The Effects of Paper, Web, and Game Based Formative Assessment on Motivation and Learning: A Literature Review

First Author: Faten Alzaid

McGill University

Co-author: Nouf Alkarzae

Majmaah University

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Abstract

Assessment has a significant influence on the process of teaching and learning. It is essential to close the gap between learners' performance and the target performance. The rapid changing of technology reached the assessment community by developing new and different ways of formative assessments. This paper is written to distinguish between paper-based, web-based, and game-based formative assessment and their possible influence on motivation and learning. It presents the main challenges remaining with traditional paper-based classroom assessment and the influential role of technology in improving the application of formative assessment. This paper also discusses the potential of gamification on the future of formative assessment and its influence on motivation and a second language (L2) learning. In this paper, gamification represents the uses of game elements and design in a non-game context such as rewards, badges, leaderboards, challenges...etc. A theoretical and an empirical framework has been discussed in the light of literature along with a comparison between the three formative assessment methods. Accordingly, gamification strategies seemed to have a clear value to overcome previous issues of traditional formative assessment in terms of motivation and learning. Future studies are recommended to implement a comparative study to investigate the implication of gamification strategies in formative assessment on L2 students' learning and motivation.

Keywords: Formative Assessment, Technology, Gamification, Motivation, Second Language Learning.

Introduction

Assessment plays an important role in the development of teaching and learning (Black, 2009). The relationship between learning and assessment has long been recognized (Black, 2009). At its most basic level, assessment in classroom serves to gather evidence of students' learning and these data are used by teachers to inform their pedagogical decisions. Because assessment can trigger learning, it is often considered the most integral component of teaching (Brown, S., 2005). Usually, there are two types of classroom assessment based on its function; summative and formative assessment. Summative assessment is usually conducted at the end of a unit, or year, and is designed to provide information on the skills and knowledge learners have acquired from a curriculum (Katz, 2012). Formative assessment can trigger learning by engaging learners to use feedback on an ongoing basis to evaluate student progress and plan future instructions (Black, 2003). Formative assessment is the focus of this research.

According to Katz (2012), formative assessment is a tool that is "designed to monitor and support student learning and to fine-tune instruction so that it meets students' evolving needs" (p. 67) throughout the semester. Black and William (1998) defined formative assessment as "all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged (pp. 7-8).

There are many methods and approaches to formative assessment (Black, 2003), such as group projects, portfolios, oral interaction, or a wide range of written assessments, such as quizzes, depending on the assessment and the learning goals. Over the last three decades, formative assessment has changed in its conception from being teacher-centered to student-centered, meaning that learners interact and engage in the process of their own assessment and

learning (Nicol & Macfarlane-Dick, 2006). In recent years, the use of technology in formative assessment, or gamification, has become increasingly common in educational institutions and innovative technology-based quizzes are being developed. In this paper, I will distinguish between paper-based assessment, web-based formative assessment and game-based formative assessment. Therefore, the following sections will review the literature and discuss the specific applications of formative assessment to language learning by highlighting advantages and challenges in the classroom, role of technology enhanced assessments, and the potential of gamification to influence learning and motivation. Furthermore, a deep theoretical and empirical review of gamification is provided in this paper.

Formative Assessment in Second Language Classrooms

Purpura (2016) defined language assessment as "a broad term referring to a systematic procedure for eliciting test and non-test data (e.g., a teacher checklist of student performance) for the purpose of making inferences or claims about certain language-related characteristics of an individual" (p. 191). There are two types of assessments in a language classroom, summative assessment and formative assessment. Summative assessment focuses on measuring students' achievements usually conducted for summative purposes such as providing grades to inform a student of his/her performance (Purpura, 2016; Lee, 2007). Unlike summative assessment, formative assessment targets learning and instruction instead of using assessment only for measuring purposes (Purpura, 2016). According to Lee (2007), formative assessment that targets learning has been in use since the 1980s where it was created by the Assessment Reform Group (ARG) in the United Kingdom. Great effort has been devoted to the study of formative assessment (FA), and its role in learning different subjects, including second language (L2) learning (e.g., Chen & Chung, 2008; Colby-Kelly & Turner, 2007; Goldberg, Russell & Cook,

2003; Gruba & Clark, 2013; Katz, 2012; Lee, 2007; Purpura, 2016; William, 2011). For L2 learners, language assessment is crucial to facilitating language learning in a classroom (Colby-Kelly & Turner, 2007). FA confirms the achievement of a learning goal (Lee, 2007).

However, Lee (2007) acknowledged that some educational institutions worldwide misuse FA in ESL and EFL classrooms. For example, in Hong Kong, where the culture of high-stakes exams is dominant, formative assessment of writing skills focuses on the product of writing more than learning through the writing process. In this case, students are asked to write a text and then they get a grade that informs them of their level rather than supporting a gradual improvement of their writing skills by breaking the assessment into small segments and providing ongoing structured feedback, such as comment-based feedback. Lee (2007) stated that formative assessment associated with grades "can easily shatter confidence and diminish motivation" (p. 203). When this happens, students shift their focus from their learning into their performance (Butler, 1988). In addition, Haskell (2013) noted that a focus on grading can in fact prevent learners from engaging in the process of assessment and learning from their mistakes. Instead, formative assessment should be learning-oriented and provide qualitative feedback rather than assigning a grade. Done this way, formative assessment not only furthers language development (Gruba & Clark, 2013), but also seems to develop students' self-esteem, independence, and motivation (e.g., Buchanan, 2000; Butler, 1988).

