

COMPLETION EQUALS COMPETENCE?

Master Thesis

Using gamification elements to improve teachers' attitude
towards gamification and the effectiveness of online learning

Keywords: teachers' training, gamification, online learning

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Abstract

Online education has widely spread during the COVID-19 pandemic. On top of distractions that the pandemic may have on one's learning, without good design considerations, it is difficult to engage and motivate learners in the digital environment. Gamification has been found to be a promising method to help learners maintain attention and motivation during learning. However, ample teachers still hold low belief in the effectiveness of gamification. Therefore, changing teachers' attitudes towards gamification is an urgent matter to solve. This study involves the use of specific game elements to increase learner motivation as well as attitude towards gamification. These game elements were implemented in a teachers' training program. The two game elements included were a ring-shaped result bar and badges. This study focuses on the effects of these two combined game elements in improving teachers' attitude towards gamification, teachers' learning outcome, as well as motivation to reattempt each training level. Teachers were randomly assigned into two groups: a group with training content with the two game elements and another group with training content without the two game elements. Results showed that the two game elements improved teachers' attitude towards gamification as well as their motivation in completing the training program. Due to ceiling effect, however, this study was not able to statistically conclude whether teachers' knowledge acquisition changed. This study provides empirical support for the use of the two game elements to improve learner motivation as well as attitudes towards gamification.

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1. Introduction

Online learning has widely spread in the past few years due to the rapid development of technology. COVID-19 pandemic accelerated this digital education trend. However, without supervision, effective and engaging learning in an online environment has become more challenging (Brinthaupt & Fisher, 2011; Kaedah & Belajar, 2020; Sánchez-Cruzado, Santiago Campión, & Sánchez-Compañía, 2021). A prominent issue in relation to online learning is reduced students' attention span and motivation (Quintiliani et al., 2021). For example, students have the access to browse internet, use cell phones more freely, and thus are prone to distractions. Learners are more susceptible to losing track of their progress, engagement, and motivation, which subsequently results in insufficient time spent on the course content which causes suboptimal learning (Lepp, Barkley, & Karpinski, 2014). Under the global pandemic context, the integration of online education was accelerated. Hence, exploring means in online education which can engage and motivate learners are crucial. The researcher hypothesizes that gamification might be such a means.

Gamification refers to utilizing game elements in non-game contexts, for example training programs (Stott & Neustaedter, 2013). Game elements may include badges, challenges, progress bars, and leader boards (Brigham, 2015). It has been found to positively impact learning effectiveness, learner's motivation, and help learners manage their learning progress in online settings (Sailer & Homner, 2020; Bai et al., 2020). However, despite the scientific discoveries about benefits of gamification in online learning, some teachers and educators are still averse to implementing it in their own curriculum (Sánchez-Mena & Martí-Parreño, 2017). Reasons such as low belief in the effectiveness of gamification, teachers' current lack of technological expertise in creating, and low comfort with implementing gamification in digital lessons were

mentioned in several studies (McGrail, 2005; Wood, Mueller, Willoughby, Specht, & Deyoung, 2005). Additionally, ample teachers find implementing gamification to be challenging (Asiri, 2019; Bovermann, Weidlich, & Bastiaens, 2018). This perception is stemmed from teachers' low perceived usefulness of gamification as well as limited knowledge in creating and successfully implementing gamification in their own classrooms (Schulz, Isabwe, & Reichert, 2015).

Therefore, aside from studying whether gamification has a positive impact on learning, there is also a need to study how we can improve teachers' attitudes and motivation towards gamification so that they can implement it themselves (Sánchez-Cruzado et al., 2021). In response to this issue, Gold (2001) claimed that teachers should have the actual experience of online learning prior to teaching online themselves. Otherwise, they might simply transfer what is known to work well in traditional practices into online learning, which can cause misfit in online environment (Kreber & Kanuka, 2006). Moreover, teachers who have never experienced online learning may find it hard to predict the challenges that students are facing (Gold, 2001). Hence, it is hard to encourage those teachers to incorporate gamification when their perceived usefulness toward gamification is low. As such, parallel to Gold (2001)'s claim, introducing teachers to gamification and allowing them to experience the process themselves may enable them to see gamification's effectiveness, which can possibly cause a positive change in their attitude towards gamification (Gold, 2001; Kreber & Kanuka, 2006).

McGrail (2005) also agrees by saying: "the teachers were willing to accept change as long as they were convinced that it would allow them to see a gain for their students as well as their own instructional practices" (McGrail, 2005, p. 21). Extending from these two ideas, it is hypothesized that introducing teachers to the concept and potential benefits of gamification in

online learning can benefit their attitude and increase the likelihood they would implement gamification themselves.

1.1 Game elements of progress bars and badges

Among the most common gamification elements, such as badges, challenges, leader boards, levels, progress bars, two gamification elements were chosen to study whether they can increase learners' motivation and engagement. The two game elements chosen are progress bars and badges. It is believed that these two gamification elements may can assist learners to track their progress and engage learners towards reaching a specific goal (Hamari, 2017; Schiffman & Greist-Bousquet, 1992).

