Theory of Gamification - Motivation

By

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Abstract

Gamification is a term first coined early in the 21st century, and the application of its principles has been seen in the business world. Department stores, convenient stores, airlines, and credit card companies have implemented loyalty points to keep customers buying their products. From the business world, to the daily lives of students, gamification has become familiar, but not clearly defined. The daily lives of high school students are filled with constant feedback through social media sites, massive online gaming, PC games and instant access to information through the Web 2.0. Gamification is the bringing of game elements, into non-gaming environments to capture the motivational factors found in games. Self-Determination theory, Flow Theory and Self-Efficacy theory form foundational principles to support gamification. This study is an overview of gamification and its foundation and research using ClassDojo in a high school online program for students needing to retake a course required for California university admissions. This quantitative causal-comparative study attempts to discover if there are any significant differences when using gamification and not using gamification for course completion in an online high school course.

Keywords: Gamification, Gamification Theory, Motivation, Gamification and Motivation, Self-Determination Theory, Flow Theory, Self-Efficacy, Gamification and Secondary Education

Dedication

This dissertation is dedicated to the people in my life I love the most. I start with Dr. David T. Fulton Jr., and Mrs. Sheila Fulton, my parents. They gave me life and gave me the drive to live it to my fullest. They did not live to see me even start this formal process, but they always believed I could do whatever I set my mind to do. I will never stop appreciating them or loving them. My siblings, who have given me a lifetime of support, and guidance in both word and example. Perhaps my biggest motivation has been my son Alex. I want him to know, it is never too late, too hard or too complicated to do what you dream. You have been and will always be my biggest blessing. Finally, my companion in life with all its ups and downs, my wife Patty Fulton. The first words out of her mouth when I presented the possibility of pursuing this dream was, "You have to do it, you can do it", and she never stopped lifting me in my weakest moments, when I wanted to quit and thought it was a fool's dream. I love you tons and tons, more and more every day. I could not have completed this without you by my side, in front of me, behind or without your loving arms around me.

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This has been an incredible journey, which has challenged me in ways I never thought possible. It has reassured me of the importance of learning and taking advantage of opportunities which come your way.

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Chapter 1: Introduction to the Study

Introduction

Educators have attempted to motivate students as part of their regular instruction since the beginning of teaching. Various schools of thought in the psychology of learning have been a partner in studying and suggesting different methods to engage students in learning. Self-Determination Theory, Flow Theory and Self-Efficacy Theory discuss motivation and how it effects learning.

In the current era of technology, educators face both a challenge and the possibility of solution with regard to motivating students (Dichev, Dicheva, Angelova, & Agre, 2015). High school aged students are comfortable with, and engage in, a variety of game playing activities regularly, and have been exposed from early life (Hasan, 2018). Whether it be on cell phone, tablet, or PC, students are more able to access information, and can do it more quickly than ever before (Dichev et al., 2015). This has changed the landscape of learning dramatically from a process to an end result in accumulation of knowledge (Dichev et al., 2015). Massively online gaming, mobile phone games, and home console games all have a common thread in that they have the ability engage students for hours. Gaming has become a part of everyday life, eliciting the question of its use in a variety of motivational areas (Hamari & Koivisto, 2014). In education, the educators' objective is motivation to learn.

The concept of gamification is an attempt to implement game-like elements into the classroom to engage and motivate students (Cheong, Filippou, & Cheong, 2014; Seaborn & Fels, 2015). Gamification comes in a variety of forms, the most used and recognizable are points, leaderboards, and medals (Hanus & Fox, 2015). With technology, teachers can choose from

various platforms, where students can take tests and quizzes, and turn in homework while receiving immediate feedback (Faiella & Ricciardi, 2015). However, technology is a tool for gamification, but gamification is a learning design, which is more than the use of a tool (Dichev & Dicheva, 2017). Researchers in the area of gamification agree that for gamification to be effective, there must be a combination of best uses of technology and design elements (Faiella & Ricciardi, 2015).

Background of the Study

Gamification is a new discipline, having only seen significance in literature since 2011 (Hamari, Koivisto, & Sarsa, 2014). With the increase in comfort in the use of technology, combined with educators' continual search for motivational tools, excitement around the concept has grown (Dichev et al., 2015). Used widely in business to keep customers loyal, gamification has become a part of everyday life in the form of loyalty programs (Morschheuser, Hamari, Werder, & Abe, 2017). While technology has made it easier to implement game-like environments, game design is more than simply using technology (Hasan, 2018). Gamification represents the inclusion of game designs, to enhance student engagement, and create a learning environment with a high level of motivation (Boyun, 2015). Gamification's application in learning has been studied from the standpoint of motivation, and learning (Dicheva, Dicheva, Agre, & Angelova, 2015). Educators on all levels have created a buzz in the use of gamification technology with a variety of available web and application-based software offerings (El-Masri & Tarhini, 2015). These offerings provide easy access, and implementation in the classroom. ClassDojo, Socrates, Kahoot, and Quizlet are a few examples of software available to teachers who are interested in using gamification in their classroom (Hanus & Fox, 2015). Gamification

software offers teachers the options of issuing points to earn badges and medals, and to create social connections in the form of leaderboards and student collaboration (Hanus & Fox, 2015).

Researchers have studied gamification, using the psychological foundation of Self-Determination Theory, Flow-Theory and Self-Efficacy Theory (Cherry, 2017; Tandon, 2017). In combination, these three perspectives set the foundation for the possible benefits of gamification. Juho Hamari published studies which linked game designs and motivation connecting learning theories and gamification design (Hamari, 2017). In eight years, the number of research connecting learning, and motivation has significantly increased, illustrating the interest and possibilities of what gamification offers (Hamari et al., 2014). In this research, gamification elements of points and badges will be used implementing the software platform ClassDojo. Michael D. Hannus and Jesse Fox noted future research in gamification should focus on specific game elements, instead of gamification in general (Hanus & Fox, 2015). Using ClassDojo, which contains as its major gamification elements points and badges, this research attempts to determine whether there are differences in outcomes when compared with those not using these same elements.

Problem Statement

In the current technological age, high school students live in one world, yet often attend school in a different one. With the ubiquitous use of cell phones, cell phone game apps, game consoles, and computers, students are well familiar with living in a gaming context. Along with games, social media makes a game of likes, follows and friending, which further illustrates the current context. However, every day when these students attend school, they also leave their familiar game-like environment. In seeking ways to motivate and engage high school students,

educators often vilify those environments where students are most comfortable, namely, gaming using cell phones and game consoles. The problem of the study is, it is not known if and to what extent there is a difference between the variable of gamification and not using gamification; this study attempts to determine if differences exist. With the current discussion and use of gamification elements in education, it is necessary to conduct research on its usefulness and proper application (Hakulinen, Auvinen, & Korhonen, 2015; Hamari et al., 2014).

Purpose of the Study

The purpose of this causal-comparative quantitative study is to examine if there is any significance between groups of students in an online course where gamification has been implemented with the use of points, and badges, with courses not using gamification. Points and badges are examples of gamification as they bring into a non-game environment, the feel of games. When students complete tasks, they are given points and badges as a method of acknowledging accomplishment and badges account for achievements. There are a variety of gamification elements, which can be used in a variety of situations, for the purpose of this study, game elements have been narrowed to the use of points and badges using ClassDojo.

This study will attempt to quantify, student outcomes to using the gamification software ClassDojo as a motivational tool. Specifically, to this study, the researcher will be looking at students who complete an online course and comparing their grade percentage with previous student scores to determine if those students who complete the courses, have a higher percentage. Furthermore, the researcher will compare the time to completion between the two groups. If there is a significant difference in the grade percentage and the time to complete a course, the researcher could find the use of gamification is beneficial to student achievement in the area of

grades earned and the time it takes to complete a course. ClassDojo can be accessed both using a cell phone, or computer to track points and badges earned. Additionally, teachers are able to monitor each individual student and assign specific point values and badges for specific accomplished tasks (ClassDojo, 2018).

Rationale for Methodology

The nature of this quantitative study is to draw data from archival records, to see if there are any significant differences between using gamification and not. Using independent samples of *t*-test scores, the researcher will compare two cohorts of students. The nature of this quantitative research allows the researcher to compare a larger number of participants than other research options. Causal-comparative research involves comparing two groups, one which experienced the independent variable, and the other which has not been exposed to it (Mills & Gay, 2016). What the researcher hopes to discover, is if there are any causes or reasons for differences when introducing the independent variable to the dependent variable (Mills & Gay, 2016). Causal-comparative research retrieves data from already completed events, and attempts to find differences based on those research data (Mills & Gay, 2016). Since data is from events already occurring, the researcher cannot assign groups or roles (Maheshari, 2018). Moreover, since the data retrieved is from already completed events, the groups for comparison are formed within the natural course of those events. Since the researcher does not have complete control over a study, causal-comparative research is descriptive and not experimental (Maheshari, 2018).

Given the fact the researcher does not have control, cause and effect cannot be determined (Mills & Gay, 2016). What can be determined is what are the differences, if any, when a dependent variable is introduced with an independent variable. Behavioral science and

education use causal-comparative research design because it would be unethical to attempt to manipulate variables so as to discriminate or eliminate participants based on factors such as intelligence, personality traits, or cultural difference (Maheshari, 2018). This factor makes the use of causal-comparative research design effective, ethical, and appropriate in the study of learning and motivation.

Research Question

The purpose of this causal-comparative study is to determine if there is a significant difference in an online high school course when using gamification. Data will be retrieved from courses taken both using and not using gamification to determine the difference, if any between the two groups compared.

RQ1. To what extent is there a difference, if any, in the final grade percentage of those who complete a course using gamification and those not using gamification?

$H1_{01}$. There is no significant difference in the final grade percentage of those who complete a course using gamification.

$H1_{a1}$. There is a significant difference in the final grade percentage of those who complete a course using gamification.

RQ2. To what extent is the difference, if any, in the time of course completion using gamification and not using gamification?

$H2_{02}$. There is no significant difference in the time of course completion using gamification.

$H2_{a2}$. There is a significant difference in the time of course completion using gamification.

The research questions and hypothesis are an outcome of reviewed literature in gamification and its need for further research (Dichev & Dicheva, 2017). Archival data will be retrieved from a southern California high school, where an online course is used for students to retake a course, they have previously received a 'D' grade. As 'D's are not permitted for California University admissions, students must retake, or validate a previous grade for application eligibility. Gamification has been studied for use as tool for motivation. This research will look at the possibility of improved grades and course completion in an independent learning context.

