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The Impact of Gamification on Second-Language Learning

By

Maram Almufareh

Claremont Graduate University

2020

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Approval of the Dissertation Committee

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Maram Almufareh as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy in Information Systems and Technology.

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Abstract

The Impact of Gamification on Second-Language Learning

By

Maram Almufareh

Claremont Graduate University: 2020

Background: The Technology-Enhanced Training Effectiveness Model (TETEM) has been used to assess the effectiveness of various technology driven solutions in improving students' learning outcomes in multiple academic fields. However, limited research is available on the use of TETEM in the context of second language learning. Using a modified TETEM, this study seeks first, to assess the direct effects of student's attitude, and experience with video-gaming on student's achievement and second, to evaluate the effects of student's attitude and experience that are mediated by student's motivation.

Methods: This study was conducted among preparatory year students at Al-Jouf University, Saudi Arabia. In a simple random sampling, students were assigned to the technology-enhanced group (Duolingo® group) or the control group. We started with confirmatory factor analysis to establish homogenous latent variables, and subsequently used structural equation models to evaluate the presence of direct and mediated effects.

Results: The technology-enhanced group performed better in reading, grammar, and vocabulary, while the control group showed more participation and timely completion of assignments. Positive attitude towards video gaming had both a direct and mediating positive correlation with student achievement. Additionally, motivation towards ESL learning was independently and positively correlated with student achievement.

Conclusion: Technology enhancement improves students' performance for ESL, however, adequate integration of technology in the course curricula is needed to minimize interference with class participation. Positive attitude towards video games and motivation towards ESL learning are positive predictors of student achievement, while experience with video games has no significant effect.

Dedication

I dedicate this thesis to my parents, daughters and my family for their constant support and unconditional love. I love you all dearly.

Acknowledgements

Undertaking this PhD has been a truly life-changing experience for me, and it would not have been possible to do without the support and guidance from many people. First, I would like to thank God without whom nothing is possible. (14:7) And when your Lord proclaimed, 'If you are grateful, I will surely increase you. Second, I would like to express my gratitude to my Advisor, Dr. Loren Olfman for his expertise, continuous assistance, and guidance throughout my research. I would also like to extend my thanks to my committee members Dr. David Drew and Dr. Brian Hilton, each of whom has provided valuable advice and shared insightful suggestions.

A good support system is important, and I will forever be thankful to my family, especially my father and mother, who have sacrificed their lives for me and provided unconditional love and care. They are my lifeline and have supported me with all they can so that I only pay attention to my studies and achieving my objective without any obstacle in the way. I love them so much, and I would not have made it this far without them.

My deepest appreciation goes to my two daughters, Rand and Wedd, for always being there for me. They gave me enough moral support, encouragement, and motivation to accomplish my academic goals. Finally, I would like to thank all my friends for providing support and friendship that I needed throughout my academic journey.

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Chapter 1: Introduction

Between the years 2000 and 2020, the price of personal computers has declined by more than 95 percent (U.S. Bureau of Labor Statistics 2020), and a similar trend is seen for smart mobile phones and internet connectivity (U.S. Bureau of Labor Statistics 2009). This price reduction has fueled an exponential increase in the ownership of internet-enabled communication devices and greater access to internet connectivity. In most parts of the world, the internet penetration rate has grown to cover more than fifty percent of the population, with higher rates among educated circles (World Bank 1990). Furthermore, while the prices have drastically fallen, the quality of both devices and internet connection bandwidth has increased. In more recent years, the widespread adoption of cloud computing has drawn on the above-mentioned phenomena to lower the entry cost for internet content creators. This new way of doing things has led to increased creativity and diversity of content available on the Internet. The popularity of internet-enabled devices combined with innovations in cloud computing has allowed progressive migration of activities online, making them portable and in some cases personalized (NPR 2018).

Education has kept up with this technological revolution. Initially, most of the content was created by big name institutions that had both financial and human resources to overcome the entry cost (Belsky 2019). However, in recent years, every educator with a computer and internet access now has the tools to create and publish educational content at minimum cost. In this context, hybrid classes and educational programs that combine in-class and online content are now part of the educational mix (Stack 2015). The COVID-19 related migration of educational activities is the greatest testament of how far education has come to embrace technology as a means for delivering knowledge (Li & Lalani 2020). As of mid-April 2020, it is

estimated that at least one-third of the human population was under various levels of lockdown/shelter in place/physical distancing measure (Kaplan, Frias, & McFall-Johnsen 2020). One key aspect, and usually the first measure in all these scenarios, has been school closures. With physical classrooms closed to prevent COVID-19 transmission, educational institutions had to either scale up their existing distance learning capabilities or establish them for those places where none existed before. Similarly, teaching approaches such as the use of games for educational purposes, have found a new technology enabled life online in the form of gamified applications. In this context, it appears there has never been a more appropriate time to examine the role of technology in education and how this symbiotic environment is shaping the future of learning.

The COVID-19 pandemic has created conditions to test the scalability and mass delivery of educational content at an unprecedented pace in human history (Thomas et al. 2020). While technology has for the most part delivered on its promises, it is now a good time to focus on the quality of education that is being dispensed online and areas that need improvement.

Additionally, the next question that will most likely arise because of the pandemic is how do we make good use of both technology and classroom workbook activities to enhance the learning experience. A well-structured scientific framework will help provide answers to these questions.

Problem Statement

The influx of educational content was initially unstructured, lacking a strong theoretical framework to guide the development of educational content considering technology-specific attributes as well as learner's characteristics (individual differences) such as attitude, experience with technology, and motivation for learning. (Landers & Callan, 2012) were among the first to develop a formal and scientific framework to evaluate the use of technology for educational

purposes. The resulting Technology-Enhanced Training Effectiveness Model (TETEM) has been used as the foundational structure to evaluate the effectiveness of various technological approaches to learning and training (Armstrong & Landers, 2017; Landers & Armstrong, 2017; Park et al., 2019).

Gamification, a method that consists of the utilization of game dynamics and game mechanics to improve learning outcomes, is one approach that has been well documented and explored in various learning settings (Landers, 2014; Landers et al., 2015, 2017). Landers and Armstrong (2017) used a gamified TETEM framework to assess the effect of attitude and experience on learners' outcomes. In their study, gamification results in better outcomes compared to conventional PowerPoint® presentations when learners had high attitude and significant experience. In contrast, gamification results in worse outcomes among learners with low attitude and little experience. In interpreting these results, the authors concluded that the success of gamification in education settings was dependent on learners' attitudes and experiences (Landers & Armstrong, 2017).

Motivation is an additional learner characteristic that is known to positively influence learning achievements within the framework of gamified learning (Fisher, Beedle, & Rouse, 2014; Flores, 2015; Hamari, Koivisto, & Sarsa, 2014; Monterrat, Lavoué, & George, 2014; Sailer, Hense, Mandl, & Klevers, 2013; Yee, 2006).

Taken together, previous existing research shows direct and independent effects of attitude, motivation, and experience on learning achievements. However, the effect of attitude towards gaming and experience with gaming technology that is mediated by motivation is not well understood.

Purpose of the Study

In this dissertation, I aimed to use a modified TETEM and evaluate the direct effects of attitude towards video games, experience with video games, and motivation towards learning on learner's achievement. Additionally, I also assessed the effects of attitude towards video games and experience with video games that is mediated by motivation towards ESL learning. This study was conducted among first year university students learning English as a second language (ESL). To achieve the above aims, the hypotheses stated below were tested.

H1: Game-based learning combined with a classroom workbook leads to higher learner achievement than a classroom workbook alone.

H2: Experience with video games is directly and positively correlated with learner achievement among students in a game-based learning plus classroom workbook group.

H3: Positive attitude towards video games is directly and positively correlated with learner achievement.

H4: Motivation towards ESL learning is directly and positively correlated with learner achievement.

H5: Experience with video games is indirectly and positively correlated with learner achievement through motivation towards ESL.

H6: Positive attitude towards video games is indirectly and positively correlated with learner achievement through motivation towards ESL learning.

Conceptual Framework

Hypotheses evaluated in this dissertation are aimed at distinguishing learner direct effects of technology related attributes that include learner experience with gaming. While the experimental study conducted to examine these hypotheses uses ESL as the study setting, the same hypotheses can be assessed in other learning environments covering other topics. Experience with and attitude towards video games as well as motivation for ESL learning are unobserved (latent) concepts and require a specific study design and analysis to be evaluated. In this dissertation a two-step process is used. First students were given questionnaires containing items that measure various aspects of each of these latent concepts. In the second step, the amount of latent variable-related information captured by each questionnaire item is assessed and the latent variables are generated. Finally, latent variables were regressed against student achievement and proposed hypotheses were evaluated (see Figure 1).