A progress bar is a visualization that helps learners to track their progress in the training content. When a learner completes a task, the progress bar indicates that the completion of the task, for example, by indicating '100% progress'. Badges are icons that learners typically obtain upon completing a task. By default, learners would normally start with no badges. The completion of tasks earns them badges.

Both progress bars and badges are likely to positively impact learning. Badges have been found to work as a reward system to stimulate motivation during learning therefore increasing user activity (Hamari, 2017). Badges were also found to help learners set clear learning goals, that is to obtain the badge. Having a clear learning goal may assist learners to anchor their expectations higher which can result in a higher performance (Bandura, 1993).

1.2 Zeigarnik Effect and people's "need" to complete

Though, like badges, progress bars can facilitate learners keeping track of their progress towards a goal, they also trigger an effect known as the Zeigarnik effect. The Russian psychologist Bluma Zeigarnik found that unfinished or incomplete tasks tend to leave a deeper

impression in the mind therefore compelling people to finish them (Kodden, 2020; Schiffman & Greist-Bousquet, 1992; Seifert & Patalano, 1991). Seeing incomplete progress can cause learners to constantly remind themselves that there is still a task to be done. Aside from the Zeigarnik effect, seeing incomplete progress bars can foster engagement with the task because progress bars appeal to people's tendency or "need" to complete a task once begun (Schiffman & Greist-Bousquet, 1992). Visualization of incomplete tasks create cognitive effort that generates an unconscious reminder that there are things to be done (Seifert & Patalano, 1991). A progress bar may therefore motivate learners to finish their training program accordingly. Badges, similarly, may encourage learners to improve their performance for every part of the training program.

By incorporating a progress bar and badge, teachers might be more motivated to complete the level. However, in an online environment, completion of the training content is not the only goal of learning. The ultimate goal was for teachers to master the training content. Utilizing Zeigarnik effect and people's "need" to complete a task, the researcher made a design alteration in the progress bar. Instead of representing the learning progress, the bar indicates the learning result in each level thus providing a clear indication about where the teachers stand in the training content. It is not about the type of gamification elements that matters, but the design as the design will determine the gamification elements' effects on learning (Kumar & Pande, 2017). To maximize the Zeigarnik effect and people's "need" to complete a task, the result bar will be designed to be ring-shaped. Fully closed ring represents full score in a level, whereas the unclosed ring represents otherwise. The researcher believes that this design will trigger people revisit the learning content due to the need of close the ring-shape result bar.

1.3 Research questions

There are numerous studies that had explored the effectiveness of gamification and different gamification elements under learning context. But studies on implementing gamification into online teachers' training and exploring their potential attitude change after experiencing gamified online training are scarce. Additionally, studies that link gamification to motivation of learners are also rare. Lastly, progress bars on numerous studies have been commonly linear; whether a differently designed ring-shaped result bar can trigger a different learning effect has not been discussed in many studies. Based on the abovementioned research gap, the following research questions are investigated:

- (1) *to what extent does the incorporation of a progress bar and badges in a teacher professional development affect teachers' knowledge acquisition on the training content.*
- (2) *to what extent does the incorporation of a progress bar and badges in a teacher professional development affect the teachers' attitudes towards gamification.*
- (3) *to what extent does the incorporation of a progress bar and badges in a teacher professional development motivate teachers to increase their number of attempts until they achieve a perfect score.*