According to Butler and Nisan (1986), "the information routinely given in schools— that is, grades — may encourage an emphasis on quantitative aspects of learning, depress creativity, foster fear of failure, and undermine interest" (p. 215). In fact, this was demonstrated in one of the studies conducted by Butler (1988) who examined the effect of three different types of formative assessment feedback and their relation to intrinsic motivation and learning. Butler

examined the differential impact of feedback that focused on performance and encouraged ego-involvement and that which focused on learning and task-involvement. Ego-involvement refers to a state of an individual's self-esteem when he or she focuses on the performance of assessment tasks, while task-involvement refers to a student's involvement in task-mastery and a focus learning rather than thinking of self-efficiency. Butler's (1998) study consisted of 132 fifth and sixth grade students who were randomly recruited from twelve classes in Israel. The students were divided into three groups. The first group received feedback via comments only, the second group via grades only and the third group via both comments and grades. Participants completed three sessions that consisted of assessment tasks related to Hebrew words and they received a questionnaire after each of these sessions. Data were collected from both the scores of the assessment sessions and the questionnaires. The findings revealed that the group who received comments only significantly attained better learning gains than the other groups. In addition, the results from the questionnaire indicated that in the grades only group and the grades combined with comments group, high achievers felt significantly more motivated to perform further tasks than low achievers. However, in the comments-only group, both low and high achievers showed an interest in performing further tasks. This suggests that using grades encouraged ego-involvement where high achievers would be more interested to perform further tasks to assure their self-esteem through their performance, while low achievers would be less interested to perform more tasks as this could affect their sense of self-efficacy. On the contrary, using comment feedback enhanced better learning but also encouraged mastery of and involvement in the learning tasks. Carless (2002) argued that the findings of Butler's study are interesting as they do not support the traditional grading practice in a classroom, where feedback is usually performance oriented.

The next sub-sections explain the challenges associated with paper-based classroom formative assessment and introduces an alternative - technology and web-based classroom formative assessment.

Paper-based Formative Assessment

As mentioned earlier, paper-based assessment is one type of classroom formative assessment, typically achieved through pencil and paper quizzes. Some researchers have indicated that there are some challenges associated this method (e.g., Buchanan, 2000; Haskell, 2013; Wood et al., 2013; Zakrzewski & Bull, 1998). First, the paper-based method lacks the flexibility to offer immediate repetition of assessment until learners reach their best performance (Buchanan, 2000; Zakrzewski & Bull, 1998). Traditional paper-based assessment usually follows the classroom schedule, and it is rare that learners can take various quizzes per day to assess their mastery of a task and check the development of their performance (Buchanan, 2000). In other words, if a student fails a quiz, there is no chance to repeat the assessment immediately. This may be because providing individual feedback through paper-based assessment demands plenty of teacher time (Janier & Shafie, 2009), and repeating an assessment could impinge on other classroom activities (Elliot, 2008). In addition, Wood et al. (2013) stated that "traditional, 'one-off' assessment activities no longer provide suitable structures for assessing student learning" (p. 514). In contrast, repeating an assessment several times provides learners with an opportunity to assess their learning, prevent disappointment of first attempts, help learners experiment with new methods and learn from previous mistakes (Wood et al., 2013). This allows them to further master a task or skill (Buchanan, 2000).

Another challenge with paper-based formative assessment is engaging learners as collaborators in the assessment procedures and learning process. While this has been shown to

help learners understand the assessment goals, enhance the quality of teacher feedback, and help teachers modify their lesson planning according to assessment results, thus achieving positive learning outcomes (Black & William, 2005; Katz, 2012), it is not always easy to accomplish using paper-based methods. As mentioned earlier, engaging learning in the process of assessment can be achieved by providing ongoing qualitative feedback through comments rather than grades. However, though comment-based feedback could offer better learning and motivational outcomes (Butler, 1988), it still requires plenty of time to produce using paper-based assessment (Janier & Shafie, 2009). In a classroom with 30 students and 12 assessments, the teacher faces a major challenge. To provide all students with timely and accurate feedback on a paper-based formative assessment is possible, but logistically challenging in a language classroom where there are often large numbers of students who need feedback on multiple language issues (Jia et al., 2012).

While formative assessment can offer many benefits to learners, such as effective learning, high interest or engagement, as well as enhanced self-esteem and self-efficacy, challenges remain with implementing traditional formative assessment language classrooms. Technology might offer a solution to many of these challenges (Jia et al., 2012). The following section discusses the application of technology for classroom formative assessment.

Technology and Web-based Formative Assessment

With the increase of 21st century technologies, new methods of assessment are being developed, which are impacting classroom practices (Wood et al., 2013). In the information age, technological devices are becoming an integral part of some language classrooms to support assessment and learning. According to the Statistic Brain Research Institute, in 2017, around 90% of schools worldwide have one or more computers in the classroom (Static Brain, 2017).