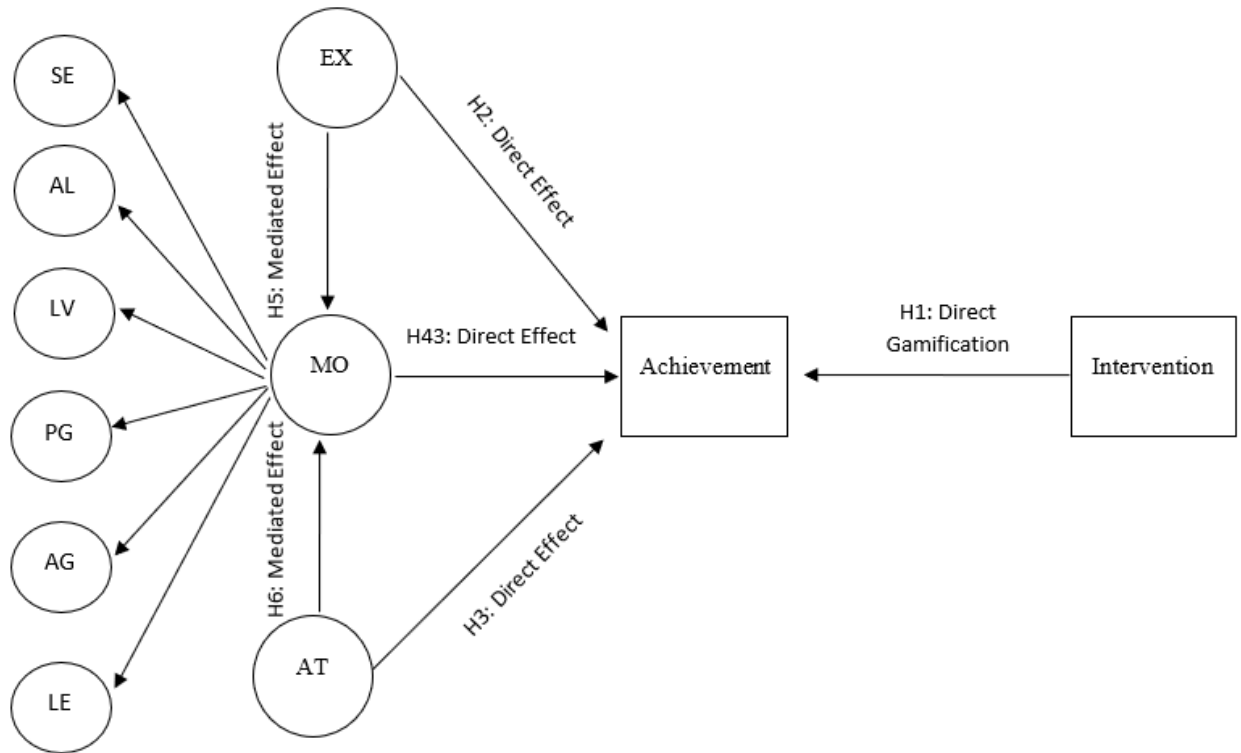


Figure 1 Proposed model for the effects of gamification and individual characteristics on learner's achievement.

Summary

In this introduction chapter, the research gaps that motivated this dissertation are described. Additionally, a modified Technology-Enhanced Training Effectiveness Model (TETEM) is proposed to bridge this void in our understanding. To this effect, six hypotheses that were to be evaluated for the proposed framework are stated. The next chapter presents a comprehensive review of the current literature on gamified learning with a special focus on second language learning.

Chapter 2: Review of the Literature

Introduction

In the context of second language learning, the term “gamification” refers to the use of game dynamics and game mechanics to teach second languages in non-game contexts. This utilization of gaming features to foster learning has been shown to increase learners’ experiences, motivation, and engagement. Additionally, the introduction of gaming into the learning environment helps to create a relaxed atmosphere and a sense of playfulness (Poondej & Lerdpornkulrat 2016), which positively improve the learning process (Flores 2015). This chapter explores various aspects of gamified learning and describes existing research in this field.

Main Features of Gamification

Gamified learning relies on practical features to incentivize students towards learning, and a good understanding of these features is a prerequisite for informed design and evaluation of game-based learning materials. Sailer et al. (2013) provide an extensive review of gamification features. Key features are described below (Sailer et al. 2013):

Points: Points are a basic gamification element. Learners gain more points by completing certain activities introduced in the gamification environment. Points are correlated with the behavioral learning perspective as a motivational mechanism, which derives from past positive and negative experiences.

Badges: Badges are game elements that provide visual representations of achievement. Badges are correlated with different motivational mechanisms such as the trait perspective, which includes the need for achievement, the need for power, and the need for fulfillment. Badges as a gamification element are also related to the motivational mechanism of the perspective of interest since they include goal setting functions.

Leaderboards: A Leaderboard as a gamification element is very important when it comes to motivation because those who stand at the top will feel motivated by wanting to stay at the top. However, the effect of leaderboards can be reversed for learners standing at the bottom. One approach to counter this potential negative effect consists of displaying team level leaderboards. This approach provides motivation to all teams and team members because it enhances team unity, collaboration, and increased socialization. It also improves relatedness by having team goals, that is, team members are encouraged to share their experiences (Sailer, 2013). The purpose of leaderboards is to provide information about users' achievements and successes. Leaderboards enhance competition between users, increase achievement, and power the motivational mechanism of the trait perspective.

Progress bars and performance graphs: Progress bars and performance graphs are gamification elements that focus on individual performance. They compare players' performance with other players and individual performance with previous performances. Both progress bars and graph performance provide feedback to a user that is matched with the perspective of interest as a motivational mechanism. Progress bars are also matched with the cognitive mechanism as they provide clear goals and metrics on how to achieve them.

Quests: Quests are game elements that show individuals the direct linkage between actions and rewards, which enhances transparency and encourage successful actions. Quests match two motivational mechanisms. The cognitive perspective and the perspective of interest. They provide clear goals, emphasize the importance of goals, and report the consequences of user behaviors.

Meaningful stories: Meaningful stories that are connected to certain activities in gamification match the perspective of emotion and the perspective of interest as inspiring stories increase positive feelings, which improve users' interests.

Gamified Learning

The proliferation of the Internet and a range of internet-enabled devices has significantly increased the role and popularity of games in the domain of education as practical and useful pedagogical tools. In addition to traditional gaming pedagogical tools, video game-inspired applications based on the concept of gamification have become popular tools in the learning environment (Morford et al. 2014). Many studies investigated the concept of gamification and its effect on the learning process (Barata et al. 2013; Cruaud 2016; Dicheva et al. 2015). Barata et al. found that gamification leads to significant learning improvement in terms of proactivity, learner concentration, and online participation. Similarly, Dicheva et al. and Garland separately found that gamification has a positive effect on language learning (Garland 2015). In their studies, Osma-Ruiz et al. (2015) and Flores (2015) found that gamification fosters the teaching and learning of a second language by creating a relaxed atmosphere.

Role of Individual Characteristics on Gamified Learning

A few research studies were conducted to investigate the influence of individual differences, such as personality traits, on academic achievement and language learning (Caprara et al. 2011; Graham et al. 2017). Generally, research suggests that gamification is a beneficial pedagogical approach (Dichev and Dicheva 2017). According to Werbach (2014) gamification not only introduces game elements in non-game contexts, but also creates a learning atmosphere in which the learner feels more empowered, motivated, engaged, and relaxed. In this context,

individual characteristics can be expected to interact with gamification in influencing learner achievement.

The focus of the previous research on the gamification of language learning and individual differences in language learning relationships have been varied and characterized by mixed results. For instance, in their study on the potential of gamification in improving learning and learning experiences among students in health care majors who are also learning English, Korkealehto and Siklander (2018) found that adoption of gamified course designs has the potential of fostering language learning and offering positive learning experiences among English-for-health-care students. In another study that sought to examine the effect of gamification on Spanish language achievement among 3rd- and 4th-grade students through the use of Duolingo®, Rachels (2016) showed that Duolingo® is an effective instructional tool for teaching Spanish to elementary students. Duolingo® is a computer-based and mobile application that uses gamification and adaptive learning technology to teach foreign languages (Rachels 2016).

In contrast, in a study that investigated the potential of gamification in enhancing second language learning, Flores (2015) found that gamification had no significant impact on second language learning. Flores' (2015) findings in this regard are contrary to a meta-analysis conducted by Garland (2015), which established a positive relationship between gamification and second language learning. Perry (2015) also explored the potential of gamifying French language learning using Explorez and found that its use had no significant impact. Lastly, Shatz (2015) found that gamification and gaming are potential instructional tools that if effectively designed and properly integrated into the teaching of foreign languages, can foster foreign language learning.

Gamification and Second Language Learning

Various studies have also attempted to explore the relationship between individual differences and second language learning. For example, Caprara et al. (2011) conducted a longitudinal study to investigate the impact of individual differences on academic achievement. The study found that various individual differences, such as age, influenced a learner's academic achievement (Caprara et al., 2011). Similarly, Courtney et al. (2017) assessed the effect of individual differences on early age learning among students whose native language is English and who are learning French. The study found that individual differences, such as gender, influence students' ability to learn foreign languages. For example, the study found that girls exhibited higher levels of enjoyment and self-efficacy in learning French than boys.

However, most of the previous studies that have attempted to explore the relationship between gamification and second language learning have been anecdotal and characterized by mixed, inconclusive, and/or conflicting results. Some of the studies have reported a negative relationship between gamification and language learning and concluded that it does not enhance motivation or foster second language learning (Hanus & Fox 2015; Long & Alevan 2014). Other studies have been characterized by inconclusive findings (Auvinen, Hakulinen, & Malmi, 2015; Su & Cheng, 2015). A considerable amount of research has been carried out in the area of gamification and language learning; however, less attention has been paid to the intervening role or influence of individual differences on gamification and second language learning. Morford et al. (2014), for instance, contended that gamification has a beneficial influence on individual learning behavior. However, the study was not focused on second language learning (Morford et al. 2014).

Despite its growing popularity, the effectiveness and success of application of gamification in the teaching and learning of second language is still characterized by mixed views and considerable knowledge gaps (Dichev & Dicheva 2017). For example, insufficient conclusive evidence currently exists to corroborate long-term benefits of gamification on second-language learning (Benoit, 2017; Deterding, Dixon, Khaled, & Nacke, 2011; Dichev & Dicheva, 2017; Garland, 2015; Flores, 2015). Moreover, the knowledge of how to design and implement gamification in accordance with individual differences for second-language learning is limited (Flores, 2015; Figueroa-Flores, 2015; Klemke, Eradze, & Antonaci, 2018).

The Technology-Enhanced Training Effectiveness Model (TETEM)

Landers and Callan (2012) developed the Technology-Enhanced Training Effectiveness Model, which describes how training inputs such as the work environment, characteristics of employees or students, training design, and training materials impact training outputs, including organizational performance and behavioral change. The model also emphasizes the effects of attitudes towards a specific technology, experience with the technology, and the work environment in which the technology is used.