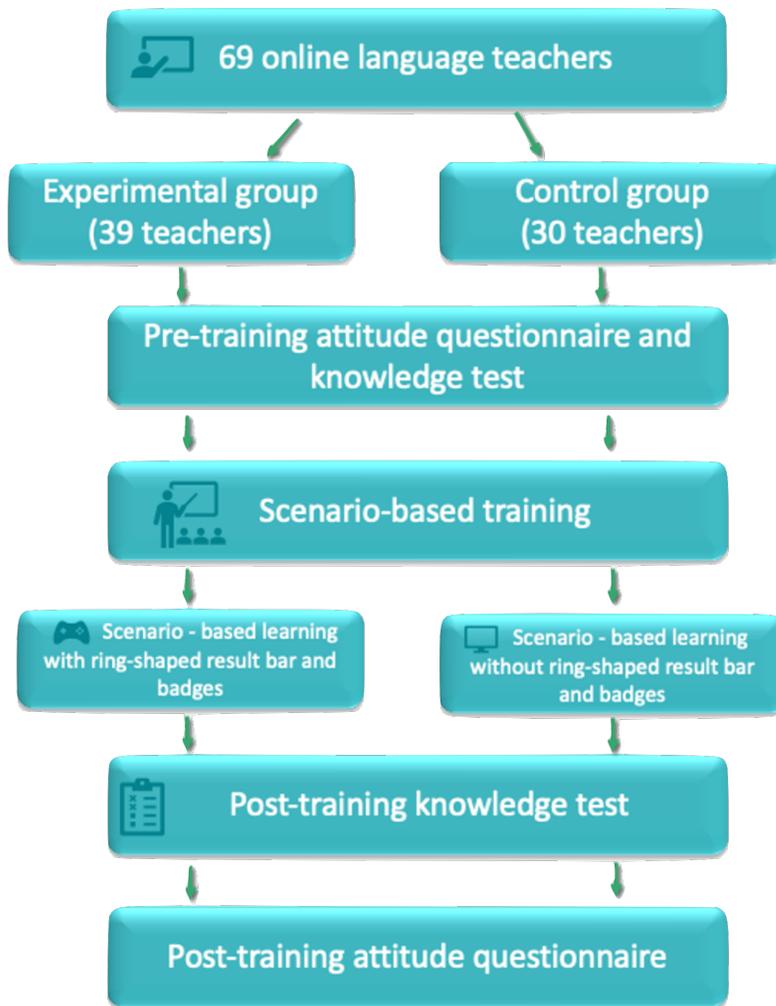
2. Method

2.1 Design

This study has a pre-test-intervention-post-test experimental design with two conditions. The *first condition* was a teacher professional development program without the two game elements. This group of participants formed the control group. The *second condition* was a teacher professional development program with the two game elements: a progress bar and badges. This group of participants formed the experimental group. The dependent variables of interest include teachers' knowledge acquisition, teachers' attitude towards gamification, and the number of attempts in each level.

2.2 Procedure

All participants in the online language academy received the invitation email to join the training course. In the email, participants were informed about the purpose of the study as well as the voluntary nature of the study. Participants were allowed to withdraw their participation anytime throughout the training. Additionally, if participants agreed to participate, a deadline of two weeks was given to complete the course. Three reminders to participate were given: first after a week, second after ten days and the last two days prior to the deadline. The agreement to participate also implied an inherent consent to enable some of their personal data to be collected for the purpose of scientific research. Participants were also informed that the expected duration of the course was 60 minutes. Figure 1 illustrates the entire experimental procedure.

Figure 1*Experimental design process*

2.3 Participants

This study's participants included teachers in an online language academy who teach languages (English, Chinese, Spanish, French, German) as a second language. The participants were from the United States of America, China, France, United Kingdom, South Africa, Spain, Germany, Canada, Croatia, Indonesia, and Mexico. The teachers were selected as participants as they have been online teachers themselves. Therefore, the participants had sufficient experience

with digital education. Additionally, the concept of gamification was already well-known to the participants. The researcher has contacted a list of participants to participate in the study. In this list, prospective participants were already randomly assigned to experimental and control groups. A total of 69 participants agreed to participate. 39 participants were from the experimental group pool, while the other 30 participants were from the control group pool. As a result, 69 (60 females, 9 males) participants' results were analysed. Participants' mean age was 37 years old ($SD = 7.6$ years) and the majority reported having Master's degree or equivalent level of education (50.7%) and Bachelor's degree or equivalent level of education as their highest educational degree (36.2%).

To demonstrate whether the results were comparable in control group and experimental group, the descriptive statistics of mean age, mean educational level and gender distribution are calculated. Table 1 below summarises the demographics of teachers in the two groups. Differences in age and gender between the two groups were studied. The experimental group's average age was not significantly different from the control group's average age, $t(67) = 0.16$, $p = .874$. Gender was also not significantly different between the experimental group (33 females) and control groups, 25 females, $p = .724$ by two-tailed Fisher's Exact Test. Education level was also not significantly different between the two groups, $\chi^2(3) = 3.58$, $p = .311$. Hence, in general, the two groups were considered to be comparable.

Table 1*Demographic comparison between conditions*

Factor	Total sample n = 69	Experimental group n = 39	Control group n = 30
Gender			
%Male	11.6%	12.8%	10.0%
%Female	87.0%	84.6%	90.0%
Mean age	36.84	36.97	36.89
Educational level			
%Master / equivalent	52.1	34.4%	43.4%
%Bachelor / equivalent	36.4	48.7%	53.3%
%Post-Secondary	7.2	10.3%	3.3%
%Other	4.3	7.7%	0.0%