Technology has been adapted in language testing and teaching since the 1960s and has contributed to the enhancement of motivation and test efficiency (Chapelle & Voss, 2016). The integration of technology into assessment has resulted a number of research investigating the differences between computer or web-based and paper-based assessments (e.g., Chapelle & Douglas, 2006; Puhan, Boughton & Kim, 2007). There are several advantages of web-based assessment compared to paper-based assessment.

Unlike paper-based quizzes, web-based assessments can provide a student with multiple attempts at succeeding on a task because it can rapidly retrieve a variety stored items or tasks and provide with instant feedback (Buchanan, 2000). With technology, learners are one click away from repeating a formative assessment they failed and receiving timely immediate feedback in each trial. This provide students real-time practice in which they can improve their own knowledge and work at their own pace (Buchanan, 2000) whether inside or outside classroom. Buchanan (2000) conducted two studies with undergraduate psychology students to examine the efficiency of a web-based formative assessment tool known as *PsyCAL* and its role in enhancing students' performance on a summative test. In both studies, students were provided with open access to plenty of online exercises in the form of multiple-choice questions, which they could use to assess themselves regularly in preparation for the summative test. In the first study, the use of *PsyCAL* was mandatory as a part of the course work, while in the second study it was not compulsory. Overall, the results of both studies indicated that students who used the online exercises, learned and performed better than those who did not use it.

As mentioned earlier, providing such variety of formative exercises as well as offering timely feedback is still a challenging factor in paper-based formative assessment. In a comparison of traditional paper-based and web-based assessments, Janier and Shafie (2009),

found that teacher time spent on feedback could be lowered by using technology. In a language classroom, computer-based assessment can efficiently provide feedback to a large number of students with variations in L2 proficiency levels (Jia et al., 2012).

Another advantage of web-based assessment is its multimedia features that might enhance learners' memorization of a subject (Jia et al., 2012). Jia et al. (2012) suggested that with visual support and well-constructed activities, memory might function better, and learners could be better able to recall required knowledge. Kayaoglu, Akbas, and Öztürk (2011) found that using multimedia functions such as visual and aural text-based materials can effectively improve students' vocabulary learning in comparison with paper-based materials.

Jia et al. (2012) also implemented a study that compared the impact of computer-based assessment and paper-based assessment on students' English vocabulary learning. This study focused on learning three basic elements: English spelling, English pronunciation, and Chinese phrases. This study had 96 participants who were enrolled in a middle school in China. Forty-nine students were included in the control group, while 47 were in the experimental group. Both groups studied 14 units that included 398 English words. They took three quizzes after each curriculum unit to assess the vocabulary acquired. The control group completed paper-based assessments, while the experimental group completed web-based assessments on Moodle, an online, free, and open-source course management platform that allows teachers to customize and design assessment questions using different forms like multiple choice, cloze tests and matching. In this study, the researchers only used multiple choice and cloze tests. After 20 weeks, data were collected from all the assessment sessions plus other tests, which included a pre-test, two mastery tests, a mid-term test, a final test, and a survey. The results supported web-based assessment over traditional assessment. First, in terms of vocabulary learning outcomes, the

experimental group showed improvement over the control group. According to the independent sample t-test, the vocabulary acquired by the experimental group was significantly higher than those in the control group ($p= 0.04$). In addition, the survey revealed that students believed vocabulary learning was challenging and difficult and that such the web-based assessment system was necessary to improve language acquisition. They also indicted that the use of the system was not complicated and participants hoped to use it in their future English classes.

Nevertheless, Wang, T. H. (2008) found that web-based assessments that resemble paper-based assessment (such as adapting multiple-choice from paper to web-based assessment) do not show the same advantages with respect to improving learning and motivation. Instead, Wang, T. H. (2008) found that adapting game like web-based formative assessment, which includes providing game design and elements such as challenges, rules, hints, collecting scores and receiving a reward, can significantly result in a better level of learning as well as motivation. Similarly, this was discussed by Wood et al. (2013), who believed that adding game mechanics to classroom assessment with the support of technology may result in increased learning and motivation. However, there are few empirical studies that examine the effects of game-based formative assessment compared to traditional paper-based assessment on students' learning motivation, especially in L2 learning classrooms.

In summary, unlike traditional formative assessment methods, web-based assessment provides many advantages including feasibility to re-access and repeat FA, availability of timely feedback, and the variety of multimedia features such as sounds, pictures and screen motions (Buchanan, 2000; Janier & Shafie, 2009; Jia et al., 2012). However, as methods of assessment keep improving (Wood et al., 2013) and recent generations become interested in gaming (Lofgren, 2016), technology-based assessment needs constant development in order to fulfill

modern educational needs (Gruba & Clark, 2013). In Wang, T. H.'s (2008) study, he concluded that such development can be attained via breaking the mold of traditional assessment by integrating game strategies to formative assessment to heighten its effectiveness and promote a higher level of learning and motivation. In the next section, I review the literature on gamification as one of the novel and innovative game strategies of technology or web-based assessment with the potential to increase the efficiency of formative assessment and improve motivation and learning.