The TETEM was developed as an extension of Baldwin and Ford's (1988) Transferring of Training Model, which indicated that training inputs such as trainees' characteristics, work environment, and training design are theorized to directly affect training outputs with no mediation. It was developed as a mediator model, where the relationships between training inputs and training outputs are explained by a mediator, namely, a new trending technology. The major contributions of the TETEM are the following propositions (see Figure 2):

- The organizational environment affects an individual's technology training motivation.

- Technology-related experience regulates the relationship between the training design and the instructional outcomes (2b).
- Technology-related attitudes regulate the relationship between the training design and the instructional outcomes (2a).
- Attitudes towards technology regulate the relationship between distal outcomes and instructional outcomes (valence).

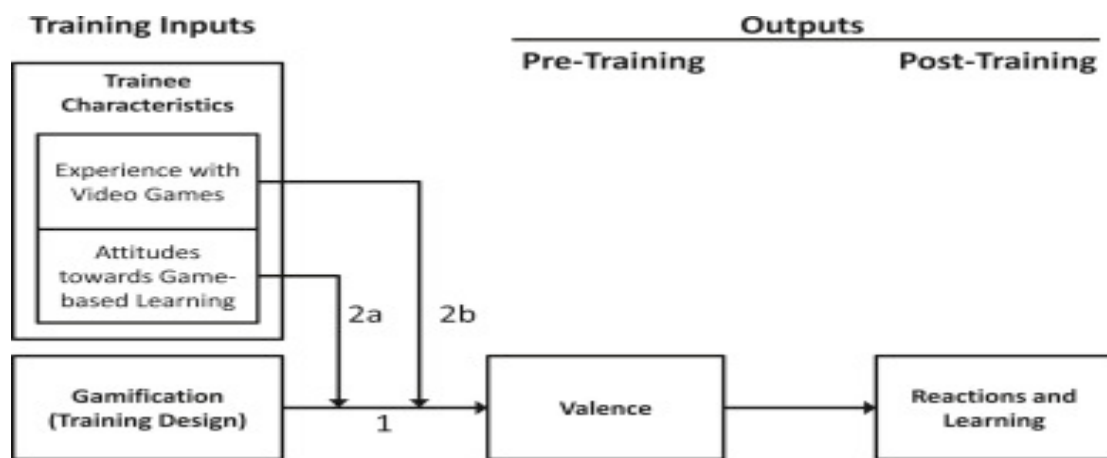


Figure 2 Technology-Enhanced Training Effectiveness Model (Landers & Callan, 2012)

Landers and Armstrong (2017) conducted a study on enhancing instructional outcomes with the use of gamification and tested the TETEM. This model suggested a framework to understand how different technologies, like gamification, impact and change different instructional outcomes. In addition, the TETEM suggested that gamification might not directly impact the change in the outcomes, especially when participants' attitudes towards game-based learning and their experience with video games are low. The study was conducted in a US university with a sample consisting of 262 students, of whom 80.2% were female (Landers & Armstrong 2017a).

Any new trending technology can be applied to the TETEM to enhance training outcomes. Landers and Armstrong (2017) used gamification as the new technology. They conducted an experiment, which consisted of two groups, an experimental group and a control group. The gamified and the control groups were both provided with written learning scenarios that described the most common training on business practices and managerial skills in American organizations. The control group received business practices and managerial training, while the experimental group received only the gamified training. Students in the gamified group (the experimental group) were provided with the needed information by the instructor via an interactive video game, which allowed the participants to gain points for correct answers (Landers & Armstrong 2017a).

The study found that participants anticipated great value from gamified instruction. However, the results were moderated by video game experience and attitudes toward game-based learning. For those learners with better experience and better attitudes, gamification produces better outcomes than PowerPoint slides (Landers & Armstrong 2017a). As previously discussed, Landers and Armstrong's (2017) study developed the Technology-Enhanced Training Effectiveness Model (TETEM). Landers and Armstrong did not include motivation as a factor in the model. However, many scholars indicated motivation as an essential factor in the implementation of gamification (Fisher, Beedle, & Rouse 2014a; Flores 2015; Hamari, Koivisto, & Sarsa 2014; Monterrat, Lavoué, & George 2014; Sailer et al. 2013; Yee 2006).

In his study of "Using Gamification to Enhance Language Learning", Flores indicated that the main objective of gamification is to enhance participants' motivation by the usage of game elements such as feedback, points, and leaderboards. Unlike Flores, Fisher et al. (2014a) conducted a study to evaluate attitudes and experience with gamification in higher learning by

surveying 70 business school respondents. The researchers provided an overview of business education that aimed to increase inspiration, motivation, and engagement in the classroom. The study found that the use of gamification increases students' motivation and learning abilities. Hamari et al. (2014) conducted a review of peer-reviewed empirical studies on gamification where they used motivation as an independent variable. They examined the current research field on gamification and found that gamification has positive effects. However, the effects are largely dependent on the context in which games are implemented and how users are using them.

Other scholars focused on implementing specific game elements in an adaptive gamification system that can be used in different learning environments. This gamification system can be personalized based on the analysis of its interaction traces. The authors indicated that gamification can be used to motivate and enhance participation in web-based activity (Monterrat, Lavoué, & George 2014). Another study conducted by Llorens-Largo et al. (2016) evaluated the impact of gamification on students' motivation in a computer science course in a university. The researchers developed a gamified learning management system and implemented key gamification elements such as badges, points, and quests. They also analyzed the positive and negative aspects of the gamified system and implemented a LEGO game that contained points, analytics, and avatars so students could compete, share knowledge, and improve by sending each other feedback about their tasks. After the students experienced the gamified learning management system, the researchers provided them with a survey to evaluate the system and how the students felt about their experience. They found that the gamified learning management system motivated students and the gamification elements positively increased their motivational level (Llorens-Largo et al. 2016).

Leaning (2015) presented a study in the usage of gamification and games in a media theory course. The researcher used two types of methods to gamify the course; the first one involved paper games such as choose your adventure, and the second method used a scoring system for students to rate their peers' in-class presentations. The researcher had 62 participants in the study: 27 students were in the experimental group with a gamified course and 35 students were in the control group. By comparing the results of the two groups, the study found that there were no differences in scoring, but the students in the experimental group reported that they enjoyed the experiment and felt motivated by the games.

Barrio, Muñoz-Organero, and Soriano (2016) conducted a quantitative experimental study to evaluate the learning benefits of a gamified and a non-gamified student response system. The researchers tested the use of the gamified student response system and its effect on improving enjoyment, attention, and motivation, in which they integrated game design elements such as rewards. The study concluded that the gamified student response system improved students' motivation and confidence, and reduced disconnections in the classroom. The study also found that the gamified student response system did not improve students' engagement in the classroom (Barrio, Organero, & Sánchez-Soriano 2016).

Sánchez-Martín, Cañada-Cañada, and Dávila-Acedo (2017) reported a quantitative study in an industrial psychology course in which the author implemented some gamification features such as gamified grading, narration, and social interaction using Experience Point, a game in which the learner that completes the most learning objectives gets the most points. Experience points are rewards used in computer games and given to a player for completing a determined number of tasks. The researchers compared the results to a traditional class. The researchers had a population of 93 students; 49 students were in the gamification group and 44 students were in

the traditional course. The research found that the experimental group had heightened enjoyment, which resulted in a positive class experience (Sánchez-Martín, Cañada-Cañada, & Dávila-Acedo 2017).

Song, Ju, and Xu (2017) investigated the effectiveness of using points on improving students' engagement. Students were given the opportunity to give presentations on topics of their interest and the rest of the students were given points by asking the presenters questions about their presentations. The study showed that points earned by the presenters were the most engaging among other gamification features for distracted students. The researchers also found that the use of gamification increased students' motivation (Song, Ju, & Xu 2017).

Psychological Perspective on Motivation through Gamification

Sailer et al. (2016) conducted a study on the psychological perspective of motivation through gamification. They matched different features of gamification to different motivational mechanisms. They conducted a literature review on motivation and identified different motivational perspectives associated with motivational mechanisms, which include the following:

Trait perspective: From a trait perspective, needs can enhance motivation, which are conceptualized around users' characteristics. The mechanism of the trait perspective is the stability of motivation over context and time. From the trait perspective, individuals feel the need for power, the need for achievement, and the need for affiliation, leading to significant impact on users' behavior.

Behavioral learning perspective: The idea of the behavioral learning mechanism is that motivation occurs based on the previous positive or negative reinforcement, which usually

impacts future behavior. Motivation is based on previous experience, of which feedback is a central mechanism.

Cognitive perspective: This motivational mechanism addresses goals, experiences, and values of the consequences. In this perspective, motivation is dependent on a situational goal, experiences regarding the outcome of the action, and experiences regarding the consequences of the action.

Self-determination perspective: This perspective focuses on the social contextual condition rather than the motivational process. Self Determination Theory (Gagné & Deci 2005) indicates that there are three innate needs: competence, relatedness, and autonomy, to be satisfied in order to allow motivation, commitment, and growth.

Perspective of interest: This considers an individual's preference as well as the context of the interest in gamification to increase and enhance motivation. Therefore, users' motivation will be enhanced if the game meets their interest for the situational context, their feeling of flow by providing feedback, their feeling of flow by setting a clear goal, and their feeling of flow by adapting different levels of game difficulties.

Perspective of emotion. This considers the different roles of emotion in cognitive and motivational processes. In this perspective, users are likely to be motivated if gamification decreases negative feelings like fear and increases positive feelings like pleasure.

In their model of integrative training evolution in Virtual Worlds (VWs), Landers and Callan (2012) used motivation, experience with video games, and attitudes towards video games as independent variables that all impact outcomes as shown in Figure 3.