2.4 Materials

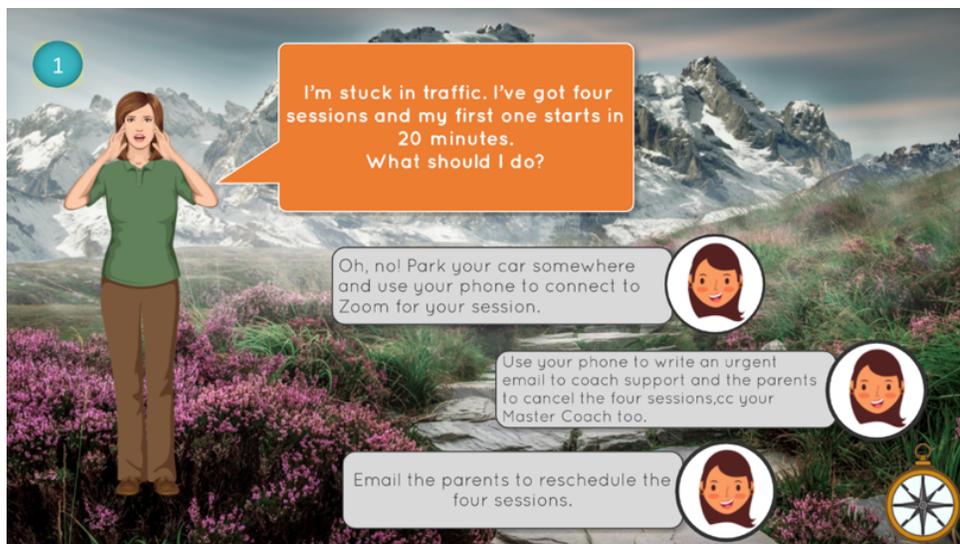
2.4.1 Learning environment

The learning content was directed to train participants to deal with emergency problems that can be frequently encountered in an online learning academy. The training was done through a computer-supported online learning environment which was created with Storyline 360. Both experimental and control condition groups shared the exact same training content. The training was designed like an adventure; participants need to help the avatar called Vivi in the training to solve problems and gain points. There were four levels in both experimental and control groups; every level had a unique theme and the themes in level one to four were respectively mountain level, jungle level, beach level, and city level. Each level contained five problems that participants needed to help Vivi to solve. Hence, there was a total of 20 problems. In Figure 2, the learning content was dealing with late and cancellation of classes. Corrective feedback (i.e., correct or incorrect) was given after every answer. Completion of a level, regardless of scores

obtained, enabled Vivi to move to other levels (i.e. moving from mountain to jungle level). Participants were free to choose which level they wanted to proceed with. Every correct response to a problem in a level counted as one point and therefore, five points were the maximum for each level. When all four levels were completed, Vivi would reach the finish line. Participants were able to re-attempt the levels indefinitely.

Figure 2

Example of a situation in an adventure



The training was an example of a scenario-based design learning as participants had to solve different cases throughout the training. Scenario-based learning emphasizes the use of active learning strategies through real life cases or problems. Usually, scenario-based learning involves a storyline around a specific set of problems to solve. In scenario-based learning, there are many opportunities to provide feedback to participants. This encourages participants to actively reflect throughout the training (Kindley, 2002). According to Hursen and Fasli (2017), scenario-based learning can enable learners to gain meaningful learning within the authentic context. Gossman et al. (2007) supported this idea by claiming that learners who learn with real-

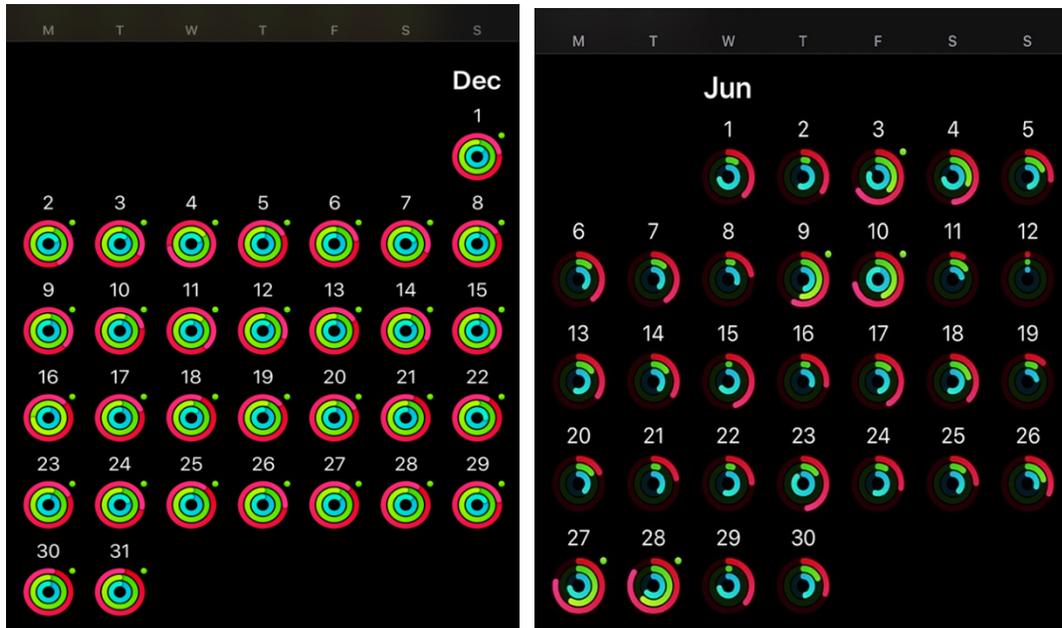
life scenarios can solve problems better. Scenario based learning creates an opportunity for learners to be more active and improving their real-life skills during their learning processes (Sorin, 2013; Yarnall, Toyama, Gong, Ayers, & Ostrander, 2007). Therefore, the content of this study follows a scenario-based learning.