Significance of the Study

The significance of this study is to add to the growing body of research in gamification and discover empirical evidence about the impact of implementing gamification. Gamification is a new discipline, requiring a variety of research perspectives to better understand how best to implement. Gamification is a combination of game elements and game designs, to create a game-like atmosphere in a non-game environment. At its core, gamification is built on researched areas of psychology of self-determination theory, flow theory, and self-efficacy. Additionally, secondary education is constantly in search of methods to motivate students and increase achievement. Currently, there are fewer studies involving secondary education. This research attempts to add to the general body of information regarding gamification, and specifically how it affects students in secondary education Hakulinen, Auvenen, and Korhonen argued, "despite the popularity of gamification, the need for more research on its effectiveness has been clearly stated in the literature" (Hakulinen et al., 2015, p. 18). Additionally, Hamari et al. (2014) indicated a need for the contexts for gamification services.

Nature of the Study

The researcher chose causal-comparative research design for this study to compare two groups in an already established program of course validation. Retrieving data from the previous year and comparing it with the most current year's courses gave the researcher an indication if there are significant differences in the use of gamification as compared to the courses which did not use gamification. The most recent courses offered implemented the use of gamification with the addition of ClassDojo as an instructional strategy.

Data retrieved represented a variety of courses necessary for California State University application. Math, Science, History and English are the primary courses offered. Each student was required to retake a course in the required areas and achieve a 'C' grade or better to be eligible to apply. The research compared final grades, looking at the percentage of the final grade, to have a more precise comparison. Additionally, the researcher compared the number of days it took each student to complete the course. The amount of time to completion and the final grade percentage gave the researcher the ability to discover if there were indeed significant differences in courses using gamification and those not using gamification. ClassDojo was the gamification platform used for this study, which uses points and badges as the game elements.

Definition of Terms

There are terms which are regularly associated with gamification.

Educational games. Games designed for learning.

Extrinsic motivation. Specifies situations in which individuals engage in an activity to obtain certain desirable and separate outcomes (Sun, Li, & Shen, 2017).

Flow Theory. Flow Theory is a study of motivation which states there is an optimal balance between what a student absolutely knows how to do something, and what they need to learn (Hamari et al., 2016).

Game design. The creation of games with an emphasis on the game or process being rewarding, and intrinsically motivated (Dichev et al., 2015).

Game dynamics. Those elements of games, which guide game play (Dichev et al., 2015).

Game elements. The elements of games, which make the game pleasing and enjoyable (Dichev et al., 2015).

Game mechanics. The parts of games which make the gaming experience engaging, such as leader boards, and ranks (Dichev et al., 2015, p. 88).

Gamification. Gamification is the creation of game-like situations, in non-game scenarios (Wiggins, 2016).

Identified regulation. "A form of extrinsic motivation with more internalized external values" (Sun et al., 2017, p. 278).

Integrated motivation. "The most self-determined form of extrinsic motivation. During this process, the individual integrates the external values into his/her own value system" (Sun et al., 2017, p. 278).

Intrinsic motivation. Intrinsic motivation is "manifested through individuals' engagement in an activity for the sake of the activity itself and for the satisfaction inherent in performing the activity" (Sun et al., 2017, p. 278).

Introjected regulated motivation. "Refers to an individual's partial or suboptimal internalization of the extrinsic value or regulatory process, but the external value has not been accepted as the individual's own" (Sun et al., 2017, p. 278).

Leaderboards. A visual representation and order of highest to lowest points.

Medals. Graphic representations of task accomplishment.

Motivation. "Process in which an individual self-regulates his/her action depending on the degree of his/her needs satisfaction" (Sun et al., 2017, p. 278).

Points. Points represent experience; the more points the more experience one has.

Self-Determination Theory. Suggests that people are motivated to grow and change by innate psychological needs. The theory identifies three key psychological needs that are believed to be both innate and universal: ":1) The need for competence. 2) The need for connectedness. 3) The need for autonomy" (Cherry, 2017, p. para 2).

Self-Efficacy Theory. The perception of the individual's ability to accomplish or do something (Tandon, 2017).

Serious games. Serious games are those games with teach specific material (Sailer, Hense, Mayr, & Mandl, 2017).

Assumptions, Limitations, Delimitations

This study adds to the body of knowledge regarding gamification. As gamification is a new discipline, there is much need to build the base of knowledge in this area (Dichev & Dicheva, 2017). This research adds to the growing body of knowledge, along with further questions for continued research.

Assumptions. It is assumed all teachers care about students. Additionally, it is assumed school site administration will give adequate support for implementing new teaching strategies. Regardless of whether a teacher has been trained in detail about gamification, this researcher assumed the administration of the school where data was be retrieved gave teachers the proper oversight and guidance and teachers taught to the best of their ability. While gamification is the center of this research, schools have an already stated objective for students to learn, which will motivate teachers to teach. At the core of a learning environment is the need for motivating students.

Limitations.

1. Using casual-comparative research methods, the researcher relied on the teachers' implementation of gamification. The researcher had no impact on the design teachers instituted in their classrooms.
2. Teachers may not have believed in gamification and may only implemented its elements because the principal instructed them to do so. Teachers in this study were mandated to use gamification. It is not known to what level teachers believed gamification as an instructional strategy. Furthermore, it is not known how much, if any, training teachers received as part of their mandate.
3. ClassDojo, which is a credible industry accepted gamification tool, is also primarily used in lower levels of education. It is possible, the platform itself was age inappropriate-better choice (RR) to make the desired impact.

4. The researcher had no control over how many participants the data represented. The number of participants affects the generalizability of the analyzed data.

Delimitations. This research had parameters which addressed the daily issues faced by educators in classrooms every day. Motivating students in a technological world, where students have access to endless information at a click or Google search. Teachers in classrooms fight for the attention of students from constantly streaming videos, absolute access to information, and console games giving students the ability to play with others around the world. The classrooms of current students' teachers where very different, and as such, sometimes lack the know-how of what the twenty-first century has to offer. Students who are natives to the age of technology have become accustomed to game-like environments in all aspects of their lives. However, when they enter school, those most familiar elements must often be left outside of the classroom door. Every era of educators has had to wrestle with best practices and strategies to motivate students to learn and this era is no different. Gamification is a new and budding discipline, with a variety of possibilities. Those possibilities are why this research was conducted. The data from this research came from a Southern California High School. Current high school students are among the first technology natives, never knowing a world without the game elements presented in the context of gamification. Moreover, this Southern California high school represented a gap in learning, educators have been attempting to narrow for quite a while. The setting of this is important to note. Findings from this research may be generalized to urban schools with high numbers of students living in poverty, and who are designated English learners.

Organization of the Remainder of the Study

Chapter 2 is a literature review of gamification and its foundation in motivational psychology. Additionally, the elements of game design as it applies to creating a game-like learning environment. The literature review creates the contexts for the theory and application of gamification. Chapter 3 is the explanation of quantitative research methods used to determine the outcome. Chapter 3 discusses research questions, research hypothesis, research design, research methods, research participants, research settings, research instrumentation, data collection, research analysis, validity, reliability and ethical considerations. Chapter 4 is the data collection and Chapter 5 analyzes the data and presents conclusions and suggestions for further study.

Summary

While there is much excitement about the positive attributes gamification can bring to learning among some educators, more empirical study is necessary to substantiate the rationale for its implementation (Dichev & Dicheva, 2017; Hamari, 2017). There are currently more questions than answers however, because of the many questions and the many gamified environments being promoted, making the need for research more important than ever (Cheong et al., 2014; Dichev & Dicheva, 2017). The possibilities of gamification and the applications for motivation, make it an important area of study for student success. Especially with the use of technology, gamification has potential for making an impact on positive student achievement.

Chapter 2: Literature Review

Introduction and Background

Students in the 21st century have a different need than those who came before them. Due to the advancement in technology, combined with the high expectations of academic success, much of their time is spent fulfilling requirements rather than learning (Dichev et al., 2015). The problem of how to motivate students to enjoy learning, in an environment filled with distractions from a variety of technology driven devices is what educators wrestle with every day. Motivation is one aspect of gamification which is often discussed, but there are questions about empirical evidence related to increasing motivation (Dichev & Dicheva, 2017).

Gamification is the creation of game-like feelings, in non-game situations (Wiggins, 2016). The objective of gamification can also be defined as the harnessing of game mechanics to inspire similar senses and engagement to that of games (Chia & Hung, 2017). As a society, the use of games for entertainment has become commonplace. The availability of gaming consoles, tablets, cell phones, and computers for playing games have become ubiquitous (Faiella & Ricciardi, 2015). Loyalty programs, which offer consumers points they can exchange for goods and services has been a successful business model for many companies (Autry, 2017). There are 3.5 billion loyalty memberships in loyalty programs, indicating, game-like activity has become a part of our regular experience (Autry, 2017). The use of points, medals, trophies, and ranks are all examples of gamification regularly used in online gaming, cell phone gaming, loyalty programs, and PC gaming (Cheong et al., 2014; World, 2015). As more young adults enter higher education and the work force, the idea behind gamifying work and study has been seen as a natural, strategic progression (Wiggins, 2016). Nick Pelling coined the phrase *gamification*, as

his definition for how games were leading society to use digital platforms, to connect people socially (World, 2015). Gamification is not simply something that is done, but it is something which has become a foundation for common transactions and interactions (World, 2015). As a motivator, the use of points, leaderboards, trophies, and medals has been profitable for business, further illustrating the impact of game-like activities (Autry, 2017; Rheude, 2017).

Often, the first thought regarding gamification leads to technology; however, gamification is a method of engaging people in activities as directed (Dichev & Dicheva, 2017). The technology of gamification is a tool to facilitate the game environment (Faiella & Ricciardi, 2015). In other words, gamification is a social construct, which motivates those included to participate in a specific way (Dichev & Dicheva, 2017). Gamification is a method of encouraging the enjoyment of accomplishment. Nick Pelling may have coined the term in 2002, (World, 2015), but the term did not truly trend until 2011 (Dichev & Dicheva, 2017) . Since then, education has embraced gamification as a method of motivating students to study and learn (Dichev & Dicheva, 2017).

The principles of several theories of motivation are the foundation for how gamification motivates students in the classroom. Self-determination theory, flow theory, and self-efficacy all have complementary components which support gamification as means to motivate. The availability of a variety of gamified platforms has furthered the discussion about its use and application. The question remains, does gamification work to motivate students? There are still mixed messages from different research, some indicating a connection and others indication no connection (Gooch, Vasalou, Benton, & Khaled, 2016).

Literature Review

Motivation: self-determination theory. Self-determination theory is concerned with a broad stroke of knowledge and understanding of human personality and motivation (Legault, 2017). It encompasses a variety of theories in psychology to explain how humans are motivated. The assumption at the core of self-determination theory; human beings are driven by their desire to grow (Legault, 2017). A major consideration of gamification in education is its motivational power. Motivation answers the question, why is something important enough for an individual to take on a task from beginning to end. In self-determination theory, motivation is discussed in the context of both intrinsic and extrinsic motivation (Sun et al., 2017).