Gamification

Technology and video games are likely to change the way new generations acquire knowledge (Flores, 2015). According to the latest statistics on video game consumption in 2016, in North America alone, about 200 million gamers are playing video games at the same time (Statista, 2016). Although video games seem to target younger age groups (Garland, 2015), they have been gaining popularity among teenage users and adults, (Lofgren, 2016) and most gamers are aged between 18 and 35 years (Entertainment Software Association, 2015).

Gamification is a strategy that uses game elements and design in a non-game context (Seaborn & Fels, 2015). Game elements in this definition represent the inclusion of rewards, badges, leaderboards, levels and immediate feedback in a task (Flores, 2015). Besides, game design represents the design of a game-full experience by creating purpose, challenges and fun for users (Flores, 2015). According to Bowers, Cannon-Bowers, Greenwood-Ericksen and Vogel (2006) the design of game challenges should have appropriate scaffolding techniques that gradually build meaningful learning skills. In other words, game design should encourage players to enjoy coping with game challenges, and solve small tasks in order to achieve bigger goals and trigger certain behaviors (Marczewski, 2013). The use of "non game context" in the

definition above represents the target and the main objective of using gamification in education which focuses on developing learners' skills and learning rather than only integrating fun or enjoyment (Flores, 2015).

Gamification has several features that increased the utility of game experience for stakeholders and players. For the purposes of education, gamification rests on important learning and motivational bases, discussed shortly. Hägglund (2012) explained the construction of gamification components and described how gamification includes both game mechanics and dynamics. Game mechanics are the elements and roles applied to a game, such as points, levels, challenges and gifts. Game dynamics, on the other hand, are the outcomes of a game, such as the rewards, status, competition, and achievement satisfaction. Hägglund considers these components to be the magical ingredients of a successfully gamified task, and he argued that they potentially increase players' motivation. In addition, Kapp (2012) emphasized the importance of game mechanics, which include features such as points, badges, and different levels, to maintain and increase motivation. However, badges and rewards should be carefully used as a recognition of achievements rather than being achievements or goals themselves (Marczewski, 2013). It is important for students to be aware about reaching learning goals when using gamified tasks rather than solely focusing on collecting rewards. Therefore, objectives should be announced prior to the application of gamification and they should match the interests of individuals (Marczewski, 2013).

In addition, providing challenging a game-based platform, game rule policies, and instant feedback have been shown to enhance the motivation necessary for learning (Kapp, 2012; Lui, 2014). Integrating a challenging game platform was posited by Kapp (2012) as the most important feature of gamification known as "game thinking platform." Game thinking is a game

process that provides a mental challenge to users. Game thinking was defined by Kim (2017) as a special game design that creates a sense of engagement for players. It is the feature that pushes a player to achieve a compelling performance until he or she masters the given task. This sort of design, which is similar to gambling technique, increases the desire to perform (Kim, 2017). This feature is effective in any authentic learning task as it triggers learners' higher-order thinking skills, and motivates the desire to solve a problem, therefore achieving higher quality of learning (Herrington et al., 2010, as cited in Wood et al., 2013). Moreover, solving a challenge needs to be supported by effective and constant feedback. In games, feedback is constant and instant to enhance players' performance and skills improvement (Marczewski, 2013). Timely-cycled feedback in games and gamified tasks sets an important role in a game experience. It helps players to concentrate on each learning task and know where they are in their learning and therefor gradually scaffold learning and understanding of a subject (Kotini & Tzelepi, 2015).

Kahoot! is a web-based formative assessment platform that integrates the gamification elements mentioned above (i.e., points, rewards, challenges etc.). According to Wang, A. I. (2015) *Kahoot!* was initially designed by Mobitroll Company in 2012. One of the aims of *Kahoot!* is to help instructors and learners create educational game-like platforms by designing online quizzes, surveys and virtual discussions that foster classroom community interaction as well as enhance learning, engagement and motivation. Learners using *Kahoot!* are asked to engage in a task, such as solving a puzzle, and their efforts are rewarded instantly with points instead of grades, and their efforts are recorded instantly to show their progress on a leaderboard instead of reporting each grade separately on papers.

Recently, as technology has advanced, technology-based gamification has started to be used in the classroom where gamification provides similar advantages of web-based assessment

(i.e., re-access FAs, timely feedback, multimedia features) except that it integrates engaging game elements that improve enjoyment and motivation for learning. Wood et al. (2013) argued that gamification can provide an even more accurate image of learners' achievements.

Gamification started to gain more attention in the field of education, as educational technologies have developed and have become more personalized and mobile (Chen & Chung, 2008; Garland, 2015; Tulloch, 2014). Caponetto, Earp and Ott (2014) reported that, between 2011 and 2014, 119 research studies were done on the topic of gamification in education. The next sections provide several theories and recent research studies of gamification effect in the field of education.

Theoretical Basis for Gamification's Benefit to Learning and Motivation

Gamification seems to provide several distinct theoretical benefits to the learning process. Some recent publications (e.g., Nicholson, 2012; Wood et al., 2013) have documented the theoretical framework of game elements and gamification as motivational tools. The sections below review both the learning theories and the theories of motivation that may underpin the effectiveness of gamification in education.