2.4.2 Experimental group learning condition

The training content in the experimental group had the two main game elements: a ring-shaped result bar as well as badges. When participants obtain a perfect five score in a level, the ring-shaped result bar closes and becomes green. The purpose of a ring-shape progress bar was to appeal to participants' sense of competence (i.e. whether participants find it unsatisfactory when the bar has not been fully closed). The unique design of the ring-shape can reveal the state of completeness directly. Apple® had implemented this design on their Apple Watch Sport®. Figure 3 below shows how the progress bar looks like. This study would also design the progress bar in a ring shape. This design was also supported by Schiffman and Greist-Bousquet (1992) who claimed that incomplete tasks generate continued task-related cognitive effort and thus attempt to finish the tasks to seek fulfilment. This also aligns with Zeigarnik effect which mentioned that incomplete tasks generate stress. Upon completing a level, an unclosed ring-shaped result bar should motivate participants to re-attempt the level to close the bar. Additionally, when participants completed a level, the badge for each level would be coloured instead of grayscale. The purpose of the badge was to prevent the participants from skipping any levels as participants might find it unsatisfactory to leave the badges greyscale. Badges were also shown to increase learner activity in the training content (Hamari, 2017). In Figure 4, the exact positions of ring-shaped result bar and badges in the training content are highlighted.

Figure 3

Apple® Watch Sport, on the left are fully closed rings, and on the right are unclosed.



2.4.3 Control group learning condition

The training content in the control group lacked both the ring-shaped result bar and badges. Instead of the ring-shaped result bar and badges, the final score of each adventure was displayed on the button of each specific level. Figure 5 below shows the layout of the training content. All other elements, such as Vivi the avatar, the representation of mountain, city, jungle and beach levels were also present in this control group.

Figure 4

Adventure map page in eLearning course in experimental group with two additional game elements.



Figure 5

Adventure map page in eLearning course in control group without two game elements



2.5 Measurements

2.5.1 *Attitude towards gamification*

Participants' *attitude towards gamification* was measured by their responses on two sets of attitude questionnaires: one administered prior to the training and another after. There were 15 items asked in the pre-training attitude questionnaire and the post-training attitude questionnaire. The first five items collected participants' background information: age, gender, and educational level. For the remaining questions, a five-point Likert scale that ranged from 'Strongly Disagree' (value of 1) to 'Strongly Agree' (value of 5) was applied. These questions measured three constructs: perceived usefulness of gamification, potential negative attitudes, and implementation of gamification intention. Perceived usefulness of gamification quantifies participants' motivation and attitude on usefulness of applying gamification concepts in learning. Potential negative attitude captures participants' perceptions on disadvantages of using gamification concepts in class. Lastly, implementation of gamification intention measures how likely it is for participants to apply gamification in their own classrooms. The full list of question items can be seen in Table 2. With a maximum value of 1, all three constructs were internally consistent with Cronbach's alphas greater than 0.80. Refer to Table 3 to observe Cronbach's alpha per construct. The sufficiently large Cronbach's alpha values indicate that the items can be considered reliable based on the responses given by the participants.

Table 2*Post-training attitude questionnaire in experimental group condition*

Construct	Item	Adapted from
Perceived usefulness of gamification in this course	1. Game elements in this training course increased my motivation.	Alabbasi (2017)
	2. Game elements in this training course drew my attention.	
	3. Game elements in this training course increased my curiosity.	
	4. Game elements in this online course increased my satisfaction about the learning experience.	
Potential negative attitudes (obstacles) toward gamification.	5. Utilizing game elements in online learning would cost too much preparation time and reduce the actual learning time.	By researcher
	6. Utilizing game elements in online learning might distract learners' attention.	
	7. Students might be more concerned about collecting points than learning the materials.	
Implementation (of gamification) intention	8. I think using gamification into my lesson to be a wise thing to do.	Ajzen (1991)
	9. I think using gamification into my lesson to be a good idea.	
	10. I think using gamification into my lesson to be a positive thing.	

Table 3*Reliability of each construct in the questionnaire*

Construct	Cronbach's <i>a</i>	
	Pre-questionnaire	Post-questionnaire
1: Perceived usefulness of gamification in this course	0.92	0.89
2: Potential negative attitudes (obstacles) toward gamification.	0.80	0.85
3: Implementation (of gamification) intention	0.98	0.90

2.5.2 Knowledge acquisition

A knowledge test was administered to measure participants' *knowledge* of what to do for which issues that may arise as they teach. In other words, the researcher was interested in observing whether participants were able to give a desired response to a certain situation that may be encountered during online teaching. The test was administered twice: once prior to the training and another after. Both tests contained same ten multiple choice questions describing a certain situation and possible responses were provided. The participants had to select the best response from four options. Each correct answer grants one point to the participant. Therefore, the maximum score for the knowledge test was 10. An example of a question was "*What is the best way to cancel a session within 24 hours?*". The choices were, respectively, *A. Contact Coach Support to cancel; B. Contact parent to reschedule; C. Email the parent, coach support and your Master Coach including "Urgent" in the subject line. D. Email the parent, coach support and your Master Coach including "Urgent" in the subject line.* The complete list of

knowledge test items can be found in Appendix A. After performing the pre-training knowledge test, participants were shown their final score. An indication of which question was right or wrong was given. However, the correct solution to the wrong questions were not given. After performing the post-training knowledge test, participants received immediate feedback including score as well as indications on which responses were correct and which wrong. No time limit was given to complete these knowledge tests.