Intrinsic and extrinsic motivation. While self-determination theory explains researched results, how they apply to motivation in gamification is in process (Gooch et al., 2016). Intrinsic motivation are those aspects of desire which motivate an individual for the pleasure and satisfaction of engaging in an activity (Sun et al., 2017). Another way of explaining intrinsic motivation is doing something for the pure enjoyment of the activity. Extrinsic motivators are those things which are imposed on an individual in an attempt to motivate completion of an activity (Sun et al., 2017). Grades, paychecks, and other types of external incentives are extrinsic motivators; those mechanisms which reward and make something worth the effort. Moreover, self-determination theory makes a point for introjected regulated motivation. Introjected regulated motivation comes from guilt or sense of duty to complete a task (Sun et al., 2017). Pride is an additional aspect of introjected motivation, which motivates by using feelings. Furthermore, self-determination theory explains motivation with identified regulation (Sun et al., 2017). Extrinsic motivation is internalized or identified by the individual as matching their own

values (Sun et al., 2017). When a student decides earning a badge is important and desirable, they have experienced identified regulation because the extrinsic motivation of the badge, becomes something they truly desire. This is the integration of what individuals hold personally and intrinsically important by adapting an extrinsic force simultaneously. Finally, integrated regulation is the highest level of extrinsic motivation in self-determination theory, where external and personal values are integrated with an individual's own values (Sun et al., 2017).

In general, extrinsic motivation is described as controlled motivation in self-determination theory (Ross, Perkins, & Bodey, 2016). However, when an extrinsic value is internalized, or an outside motivator becomes as important to an individual as their own value, integration occurs (Sun et al., 2017). When integration occurs, extrinsic motivation can illicit the same feelings as intrinsic or autonomous motivation (Anthology, 2017). The difference is, while a person has internalized the value of an extrinsic motivator, the motivation comes from the desire to attain the goal (Sun et al., 2017). Sun et al., describes this as someone who wants good health and runs to achieve it, but does not particularly enjoy running (Sun et al., 2017). The value of having good health is a motivator to run, regardless of whether the individual enjoys running. Researchers, using self-determination theory, argue a balance where individuals take on the importance of what is extrinsic, as important and meaningful (Gooch et al., 2016). When integration occurs, what was external, becomes at least quasi internal, in that the individual holds an extrinsic motivator as important (Gooch et al., 2016). Drawing on gaming, players value games offering badges, medals, and customization within the player experience. These items have no real value outside of the game; however, they become so important, gamers will play for

hours on hours to gain access for an addition to their avatar, or to level up. This illustrates how extrinsic motivators become internalized.

Types of motivation. Gamification seeks to take elements from games, and implements them in non-game environment; in educational settings its focus is to motivate learning (Sailer et al., 2017). Sailer et al. (2017) used self-determination theory of motivation as a foundation for their study on how gamified environments can motivate learners. Self-determination theory differs from other theories of motivation because while most focus on motivation as steps, or amounts, Edward Deci argued motivation as types (Anthology, 2017). For Deci, the types of motivations are autonomous and controlled motivation (Anthology, 2017). Autonomous motivation is characterized by doing something because you enjoy it and gain pleasure and satisfaction from it (Anthology, 2017). At the earliest stages of human existence, pleasure, and enjoyment are foundational to intrinsic motivation (David A Cook, 2016). As a child grows and matures, they are presented with a series of extrinsic motivators, and situations of non-pleasurable activities they must participate. These non-pleasurable activities are necessary, but bring no intrinsic joy (David A Cook, 2016). To illustrate, consider students who must pass a class in a subject area they do not enjoy, but know passing is necessary to graduate and gain access to higher education. In contrast to enjoyment, when one does something because of the gain, or avoidance of something unwanted, Deci discussed this as controlled motivation (Anthology, 2017). The more one acts or engages in undesirable activities for extrinsic gains, motivation diminishes (David A Cook, 2016). Autonomous motivation creates individuals who feel better, work harder, and enjoy what they are doing more than those who experience controlled motivation (Anthology, 2017). Deci explained, to properly motivate, one needs to

create an environment based on competence, autonomy, and relatedness across all social situations and disciplines (Anthology, 2017). If a teacher can create a classroom environment where students feel competent, autonomous, and connects students to each other; autonomous motivation can occur, and those students will achieve at a higher level than students who are not in this environment (Anthology, 2017).

Competence is the ability of the learner to complete tasks (Sailer et al., 2017). Individuals are motivated when they can do something. Motivation is based on desirability or expectation. After time, the simple rewarding of activities is not enough to stay motivated (David A Cook, 2016). Autonomy, in self-determination theory, points to the individual's ability to make choices in the context of solving problems (Sailer et al., 2017). This ability gives the freedom to choose options within given parameters allowing for the feeling of freedom and the ability to tap into one's personal definitions of values and meaning (Sailer et al., 2017). The third foundational aspect of self-determination theory is the need for social relatedness (Sailer et al., 2017). Social relatedness is the ability of having a sense of belonging and connection, within the given environment (Sailer et al., 2017).

In the context of self-determination theory; competence, autonomy and relatedness are areas which can be created and implemented into a learning environment (Sailer et al., 2017). Self-Determination theory argues, individuals grow and develop according to their psychological need (Kim, Song, Lockee, & Burton, 2018). Psychological needs are those foundations human beings need to be happy, productive, and absent of negative consequences (Anthology, 2017). Self-determination theory argues, autonomy, relatedness, and competence are universal human, psychological needs (Anthology, 2017). Giving students the opportunity to make choices which

determine their learning creates a learning environment where students feel more in control of how they learn, which in turn motivates students (Kim et al., 2018). In an environment where students are making choices, they are additionally able to decide what they are capable of accomplishing. Choice gives students the sense of control, creating a feeling of autonomy which in turn increases intrinsic motivation (Jeno, Grytnes, & Vandvik, 2017). Satisfying the basic psychological needs of self-determination creates motivation in students to learn (Jeno et al., 2017). In this context, students are in charge of determining their ability to complete tasks (Kim et al., 2018).

Finally, the creation of a learning environment where students must work together to accomplish a task, creates group dynamics, which connects students (Kim et al., 2018). Working on a project or solving a problem as a team requires students to connect socially and intellectually. Quests and leaderboards are examples of social connection (Jantke, Baumbach, & Friedemann, 2015). In quests, students must work together to solve problems to earn points or other recognition. Leaderboards give information about where individuals are in relationship to completing tasks. This social competition connects students to a common goal (Jantke et al., 2015). Leaderboards allows students to view their progress, in relationship to their peers (Chia & Hung, 2017). According to self-determination theory, students who are given choices, the ability to determine their learning, and create connections will be motivated.

In a gamified learning environment, students will be continually given opportunities to show their competence through constant feedback. Platforms such as Kahoot, Socrative, Quizizz, and Mindcraft: Education Edition give students opportunity to practice and show their competence (Lynch, 2017). Using these applications, students are given immediate feedback on

both correct and incorrect responses (Lynch, 2017). This feedback allows students to show their competence and function autonomously while they learn. Learners with high levels of believing in what they are capable of tend to participate more in areas which will help them build their abilities so they will acquire necessary skills (Schunk & DiBenedetto, 2016). Badges and stars are not themselves important; however when students truly desire a badge, star, or avatar and internalize their desire, working for it becomes integrated motivation (Anthology, 2017). Moreover, in a learning environment where students have some level of control over how they accrue points in pursuit of an outcome, choosing will be a motivating factor. In a gaming environment, the pursuit of external motivators becomes paramount in the mind of the player. Players will spend hours to gain a medal, badge, or the ability to modify the game environment (McGrath, 2017).

The promoters of gamifying learning suggest, if this same environment can be replicated in the classroom, students will internalize the objectives and in turn better learn the material required of them (McGrath, 2017). The idea of gamifying learning is for learning to have the elements of fun and enjoyment, while learning. At the foundation, self-determination theory competence, autonomy, and relatedness, are the factors which produce motivation in students (Sun et al., 2017). Students are motivated by accomplishing tasks they feel competent doing (Anthology, 2017). In traditional learning, the teacher is the holder of knowledge, and students gain knowledge based on how and when the teacher presents it. Moreover, in traditional learning, students' complete assignments and take exams when they are told and have no say in when those assignments are due, or what assignments they need to complete. Not having a stake or active input in how students show mastery is demotivating according to motivational

principles in self-determination theory (Jeno et al., 2017). Finally, traditional learning requires students to sit in rows, facing the same way, completing work independent of their peers. In this configuration, students do not interact with one another and interact with the teacher only when called upon (Holland, 2014; McKiben, 2016).

Gamifying the learning experience implements the three foundational elements of self-determination theory, giving the learner a sense of competence, autonomy, and relatedness (Hamari et al., 2016). To socialize learning, the use of leaderboards, gives students the opportunities to compete, showing progress as they complete tasks. This social interaction of competition creates connections with other students. Additionally, working on projects together to solve problems, builds connections and connectedness.

Motivation: flow theory. Flow theory is a study of motivation which states there is an optimal balance between what an individual absolutely knows how to do and what they need to learn (Hamari et al., 2016). In this balance, active engagement in an activity is all consuming (Hamari et al., 2016). This all-consuming state is referred to as *flow* (Art, 2017). Mihaly Csikszentmihalyi postured when an individual is in ideal balance between their ability and challenge, flow is experienced (Hamari & Koivisto, 2014). This balance between what a person knows they can do and the challenge of attaining what they believe they can do, motivates.

Csikszentmihalyi's work studied professionals in various areas to understand when an individual reaches this state of flow or optimal balance (Hamari & Koivisto, 2014). Athletes and artists are a prime example of individuals who achieve flow in pursuit of their goals. Flow is a motivating force, which when given the appropriate levels of challenges, creates motivation for a given activity (Rodriguez & Meseguer-Artola, 2017). As technology has advanced, and

computing is a part of everyday life, ubiquitous in cell phones, laptops, tablets and online gaming devices, the implications of flow have been considered for education and learning (Hamari & Koivisto, 2014). Rodriguez-Azura and Meseguer-Artola's (2017) research indicated the importance of designing lessons and learning with flow, especially when considering online learning (Rodriguez & Meseguer-Artola, 2017). The implications for lesson design with flow theory as a foundation, is a meeting of challenge and ability to motivate students to learn (Hamari et al., 2016). In traditional classroom environments, every student must learn at the same time and at the same pace (Hamari et al., 2016). This is true whether this scenario motivates or demotivates. It becomes a static kind of learning. For some students this is effective, because they have bought into the process. However, for others, it does not and going to school decreases their desire and motivation to learn because of feelings of incompetence (Hamari et al., 2016).

