities with peer collaboration and competition would have a better response compared with participants from CTM. In consideration of [31]'s finding of no significant correlations between engagement with Teacher/Student Relationship (TSR) and Peer Support for Learning (PSL), a possible assumption to explain this is that despite their personal opinion and preference, all the CTM participants share the

same learning experience and this could indirectly promote the sense of belonging of being in-group. Reference [3] added that the learning often occur from the teacher revealing the information to the students with an emphasis on teacher-student interaction.

The result indicates that the GTM participants show higher Family Support for Learning (FSL), Control and Relevance of School Work (CRSW) and Future Goals and Aspiration (FGA) compared with CTM. [25] found in their studies that certain demographic groups do suffer lower engagement in school. Since the present study does not take demographic into account and there may be a possibility of it influencing the engagement level, it is possible that that the homogeneity of participants from both groups could have indirectly contributed to the reported insignificant differences. There is a possibility that all the participants share a close to similar perception on FSL, CRSW and FGA.

VII. CONCLUSION

Although only differ marginally, gamification teaching method did show better potential in raising student's engagement in the classroom when compared with the conventional teaching method. This finding shows that the gamification teaching method is likely to be the solution to the current issue of low motivation to learn and engagement in the classroom among lower secondary school students in Malaysia.

Furthermore, gamification is flexible enough and adaptable for academic use in local settings. Educators should consider to gamify their content to raise their student's motivation and engagement level in the classroom while the policy maker should consider gamification approach in their decision making while drafting future education policies and strategies.

REFERENCES

- [1] S. Saleh, and A. Aziz, "Teaching practices among secondary school teachers in Malaysia." International Proceedings of Economics Development and Research, vol. 47, pp. 63-67, 2012.
- [2] Lee Ai Rene, "Minat sikap belajar dan masalah pengajaran dan pembelajaran di kalangan pelajar 4 SPA." (Unpublished doctoral dissertation). Universiti Teknologi, Malaysia, 2004.
- [3] S. Maruli, and R. Wayan, "Identifikasi miskonsepsi guru Kimia pada pembelajaran konsep struktur atom." Jurnal Penelitian dan Pengembangan Pendidikan, Lembaga Penelitian Undiksha, vol. 1, no. 2, pp. 148-160, 2007.
- [4] N. Chan, "Another Malaysian education dilemma: Can we trust our exams?" Retrieved May 10, 2014: <http://www.theedgmalaysia.com/commentary/270283-opinion-another-malaysian-education-dilemma-can-we-trust-our-exams.html>, 2014.
- [5] J. J. Lee, and J. Hammer, "Gamification in education: What, how, why bother?" Academic Exchange Quarterly, vol. 15, no. 2. Retrieved 5th May, 2014 from <http://www.gamifyingeducation.org/files/Lee-Hammer-AEQ-2011.pdf>, 2011.
- [6] K. Erenli, "The Impact of Gamification - Recommending Education Scenarios." International Journal of Emerging Technologies in Learning, vol. 8, pp. 15-21, 2013.
- [7] S. Blumenfeld, "The importance of rote learning." Practical Homeschooling, vol. 34. Retrieved July 20, 2014 from <http://www.home-school.com/Articles/the-importance-of-rote-learning.php>, 2000.
- [8] D. Ong, Y. Y. Chan, W. H. Cho, and T. Y. Koh, "Motivation of learning: An assessment of the practicality and effectiveness of gamification within a tertiary education system in Malaysia." Paper presented at World Academy of Researchers, Educators, and Scholars in