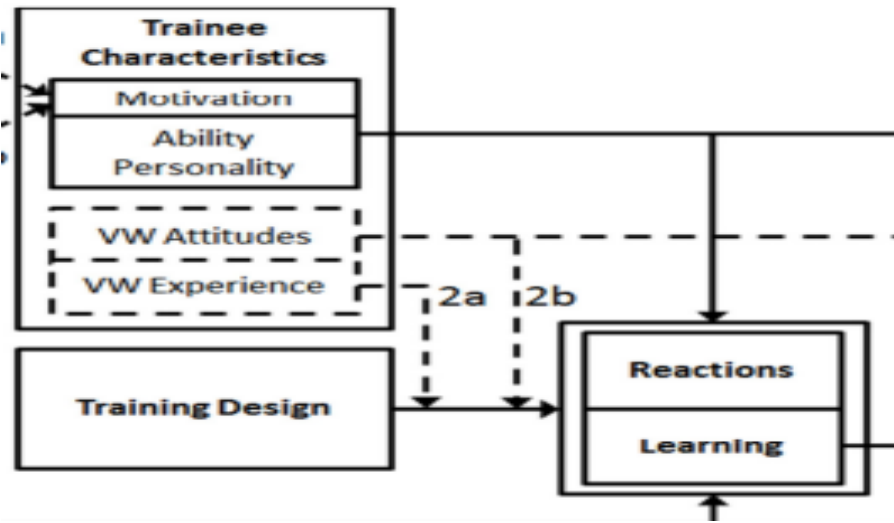


Figure 3 Integrative model of training evaluation in VWs, with new propositions numbered

In another study, Landers and Armstrong (2017) tested the Technology-Enhanced Training Effectiveness Model using experience with video games, and attitudes towards video games as independent variables that impact outcomes by using valence, which is a motivational variable, as a moderator between experience with video games, attitudes towards video games, and the outcomes as shown in Figure 4 (repeated from Figure 2).

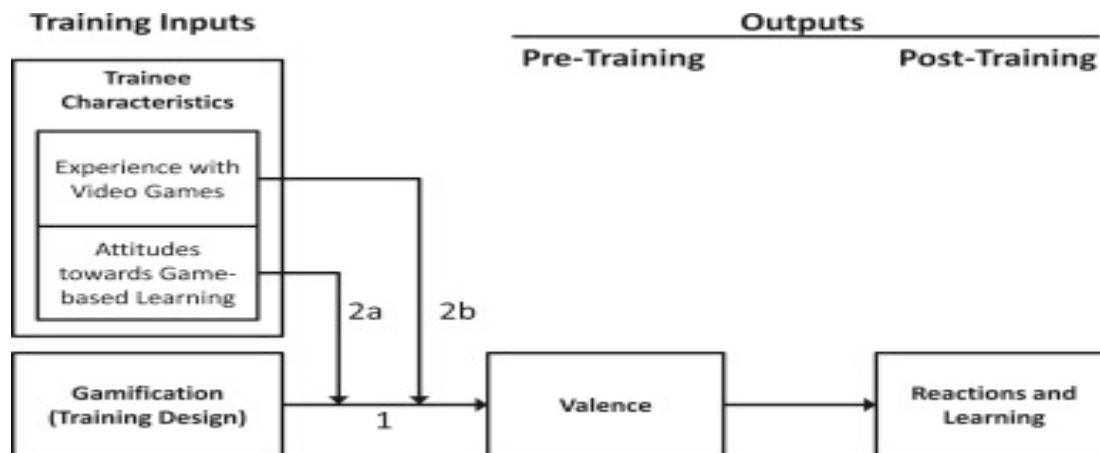


Figure 4 Technology-Enhanced Training Effectiveness Model

Both models (Figure 3 and 4) are plausible. The aim of this dissertation is to test the direct effect model, the moderating model, and a combination of both as motivation can have a moderating and a direct effect on outcomes. Therefore, motivation needs to be used in the TETEM as a moderator between attitudes and experience, and reactions and learning, due to the fact that it has been shown through a review of previous research that motivation is a key construct that enhances learning as a moderator. In addition, the relationship between motivation with video games and achievement needs to be tested as well. In this context, a path analysis is used to test the relationships detailed in Figure 1.

Summary

In this chapter, the Technology-Enhanced Training Effectiveness Model (TETEM) is explained, and gamification defined. The current literature is presented and gaps around the role of individual characteristics on gamified learning are highlighted. The need for a modified TETEM is explained. The next chapter details the study methods that were used to bridge the knowledge gap that is described in this chapter.

Chapter 3: Research Methods

The aim of the research conducted for this dissertation is to evaluate the impact of gamified learning on learner performance in addition to a conventional class workbook. Additionally, the study also assesses the relative importance of experience with video games, attitude towards video games, and motivation towards ESL learning as potential pathways through which gamified learning operates to improve learner performance. In this context, hypotheses investigated in this dissertation involve the assessment of direct effects of experience with video gaming, attitude towards video games and motivation towards ESL learning in student performance.

Additionally, and unique to this study, the role of motivation towards ESL learning as a mediator for experience and attitude effects is examined. This methods chapter will include a detailed description of the study design, setting and population. Additionally, this chapter describes predictor and outcome measurements and statistical methods used for all analyses included in the dissertation.

Study Design and Population

This simple randomized controlled study was conducted at Al-Jouf University in Saudi Arabia. The subjects were female first-year students who were required to take an English as a Second Language (ESL) course. The experiment was part of an ESL course during which the students meet for two hours two times per week. The researcher contacted two English teachers at Al-Jouf University, and they agreed to structure parts of their classes for this experiment. Using simple random sampling, students were assigned into the treatment and control groups. The control group followed the normal course curriculum, which included completing a

workbook. The experimental group used a web-based tool, Duolingo[®], in addition to the regular workbook.

Experimental Group

The gamified group, which is the experimental group, learned English through the Duolingo[®] application. In this group, during the first hour of each class, students were given a PowerPoint[®] presentation lecture. This is the same class material that is used at Al-jouf University to teach English as a second language. During the second hour of the lecture, each student in the experiment group was provided with a computer that had access to the Internet to access Duolingo[®]. This gave each student the opportunity to use the application in a language-lab style setting. Additionally, students in the experimental group were also encouraged to continue Duolingo usage on their own.

Control Group

Students in the control group were given the same first hour of instruction as the experimental group. However, the second hour of the class consisted of the students doing exercises in a language workbook.

Duolingo[®] Application Overview

Duolingo[®] is a free application that can be downloaded to smart phones, tablets, or computers. The application allows the student to choose his/her native language and then choose the language he/she wishes to learn. The Duolingo[®] application, as illustrated in Figure 5, lists easy, convenient, and understandable ways through which someone can learn one or more languages. Additionally, the application provides a platform through which one can join language clubs with other students and share knowledge with the group based on what one has learned. The club idea, presented in a creative way, is an interesting invitation into faster

comprehension of languages. The whole concept is designed to effectively motivate learners in a gamified way. The ‘practice makes perfect’ mantra, the achievement display, and the leaderboard can offer enough incentives for language learners. In the end, an individual may get involved in the learning process sub-consciously due to these motivational factors.

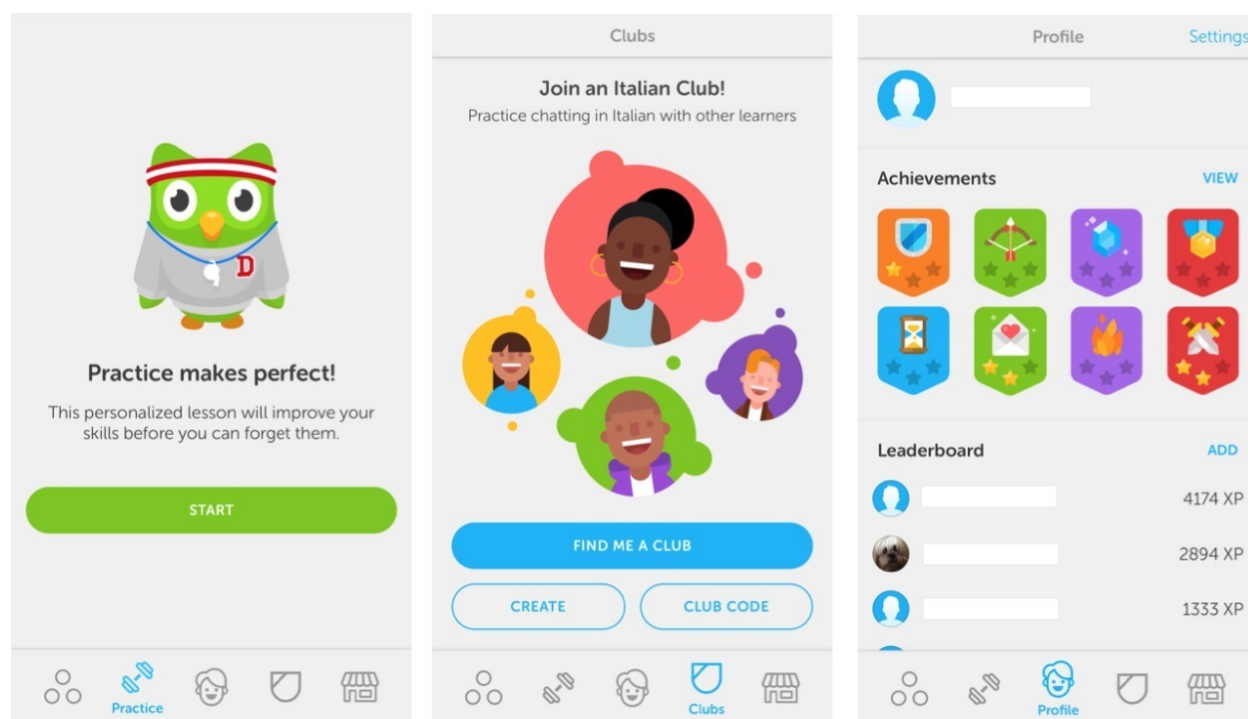


Figure 5 Example of Duolingo® Screens

Study Setting

Al-Jouf University in Sakaka province is a research institution that was established in 2005. It is currently the only university serving the Al-Jouf Region. The total number of faculty at Jouf university is 1778 (702 female and 1076 male) and the number of students is 24,996. Aljouf University has academic units such as the Computer Science College that require all professors to teach their classes in English, and the students are required to learn English in order to succeed in their programs.