There are five main scenarios necessary to engage flow. The first is clear task goals (Duncan & West, 2018). Clear goals give the learner the information they need to complete an assigned task. As stated earlier, in a gamified situation, students are given constant feedback based on clearly stated goals. Students have clear objectives and clear paths for completing those objectives. Second, is intense concentration (Duncan & West, 2018). This intense concentration is illustrated by an immersed experience, where time slows and there is a feeling of timelessness. Key to intense concentration is limited or no distractions (Duncan & West, 2018). The third concept is a sense of control giving the learner a part to play in their learning experience. Autonomy allows the learner to experience information as they need to know it (Duncan & West, 2018). The fourth element is a balance of challenge and skill, enables the

learners' ability to match equally with the challenge (Duncan & West, 2018). Finally, clear feedback allows the learner to know exactly what they are doing well and what they need to do to improve (Duncan & West, 2018).

Flow challenge. Often, the assumption for unmotivated students is they do not want to engage in work which is too difficult. According to Hamari et al. (2016), this is an incorrect assumption. Students want to be challenged, and when they achieve more they enjoy learning more (Hamari et al., 2016). Flow theory attempts to put learners in a state where their abilities are challenged in a way, which motivates them to continue to completion of a given task (Hamari et al., 2016). Flow theory argues, if you put a learner's ability and challenge in an ideal state, the learner can enter flow, which in turn keeps them engaged (Art, 2017). This theory argues for the balance between something being difficult and unattainable. Complete flow state is achieved when the individual involved in the activity reaches a complete state of immersion (El-Masri & Tarhini, 2015). Complete immersion is achieved when the player has a sense of timelessness (El-Masri & Tarhini, 2015). For a participant to achieve immersion, the activity must have clear goals, immediate feedback of performance and finally, the participant must have the skills to take on the challenges (El-Masri & Tarhini, 2015; Rodriguez & Meseguer-Artola, 2017). There is a real importance in challenging ability to complete a task. From a cognitive perspective as it relates to flow, challenge is an important aspect for learners entering flow because the challenge engages their sensibilities (Rodriguez & Meseguer-Artola, 2017). Especially, for online learning, the creation of challenge gives a sense of control which focuses the learning experience (Rodriguez & Meseguer-Artola, 2017). Different from conventional psychological theory, flow

theory looks at actions or tasks, which create enjoyment and motivation because of the enjoyment of the activity (Art, 2017).

Individuals who enter flow are participating in their chosen activity not for some treat or reward, but because they truly like what they are doing (Art, 2017). In a classroom or other learning context, the initial motivation for learning may be extrinsic. The extrinsic motivation is the given assignment, or enrolling in the course (Rodriguez & Meseguer-Artola, 2017). This extrinsic motivator becomes intrinsic, when the learner is engaged in the learning process, which brings pleasure to the learner (Rodriguez & Meseguer-Artola, 2017). The learner enters flow because of being involved in, and present in learning. Since the activity is something truly enjoyable, the challenge of advancing in skill creates motivation, and in turn further enjoyment (Art, 2017; Rodriguez & Meseguer-Artola, 2017). As long as skills can advance, motivation to pursue task completion continues to grow (Art, 2017). Flow theory is based, according to Csikszentmihalyi, on intrinsic motivation (Art, 2017).

Online games for entertainment have a constant, progressive difficulty as the ability of the player increases. This collective progression keeps the player engaged because they are constantly given feedback and opportunity to increase their skill (Hamari et al., 2016). The level of challenge is a key component to flow theory, as the challenge must be balanced to the participant's ability (Hamari et al., 2016). If the challenge is below the skill level of the players, they will become bored. If the challenge is above the players ability, the player will be apathetic to the challenge because it is out of reach (El-Masri & Tarhini, 2015). Apathy is caused by a high level of anxiety experienced due to lack of ability (El-Masri & Tarhini, 2015). Skill in flow theory is important and related to competence in self-determination theory (Legault, 2017). Both

theories agree that for a learner to remain engaged and enjoy the process, they must perceive themselves as having the skill to complete the task. Immediate and constant feedback in the gaming environment increases the players' knowledge of how to play the game, and what areas they need to improve to rank up (El-Masri & Tarhini, 2015). In a learning environment, clear feedback, which does not interrupt the learning, gives the learners precise feedback on what they are currently working (Duncan & West, 2018). The more feedback is positive, the more the learner remains in flow, and motivated to continue (Duncan & West, 2018).

The difference in games for entertainment and educational games, is the primary objective is learning. However, if a game is designed for education with flow theory as its guide, the player or learner will enjoy the game because they have been put in a situation where they are working, learning and enjoying (Hamari et al., 2016). The combination of learning while enjoying, increases engagement, which in turn increases learning and the building of skills and knowledge (Hamari et al., 2016).

Immersion and arousal. Immersion is a game element, which is designed for games. However, for educational purposes, complete immersion does not allow for students to learn (El-Masri & Tarhini, 2015). Immersion is skill based, and as the player is better skilled and the challenges increase, they automatically react in the game environment (Hamari et al., 2016). This immersive experience is absent of active awareness (El-Masri & Tarhini, 2015). According to El-Masri and Tarhini (2015), when there is an absence of awareness, learning does not take place. However, Hamari et al. (2016), found that immersion does not influence learning, but challenges do.

Arousal incrementally increases as the player's or learner's abilities increase. Arousal theory in games for education argues to keep the challenge just above the ability level of the player, so the individual constantly has something for which to strive. (El-Masri & Tarhini, 2015). Keeping the challenge out in front of the player is a carrot they will continually reach for, to achieve the goal.

Growth principle. Flow theory and self-determination theory both postulate the importance of maintaining the challenge of an activity, to keep the participant engaged in reaching a goal (El-Masri & Tarhini, 2015) (Art, 2017). Learners who are engaged in challenging activities, who enter flow and find enjoyment in the engagement are examples of the growth principle (Rodriguez & Meseguer-Artola, 2017). As part of the human experience, growth is important and meaningful (Rodriguez & Meseguer-Artola, 2017). When entering into flow, learners grow, which continues the desire to develop, improve and learn (Rodriguez & Meseguer-Artola, 2017). As it relates to gamification, if a learning environment can be created which offers a balance between ability and challenge, learning will have an element of enjoyment, which in theory, will motivate students to learn (Hamari et al., 2016).

Motivation: self-efficacy theory. Self-efficacy, as described by Albert Bandura, is the perception of the individual's ability to accomplish or do something (Tandon, 2017). When individuals with a high level of self-efficacy see a challenge, they are the individuals who accept the challenge and find ways to overcome them (Ross et al., 2016). High self-efficacy motivates individuals to accept challenges and find ways of accomplishing the task at hand (Tandon, 2017). People with high self-efficacy see themselves as capable and able to take on difficult tasks, and the taking on of difficult tasks creates motivation and a deep focus (Tandon, 2017). If these

individuals fail, or fall short of their goal, they are prone to figuring out how to overcome and can become more focused (Tandon, 2017). More than ability, self-efficacy is the personal belief in one's being able to do something (Ross et al., 2016). This is significant because whether an individual possess the skills to accomplish a task, self-efficacy is the belief you can learn and acquire those skills (Ross et al., 2016). Additionally, Ross et al. (2016) indicated Bandura's research shows, the belief in your ability to learn and be able to accomplish something, is a stronger indicator of competency, then having capabilities. Self-efficacy, gives individuals the idea and sense of what can be accomplished, no matter the level of perception or where an individual is in their current state (Ross et al., 2016). More than ability or experience in doing a thing, the belief in doing something is a better indication of potential.

Bandura's Social Cognitive Theory asserts individual beliefs, or those things which give control over one's life, indicate control (Schunk & DiBenedetto, 2016). If an individual believes they are not passive receivers of what others believe about them, they will be able to take control and do those things which will lead them to where they desire (Schunk & DiBenedetto, 2016). At the core of Social Cognitive Theory is self-efficacy and the ability of the individual to control and do what is necessary to achieve (Schunk & DiBenedetto, 2016). Like self-determination theory's autonomy, self-efficacy requires the individual take control of their situation. In the context of education, the learner then, must take control or be in an autonomous situation to increase their motivation. In an educational setting, the instructor can play a significant role in the development of self-efficacy in students (Schunk & DiBenedetto, 2016). Social-Cognitive Theory argues, the social environment guides and motivates what the individual believes about themselves (Schunk & DiBenedetto, 2016). In the classroom, the teacher can change the way

individuals think about themselves, which in turn increase self-regulatory skills and increases motivation (Schunk & DiBenedetto, 2016). This power then can control the factors which make up the human condition: personal, behavioral, environmental; which contribute to increased motivation (Schunk & DiBenedetto, 2016). In gamification, the goal is to create a framework, where students are in control, are given the tools to complete tasks, and a system of rewards as examples of accomplishments (Tang & Kay, 2014). Moreover, in the context of self-efficacy, the instructor is a social model for what students are capable of doing (Schunk & DiBenedetto, 2016). In this way, the teacher is no longer the holder of all information, but works with students to gain knowledge and skills.

Self-efficacy and learning. High levels of self-efficacy motivate individuals to do the requisite activities and pursuits to be able to accomplish tasks, even if they are unable to accomplish the task in their present condition (Ross et al., 2016). In the context of lifelong learning, individuals with high levels of self-efficacy develop a method of motivation, which can be applied throughout their learning lives (Ross et al., 2016). Individuals who feel they can do something, no matter what their current ability or knowledge, have formulated a plan to learn whatever is required of them. Thus, they have developed a way of self-motivation (Ross et al., 2016). To explain, learners who exhibit characteristics of self-efficacy make the choices necessary and conducive for their learning. In a self-efficacy model, those aspects which an individual can use to change their thinking, can also be influencers (Schunk & DiBenedetto, 2016). A teacher who sets goals, uses a variety of learning and teaching strategies, monitors comprehension through feedback and creates a learning environment is teaching students not just subject matter, but also how to be an efficacious human being (Schunk & DiBenedetto, 2016).

Self-efficacy and social relatedness. In education, different concepts or strategies are used to teach and create in the learner a sense of what they can accomplish. These same tools should have duality of instructing material and self-sufficiency (Schunk & DiBenedetto, 2016). The classroom is a social construct and as such, is an optimal place for students to begin gauging their ability in comparison to others. When students see their peers achieving, they are informed of their own ability to achieve in the same way (Schunk & DiBenedetto, 2016). Social relatedness is an important concept in self-efficacy and social cognitive theory. However, this concept can happen in reverse, giving students a sense of what they cannot accomplish (Schunk & DiBenedetto, 2016). It is important for teachers to create a learning environment, which is paced properly to motivate and not negate ability (Schunk & DiBenedetto, 2016). An efficacious learning environment is one where students are given a clear path to learning, so everyone knows they are capable (Dichev et al., 2015). Classroom teachers can support student self-efficacy, by modeling and putting students in achievable scenarios. Additionally, teachers need to scaffold, and differentiate learning, so students are in a balance of what they know, and what they need to know and to be able to accomplish a task (Dichev et al., 2015). Gamification is complex and has the potential to effect both intrinsic and extrinsic motivators (Chia & Hung, 2017). As this is the case, gamification is more than simply the implantation of game elements, but a reconstruction of learning and motivating (Chia & Hung, 2017)

According to gamification principles, teachers can manipulate the learning environment to give students the ability to connect to each other and accomplish tasks incrementally, giving them a sense of their own ability (Hamari et al., 2016). Motivational theories are the foundation of gamification, and currently, the technology exists to make this process more accessible. The

question remains, what are the elements within the construct of gamification which motivate? Moreover, there is the question of whether student engagement and motivation increase student achievement? There are studies which indicate gamification is motivating for engagement and participation, however does not increase grades (Chia & Hung, 2017). If gamification is truly effective, it must both engage students in learning and increase student achievement.