- Business, Social Sciences, Humanities and Education Conference, 22 - 25 July 2013, Cape Town, South Africa.
- [9] J. Hamari, "Transforming Homo Economicus into Homo Ludens: A Field Experiment on Gamification in a Utilitarian Peer-To-Peer Trading Service." *Electronic Commerce Research and Application*, vol. 12, no. 4, pp. 236-245, 2013.
- [10] S. Deterding, R. Khaled, L. E. Nacke, and D. Dixon, "Gamification: Toward a definition or Corcoran." *The Gamification of Education. Conference on Human Factors in Computing Systems, Vancouver, BC, Canada*. Retrieved May 4, 2014, from <http://hci.usask.ca/uploads/219-02-Deterding,-Khaled,-Nacke,-Dixon.pdf>, 2011.
- [11] S. Smith-Robbins, "This game sucks: How to improve the gamification of education." *EDUCAUSE Review Online*. Retrieved May 14, 2014, from <http://www.educause.edu/ero/article/game-sucks-how-improve-gamification-education>, 2011.
- [12] Bunchball, Inc. "Gamification101: An introduction to the use of game dynamics to influence behavior." Retrieved 10 May, 2014 from <http://www.bunchball.com/sites/default/files/downloads/gamification101.pdf>, 2010.
- [13] J. Leming, L. Ellington, and K. Porter-Magee, "Where Did Social Studies Go Wrong?" A report from Thomas B. Fordham Foundation. Retrieved May 8, 2014, from <http://www.flagarts.com/faculty-staff/Jennifer%20Spensieri/documents/ContrariansFull.pdf#page=109>, 2003.
- [14] A. Hamilton, "Rote learning isn't necessarily a bad thing." *FMT News*. Retrieved July 30, 2014 from <http://www.freemalaysiatoday.com/category/opinion/2014/04/08/rote-learning-isnt-necessarily-a-bad-thing>, April 2014.
- [15] E. L. Deci, and R. M. Ryan, "Intrinsic motivation and self-determination in human behavior." New York: Plenum Publishing Co, 1985.
- [16] K. Cherry, "What is Motivation?" Retrieved May 8, 2014 from <http://psychology.about.com/od/mindex/g/motivation-definition.htm>, May 2014.
- [17] Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and wellbeing. *American Psychologist*, vol. 55, no. 1, pp. 68-78.
- [18] E. L. Deci, and R. M. Ryan, "Promoting Self Determined Education." *Scandinavian Journal of Educational Research*, vol. 38, pp. 3-41, 1994.
- [19] G. Wilson, "The Effects of External Rewards on Intrinsic Motivation." *Journal of HYPERplasia Research*. Retrieved July 14, 2014, from <http://www.abccbodybuilding.com/rewards.pdf>, 2006.
- [20] J. A. Fredericks, P. C. Blumenfeld, and A. H. Paris, "School engagement: Potential of the concept, state of the evidence." *Review of Educational Research*, vol. 74, pp. 59-109, 2004.
- [21] H. M. Marks, "Student engagement in instructional activity: Patterns in the elementary, middle, and high school years." *American Educational Research Journal*, vol. 37, pp. 153-184, 2000.
- [22] The Student Engagement Instrument (SEI), University Of Minnesota. Retrieved July 21, 2014, from <http://checkandconnect.umn.edu/research/engagement.html>, 2014.
- [23] J. Hamari, J. Koivisto, and H. Sarsa, "Does Gamification Work? – A Literature Review of Empirical Studies on Gamification." In proceedings of the 47th Hawaii International Conference on System Sciences, Hawaii, USA, January 6-9, 2014.
- [24] The Glossary of Education Reform, "Student Engagement." Retrieved May 9, 2014 from <http://edglossary.org/student-engagement>, 2014.
- [25] M. J. Furlong, and S. L. Christenson, "Engaging Students at School and with Learning: A Relevant Construct for All Students." *Psychology in the Schools*, vol. 45, no. 5, pp. 365–368, 2008.
- [26] J. J. Appleton, S. L. Christenson, D. Kim, and A. L. Reschly, "Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument." *Journal of School Psychology*, vol. 44, pp. 427–445, 2006.
- [27] J. D. Finn, "Withdrawing from school." *Review of Educational Research*, vol. 59, pp. 117–142, 1989.
- [28] J. Marquis, "Debates about Gamification and Game-Based Learning (#GBL) in Education." *Classroom Aid – Connecting Dots of Digital Learning*. Retrieved July 20, 2014, from <http://classroom-aid.com/2013/04/07/debates-about-gamification-and-game-based-learning-gbl-in-education>, 2013.
- [29] D. Eseryel, V. Law, D. Ifenthaler, X. Ge, and R. Miller, "An Investigation of the Interrelationships between Motivation, Engagement, and Complex Problem Solving in Game-based Learning." *Educational Technology & Society*, vol. 17, no. 1, pp. 42–53, 2014.
- [30] X. Wu, R. C. Anderson, K. Nguyen-Jahiel, and B. Miller, "Enhancing Motivation and Engagement through Collaborative Discussion." *Journal of Educational Psychology*, vol. 105, no. 3, pp. 622-632, 2013.
- [31] C. P. Carter, A. L. Reschly, M. D. Lovelace, J. J. Appleton, and D. Thompson, "Measuring Student Engagement Among Elementary Students: Pilot of the Student Engagement Instrument - Elementary Version." *School Psychology Quarterly*, vol. 27, no. 2, pp. 61-73, 2012.