This English language requirement created learning anxiety for most of the Arabic-speaking professors and the students. Most of the students at Al-Jouf University graduated from high schools in Al -Jouf province, where most of the students speak very little English. This limited capacity is a result of English being taught in Saudi Arabia only in middle school and high school. As a result of these challenges, Al-Jouf University developed an intensive one-year program called “The Preparation Year”. Additionally, Al-Jouf University took a further step and created a new academic unit named “The Deanship of Preparatory Year”. According to the Al-Jouf University official website, the following is a description of the program:

The program aims at preparing the students for university study by bridging the knowledge gap between school education and university education. Students are exposed to intensive courses in English language, basic sciences, and computer skills. By so doing the students’ academic performance is developed to meet the requirements of the university study. Therefore, the objective of this preparation year is to teach high school graduates to learn English to perform better in their educational career at Al-Jouf University.

After successfully completing the preparatory year and based on the students’ performance during that preparatory year, the university will assign the student’s major based on the top three choices made by the students. Based on their major, students are assigned to different colleges such as Medical School, Pharmacy School, Engineering School, and the College of Computer Science.

Outcome Measurements

Student grades were the main achievement measure in this study, and these include both total and topic-specific grades. Specific topics that were graded were reading grammar and

vocabulary, listening, writing, and speaking. Additionally, student class participation and timely assignment completion were also graded.

Predictor Measurements

A 47-item Likert scale questionnaire was used to assess students' attitude and experience with video games as well as motivation towards ESL. Additionally, students' grades before, during, and after the course were provided by the Dean of the College. Furthermore, qualitative data consisting of students' and professors' interviews and course evaluations as well as students' Duolingo® performance were collected.

Attitude and experience with video games

Five Likert scale questions were used to assess students' experience with video games before and after completion of the course. Similarly, students' attitude towards video games was assessed using three Likert scale questions.

ESL motivation

Six dimensions with a total of 39 Likert scale questions were used to evaluate students' motivation for ESL learning before and after course completion. Included dimensions are self-efficacy (7 questions), active learning (8 questions), learning value (5 questions), performance goals (9 questions), achievement goals (5 questions) and learning environment (5 questions).

Appendix A1 lists all questionnaire items.

Student and Professor Interviews

I conducted interviews with 50 students to get their feedback on Duolingo® use and features they found to be useful. I stopped at 50 interviews because I reached saturation. The following questions were asked:

1. After using Duolingo, how did the gamification elements motivate your learning performance?
2. What gamification elements or features helped you to learn English the most?

Additionally, a 27-item questionnaire focusing on various aspects of the ESL course was given to students (see Appendix A2).

Five professors were also interviewed about their assessment of the value of Duolingo[®] use, and its potential contribution to student performance. The following questions were asked:

1. After using Duolingo[®], how did the gamification elements motivate your students learning performance?
2. What gamification elements or features do you think helped your students to learn English the most?

Statistical Analyses

Statistical analyses were conducted using a two-step approach, initially, a confirmatory factor analysis (CFA) was conducted to extract latent variables corresponding to students' experience and attitude towards video games as well as students' motivation towards ESL learning (Bryant & Yarnold, 1995). In the second step, a structural equation model (SEM) was used to extend the CFA and evaluate direct effects (Ullman & Bentler, 2003) of experience and attitude towards video games on student performance. In the same model, the effects of experience and attitude towards video games on student performance mediated by student motivation were also assessed. The goodness of model fit was assessed using root mean square error approximation (RMSEA), standardized root mean square residual (SRMR), the comparative fit index (CFI) and the Tucker-Lewis Index (TLI). All tests were two-sided and

performed using a significance level of ninety-five percent ($\alpha= 0.05$). Quantitative analyses were conducted using the Lavaan package (Rosseel 2012) while thematic analyses of qualitative data used the RQDA package (Huang, 2018). All analyses were performed using the R statistical analyses software (R Core Team, 2019).

Ethical Considerations

The study conducted for this dissertation involves human subjects and the study protocol was reviewed by the Claremont Graduate University Institutional Review Board (Protocol ID 3512). The study used a questionnaire and interviews as the main data collection tools, and in this context IRB gave it an exempt status. Subjects were required to sign a consent form.

Summary

In this chapter, the study design, setting, and population are presented, additionally, experimental instruments, outcomes and interventions are also described. Furthermore, statistical methods used for data analyses are described. The next chapter details the study results on the impact of learner experience with video games, attitude towards video games and motivation for ESL learning on learner achievement.

Chapter 4: Study Results

Study Population

A total of 220 female first-year college students aged between 18 and 20 years taking an ESL class were recruited to participate in the study. Among them, 110 were randomly assigned into the control group while the remaining 110 were assigned to the experimental group. Of the 110 students assigned to the experimental group, one student did not complete the questionnaire or participate in Duolingo® tasks; in contrast, of the 110 students assigned to the control group, 24 students did not complete the questionnaires. By design Duolingo® application utilization measurements were only available for the experimental group. Duolingo® application utilization measurements were right skewed motivating the use of median and interquartile range as summary measures. For the 109 students in the experimental group, the median (25th, 75th percentile) time spent on using the Duolingo® application was 7 (3, 10) days, the median number of lessons completed was 64 (44, 111), the average number of skills gained were 4 (2, 9.5) and the median number of experience points gained were 992 (623, 1593).

Duolingo® + Workbook vs Workbook Alone

Compared to the control group, the experimental group had significantly higher achievement in reading, grammar, and vocabulary, with mean (standard deviation) and t-test p-value of 13.88 (1.21) vs 13.44 (1.88), $p = 0.04$. Similarly, the experimental group had higher grades in writing, 78.76 (1.80) vs 77.67 (3.63), $p < 0.01$. In contrast, no significant difference was observed between the two groups for listening, speaking and final grade. Furthermore, the control group achieved higher grades on class participation and timely completion of assignments 10.00 (0.00) vs 9.71 (0.66) and 9.93 (0.26) vs 9.76 (0.47), $p < 0.01$ for both comparisons (see Table 1). Note that listening scores decrease over time because the material is

more difficult as the student progresses. Further, the two writing tests are graded on different scales.

Grades	Experimental (n = 109)	Control (n = 86)	p-value
Reading Grammar and Vocabulary			
Entry	12.83 (1.98)	12.53 (2.24)	0.33
Midterm	13.88 (1.21)	13.44 (1.88)	0.04
Final	17.22 (2.40)	16.49 (3.22)	0.07
Listening			
Entry	9.63 (0.77)	9.64 (0.97)	0.95
Midterm	9.01 (1.27)	8.78 (1.58)	0.26
Final	8.60 (1.63)	8.55 (1.81)	0.84
Writing			
First Test	78.76 (1.80)	77.67 (3.63)	<0.01
Second Test	8.06 (1.56)	8.57 (1.59)	0.02
Participation and Assignments			
First Test	9.71 (0.66)	10.00 (0.00)	<0.01
Second Test	9.76 (0.47)	9.93 (0.26)	<0.01
Third Test	8.56 (1.18)	8.87 (1.40)	0.09
Speaking			
Final	42.44 (4.81)	42.41 (6.02)	0.97
Total	87.70 (8.37)	87.22 (10.57)	0.72
Grade (%)			0.24
A	48 (44.0)	43 (50.0)	
B	41 (37.6)	22 (25.6)	
C	15 (13.8)	13 (15.1)	
<C	5 (4.6)	8 (9.3)	

Table 1 Student Grades by Experimental Group with Mean (Standard Deviation) and t-test p-value

Latent Variables Measurement

Nine latent variables, eight first-order and one second order, were estimated. Six first order latent variables (self-efficacy, active learning, learning value, performance goals, achievement goals and learning environment) were used to measure student motivation towards ESL learning as a second order variable of the study. In addition to motivation towards ESL learning, first order latent variables that measured attitude and experience towards video gaming were used in the analyses to evaluate study hypotheses. Confirmatory factor analyses showed moderate fit to the proposed measurement model, with CFI = 0.714, TLI = 0.698 and RMSEA = 0.079 (see Table 2). Composite reliability was estimated for each latent variable. Only one, self-efficacy, had a very low composite reliability of 0.28, and was dropped from the model. The exclusion of self-efficacy slightly increased the CFA model fit with final CFI = 0.744, TLI = 0.726 and RMSEA = 0.086 (see Table 3).

Model	CFI	TLI	RSMEA
With Self-Efficacy	0.714	0.698	0.079
Without Self-Efficacy	0.744	0.726	0.086

Table 2 Student Grades by Experimental Group

Latent variable	Value
Self-Efficacy	0.28
Active Learning	0.83
Learning Value	0.69
Performance Goals	0.74
Achievement Goals	0.85
Learning Environment	0.79
Experience	0.90
Attitude	0.84

Table 3 Composite reliability

Table 4 shows that for most items on the questionnaire, standardized factor loadings had moderate (> 0.5) to high (> 0.7) correlation with the latent variables. Additionally, the evaluation of latent variable correlation showed that attitude and experience towards video gaming were positively correlated. In contrast, neither attitude toward nor experiences with video gaming were correlated with motivation towards ESL learning.