Gamification elements. Researchers are beginning to study how these individual elements contribute to student motivation (Hakulinen et al., 2015). For this research, the question of motivation is studied from the perspective of gamification, and its foundational elements. The importance of finding a variety of methods to motivate is in part due to the many distractions and lack of motivation faced in the classroom on a daily basis (Dichev & Dicheva, 2017). Gamification elements are varied, so there is a need for research to provide their individual effectiveness to motivate as well as the combinations of elements to motivate most effectively (Hamari, 2017; Sailer et al., 2017). Current research on gamification lacks the separation of elements to determine which are most effective (Faiella & Ricciardi, 2015). To illustrate the varied and different elements of gamification, literature reviews indicate there is no systematic, or regular categories for gamified elements (Cheong et al., 2014; Dicheva et al., 2015). Leaderboards, medals, points, and avatars are examples of a gamification environment. However, little research has been done specific to individual game elements (Hakulinen et al., 2015). To answer these questions each element should be studied individually and then collectively to discover the best methodology for their use (Sailer et al., 2017). Juho Hamari (2017) published a two-year study specifically on badges and their effect on user engagement. The results were mixed (Chia & Hung, 2017). Users were seen to engage more when in

gamified environment using badges. However, combing other factors, badges were found to have no significance (Hamari, 2017). In another study on the use of badges, Lasse Hakulien, Tapio Auvinen, and Ari Korhonen (2015) found a statistical significance in the use of badges regarding the amount of time spent engaged on activities. These two studies illustrate the need for specific research. While both studied the effects of users, the participant groups varied. Hakulien, Auvinen, and Korhonen (2017) studied university students in a specific online course, and Hamari's participants from the general population of users of an online platform. Furthermore, each element, as a result of careful research, must be systematically categorized for consistency of the discipline (Dicheva et al., 2015). An understanding of game elements, and their effects on learning and learners is needed, so practitioners can have valid information on the formation of effective lesson design (Morschheuser et al., 2017; Nacke & Deterding, 2017). At this point in gamification, elements of designs and mechanisms are known and discussed, but best practices in how to create lessons which motivate are not known (Morschheuser et al., 2017; Nacke & Deterding, 2017). There are a limited number of studies on specific game elements and designs, in specific contexts (Dicheva et al., 2015; Hamari, 2017).

Learning enjoyment. While many parents and educators find cell phones and game consoles a distraction to students, they may also have the answer to the question of motivating students and encouraging them to enjoy learning (Dichev et al., 2015). Enjoyment does not mean entertaining, but in the context of gamification, enjoyment denotes a created environment (Hamari et al., 2016). This environment has motivational elements which make the taking on of tasks meaningful, because challenges are a natural human desire (Hamari et al., 2016). Games provide an environment where players are given constant feedback, along with short term and

long-term goals and objectives in the process of completing a given set of circumstances. Gamification is the inclusion of game-like experiences into the learning process (Dichev et al., 2015). In the game world, the player is participating purely for the enjoyment of playing and not to learn. Flow theory argues enjoyment is a component to staying engaged (Duncan & West, 2018). In this context, when discussing fun and enjoyment, it is not a reference to entertainment. It is, however, a reference to a state of mind in which the learner is motivated because the learning experience is enjoyable (Hamari et al., 2016). In creating a gamified environment, designers attempt to create the feeling of a game, by using similar game dynamics and mechanisms (Dichev et al., 2015). By using game mechanisms such as the accumulation of points, customization, and position on a leaderboard, educational game designs create a game-like situation where students can level up and compete with their peers (Dichev et al., 2015).

Points, leaderboards, and medals. The game mechanisms of points, leaderboards, and medals are the most discussed of gamified environments, and with the use of technology, game mechanisms are almost endless (Nacke & Deterding, 2017). While these are the most commonly discussed game mechanisms, there has not been any consistent research methods or research itself to find which elements possess the most powerful motivating factors (Hakulinen et al., 2015). Hung argued, it is too simplistic to think the accumulation of points and medals will establish long-term learning motivation (Chia & Hung, 2017). He suggested because students need a more in depth reason to stay motivated then points and medals will eventually lose their importance (Chia & Hung, 2017; Hakulinen et al., 2015).

Game-like environment. Gamification is much more than keeping track of student progress. Gamification attempts to create a learning environment, where the entire process of learning is

game-like (Hasan, 2018). This game-like environment influences all aspects of the learning experience. To create a feeling of autonomy, all aspects of the classroom need to be gamified, giving students choices, and opportunities. In a true sense, gamification is the ultimate differentiation of student learning (Wiggins, 2016). Leveling up, unlimited restarts, and unlimited lives in the classroom affect the accumulation of points, attendance, final grades, pacing, and the relationship between students (Chia & Hung, 2017). Furthermore, with gamification being a buzz word, there is created a sense of one size fitting all (Hakulinen et al., 2015). However, in a gamified environment, each student has the opportunity to progress at their own pace to reach the final objective (Wiggins, 2016). This individual progress is predicated by gender, personality, and ability (Chia & Hung, 2017). Moreover, gamification is not just labeling classroom elements differently (Chia & Hung, 2017). It is a redesigning of the look and feel of learning (Hasan, 2018). For gamification to be effective and meaningful, there must be a consensus based on research, which directs educators towards best practices and implementation strategies (Hakulinen et al., 2015).

Game dynamics. Game dynamics are the rules of the game (Dichev et al., 2015; Kim, 2015). In every game, there is a purpose for the process. In the game of Monopoly, there are agreed upon rules; purchasing of property when landing on a property and landing on jail requires rolling doubles to continue play (Brothers, 1997). The dynamics of a game give players the parameters within which they play. The rules give guidance about how to play the game, and how to accomplish a task to receive something (Kim, 2015). Gamification takes these elements and applies them to learning. Bradley Wiggins (2016) points out gamification intends to incentivize learning by adding game elements, not creating a game. The intent of gamification,

according to Aaron Chia and Yuan Hung, "is to harness these mechanics to encourage and reward behaviors that support learning and foster productive social interactions" (Chia & Hung, 2017, p. 58). Most of the time when discussing gamification, technology is the central component. However, it is important to note gamification is not creating an educational version of Call of Duty or World of Warcraft, but implementing the similar mechanics and dynamics of gaming (Dichev et al., 2015). Technology can enhance the creation of a game-like environment, making it easier for students and teachers to access. However, gamification is not solely about technology. Simply adding a technology is too simplistic to call it gamification (Chia & Hung, 2017). The dynamics of games are what moves the game along. In education, game dynamics can move learning. Students are given recognition for the demonstration of learning. There are many game dynamics; immediate feedback, leveling up, points, leaderboards, medals, unlimited lives, restarts, and quests are some (Dichev et al., 2015). These dynamics give constant feedback of progress, opportunities to succeed after failing, clear objectives, and opportunities to generate points necessary to customize your gaming experience (Dichev et al., 2015). As stated earlier, gamification is not the creation of games to teach specific subjects. Serious games, are those games which teach specific material (Sailer et al., 2017). The core of gamification is taking the elements of games, the essence of what holds the attention of gamers, and applies those principles to learning (McGrath, 2017). What gamifying learning is attempting to do is mimic the dynamics of games in learning environments to motivate (Hasan, 2018). The time spent engaging in the video game environment points to the power of the game-like environment (Faiella & Ricciardi, 2015). In fact, gamers are motivated to dedicate large parts of their lives in pursuit of accomplishments. Gamers continue to be motivated even though the points, medals,

and list of accomplishments mean nothing outside of the gaming environment. The essence of gamification is not the game, but the created environment, which engages learning. Gamification is a system by which students follow rules to achieve objectives based on the creation of a system (Huotari & Hamari, 2016).

Learning environment of gamification. The process of gamifying learning is the incentivizing and making it personal and meaningful (McGrath, 2017). Jason Goldsmith in his presentation to the Gen Con Trade Day, spoke about wanting to create a system where students in his English course feel they are earning and receiving points, as opposed to losing points for incorrect responses (McGarth, 2017). This describes a gamified learning environment where students are earning points and earning grades, in combination with having choices in the ways they earn points towards their final grade. Students are able to choose how to fulfill the course requirements by choosing the type of assignments to show mastery (McGarth, 2017). It is the creation of a learning environment with a set of rules, and a system for guiding students in the process (Sailer et al., 2017). In a gamified learning environment, students are given rules to follow, by which they receive rewards and recognition. Those rewards and recognition scaffold student learning, giving them bits and pieces of information to fill in the learning experience (Dichev et al., 2015). The reason for this incorporation is to answer the question about motivating students to learn and give a sense of joy in learning (Dichev et al., 2015). The big picture of learning in a classroom setting, is to learn a given set of standards. Pulling game elements into the classroom means, learning the big picture standards, by way of learning a series of small, scaffolded objectives, which build upon each other (Dichev et al., 2015).

It is unnecessary to have a game to be gamified, but to teach in a game-like environment (Hasan, 2018). Gamification claims to have the ability of modifying the learning environment by implementing game dynamics and mechanisms into learning (Dichev et al., 2015). There are a variety of platforms which teachers can access to give students the opportunities to see their achievements on leaderboards, collect medals, and connect with their peers (Lynch, 2017). These platforms are web based and can be accessed by any device connected to the internet. Teachers can use these tools for taking notes, giving quizzes, tests, and making presentations. These applications are tools, they are not themselves games or the definition of a gamified classroom. Gamification tools collect data, give feedback, and award points and medals according to what instructors create. Incorporating these game dynamics and mechanics, creates a learning environment where students are active, autonomous participants in their learning (Boyun, 2015). While gamification is a new concept in learning, many of the elements are not entirely new (Dichev et al., 2015). Both gamification and traditional learning provide the opportunity to earn points and badges. Traditional learning has actual points; grades from tests, quizzes, and assignments. Leveling up occurs when students move on to the next level of learning from grade to grade, with the ultimate medal a diploma or degree. The problem in a traditional learning environment, is it takes long periods of time to feel the gratification of receiving points or medals. Feedback is an important pedagogical strategy; however in a traditional learning environment, feedback is not immediate (Dichev et al., 2015). In a gamified learning environment, students do not have wait to receive points, but can be awarded them as soon as they are earned. Moreover, retesting is a learning strategy. However, in a gamified learning environment if a student fails, they can immediately put into practice what they have

learned and attempt the activity again without waiting. Leveling up is not something that only happens over the course of a year or four years, but in smaller objectives along the way (Dichev et al., 2015). These elements give students control and autonomy in their learning, along with real-time information about their progress. In the 21st century, students at all levels are familiar with this environment, and when done properly, the learning environment can have these same elements, eliciting the same sense of accomplishment and joy (Dichev et al., 2015). As gamification evolves from concept to application, each of these game elements discussed must be researched individually, to discover which element is successful in which situation (Dichev & Dicheva, 2017). There is a need to be more specific, so practitioners can apply research-based strategies with applicable pedagogy (Dichev & Dicheva, 2017). Furthermore, research is needed to look into the differences in gamification and different demographic groups (Dichev & Dicheva, 2017). "Broadly, studies comparing gamification to no gamification without carefully isolating elements or meaningful element clusters are of limited theoretical value and should not be conducted" (Landers, Auer, Collmus, & Armstrong, 2018, p. 16).