2.5.3 Motivation through number of attempts at each level

The last variable, *the number of attempts in each level*, was derived from the logfiles? The measurement was made through recording how many times each level was replayed by participants. Higher number of attempts may indicate higher motivation that participants have in obtaining the highest score possible.

2.6 Data analysis

2.6.1 Final sample in the analysis

One teacher did not fill in the pre-training attitude questionnaire and 18 did not complete the post-training attitude questionnaire. Four teachers did not complete pre-training knowledge test and 14 did not complete post-training knowledge test. Results were included in analysis whenever possible (i.e., performance in the learning environment can be compared regardless of whether the teacher completed the post training attitude questionnaire), thus none of the teachers' results were permanently excluded from the analyses. The sample sizes for each analysis can be found in the result section.

2.6.2 Research questions data processing and analyses

All statistical analyses were performed using SPSS version 27. These analyses were performed to answer the research questions.

To answer research question one, *to what extent does the incorporation of a progress bar and badges in a teacher professional development affect the teachers' attitudes towards gamification*, no new variable was constructed. Data points used for analysis were obtained directly from the results of the pre- and post-training attitude questionnaires.

To answer research question two, *to what extent does the incorporation of a progress bar and badges in a teacher professional development affect teachers' knowledge acquisition on the training content*, similarly, no new variable was constructed. Instead of results of the pre- and post-training attitude questionnaires, results of teachers' knowledge test were used for analysis to answer the question.

To answer research question three, *to what extent does the incorporation of a progress bar and badges in a teacher professional development motivate teachers to increase their number of attempts until they achieve a perfect score*, a new variable was constructed. There was a need to operationalize teachers' motivation. The current data did not have any measures of motivation. One way to do this was to link the number of attempts with the scores teachers obtained at various levels of the professional development program. If a teacher only had one attempt and it was not a full score, it might imply that the ring-shape result bar did not motivate the teacher to re-attempt therefore close the ring. However, if a teacher made several attempts and the last score was a full score, it might imply that this teacher was motivated to re-attempt until the full score was achieved. Consequently, there were two types of teachers: teachers who managed to close the ring-shaped result bar (i.e., obtain a score of 5) at the first attempt of the

level and those who did not manage to do so. Data of teachers who managed to close the ring at the first attempt were excluded in the analysis. Effect of the two game elements on increasing the motivation will not be applicable to these teachers as these teachers already received a perfect score at the first attempt and thus did not perform any more attempts. Thereafter, an average of the number of attempts per teacher was calculated.

Table 4

Illustration of data processing to measure participants' motivation in attempting the levels

ID	Beach		Jungle		City		Mountain		Mean attempt
	Score	Attempt	Score	Attempt	Score	Attempt	Score	Attempt	
1	5	1	4	2	5	3	3	2	$\frac{(2+3+2)}{3} = 2.33$
2	3	1	5	3	5	1	5	2	$\frac{(1+3+2)}{3} = 2.00$
3	5	4	4	2	5	1	5	1	$\frac{(4+2)}{2} = 3.00$

To illustrate the above: a teacher may have obtained a final score of 5 at the first attempt at beach level, a final score of 4 at the second attempt at jungle level, a final score of 5 at the third attempt at city level, and final score of 3 at the second attempt at mountain level. The number of attempts at beach level was excluded as the teacher managed to achieve a perfect score of 5 at the first attempt. The number of attempts at city level was, however, not excluded. This was because the teacher managed to only achieve a perfect score of 5 at the third attempt. This teacher therefore might have shown motivation to achieve a perfect score of 5 for a specific

level. The average number of re-attempts for this particular teacher was 2.33, which was based on the average number of re-attempts from the three remaining levels (i.e. average of 2 (attempts at jungle level), 3 (attempts at city level), and 2 (attempts at mountain level)). Table 4 illustrates the inclusion and exclusion of the data. The shaded cells indicate the excluded data.

3. Results

3.1 Descriptive statistics of results

Table 5 summarizes the key descriptive statistics of our data. First six rows of the table pertain to the data needed to measure the attitudes of teachers towards gamification while the last two rows pertain to the data needed to measure the knowledge acquisition of the training content.

Table 5

Descriptive statistics for participants' test score and process data per condition

	N		Mean		SD	
	Control	Exp	Control	Exp	Control	Exp
Pre-training perceived usefulness	30	38	4.53	4.51	1.06	0.64
Pre-training negative attitudes	30	38	2.24	2.14	1.17	0.64
Pre-training implementation intention	30	38	4.42	4.42	1.13	0.99
Post-training perceived usefulness	24	27	4.25	4.46	0.94	0.75
Post-training negative attitudes	24	27	2.63	1.85	1.14	0.68
Post-training implementation intention	24	27	3.75	4.62	1.01	0.71
Pre-training knowledge test	28	36	6.75	7.08	1.87	1.74
Post-training knowledge test	25	30	8.88	9.30	1.09	0.87

3.2 Knowledge acquisition

Pertaining to research question one, *to what extent does the incorporation of a progress bar and badges affect teachers' knowledge acquisition*, a univariate analysis of covariance (ANCOVA) was conducted. The independent variable was two conditions (i.e. with and without further game elements), the dependent variable was post-training knowledge test scores and the covariate was pre-training knowledge test scores. Pre-training knowledge test score was included as a covariate to control for its effect on post-training knowledge test scores.