Model	Parameter	95%CI	p-value
Active Learning			
Q8	0.61	0.51 0.72	<0.001
Q9	0.59	0.48 0.70	<0.001
Q10	0.62	0.51 0.72	<0.001
Q11	0.61	0.50 0.72	<0.001
Q12	0.67	0.58 0.77	<0.001
Q13	0.60	0.49 0.71	<0.001
Q14	0.67	0.57 0.76	<0.001
Q15	0.58	0.46 0.69	<0.001
Learning Value			
Q16	0.55	0.43 0.68	<0.001
Q17	0.62	0.50 0.73	<0.001
Q18	0.53	0.40 0.66	<0.001
Q19	0.47	0.33 0.61	<0.001
Q20	0.61	0.50 0.73	<0.001
Performance Goals			
Q21	0.34	0.20 0.48	<0.001
Q22	0.27	0.13 0.42	<0.001
Q24	0.24	0.09 0.39	<0.001
Q25	0.54	0.42 0.66	<0.001
Q26	0.58	0.47 0.69	<0.001
Q27	0.71	0.62 0.79	<0.001
Q28	0.80	0.73 0.87	<0.001
Q29	0.78	0.70 0.85	<0.001
Achievement Goals			
Q30	0.63	0.54 0.73	<0.001
Q31	0.71	0.62 0.79	<0.001
Q32	0.81	0.74 0.87	<0.001
Q33	0.78	0.71 0.85	<0.001
Q34	0.72	0.64 0.80	<0.001
Learning Environment			
Q35	0.76	0.67 0.85	<0.001
Q36	0.80	0.72 0.88	<0.001
Q37	0.51	0.39 0.64	<0.001
Q39	0.51	0.38 0.64	<0.001
Experience			
Q40	0.87	0.82 0.91	<0.001
Q41	0.82	0.77 0.88	<0.001
Q42	0.71	0.63 0.79	<0.001
Q43	0.70	0.62 0.79	<0.001
Q44	0.85	0.80 0.90	<0.001
Attitude			
Q45	0.74	0.67 0.81	<0.001
Q46	0.97	0.94 1.01	<0.001
Q47	0.86	0.81 0.91	<0.001

Model	Parameter	95%CI		p-value
Motivation				
AL	0.65	0.54	0.77	<0.001
LV	0.79	0.68	0.89	<0.001
PG	0.86	0.79	0.94	<0.001
AG	0.92	0.86	0.99	<0.001
LE	0.70	0.59	0.81	<0.001

Table 4 Confirmatory factor analysis (CFA), factor loadings

Structural Equation Models

The structural equation models proposed in this study were aimed at assessing direct effects of experience towards video gaming (H1), attitude towards video gaming (H2), and motivation towards ESL learning (H3), as well as motivation mediated effects for experience (H4) and attitude (H5) (see Figure 6). Video gaming experience and attitude towards video games have no significant direct effect on student grade, $p = 0.822$ and 0.898 , respectively. However, motivation towards ESL learning is positively and statistical significantly correlated with student grade (achievement), $p = 0.009$. Furthermore, attitude towards video gaming has a significant effect on student grade mediated by motivation towards ESL learning, $p = 0.011$ (see Table 5).

Items	Parameter	95%CI		p-value
Direct Effect				
Experience	-0.04	-0.35	0.28	0.822
Attitude	-0.02	-0.33	0.29	0.898
Motivation	0.29	0.07	0.50	0.009
Mediated Effects				
Experience	0.11	-0.05	0.27	0.167
Attitude	0.21	0.05	0.37	0.011

Table 5 Roles of experience, attitude, and motivation on student achievement

	Median	Interquartile Range
Time spent on using Duolingo®	7	(3, 10)
Lessons completed	64	(44, 111)
Number of skills gained	4	(2, 9.5)
Experience points	992	(623, 1593)

Table 6 Duolingo® characteristics

Qualitative Data Thematic Analysis

Thematic analyses of students' views on Duolingo® are summarized in Figure 7 and 8, and students' ESL course evaluations are summarized in Figure 9. Figure 7 shows that students found Duolingo® to be most helpful in improving their writing, reading and vocabulary. Figure 8 shows students found the audio-visual representation to be by far the most critical feature followed by the repetitive nature of the application settings. Overall, students also found Duolingo® to be fun to use. Finally, Figure 9 shows that students were unanimous in their appreciation for the class, except that they felt the number of hour credits allocated for the class were fewer relative to the amount of work required for the class.

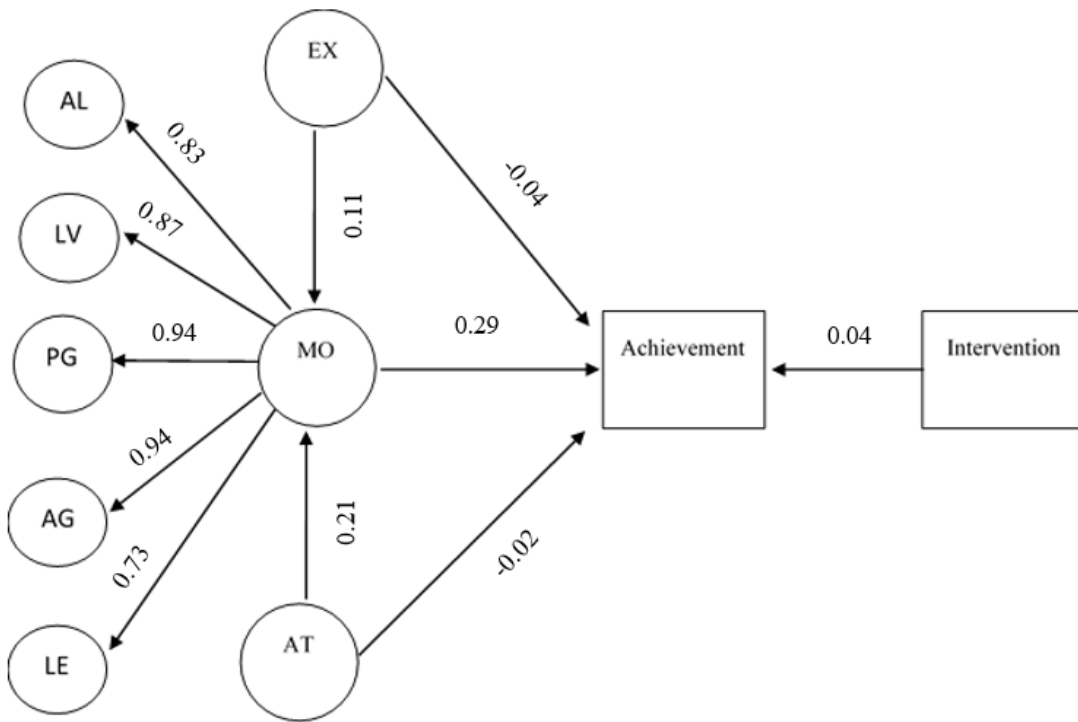


Figure 6 Final Structural Equation Model (SEM)

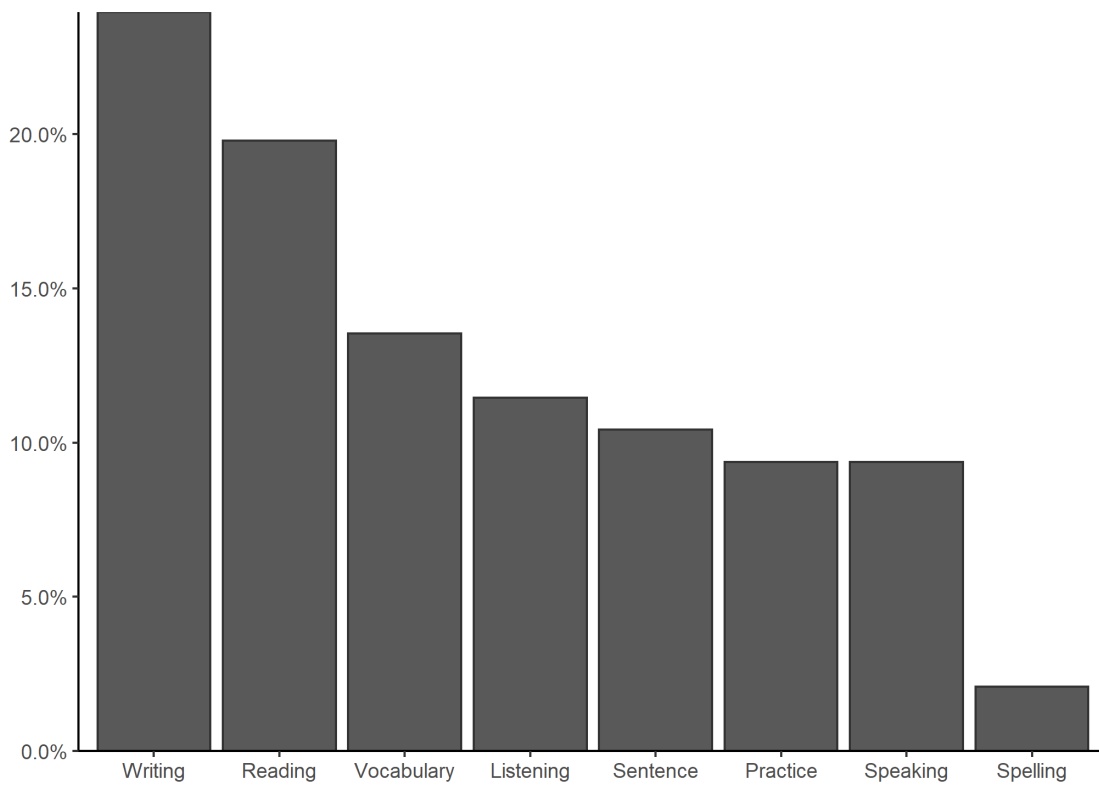


Figure 7 Thematic analysis of 50 student interviews on the impact of Duolingo® on learning performance