Learning theories. There are many theories of learning that are applicable to the conception of gamification, such as operant conditioning theory and involvement load hypothesis.

Operant conditioning. Janerose (2012) and Robson, Plangger, Keitzmann, McCarthy and Pitt (2015) claimed that gamification operationalizes Skinnerian conditioning and learning theory. They compared Skinner's theory, which uses external reinforcements to elicit desired behaviors to the gamification model, which uses external reinforcements like points and badges to maintain desired behaviors and promote learning. However, to maintain a positive learning

outcome, rewards should be provided occasionally in gamification to prevent players from losing their interest in the game (Richter, Raban, and Rafaeli, 2015) and therefore learning. Richter, Raban, and Rafaeli (2015) explained that occasional rewards are similar to those used in gambling. Likewise, in the classroom context, gamification should provide students with rewards after several achievements or after several fluency trials of the games, which should keep players keen to receive the rewards.

Involvement load hypothesis. Huang, Willson and Eslami (2012) shed light on Laufer and Hulstijn's (2001) involvement load hypothesis, which assumes that language learners effectively learn vocabulary when they are involved in deeply processing words. They explained that to reach such a mental state, students need to go through three cognitive stages: need, search, and evaluate. Gamification potentially allows such deeper processing to occur via the game thinking feature (Kapp, 2012). That is, when learners *need* to know the meaning of a word, they *search* for the right meaning in a game resource and eventually *evaluate* their responses. Though Abrams and Walsh (2014) did not address the involvement load hypothesis in their study, the implication of the theory has emerged in one of the case studies in their paper on gamified vocabulary through e-learning. In their study, they engaged their students in two gamified experiences, one which took place after school and the other during school. They used different gamified online resources such as The Challenge, and Vocabulary.com. The former has an adaptive feature that detects learners' vocabulary needs and creates a personal words list, while the latter gamifies the target words by proposing a series of challenging multiple-choice questions with hints, a points system, and feedback. In one part of Abrams and Walsh's (2014) study, learners were asked to answer gamified multiple-choice questions designed by the Vocabulary.com website to test a set of 25 words that were retrieved from each study unit and

introduced at the beginning of every unit in class. Learners in this activity needed to respond to questions and find the correct meaning of a word to gain more points. If they did not know the answer, they were allowed to look up the word by clicking on a link that was provided. Interestingly, the resource only provides a full definition and explanation of given words in the question and evaluation of the best answer is left for a student. Abrams and Walsh (2014) suggested that even though this sort of task is similar to the traditional multiple-choice method, it has more advantages because it provides learners with a chance to involve, evaluate, and become agents for their own learning. Therefore, gamification strategy seems to be able provide positive task involvement that is beneficial to convey a deep learning of vocabulary.

Motivational theories. Research indicates that motivation is crucial to facilitating authentic language learning (Garland, 2015). Motivation is an essential personality factor that students need to obtain a L2 (Brown, H., 1994). Despite the fact that motivation is highly important in L2 learning, Garland (2015) argued it is not an easy factor to provide. For this reason, gamification provides a potentially fruitful strategy in the L2 classroom, as it may benefit students' learning and motivation (Garland, 2015; Hasegawa, et al., 2015). Tulloch (2014) argued that gamification is a powerful and unique pedagogical tool due to its primary focus on engagement. Engagement or involvement in a task is motivational because it increases the state of flow where a person enjoys doing a task and forgets about physical feelings and time (Csikszentmihalyi, 2008). More explanation of flow is provided in shortly.

Motivational affordance. Several publications have established an extensive explanation of the construct of gamification and its psychological impact on players. For example, Hamari, Koivisto and Sarsa (2014) presented a theory of gamification consisting of three major parts: motivational affordance, psychological outcomes, and behavioral outcomes. They explained that

motivational affordance occurs through experiencing the impact of points, badges, and leader boards, which rank players based on their performance and feedback, while the psychological and behavioral outcomes emerged as results of these motivational affordances. Hamari et al. (2014) distinguished between psychological and behavioral outcomes. The former consists of learner enjoyment, engagement and satisfaction, while the latter are achieved by learning new skills, increasing the level of participation or completing a task.

Intrinsic motivation. Intrinsic motivation in L2 learning stems from learners' enjoyment of learning the language regardless of any sort of external pressure (Ng & Ng, 2015), while extrinsic motivation is to perform actions to seek a certain reward such as gifts or money (Hägglund, 2012). Hägglund (2012) considered intrinsic motivation more essential in the process of learning a subject than extrinsic motivation. Reiners and Lincoln (2015) argued that "performing tasks for intrinsic reasons puts someone in a healthier mental state than performing tasks for extrinsic rewards" (p. 2).