Gamification design and framework. There has been a proliferation of discussions on gamification and its perspectives in recent years. Gamification in the business sector has grown with the emergence of loyalty programs, purchasing with points and status relating to what and how often individuals make purchases (Autry, 2017). Additionally, in education the discussion of gamification in the classroom is a hot topic, with online platforms for teachers and students, which also promote the issuing of points, medals, and badges (Chia & Hung, 2017). However, in the academic discussion of gamification, there is a considerable need to both define what gamification is, and how it is best designed for specific purposes (Seaborn & Fels, 2015). At its

base, a significant argument about gamification is whether game design increases or decreases motivation. Researchers argue, because of the emphasis on points and leaderboards, gamification has been reduced to 'pointsification', disregarding the essence of creating a game-like environment (Cheong et al., 2014; Seaborn & Fels, 2015). 'Pointsification' refers to simply gathering points and calling them games, without the benefit of real game design. Seaborn pointed out Margret Robinson, a game designer, argued points and leaderboards are the least important aspects of games and game design is most important (Seaborn & Fels, 2015). However the least important aspects gamification is most discussed (Seaborn & Fels, 2015). As it relates to game design, simply giving points and putting an ordered list of point recipients from most to least does not capture what games are designed to illicit. Sebastian Deterding (2014), recently weighed in on the need for gamification to transform and focus on its ability to create a feeling. The current viewpoint of game design, according to Deterding, is to add elements and say they are designs. What Deterding suggested, is for a game design, which does not seek to answer all the questions the same for participants, but to create a game environment which allows for the participants to have experiences. To illustrate, Deterding suggested calling something a game design, which is simply the addition of a new element, is not game design for gamification. Just adding a way to collect points, or as he argues, adding a 'deadly trap' does not make an activity gamified (Nacke & Deterding, 2017). Deterding is saying gamification needs a methodology of creation, and not more elements. Elements are necessary, however they alone do not define gamification (Deterding, 2014). The limitation of game design in gamification has been traditional game design attempts to cause something to happen. In gamification, the design is intended to create an environment, where there are multiple possibilities for the user

(Deterding, 2014). A design lens can see the big picture, while the game design, can only see the patterns (Deterding, 2014). For gamification to be effective, both design and the creation of a learning environment must be taken into consideration (Kim, 2015). To prevent gamification for simply being a way to relabel instructional design, game design elements must be understood (Kim, 2015). The complete picture of designing games is beyond the scope of this research, but it is important to note. MDA, or mechanics, dynamics and aesthetics are the foundation of game design (Kim, 2015). All three elements are needed to be understood to adequately create a gamified learning environment (Kim, 2015). To understand how elements create an environment or cause participants to experience, experimental research must be conducted (Landers et al., 2018). Currently, gamification does not have a definitive list of game elements and their likely achievement outcomes. There is a significant need for game elements to categorized, not for the sake of listing elements and design, but for the purpose of establishing which gamified categories create the intended outcome (Landers et al., 2018). In this context, it is important to consider both the direct and indirect causal relationships between game elements (Landers et al., 2018). Gamification has been considered a universal action in education, however different contexts call for different elements if the desired outcomes are to be achieved (Landers et al., 2018). Landers et al. used as an example of the difference in male and female success in different gamified contexts. Research shows male students are more likely to respond to gamified contexts where competition is used, while female students are more motivated by social contexts (Landers et al., 2018). Continuing this example, if researchers do not consider the issue of gender as they look to study elements of gamification, they will have outcomes which are not likely to be replicated. Not to consider the differences in gender, age, grade level, and subject would amount to a guess

(Landers et al., 2018). For gamification to work, researchers must provide specific findings in the context of students and their learning. Gamification is more complex than simply adding game design elements (Deterding, 2014). To this, there is a continuing need to engage in research, which has validity and correlation to the measures being studied (Landers et al., 2018). In many studies, it is not clear which individual elements are being studied in connection with the desired outcomes (Landers et al., 2018). It is important to identify game elements, what they cause and in what combinations they are effective (Landers et al., 2018). Gamification is not a series of elements, put together to just create fun, or implement technology; gamification should be a tool, to solve specific problems and create challenges in the classroom (Dichev et al., 2015). If teachers only add game elements, with no consideration or knowledge to game design principles, all they will have is a list of activities with no direction (Kim, 2015). Hung argued, those game-like elements do not indicate learning is taking place (Chia & Hung, 2017). For example, students who are given the ability to level up, by receiving points for logging into a platform, downloading files, and posting a thought, can do so without reading or learning the intended material. If gamification is to be a real tool for learning, the design must be more than points and leaderboards, and promote real learning (Chia & Hung, 2017). If educators are merely going to use gamification to indicate the number of points accrued and how often a student accesses a learning platform, then Ian Bogus is correct in that gamification is nothing more than pointsification, and an exploitation of game design (Chia & Hung, 2017).

Methods and research. Gamification as a study, is new; the term first coined in 2002 (World, 2015). Serious consideration regarding the possibilities of gamification did not begin in

earnest until 2011 (Hamari et al., 2014). While a new discipline, it is fast growing, which has caught the attention of business and now education.

Research in the area of gamification includes both information about gamification elements, design, and pedagogy (Bozkurt & Durak, 2018). Additionally, there is considerable discussion of motivational aspects of learning, specifically with regard to motivation, self-determination theory, flow theory, and self-efficacy theory arising as the foundational elements discussed in relation to gamification in learning (Bozkurt & Durak, 2018).

Gamification is an evolving study, and as such, there is not agreed upon best research methods (Osatuyi, Ostuyi, & Rosa, 2018). Research methods vary from surveys, quasi-experimental, experimental, case studies, and mixed methods giving definitions for frameworks, technology perspectives, and system designs (Nacke & Deterding, 2017). Bradley Wiggins conducted research using an online survey to determine common and uncommon uses of gamification in higher education (Wiggins, 2016). Mazen El-Masri and Ali Tarhini used a design science approach to explore design principles in the creation of gamified environments (El-Masri & Tarhini, 2015). Yet, another example is Lie Ming and Judy Kay's qualitative case study in determining scaffolding in online learning to use the mechanics, dynamics, and aesthetics model (MDA) (Tang & Kay, 2014).

Research design also varies. Bozkurk and Durak found in their 2018 literature study that the majority of gamification research came in the form of literature reviews (23.7%), experimental studies made up 11.5%, correlational studies 10.6%, survey studies 9.6%, and the least used design method was case studies at 8.7% (Bozkurt & Durak, 2018). They also noted there is an increase in experimental and correlational designs (Bozkurt & Durak, 2018).

Gamification is a new and upcoming discipline, and as such, there is a need for a more diverse method of research to gather empirical data (Bozkurt & Durak, 2018).

In general, there are areas which are lacking in the research. The number of participants and length of studies have been called to question when studying gamification (Hamari, 2017). There is a need for longer studies, using more participants to truly have generalized, applicable results (Hamari, 2017). Moreover, the majority of gamification research (43%) of published articles have been conducted using university students as participants (Bozkurt & Durak, 2018). This high percentage of research in higher education leaves much work to be done in elementary and secondary settings. While there is an increase in research in gamification, there continues to be differences in definitions and applications of gamification elements showing a need for a more universal definition (Bozkurt & Durak, 2018). The progression of gamification research, is towards an, "institutionalizing as a cross-disciplinary field in the form of dedicated professorships, educational programs, collected volumes, and academic conferences" (Nacke & Deterding, 2017, p. 452). In other words, gamification is a growing body of research and methods in the building of a true discipline of study.

Summary

Gamification has become an increasingly interesting and researched discipline in education and learning. Additionally, it has been shown to hold within its concepts, complex foundations of both psychology and learning. The available research has given way for a variety of avenues to be studied and discussed. Technology has aided in the growth and development of platforms, however there is much more involved. Educators and scholars must consider the psychology of motivation in combination with solid foundations of game designs and elements

to truly achieve the potential of gamification. Moreover, the research methods in gamification must begin to focus on specific elements and best research methods to more clearly come to consensus of best practices in research application. While gamification is not in and of itself a game, it is attempting to bring to the classroom, the feel of games, and as such, it is important for researchers to understand what games are from a design perspective. Additionally, for gamification to be relevant, it must look at specific game elements in comparison with specific demographic groups, so there are more clear methods for educators to implement gamification with effectiveness. Finally, educators must understand the implementations of gamification is a complete pedagogical process. This process changes educators' current understanding of the creating a learning environment, giving up more control and allowing for more student autonomy in how information is accessed, and how mastery is shown. This literature review illustrates the need for more research and understanding in implementing gamification both in the classroom, and as new software is evaluated.

Chapter 3: Research Method

Introduction

There is a need for research of gamification in secondary education as it is a much used, but little researched area in that context (Dichev & Dicheva, 2017). High school teachers are utilizing a variety of gamification elements, with no direct research to guide them regarding the best elements for their discipline. The appeal of gamification in learning is satisfying because students utilize technology, and the elements of gaming in their daily lives via cell phones (Pearson, 2015). Eighty-two percent of high school students use a cell phone on a regular basis (Pearson, 2015). Facebook, Instagram, Twitter, and Snapchat are several examples of platforms popular in the lives of secondary students. In each platform there are elements of gaming, which have become a part of their living experience. These platforms allow students to tell their story using words, photos, and graphics. All these platforms give students feedback, if not immediately, almost immediately as there is a social aspect to each platform in addition to the system's feedback. Students post stories, pictures, and comments and are then greeted by others on the social network, or by the system itself, giving information about the number of likes, follows or reposts. These aspects of social networking sites give insight into the world high schools students are most comfortable (Yonker, Zan, Scirica, Jethwani, & Kinane, 2015). It is notable as well, to include the ubiquitous use of cell phones, which most high students are in possession (Anderson & Jian, 2018). The Pew Research center in 2015, reported 24% of teens are online almost constantly and 92% report they go online daily (Lenhart, 2015). Furthermore, 71% of teens used more than one social media site to connect (Lenhart, 2015). In 2018, Pew Research reported 95% of teens have a cell phone and, nearly half, 45%, indicate they are almost

always online (Anderson & Jian, 2018). The most easily accessed technology for gamification is the cell phone. Secondary teachers fight the use of cell phones in the classroom instead of embracing the possible motivating elements of its use (Press, 2018). Professional development often focuses on the importance of engaging students as an opportunity to increase student achievement, yet the use of cell phones is often discouraged or penalized. In a world more technologically driven, this attitude misses the point of education's prime directive to teach all students with the best available strategies and resources.