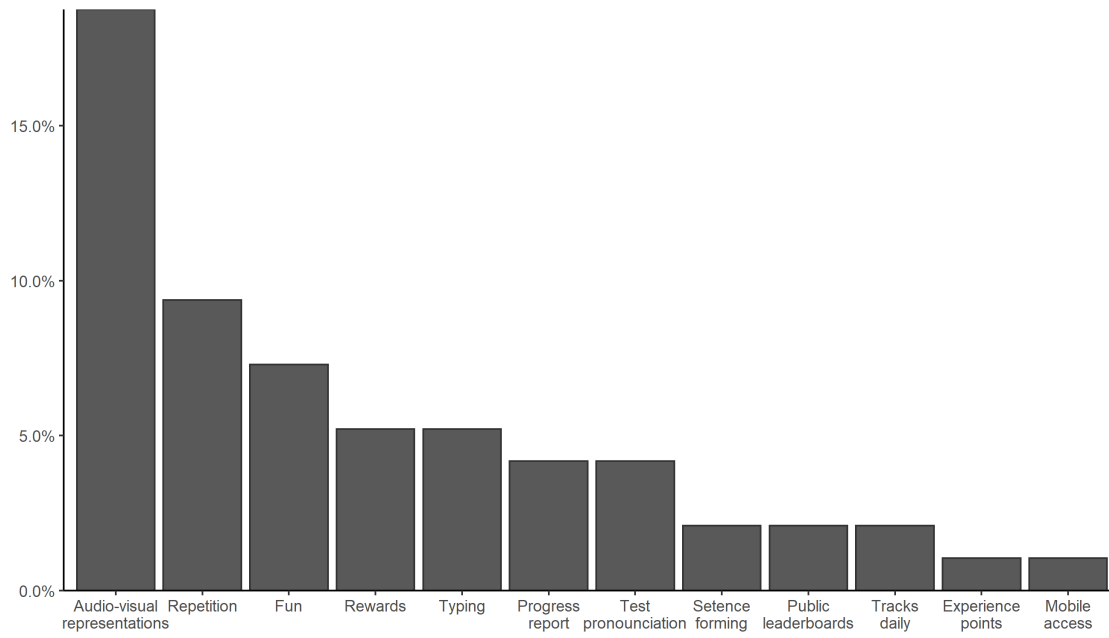


Figure 8 Thematic analysis of Duolingo® gamification features from 50 students



Figure 9 Students' course evaluations

Chapter 5: Discussion and Implications

Introduction

The aims of the study conducted for this dissertation were twofold. The first was to assess the added value to ESL students of gamified learning (Duolingo®) plus using a classroom workbook compared to using the workbook alone. Second, was to evaluate the effects of individual characteristics, namely experience with video gaming, attitude towards video games and motivation for ESL Learning on student achievements. This chapter provides a discussion of the findings in the broad context of existing literature, the implications for research and education, the limitations of the reported results and the future research opportunities they present.

Summary of Key Findings

Results reported in this study reveal three major findings. First, game-based learning combined with a classroom workbook leads to higher learner achievement than the classroom workbook alone. Second, learner personal characteristics (i.e., attitude towards video gaming and motivation for ESL learning) are positively correlated with learners' achievements. Third, in addition to the independent and direct effect, attitude towards video games is also mediated by learners' motivation for ESL learning.

Effect of Duolingo® + Class Workbook Versus Class Workbook Alone

In this study, the Duolingo® + class workbook group scored higher on reading, grammar, vocabulary and writing compared to the class workbook alone group. These findings are in line with students' views that Duolingo® is most helpful for improving writing, reading, and vocabulary through audiovisual representations and multiple repetitions. Additionally, these findings are like those reported by Bennani and Mosbah (2018) who found significant

improvement in grammar and vocabulary among learners in the Duolingo® group compared to the control group following a 10-week use period. Similar conclusions were also made by Munday (2016) with respect to college students learning Spanish as a second language and Loewen et al. (2019) from a semester-long experiment among students learning Turkish as a second language.

The effectiveness of gamified learning to improve learning achievements seen in this study can, in part, be attributed to two key aspects that became apparent in student interviews. First, Duolingo® provides bi-sensory information acquisition through audio-visual representation. Coincidentally, students found this to be the most helpful in learning a second language. This finding is supported by previous studies that have shown the importance of audio-visual representation in second language acquisition (Bahrani, Tam, & Zuraidah 2014; McLoughlin & Lertola 2014). Second, Duolingo® uses repetition to reinforce retention of the class material and students reported to have found this forced repetition to be a key ingredient in their learning improvement. Repetition has been known to increase second language acquisition, and it is not uncommon for individuals taking on a second language to use the service of a tutor. In fact, existing literature shows that repetition is a key feature of second language learning (Larsen-Freeman 2012; Jensen & Vinther 2003; Yoshimura & MacWhinney 2007).

In contrast, compared to the workbook group, students in the Duolingo® + workbook group had lower grades on class participation and timely completion of class assignments. These findings are likely due to the supplementary nature of the Duolingo® component. While this experiment was approved by the school, Duolingo® was not integrated into the classwork load. In this context, these lower grades can be thought of as indicators of the extra work that was required to use Duolingo®, which negatively impacted class participation. In the context of the

study, two major aspects can partially explain these findings. First, using Duolingo® created an extra burden on students in the experimental group and most likely reduced the time they could allocate to other class activities including assignment completion. Second, they are in line with prior research that shows the potential for technology to become a distraction for students (Beland & Murphy 2016; Aagaard 2015; Neiterman & Zaza 2019); in this context, it is conceivable that the observed poor class participation among students in the experimental group was due to the distracting nature of gamified learning. This final point also highlights the need for judicious approaches in incorporating technology into second language classes (Munday 2016; Loewen et al. 2019).

Effects of Personal Characteristics

This study also found that video gaming experience and attitude towards video games have no significant direct effect on student grades. These findings are in contrast to those reported by others (Landers & Armstrong 2017b; Landers, Armstrong, & Collmus 2017) that showed significant positive correlation between learners' experience and attitude towards video gaming and learning achievements. A plausible reason behind absence of a direct effect is the fact that in the experiment reported here, Duolingo® use was an add-on to the ESL class and not an integral part or a major component of the class work. In this context, timely and consistent use of Duolingo® was not rewarded at the same level as assignment completion and class participation.

Student motivation towards ESL learning was correlated significantly and positively with students' grades. This finding is also in agreement with students' course evaluations, which shows that for students in both experimental and control groups, there was unanimous appreciation and motivation towards this ESL class. This is also in line with previous studies that

have consistently shown the critical role that motivation plays in acquiring new knowledge, especially in a gamified learning environment (Fisher et al., 2014; Flores, 2015; Hamari et al., 2014; Monterrat et al., 2014; Sailer et al., 2013; Yee, 2006). Furthermore, there was a significant, albeit smaller, effect of attitude towards video gaming on students' grades, which was mediated by motivation towards ESL learning. To the author's knowledge, this is the first study to show the existence of a motivation mediating effect on attitude towards video gaming for second language learning achievements.

Implications for Research and Second Language Learning

This research demonstrated some value in using gamified learning for second language instruction. This is an important finding given limited existing documentation on the subject. Second, it demonstrated that learners' characteristics matter, especially motivation and attitude. While technology-driven applications such as Duolingo® can clearly complement existing classroom workbooks, the weight of their contribution for second language acquisition is not clear. This missing information is important, as it is needed to define and establish the appropriate amount of time and teaching resources that should be dedicated to gamification in the context of second language learning. Further research in well-integrated settings is needed to understand the best ways to synchronize these two learning approaches. Finally, the weight given to technology-enhanced gamified learning still needs to be determined in striking the right balance between the value of classroom workbooks and technology-enhanced solutions.

Limitations

This study has limitations. First, Duolingo® was not integrated into the course syllabus and this created the sense of an extra burden for students in the experimental group. As a result, Duolingo® activities were not all completed in a timely and orderly fashion as had been initially

hoped. This lack of seamless integration can also have negative consequences as observed with student assignment completion and class participation. Additionally, the researcher was unable to incentivize students in the control group and this led to a number of dropouts in this group. Despite these limitations, the study constitutes an important step in the understanding of the role of gamification in second language acquisition.

Conclusion

Taken together, findings reported in this study show that using gamified learning technology improves students' ability for second language acquisition. This is achieved by maximizing sensory input using audio-visual representations and by forcing students to repeat the same concept till mastery. This is done without hindering students' enthusiasm for learning. Additionally, areas of second language learning that are positively affected by gamified learning are identified and these include grammar, vocabulary, reading and writing. Furthermore, student motivation for second language learning was found to be the strongest personal characteristic that directly and positively affects students' achievement. Finally, attitude towards video games was shown to operate through two pathways. First, attitude towards video games has a direct and positive correlation with students' achievement. Second, the effect of student attitude towards video games on student achievement is also mediated by student motivation for second language learning. These findings are important as they highlight the benefits of gamification in second language acquisition, and more importantly, the need to consider students' personal characteristics when designing and implementing gamified learning programs for second language.

The study done for this dissertation was conducted among female only students, who are in the same age range of 18-21. The narrow and very selective nature of the study population

limits the range of external generalizability. Additionally, the effects and potential interactions of gender and age with attitude, experience and motivation could not be evaluated. In this context, while findings presented for this dissertation are informative, their scope of application remains limited. Furthermore, students included in this study are native Arabic speakers who were learning English as a second language. More studies are therefore needed; first, to corroborate findings reported in this dissertation, and to expand to a larger and more diverse study population in terms of demographic, linguistic and educational backgrounds. Only once these studies are available can a broader consensus emerge on the magnitude and the direction of the role played by individual characteristics on gamified second language learning achievements.