Deci and Ryan's (2004) self-determination theory is one of the well-known theories of intrinsic motivation that can be associated with gamification conception. Self-determination theory assumes that intrinsic motivation is a pattern that combines three psychological needs: autonomy, competence and relation (Deci & Ryan, 2004). If one or more of these needs are satisfied, this can trigger intrinsic motivation. Self-determination theory, however, represents an individual's intrinsic motivation during a task without the influence of external pressure or reinforcement. For example, one of the intrinsic motivational needs in L2 classrooms is the need for a sense of competence (Ng & Ng, 2015). Aparicio et al. (2012) has mentioned that game elements of gamification such as positive feedback, optimal challenge, progressive information, points, levels, and leaderboards can influence an individual's sense of competence, and can thus

trigger intrinsic motivation. This was demonstrated also in Sailer, Hense, Mayr and Mandl's (2017) study that investigates the role of game elements such as points, leaderboards, badges and performance graphs in satisfying intrinsic motivational needs. The researchers found that individuals who experienced such game elements felt significantly more competent than those who did not.

In summary, using game elements with learners can trigger one or more of the psychological needs of intrinsic motivation that is necessary for L2 learning.

Flow theory. Flow theory by Csikszentmihalyi (2008) is defined as the state of a deep concentration in a task with less consciousness of time and physical feelings such as involving in a game or performing arts. According to Domínguez et al. (2013), the state of flow, which is extremely motivating, can be reached by engaging in a gamified task. Egbert (2004) argued that the characteristics of tasks influenced by flow can enhance language acquisition. He explained that tasks should be interesting, demonstrate appropriate challenges with clear goals, have allotted time and immediate feedback, and that learners should have control and be focused on tasks with fewer interruptions. In addition, when the challenge of a task matches learners' skill level, they can achieve better level of flow, and this enhances enjoyment, engagement, motivation and performance (Egbert, 2004). Abrams and Walsh's (2014) study of gamification and vocabulary learning in L2 learning context revealed interesting findings that suggest the players reached a state of flow: they stated that "many students enjoyed learning vocabulary through a gamified approach because the challenge was fun" (p. 56). In their study, they believe they reached the roots of flow by involving students in five categories: control, competence, appropriate challenges, immediate experiences and clear feedback by "The Challenge" program,

which is a gamified online website. In sum, providing these categories through gamification enhances learners' sense of flow and engagement which can improve learning outcomes.

Achievement levelling system. One of the major theoretical frameworks for motivation in gamification is the achievement levelling system, or qualifying players to move to the next level upon successful task completion. This feature is an integral part of video games mechanics (Goehle, 2013). The theory behind such mechanics is to provide learners with a sense of power that gradually maximizes their ability (Goehle, 2013). As learners move to a higher level they are given a new power to help them to cope with surrounding game challenges. Goehle (2013) clarified that in classroom contexts, these rewarded powers can be provided through additional time for homework, extra credits or extra help in assignments. However, to help learners experience different levels with sustainable motivation, it is important to provide suitably challenging and achievable tasks (Ng & Ng, 2015), which can be proposed via series of gamified tasks (Hasegawa et al., 2015).

Meaningful game context. Nicholson (2012) described the importance of the narrative that runs through many games. This element is considered a crucial feature of Alternate Reality Games (ARGs). ARGs are virtual games that include telling a story that mimics real world situations (Nicholson, 2012). Having a narrative in virtual reality games that reflect real-world practice (e.g., OpenSim games) can motivate learners to learn the target language authentically (e.g., Jauregi, 2016). Jauregi (2016) conducted a case study to examine the effect of telecollaborative games, games that use gamification elements and game narrative virtually, on students' motivation. The game played in this study used advanced technology known as OpenSim that engages students in a cross-cultural virtual platform through interaction with other players, choosing an avatar, moving around different virtual rooms, and performing task using

German as the target language. Twelve students played OpenSim for two sessions and responded to a pre- and post-survey of each session. The results from the survey suggested that learners enjoyed playing in a virtual cross-cultural game, which allowed them to communicate with peers from another country as they solved some problem-based tasks together. This study indicated that such virtual games that have reflected real world practice of a language, have the ability to enhance learner motivation toward learning the target language in a meaningful way. Stott and Neustaedter (2013) explained, "Providing a unifying story throughout a curriculum can put the learning elements into a realistic context in which actions and tasks can be practiced, something that is considered extremely effective in increasing student engagement and motivation" (p. 3).

Empirical studies on gamification

Gamification has recently been the theme of many research studies in the field of education (Flores, 2015). According to previous studies, the gamification of classroom activities can result in improvements in both learning outcomes and motivation (e.g., Haskell, 2013) and can therefore be an effective tool to promote learning and productivity. The section below reviews the research on gamification and learning. As there are few empirical studies that examine the effect of gamification on L2 learning (see Hasegawa, et al., 2015; Lui, 2014; Perry, 2015; Jauregi, 2016), four empirical studies from other fields were reported in this section to investigate the effect of gamification on classroom learning and motivation. Overall, the results of the studies reported below are positive and suggest that gamification can increase learners' motivation, engagement and learning.