ANCOVA test results revealed that there was no main effect of the two game elements on the post-training knowledge test scores after taking into consideration of pre-training knowledge test scores as a covariate, $F(1, 50) = 3.20$, $partial \eta^2 = 0.06$, $p = .080$. This finding could be caused by a ceiling effect due to low item discrimination. As shown in table 5, pre-training knowledge test in control group was 6.75 and 7.08 in experimental group. The results could be considered to be relatively high prior to the training. This phenomenon will be discussed in the discussion section.

3.3 Teachers' attitudes

Pertaining to research question two, *to what extent does the incorporation of a progress bar and badges in a teacher professional development affect the teachers' attitudes towards gamification*, a multivariate analysis of covariance (MANCOVA) was conducted. The independent variable was condition (i.e., with and without further game elements), the dependent variables were the attitude questionnaire constructs (i.e. perceived usefulness of gamification, potential negative attitudes on gamification, and implementation of gamification intention), and the covariate was pre-training attitude questionnaire. The covariate was included to control for the effect of pre-training attitude on the post-training attitude.

MANCOVA test results revealed that there was a significant main effect, *Pillai's Trace* = 0.45, $F(1, 48) = 11.67$, *partial* $\eta^2 = 0.45$, $p < .001$. Further post-hoc analysis of between-subject effects indicated that there was a significant difference between conditions considering post-training scores of participants' negative attitude towards gamification, *partial* $\eta^2 = 0.23$, $p < .001$, and post-training scores of participants' implementation of gamification intention, *partial* $\eta^2 = 0.25$, $p < .001$. Scores of potential negative attitudes were lower in the experimental than in control group, whereas scores of implementation intention of gamification was higher in experimental than in control group. Post hoc comparison did not show a significant difference between conditions in teachers' perceived usefulness of gamification after the intervention, *partial* $\eta^2 = 0.02$, $p = .418$.

3.4 Number of attempts

Pertaining to research question three, *to what extent does the incorporation of a progress bar and badges in a teacher professional development motivate teachers to increase their number of attempts*, an independent two-sample *t*-test was conducted. The independent variable was condition (i.e. experimental and control) and the dependent variable was number of attempts made by teachers.

Levene's Test for Equality of Variance indicated that the variances in the mean number of attempts of participants between the experimental and condition groups can be assumed to be equal ($p = .579$). The independent sample *t*-test suggested that the experimental group ($N = 28$, $M = 1.64$ attempts, $SD = 0.55$) showed a higher number of re-attempts as compared to the control group ($N = 27$, $M = 1.26$ attempts, $SD = 0.30$), $t(53) = 3.17$, $p < .001$.

4. Discussion

The current study examined how implementing gamification elements into online teachers' training can improve the learning effectiveness and increase the learners' motivation. The study also examined whether teachers experience gamified online training can yield a different attitude towards gamification. Furthermore, effects of incorporating a ring-shaped result bar into the teachers' online training to see whether the different design can engender a higher number of level attempts were also explored.

4.1 Knowledge acquisition

There was an insignificant change in knowledge acquisition between the two groups. There were some conditions that have influenced our ability to capture a possible effect of the intervention on the change in teachers' knowledge acquisition of the learning content. This observation can be partially explained by the ceiling effect present in the pre-training knowledge test. The pre-training knowledge test in both control and experimental group were relatively high prior to the training, refer to table 5. The teachers might have had a close-to-perfect performance. This phenomenon reduces the chances to measure improvement that the training content had on knowledge acquisition as the teachers had little space left to improve. Therefore, the effect of progress bar and badges on knowledge acquisition was inconclusive.

Another issue was the fact that feedback was given to teachers prior to the training itself. Feedback triggers deep learning and employment of better learning strategies (Vollmeyer & Rheinberg, 2005). Despite no correct solution to each question was given, feedback on their overall performance already primed teachers into believing that some of their answers were not correct. Therefore, there might be a possibility that teachers gave the correct answer, or simply tried another answer, in their post-training due to teachers reflecting on the feedback instead of

the knowledge obtained from the training. As teachers from both groups received feedback after their pre-training knowledge test, the impact of feedback might explain why there was no difference in the knowledge test results between the control and experimental groups.

Both conditions make comparison between the groups challenging and therefore no statistical conclusion can be made regarding knowledge acquisition of the learning material. Future research should provide feedback only at the very end of the experiment to measure the knowledge acquisition from the training content.