Beyond study population expansion and diversification, more studies are also needed that address some of the conduct issues that were faced. Since gamified learning was an add-on, a better design would be to make gamified learning an integral part of a course. If given the option to create my own application, I would improve the design of the interface to make it more flexible and user friendly. Also, I would create the lessons based on the class material rather than the presets Duolingo offers. I would increase the range of difficulty and variety of the games. I would also try to include more engaging games inspired by real video games to keep students interested. Additionally, interviews with the four instructors revealed that some of the students found the lessons to be boring and easy. In my view, this would significantly improve the learner's compliance and subsequently reduce measurement error, as data can be collected in near-real time.

In addition, future research should strive to expand to other disciplines and assess whether the effects reported here for attitude and motivation remain intact when individuals are learning science, for example, rather than a second language. This would provide an opportunity

to identify the magnitude of the effects that are discipline dependent and those that are discipline independent, which would greatly enrich the model proposed in this dissertation. Finally, rigorous research should also focus on the mechanism, for integrating gamified learning into existing classroom coursework. Since no single scenario would be expected to work for all learning environments and institutions, multiple approaches should be examined with various assumptions, and educators can then choose the approach that best resembles their own teaching environment. Finally, it will be important to conduct a longitudinal study to determine the extent to which students become bored, if at all, with educational games.

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APPENDICES

Appendix A1: Individual Characteristics Questionnaire

A. Self-efficacy

1. Whether learning ESL content is difficult or easy, I am sure that I can understand it.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

2. I am not confident about understanding difficult ESL concepts.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

3. I am sure that I can do well on ESL tests.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

4. No matter how much effort I put in, I cannot learn ESL.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

5. When ESL activities are too difficult, I give up or only do the easy parts.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

6. During ESL activities, I prefer to ask other people for the answer rather than think for myself.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

7. When I find the ESL content difficult, I do not try to learn it

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

Students' motivation towards ESL learning

B. Active learning strategies

8. When learning new ESL concepts, I attempt to understand them.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

9. When learning new ESL concepts, I connect them to my previous experiences.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

10. When I do not understand an ESL concept, I find relevant resources that will help me.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

11. When I do not understand an ESL concept, I would discuss with the teacher or other students to clarify my understanding.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

12. During the learning processes, I attempt to make connections between the concepts that I learn.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

13. When I make a mistake, I try to find out why.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

14. When I meet ESL concepts that I do not understand, I still try to learn them.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

15. When new ESL concepts that I have learned conflict with my previous understanding, I try to understand why.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

C. ESL Learning Value

16. I think that learning ESL is important because I can use it in my daily life.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

17. I think that learning ESL is important because it stimulates my thinking.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

18. In ESL, I think that it is important to learn to solve problems.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

19. In ESL, I think it is important to participate in inquiry activities.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

20. It is important to have the opportunity to satisfy my own curiosity when learning ESL.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

D. Performance Goal

21. I participate in ESL courses to get a good grade. (–)

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

22. I participate in ESL courses to perform better than other students. (–)

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

23. I participate in ESL courses so that other students think that I'm smart.(–)

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

24. I participate in ESL courses so that the teacher pays attention to me.(-)

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

E. Achievement Goal

25. During an ESL course, I feel most fulfilled when I attain a good score in a test.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

26. I feel most fulfilled when I feel confident about the content in an ESL course.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

27. During an ESL course, I feel most fulfilled when I am able to solve a difficult problem.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

28. During an ESL course, I feel most fulfilled when the teacher accepts my ideas.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

29. During an ESL course, I feel most fulfilled when other students accept my ideas.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

F. Learning Environment Stimulation

30. I am willing to participate in this ESL course because the content is exciting and changeable.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

31. I am willing to participate in this ESL course because the teacher uses a variety of teaching methods.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

32. I am willing to participate in this ESL course because the teacher does not put a lot of pressure on me.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

33. I am willing to participate in this ESL course because the teacher pays attention to me.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

34. I am willing to participate in this ESL course because it is challenging.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

35. I am willing to participate in this ESL course because the students are involved in discussions.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

Experience with video games

A) I like playing video games

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

B) I often play video games

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

C) Compared to people of my age, I play a lot of video games

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

D) I would describe myself as a gamer

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

E) I play different types of video games

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

Attitude towards video game learning

Preference for video games

A) If I had the choice, I would choose to follow courses in which video games are used.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

B) If I had to vote, I would vote in favor of using video games in the classroom.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

C) I am enthusiastic about using video games in the classroom.

A) Strongly disagree B) Disagree C) No opinion D) Agree E) Strongly agree

Appendix A2: Course Evaluation Questionnaire

Course Name: English Course (ENGL 001)

Program Name: Co-first year section: English language

Semester: First

Year: 1440-1441

This questionnaire is secret, so please do not write your name on it or reveal your identity. You will combine your answers with the answers of others through a process that does not allow anyone to be identified, and uses a summary of opinions to plan improvement.

Please kindly answer the following questions by filling in the circle that represents your full answer.



Please shade the circle like this and not like this

Taking into account that the color of the circle is dark, and not to use phosphorous highlighters

Please use a **blue or black pencil or ink pen only**, and do not use a red, green or yellow pen.

Strongly agree: means that the statement is always correct or almost all the time, or that the requirement has been fulfilled to the fullest extent.	Strongly agree	agree	Correct to some extent	Disagree	Strongly disagree
Agree: It means that the phrase is often or in most often, or that the requirement has been performed almost well.					
(Correct to some extent): Means that the required fulfillment of an average.					

Disagree: means that the requested was performed poorly or not most of the time.						
Strongly disagree: It means that the requirement was performed very poorly, did not perform at all, or rarely was it performed.						
Special Questions for the Beginning course						
1	The main lines (including the information and skills that the course was designed to develop) were clear to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	The requirements for success in the course (including the duties to be assessed upon, and the assessment Touch) were clear to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	The sources of my help with the course (including office hours for the faculty member, and references) were clear to me			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
especial Questions about what happened during the course						
4	The implementation of the course and the things that I was asked to perform were consistent with the basic lines of the course.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	The faculty member was committed to giving the complete course (for example: the lectures started on time, the faculty member was present permanently, good preparation for the auxiliary materials in teaching, and so on).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	The faculty member who submits this course has full knowledge of the course content.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	The faculty member was present to help during Library hours.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	The faculty member was enthusiastic about what he taught.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	The faculty member was interested in my progress and was appointed to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	All that was presented in the course was recent and useful (reading texts, summaries, references, and the like it).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	The resources I needed in this course were available whenever I needed them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	There was effective use of technology to support my education in this course.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13	I found encouragement to ask questions and develop my own ideas in this course.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
14	I encouraged in this course to do my best.	
15	Something help me that require in this course (class activities, laboratories, and so on) helped me to develop my knowledge and skills that the course aims to teach.	
16	The amount of work in this course was proportional to the number of credit hours.	
17	I provided grades of duties and tests in this course within a reasonable time.	
18	The correction of my duties and tests was fair and appropriate.	
19	The relationship between this course and other courses in the program (section) explained to me.	
Course evaluation		
20	What I learned in this course is important and will benefit me in the future.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
21	This course helped me improve my ability to think and solve problems instead of just saving information.	
22	This course helped me improve my skills as team.	
23	This course helped me improve my ability to communicate effectively.	
General evaluation		
24	I am generally satisfied with the quality level of this course	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Suggested questions:		
25	What did you like most about this course?	
26	What did you not like so much about this course?	

27	What suggestions do you have to improve this course?
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Appendix A3: Institutional Review Board (IRB) Approval Form

The Impact of Gamification and Individual Differences on Second-Language Learning: Mixed method approach

Admin	Carrie Herr (CGU Screen Admin) James Griffith (Review Administrator)
Protocol ID	3512
PI	Maram Almufareh Signed 05/19/2019 12:39 PM PDT
PI Type	Student
Faculty Supervisor	Lorne Olfman 05/15/2019
Campus	CGU
Faculty Supervisor Acceptance Status	Accepted
Review Type	Exemption
Approval Status	Exemption Verified
Based On	(1) Educational Research
Submitted By	Maram Almufareh
Date Received	06/04/2019
Date of Completion	07/11/2019
Date Approved	07/11/2019
Approval Expires	Approved Without Renewal
Proposed Anticipated Start Date	06/15/2020
External Funding	No
Consent Waived	Not Requested
Waiver of Documentation of Informed Consent	Not Requested
Vulnerable Subjects	• Not Applicable
Searchable Keywords	game-based elements, Gamification

(1) Educational Research Questions

Date Last Updated: 06/19/2019 4:10 PM PDT

Is this research project conducted in an established or commonly accepted educational setting?

Answer: 1. Yes
 2. No

Is the research unlikely to adversely impact the students' opportunity to learn required educational content?

Answer: 1. Yes
 2. No

Is the research unlikely to adversely affect the assessment of the educators' performance as teachers?

Answer: 1. Yes
 2. No

Is the research unlikely to adversely impact the ability of educators to assess student learning?

Answer: 1. Yes
 2. No

Which types of activity does this study involve (check all that apply):

Answer: 1. Research on regular and special educational strategies
 2. Research on the effectiveness or comparison of instructional techniques, curricula or classroom management methods
 3. None of the above

Provide, in lay terms, a detailed summary of your proposed study by addressing each of the following items.

Clearly state the purpose of the study.

Answer:

This study seeks to investigate the impact of different gamification features and individual differences on second-language learning at Aljouf University. In the context of language learning, the term "gamification" refers to the use of game-based elements such as game dynamics and game mechanics to instruct the learning of second languages in non-game contexts to improve

learners' experiences, motivation, and engagement, as well as create a relaxed atmosphere and a sense of playfulness.