Cheong, Cheong, and Filippou (2013) performed research to see if gamification improves learning, enjoyment, and engagement. In total, 76 undergraduate IT students engaged in a series of short quizzes to review past course materials via a gamified app, the Quick Quiz. These

quizzes took the form of activities and were used over the course of four weeks. Students were asked to answer the multiple-choice questions in the game and try to achieve progress. The gamification elements used in this study included points, time constraints, competition, and feedback. At the end of the four weeks, researchers provided students with a questionnaire on students' learning, enjoyment, and engagement. The results revealed that 56.58% believed that the gamification practice they experienced had increased their learning productivity and 46.05% felt happy when playing the Quick Quiz. In addition, 44.74% of students felt excited and engaged during the game. The researchers suggest that majority of students felt that gamified activities have clear value for increasing learning outcomes. Students also found the activities engaging which resulted more enjoyment for them.

Though motivation is considered high in most gamification applications, Hanus and Fox (2015) argued that gamification could lose its novelty after a certain period of time. Learners may at first feel interested to play and then experience a decrease in their level of excitement. For this reason, Wang, A. I. (2015) examined the effects of a game-based student response system (GSRS) after short- and long-term use on students' engagement, motivation, and learning. A gamified system known as *Kahoot!* was implemented under two conditions: in the first condition, *Kahoot!* was played at the end of a motivational lecture on game-based learning, and in the second, *Kahoot!* was used as a summary task at the end of each class of a software architecture course. The former condition represented a short-term usage of the system, which lasted for a total of only 45 minutes, while the latter represented long-term usage, as the system was used frequently throughout the semester. The gamified factors of this system were the time trails, points, and individual feedback. The data were collected from a total of 252 participants at the Norwegian University of Science and Technology. The data were obtained from a survey,

and observations of participants' interactions. Overall, 206 participants from the short-term usage group and 46 participants from the long-term usage answered the survey. The results indicate that students in the short-term use of *Kahoot!* group significantly found the system more fun and communicative than their counterparts. However, results from observations and survey data indicate that students from long-term use group were found to be more attentive, focused and communicative during the application of *Kahoot!* but they show less enjoyment of competition than their counterparts. Overall, this study suggests that in both cases, students reacted positively to gamification in the classroom. However, over a long period of use, the researchers recommend varying the games frequently to avoid drawbacks in motivation and engagement.

Wang, T. H. (2008) used assessment as a game attribute to track students' progress and learning. Specifically, the study investigated the effectiveness of three different formative assessment methods on student motivation and learning. In total, 165 fifth grade students participated in this study from six classes in Taiwan. The first group completed the formative assessment via a game-based website known as GAM-WATA, the second group completed a normal web-based test, while the third group completed a paper-based assessment. The experiment lasted for two weeks and students were assessed about a science lesson on plants. The purpose of this study was to test the effectiveness of the integration of technology and game mechanisms into a formative assessment practice. The gamified factors in this study included points, rewards, and feedback. The latter was not provided immediately but rather the game proposed a few hints when a student failed to choose the right answer to support learners' feelings of competence. According to the data that were collected via pre- and post-assessment, the results revealed that the GAM-WATA group significantly outperformed the other two groups

in the activities that have comprehension-items. This group also showed significantly better performance than those in the paper-based group in the activities that have knowledge-items. This result supports the view of Wood et al. (2013) that suggests the integration of technology-based formative assessment combined with gamified elements may improve a successful level of learning.

In addition, the findings are similar to the study conducted by Su and Cheng (2015), who suggested implementing mobile gamification learning system enhances students' learning, achievements and motivation. Su and Cheng (2015) implemented a study to seek further knowledge of the role of mobile technologies to support gamified learning elements and their influence on students' motivation and learning achievements in a science course. This study took place in an elementary school natural science class in Kaohsiung, Taiwan. The 102 fourth grade students who participated in the study were randomly assigned to three different groups. The groups consisted of two control groups and one experimental group; the first control group did the learning exercises using normal mobile devices, the second control group used traditional classroom teaching, while the experimental group used mobile gamification learning system (MGLS). MGLS is a system that provides series of outdoor learning activities and exercises about insects using leaderboards, badges and missions. In addition, the information and activities in MGLS were presented with visual, auditory and textual support. Overall, the objective of the teaching activities for all the groups was to certify that students know the name, character, ecology, type and category of a varied selection of insects. The teaching and activities lasted for six weeks. Data were collected using pre-test, pre-questionnaire, post-test and post-questionnaire, except that the post-questionnaire was introduced only to the experimental group. The main relevant results indicate that students in the experimental group who used gamification combined

with mobile technology significantly outperformed the other two control groups in the post-test scores. In addition, the questionnaire analysis indicated that participants in the experimental group showed the highest level of learning motivation among the other groups. Su and Cheng (2015) noticed that there was a positive relationship between motivation and learning achievements, which was clearly found in the experimental group. Finally, they concluded that the application of gamification strategies in the context of education "could make learning more enjoyable, and greatly increase learner engagement, offering students the opportunity to become more active in their learning process" (p. 283).