This research attempted to look specifically at comparing secondary student achievement and progress, in courses not implementing gamification, with courses using gamification. Much of the research conducted around gamification has post-secondary students as participants, with little research conducted with secondary students (Hamari, 2017). As this is a participant group underrepresented in studies, contributing to the body of research and knowledge will continue to grow and develop the base of knowledge around gamification, their elements and design principles. Gamification is a growing discipline progressing towards a professional standard. The next step in the evolution is the creation of standard templates for evaluating elements and design (Nacke & Deterding, 2017). The researcher chose a quantitative causal-comparative design. Causal-comparative research designs are common in educational research because it raises less ethical concerns (Maheshari, 2018). Working only with data in an ex post facto manner, negated the requirement for each participant to provide parental permission. In this research, participants where all minors, however no participant was contacted. Data from classes, provided by the school in the study, were the only method used to gather participant information by the researcher. A qualitative method to conduct this research of 99 participants,

would have made the process of acquiring the required permission prohibitive, and was beyond the capability of this study to facilitate. Furthermore, with the number of participants, a qualitative design would have been time prohibitive. Additionally, the researcher in this study was interested to providing a foundation of understanding on the topic and direction of research in gamification. The quantitative results provided a clear direction for further researchers.

Research Designs

There are a variety of designs from which researchers can choose. There are both quantitative, and qualitative approaches. It is important to understand options when conducting research, to determine the best course of study. The following describes options in research design.

Quantitative Research

Quantitative research methods allow for comparison of two student groups after they have both completed their courses. By using statistical analysis, both research questions were examined, drawing from archival data systems to see if there were significant differences in student outcomes. Qualitative research for determining the same information would be impractical and would limit to what degree the researcher could generalize findings. Responses to interview questions and observations would not have yielded specific and straight forward information with the potential number of students this program affects. It would be impractical to interview and observe every student in this setting, and impossible to contact and interview all the required students who have gone through the program in the past. A quantitative approach allowed the data to be interpreted directly to determine if the there were differences which support either the alternative hypothesis or null hypothesis of the study. The research questions

were specific to key points in an educational setting: Time to completion of a course and final grades as a percentage. The research questions in this study sought to see data as percentages and elapsed times. Time and percentage are precise measurements, and as such require a quantitative approach (Hammarberg, Kirkman, & Lacey, 2016). If the purpose of this research where to discover the attitudes, and understanding of gamification, a qualitative approach would have been appropriate (Hammarberg et al., 2016). Additionally, the desire of the researcher was to have more generalizable data, and gathering quantitative data is more in alignment with this desire (Rahman, 2017). As the data analysis of this research used data which are percentages and elapsed time, the more appropriate research method is a quantitative approach. Specifically, as it relates to gamification research, quantitative research is in alignment with the majority of gamification research (Koivisto & Hamari, 2019). This may be due to the newness of gamification and as such, many research studies use descriptive approaches (Koivisto & Hamari, 2019)

Experimental research. Utilizing randomization, experimental research can manipulate the independent variable. In experimental research the researcher can determine who and what is included and excluded from the influence of the independent variable (Mills & Gay, 2016). Manipulation and control gives the researcher the ability to "select the treatments and decides which group will get which treatment" (Mills & Gay, 2016, p. 252). Experimental research compares two groups, one being the control group, to see cause and effect of the independent variable. Random sampling is used, which includes precise guidelines as to who or what is included (Mills & Gay, 2016). This process ensures homogeneity of participants to retrieve cause and effect data. The researcher, based on the data, can then determine what is the effect of

the independent variable. Since the researcher has complete control over which participants are exposed to the independent variable and who meets the qualification for inclusion in the study, the outcome is reliably determined. Experimental design uses a method of randomizing to create groups for comparison.

Quasi-experimental research. In a quasi-experimental study there may not be an opportunity to truly randomize the study (Mills & Gay, 2016). Quasi-experimental research compares already existing like groups (Mills & Gay, 2016). Its intent is to find causes or reasons for differences between groups (Mills & Gay, 2016). The researcher controls which group receives the treatment and which does not (Mills & Gay, 2016). The most notable difference between experimental research and quasi-experimental research is the randomization process (Mills & Gay, 2016). When it is unethical to split up an already existing group such as classrooms which are already created, quasi-experimental design, compares classrooms already in existence and which are alike (Mills & Gay, 2016).

Correlational research. Correlational research design determines the correlations, not the cause, of the independent variable (Mills & Gay, 2016). In correlational research design, two or more variables are used to examine the relationship of the independent variable and the group (Mills & Gay, 2016). Correlational research "involves collecting data to determine whether, and to what degree, a relationship exists between two or more quantifiable variables" (Mills & Gay, 2016, p. 216). Data are gathered, and correlation is determined by use of a correlational coefficient. While there is no cause and effect, correlational studies are used to predict outcomes based on quantifiable data (Mills & Gay, 2016). For example, a study may determine more studying correlates with higher grade point averages. It cannot be determined that studying

caused high grade point averages, because it does not take in to account the intelligence of students studied or the condition in which they studied. Intelligence and conditions are uncontrolled variables. What can be determined is if there is a relationship between time studied, to grade point averages, and then the researcher can make a prediction based on the relationships (Mills & Gay, 2016). If after analyzing data, it is found that the more hours students study, the higher the grade point average, and with fewer hours of study grade point averages go down, the researcher can predict with more hours of study students will achieve higher than with fewer hours of study.

Causal-comparative. Causal-Comparative research design compares two groups one exposed to the independent variable, and the other not exposed to it. (Mills & Gay, 2016). As in correlation research design, the researcher does not manipulate the independent variable, but compares the causal relationship between the groups and the independent variable. This process "attempts to determine the cause, or reason, for existing differences in the behavior or status of groups or individuals" (Mills & Gay, 2016, p. 241). However, in causal-comparative research, there is no randomization, so real cause and effect is difficult to quantify (Mills & Gay, 2016). Causal-comparative research uses already established and natural forming groups for research purposes (Mills & Gay, 2016). Within these groups, an independent variable is introduced, and comparisons made. Since there is no control over dependent variables such as intelligence, gender, teaching styles etc., there is not the opportunity to find a cause and effect of the introduction of the independent variable. However, what can be determined is if there are significant differences with the introduction of the independent variable compared to groups without the introduction of the variable. Causal-comparative research has also been called ex

post facto or after the fact research (Mills & Gay, 2016). Data are referred to after the fact to compare groups of dependent variables with no exposure to the independent variable being tested, with groups exposed to the independent variable being tested.

Qualitative Design

Qualitative research is research gathered firsthand. Interviews, observations and surveys are examples of how research is conducted in a qualitative study. The researcher does not relay on statistics, but the setting and context of participants (Mills & Gay, 2016). In gathering data via interviews and observations, the researcher must keep detailed descriptive accounts. The process of documenting the context creates the ability to validate the research study (Mills & Gay, 2016). There are a variety of methods to gathering data in a qualitative study, interviews and observations are just two examples. In describing those methods collectively, the researcher in a qualitative study has direct interaction with participants in obtaining data. Because of the wide variety of methods, a strict definition of qualitative research is difficult. Md Shidur Rhman notes, "we mean any type of research that produces findings not arrived at by statistical procedures or other means of quantification." (Rahman, 2017, p. 103). Qualitative research can either be a participant or nonparticipant. A participant becomes a part of the context, whereas the nonparticipant is an observer, and not involved directly with participants. Participant researchers have a role in the activity being researched (Mills & Gay, 2016). A nonparticipant researcher strictly observes and does not interact with participants. Whether the researcher in qualitative research studies are participant or nonparticipant, qualitative research is concerned with gathering data firsthand, noting the context, attitudes and feelings of the situation being observed (Mills & Gay, 2016). The researcher through interviews, surveys, or observations, will

analyze responses, reoccurring themes and/or emotional expressions to determine important emerging information (Mills & Gay, 2016). The difference between quantitative and qualitative research lies in the focus of the study. Different from quantitative research, qualitative research is not as concerned with generalizability. Its concern is primarily to answer the questions what is happening currently, and why these occurrences are happening (Mills & Gay, 2016). An advantage of qualitative research, is the ability to catalog the attitudes and feelings of participants (Rahman, 2017). Instead of relying exclusive on the number of times something occurs strictly from a statistical perspective, qualitative research attempts to understand why a particular feeling or attitude is persistent (Rahman, 2017). Qualitative research can be conducted with the following designs:

Interviewing. Interviewing entails having a conversation one on one. The interviewer creates questions, whose answers provides needed information (Mills & Gay, 2016). Through the process of interviewing a number of participants, the researcher discovers emerging themes. Those reoccurring themes formulate the basis for analysis.

Focus groups. Focus groups can be used when the researcher wants to obtain information about a shared experience. The researcher interviews the groups, records their attitudes, understanding and ideas about the topic (Mills & Gay, 2016) By discovering the opinions and experience of those involved in the focus groups, the researcher is able to identify common expressions. These expressions form the basis for analysis of the research question.

Email interviews. Email interviews are a new approach, which provides convenience. The researcher emails participants, they can respond at their leisure, in as much detail as they

have time to provide (Mills & Gay, 2016). Emailing provides flexibility and is appropriate in this age of technology. The drawback is no personal interaction, subtleties can be missed.

Questionnaires. Questionnaires are useful if the researcher cannot make the necessary arrangements to meet interviewees in person. Questionnaires are self-reporting tools, which the researcher then consolidates to from and an understanding of the topic (Mills & Gay, 2016). The use of questionnaires is useful, because the researcher can contact a variety of participants without the need to travel. Participants from different geographic locations can respond. The researcher can then combine responses, to guide data analysis.

Examining records. Researchers can examine a variety of archival records. Journals, video, audio, business minutes, maps and other artifacts are often kept by organizations and can give a history and context for the organization (Mills & Gay, 2016). The qualitative researcher must identify ongoing themes, attitudes and observational notes and categorize them.