4.2 Teachers' attitude towards gamification

This study also provided empirical evidence that the use of the two game elements is overall positively correlated with teachers' attitude towards gamification. Based on the results in this study, the two game elements did not result in a significant increase in perceived usefulness of gamification but were able to significantly reduce negative attitudes towards gamification as well as increase intention to implement gamification in their own classrooms. It should be taken into account that prior to the training, the mean score for teachers' perceived usefulness of gamification was already almost nearing maximum.

The reason of high pre-score of perceived usefulness could be this study's sample was too positively biased towards digital learning and gamification. Due to the academy's online nature, teachers were hired with the intention of teaching online. Henceforth, technology readiness and affinity towards technology were also a part of the hiring criteria. The relatively young age of samples, additionally, might also have made them more receptive towards innovative practices that can take place in an online education (Sánchez-Mena & Martí-Parreño, 2017). However, understanding the effect of gamification is only possible if the study involved samples with reasonable affinity and sufficiently positive attitude towards gamification. In the

future, samples from other types of institutions, particularly the more traditional, offline institutions should be included. On top of that, samples from a relatively more senior age should be considered as well. Doing these will help to increase the generalizability of the findings in this study.

The expectations that the two game elements were able to significantly reduce potential negative attitudes teachers have towards gamification were met. From the questionnaire answers, teachers did not think that gamification distracts learners as much as before the training. Similarly, teachers also believe that gamification does not cause learners to collect points instead of truly acquiring the learning materials. Future designers could use the results of this study to suggest that certain gamification elements do not distract students and therefore encourage future educators to implement it in their classrooms whenever appropriate.

4.3 Number of attempts

The training with two game elements (i.e. ring-shaped result bar and badges) were associated with an increase in the motivation of teachers to perform a higher number of attempts. This finding is in line with Hamari (2017)'s study that mentioned that some game elements (i.e. badges) are able to increase user activity in the learning content. The observations from this study might also be related to Zeigarnik effect. Zeigarnik effect mentions that incomplete tasks trigger our attention as it notifies learners that there are still some tasks to be done, which causes learners to put more cognitive effort into finishing these tasks (Seifert & Patalano, 1991). The incompletely closed ring-shaped result bars might have been seen as representations of incomplete tasks to be done. Concurrently, simple presentation of scores did not visually demonstrate whether the current score (i.e. 4 out of 5) is a full score or not and how far it is from the full score, therefore, it is less likely to trigger the "need" to complete. This observation also

aligns with the findings that incomplete tasks appeal to people's tendency to complete the task once begun (Schiffman & Greist-Bousquet, 1992). In this study, final scores of each level were both apparent in the control and experimental conditions. Hence, the presence of scores might not have appealed to teachers' need for competence.

5. Conclusion

This study provided some evidence of usefulness of specific game elements in manipulating learners' need for competence when implemented in an already gamified teacher training content. Specifically, the use of ring-shaped result bar and badges were shown to increase teachers' motivation to complete the learning program and attitudes towards gamification. The results of this study can be used to convince teachers of the usefulness of gamification in online learning and therefore, to encourage teachers to use gamification in their online classrooms. The ring-shaped result bar and badges might also be a suitable way to help monitor students' progress as well as motivation when in taking part in distant, online learning. This study has provided a steppingstone into understanding the vast possibilities of impact of gamification in the future, whether in the context of teacher professional development or classroom curriculum.

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Appendix A

Sample Quiz	Options
questions	
1. What is the best way to cancel a session within 24 hours	<p>A. Contact Coach Support to cancel</p> <p>B. Contact parent to reschedule</p> <p>C. Email the parent, coach support and your Master Coach including "Urgent" in the subject line.</p> <p>D. Write an URGENT email to coach support that you won't be able to make this session, and copy to your master coach, mark this session as coach late cancellation.</p>
2. If you stuck on a traffic, and your session is only 20 minutes away, what is your best option?	<p>A. Use your phone or tablet to teach</p> <p>B. Contact the parents and coach support to cancel the session. When you can access the internet, you can mark this session as coach late cancellation.</p> <p>C. Contact parents to reschedule a new time.</p> <p>D. Contact coach support and copy to your master coach to explain the situation, they will help you to contact parents.</p>
3. Coach Vivi cancelled 4 sessions within 24	<p>A. Coach Vivi will not be eligible for the pay raise in the half-year review.</p>

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- hours. What is going to happen?
- B. VivaLing will stop recommending Coach Vivi for two months.
- C. If these 4 sessions happen within the same day, it will count as one Coach Late Cancellation.
4. If your learner is late, who do you need to contact?
- A. Parents
- B. Your Master Coach
- C. Parent and Coach Support
5. A parent wishes to swap the session within 24 hours to the learner's sibling. Do I have to accept?
- A. You are not obligated to complete any session that is changed with less than 24 hours' notice. You can use VivaLing's policy and say you are not allowed. However, if you feel comfortable and want to continue with the other learner, you can choose to accept.
- B. If you already teach the other learner, you should accept the request. If you have never taught the other learner before, you should politely refuse the request.
- C. You are obligated to provide the best experience for VivaLing families. Refusing the sibling switch might leave the family with a poor opinion of VivaLing.
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