Perry (2015) used self-determination theory in her study. She tested one of the online-gamified learning tool known as *Explorez* on 11 first-year university French L2 students. The system *Explorez* is a program that uses a GPS to map the University of Victoria in British Colombia, and it allows students to be personal assistants to a famous character. Students were required to interact with the virtual characters in French and respond to requests. Participants played this program for 50 minutes each session for three sessions. Specifically, this study provided a gamified system with points, badges, challenges, reward, and feedback. Data collection in this study included pre- and post-questionnaires, focus group interviews, and audio recordings of students' playing sessions, for the analysis of their interactions using *Explorez*. However, only preliminary findings of playability of *Explorez* and participants' assessment of this system, in terms of their learning experience, were reported. Preliminary results, based on observation, suggest that, regardless of technical difficulties and some minor challenges, learners were motivated to interact with other advanced partners in class to help them when they lacked some vocabulary they needed for interaction. Based on other studies of L2 learning, this is a positive factor in learning a L2 via social interaction. A questionnaire and focus group showed

that participants rated game elements as intrinsically motivating and said that they support collaboration. In the focus group, students on average said that they found the tool meaningfully engaging and believed it supported their real-world practice of French as L2.

More specifically toward vocabulary acquisition, Lui (2014) conducted a case study to investigate the effectiveness of gamified vocabulary online systems on undergraduate students at a university in Macau. This study aimed to solve language learners' issues of remembering target language vocabulary that instructors usually teach in traditional ways. There were 101 participants enrolled in this study, from five classes (two English and three Business). Lui (2014) exposed students to two gamified vocabulary flash games in which they included gamified factors such as points, level, a progress bar, a character, and hints. These two programs were called Fling the Teacher and Jeopardy. Students then completed a survey about their experience using the online-gamified vocabulary programs and their effectiveness in terms of improving retention of learned vocabulary. One hundred percent of participants in English classes and 85.5% in Business classes preferred these two gamified vocabulary systems to traditional worksheets for revising vocabulary. Also 100% of participants in English classes and 87.9% of participants in Business classes highlighted that these games could help them to remember new vocabulary. In general, this study shows that learners believe that using gamification is an effective method to facilitate vocabulary learning.

Hasegawa et al. (2015) used the leveling system as a theoretical approach. They carried out a study on gamification and L2 learning which used systematic leveling to match learners' ability (Goehle, 2013). In particular, Hasegawa et al. (2015) developed a gamified English vocabulary learning system with the potential to support students' sustainable motivation and English vocabulary learning. The system gamified learning tasks by using many factors, such as

levels, time trials, points, and a leaderboard platform. The system used vocabulary from the basic level of the Test of English International Communication (TOEIC), and gradually moved players forward based on their skills. Players practiced several series of gamified vocabulary tasks, which provided an estimated level of vocabulary learning. The authors then gave a questionnaire to 27 participants about their experience using the system. The results showed that majority of learners found the time trials, clear points, and ranking system extremely valuable for both their motivation and vocabulary learning. Hasegawa et al. (2015) concluded that gamification might has the potential to influence learners' motivation and L2 learning.

Conclusion

Formative assessment is considered a valuable tool that increases learners' language ability and enhances teachers' knowledge of instructional and learning needs. As the efficiency of technology in education has improved, traditional paper-based formative assessment has struggled to fulfil learning needs in many ways. For instance, it is hard with paper-based formative assessment to offer various individual repeated demonstration of assessment in short period of time and it is challenging for instructors because providing feedback for each student over a short period requires a tremendous amount of time. This factor prevents teachers from providing timely customized feedback to all students that is considered important to facilitate effective learning. Web-based assessment solves many of these issues in that it provides flexible multiple attempts, immediate feedback with less time and minimal human efforts. Additionally, web-based assessment offers multimedia features that enhance the improvement of memory and learning of a subject. Nonetheless, as technology has been improved, development of web-based formative assessment in classroom is necessary to sustain the motivation for learning.

Gamification with the support of technology provides same advantages of web-based formative assessment, but further has the potential to boost learners' enjoyment, motivation and learning.

Vocabulary learning is essential as nothing can be expressed without words. Mastering vocabulary is considered one of the most challenging aspects of L2 learning (Jia et al., 2012) as it is hard to remember for a majority of language learners (Chen & Chung, 2008). With this in mind, several publications have suggested that gamification as a motivational tool has the ability to improve the L2 learning process (Garland, 2015; Hasegawa, et al., 2015; Jauregi, 2016; Lui, 2014; Perry, 2015). Other researchers have suggested that gamification in particular has the potential to improve vocabulary acquisition, as it requires the kind of repetitive exposure that can be provided through games (e.g., Abrams & Walsh, 2014; Lui, 2014).

As Wood et al. (2013) highlighted, gamification integrated with formative assessment with the support of technology has a clear value to result in authentic learning. Although some studies have investigated the role of gamification to develop vocabulary learning (e.g., Hasegawa et al., 2015; Lui, 2014), only a few scholars focus on the use and advantages of gamification with formative assessment and technology to develop ESL vocabulary acquisition and learners' motivation (Abrams & Walsh, 2014). In summary, this review article provided theoretical and imperial review of literature on formative assessment in language learning from different angels. That includes the use of traditional formative assessment, technology and its role in facilitating the implementation of web-based formative assessment in the classroom, as well as the potential of gamification to heighten the advantages of formative assessment. Future research of gamification recommended to investigate deeper about the influence of gamification on motivation and learning of other language parts such as grammar. Furthermore, it is also

suggested that future research conduct experimental based-studies in real language classrooms to better investigate gamification effect on ESL learners.

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