Causal-comparative research was chosen for this study to compare classes using gamification methods, with classes not using gamification. The study attempted to discover if there were significant differences in student outcomes when using gamification. The data desired from this study was the final grade in the form of a percentage for students completing a course. Students are customarily given a letter grade on a traditional scale. For example, students receive a ‘C’ if their percentage in the course is between 70% and 79%. For this research, the final grade, with the precise percentage end of course score, was used for comparison. So, a ‘C’ with a percentage of 75% is an indication of higher achievement than a grade of ‘C’ with a percentage of 72%. Moreover, this researcher looked to discover if there were any differences in the time of course completion with introducing gamification. Causal-

comparative research methodology gives the opportunity to compare data with both the inclusion and exclusion of gamification to determine if there were any significant differences on these data points. Since the groups were naturally chosen within the context of student need, there was no ethical dilemma negatively effecting students and their potential for achievement. Likewise, no dependent variables were used to filter out any demographic information represented in the student body. The groups for comparison were already determined by students being assigned to an online course because of receiving a 'D' in a course requiring at least a 'C' for college entrance. This practice was and continues to be a standard practice for all students meeting this criterion in this southern California school district. The results from the data provided quantifiable comparisons to determine if there were any differences in outcomes when using gamification.

Research Method

The APEX Learning program has been utilized in this southern California school district for several years and has made a positive impact on A-G rates. A-G references the necessary courses students need to complete with a 'C' or better for eligibility for application to a California university. However, always striving to give students the best opportunities, there are still students who do not complete courses offered in this program. By comparing data from courses utilizing gamification with courses not using gamification, the researcher was able to determine if there were any significant differences in student outcomes in APEX Learning when gamification was introduced. No gamification elements were used in previous years, so the most recent data when students used gamification was used for comparison. APEX Learning is an online learning platform. Students can earn a high school diploma or supplement their high

school learning. The district contracts with APEX Learning, to enable them to offer courses to students who need to validate courses needed for California state universities, after having received a 'D'. California state universities require all students wishing to be eligible for admission earn a minimum GPA and have no less than a grade of 'C' in any admissions required course. Since 2014, the district has been utilizing APEX Learning to give students a second opportunity to qualify for university admissions. Retaking and replacing an acceptable grade is referred to as validating. APEX Learning keeps detailed data on every student who takes a course.

During the fall semester of the 2018-19 school year, at the direction of the principal, teachers setup a ClassDojo account and incorporated the gamified elements into the required class time for validation students. The data gathered during the first semester was compared to data from the preceding year's course, where gamification was not implemented. On the first day of APEX Learning instruction, students were to be given information for logging into ClassDojo, as well as instructions for acquiring the free cell phone application. Students were given points and badges via ClassDojo, for completing those elements the teacher deemed important. The teachers created the assignments of points and badges and encouraged students to check their phone notifications for new awards. APEX Learning does not have a specific completion time, and students work at their own pace. However, students are required to continually work towards course completion by attending the two required sessions each week until they have completed their assigned course.

Research Questions

RQ1. To what extent is there a difference, if any, in the final grade percentage of those who complete a course using gamification and those not using gamification?

$H1_{01}$. There is no significant difference in the final grade percentage of those who complete a course using gamification.

$H1_{a1}$. There is a significant difference in the final grade percentage of those who complete a course using gamification.

RQ2. To what extent is the difference, if any, in the time of course completion using gamification and not using gamification?

$H2_{02}$. There is no significant difference in the time of course completion using gamification.

$H2_{a2}$. There is a significant difference in the time of course completion using gamification.

Research Hypothesis

The research questions for this study asked to what extent if any, does the use of gamification in learning, show differences in student outcomes. Gamification has been defined in many ways, but the 2011 definition of Sebastian Deterding addressed the central elements. Deterding cites himself, from 2011, in defining gamification as the inclusion of game elements in non-gaming situations (Deterding, 2014). Gamification itself is not a game, but its intention is to bring the elements of games into education, expressing the feeling of games (Costa, Aparicio, Aparicio, & Aparicio, 2018). "Gamification in education refers to the introduction of game design elements and gameful experiences in the design of learning processes" (Dichev & Dicheva, 2017, p. 2). In learning, gamification is used to create an environment where students experience feelings like those in a game environment. The creation of a game-like environment

can be achieved in a variety of ways. Using technology is one example of how to create a game-like environment (Dichev & Dicheva, 2017). However, gamification is also a method in how to create a learning environment which is fun and exciting for learning (Dichev & Dicheva, 2017). Gamification is not meant to teach but create an environment for teaching and learning. Serious games are games to teach specific material (Landers, Armstrong, & Collmus, 2017). There are games, which have been created to teach. Minecraft for education is an example. Playing Minecraft for education can teach Chemistry, Coding, math, Social Science, and any other discipline (Minecraft Education Edition). However, gamification in education is an attempt to motivate learners by giving them a series of conditions in conjunction with their learning (Huotari & Hamari, 2016). This creates the game-like environment. The purpose of creating conditions is to encourage students to comply with the parameters set up by the instructor (Huotari & Hamari, 2016). There are many conditions or game mechanics utilized in gamification, the most commonly discussed and used conditions are points, leaderboards, levels, challenges, and medals (Jantke et al., 2015).

In this study, ClassDojo was used as the gamification element in a learning environment. ClassDojo is a free online service, which additionally offers a cellular phone application. Currently, ClassDojo is used in 90% of elementary and junior high classrooms in the US and in over 180 countries (ClassDojo, 2018). Moreover, ClassDojo has been translated into 35 different languages (ClassDojo, 2018). ClassDojo estimates, "1 in 3 US kids ages 5-14 have learned about Growth Mindset and Empathy with ClassDojo" (ClassDojo, 2018). Teachers can utilize ClassDojo in conjunction with any element in their classroom. Teachers have the autonomy to assign values for those aspects of their classes they deem important. Points and medals can all

be assigned to students for accomplishing behavioral and academic tasks. The use of ClassDojo is intended to motivate students to accomplish tasks assigned by the teacher. The use of ClassDojo allows the teachers to establish the rules of play, in that students can earn points, and badges for completing what has been assigned. The more a student accomplishes, the more points and badges the student will receive. It is an example of a gamification tool as it combines game-like designs within the context of a traditional classroom setting (da Rocha Seixas, Gomes, & de Melo Filho, 2016; Jantke et al., 2015). Additionally, ClassDojo is a tool, teachers can use to direct the progress they intend for students. By awarding points, connecting students to each other and their parents, teachers create a game-like environment where the rules of the game are to complete assigned tasks and earn points and medals. Those tasks can be any part of the classroom environment. Furthermore, ClassDojo exemplifies the elements of self-determination theory: competence, autonomy, and relatedness (Jeno et al., 2017). Students can create and change avatars, communicate with each other, and are given feedback on what they have accomplished. Using this application enables teachers to communicate with students and parents. Additionally, students and parents can communicate with teachers. Students can set personal goals for achieving medals, collaborate with one another, and see the progress of their achievements in real-time. Since it is also a cellular phone application, students can connect in school, at home, or anywhere via a smartphone, giving them independence to access their information at virtually any time anywhere. The cell phone application, and its capabilities when connected to the internet further illustrates students' ability to work independently and autonomously (da Rocha Seixas et al., 2016). ClassDojo has, within its program, game mechanics of points and medals to create a gamified atmosphere for students and teachers.

Research indicates when gamification elements such as badges are present in the classroom, students are more engaged (da Rocha Seixas et al., 2016). Specifically, da Rocaha Seixas et al. (2016) found the groups within learning environments with more badges, students also had higher scores. The use of ClassDojo in this research, attempted to highlight the impact, which can be created when implemented.

Participants

The data was gathered from students who attend high school in a district in Southern California. Students who were enrolled in the APEX Learning courses were all students who could graduate A-G eligible, meaning they could earn a 'C' or better in all the required courses for California State university admissions. No students in this study were contacted during the implementation of ClassDojo. The data generated from their course work was studied, after courses were completed. Students were not required to take the course but realized if they did not validate a previous 'D', they would automatically make themselves ineligible for California State university admissions. The number of courses each student needed to validate varied, but most did not need more than three courses total. There were a total of 99 participants in this study, 67 who completed their courses not using gamification and 32 students who completed their courses with gamification having been introduced. After running a power analysis using G*Power 3.0.10, to have a power of .897208 the sample size would have to be a total of 134 participants, split evenly. Group 1 would consist of 67 participants and group 2 would consist of 67 participants to have a balanced analysis. However, once the data was received there was an imbalance of participants.

Research Setting

This high school was a Title I school, with approximately 80.3% (1,455) of students qualifying for free or reduced lunch (Education, 2017). Title I is a federal designation which signifies students in the school fit the definition of socioeconomically disadvantaged. Additionally, 38% (689) of the student population is classified as an English learner (Education, 2017). Within this district, their A-G rate is among the highest in the district.

Implementation Protocols

In a traditional classroom, or non-gamification environment, students listen to lectures or direct instruction, and then they are given assignments which support or reinforce the given information. As part of this process, students take quizzes and tests to show mastery. APEX Learning, being an online learning platform, students work independently, and at their own pace. Instead of having a teacher in the classroom providing instruction, APEX Learning utilizes online study guides, text to speech tools and simulations to deliver content to students (Learning, 2018). While APEX Learning is an online learning platform, and instruction is conducted via the online platform, there was a teacher monitoring the progress of students, proctoring tests and quizzes and providing support for students. The teachers were regular teachers at the school, working extra duty hours. Students were required to report to the library/computer lab/classroom twice a week for two hours each. For five years, there has been no gamification elements introduced either by APEX Learning or the school site. In a gamification environment, students earn points which in turn generates badges. The principal of the school instructed teachers to utilize the ClassDojo platform for assigning points and badges to increase student achievement. Teachers customized the number of points necessary to receive a badge, as well as choosing

from preset badge avatars, which correlated to an area of focus. Students received badges and points for completing assignments, quizzes, and tests or any other aspect of the class. Teachers had complete autonomy to implement the use of ClassDojo any way they chose. Points and badges in ClassDojo are not limited to academics but could also be issued for those things which enhance student learning. For example, teachers could give students points and badges for regular attendance, being polite, or sitting quietly at their computer. Using ClassDojo, the teacher can click the appropriate badge for the appropriate activity and award student output. Moreover, students can download the free ClassDojo app from either the App Store or Google Play Store. Having the application allows students to receive notifications of points and badges awarded and messages sent from the teacher in the classroom. Parents can also download the app and receive updates about their students' progress. If students and parents did not have a smartphone, they could access the class the same way via the ClassDojo website, logging in as either parent or student. The dependent variables of this study were final grades and the time it took for students to complete a course. This study looked at differences, if any, in the final grade as a percentage, and the time it took to complete a course in days, using gamification.

The two groups compared were configured with students who all had the same element in common. The dependent variable being they all received a poor grade in a course which requires a 'C' or better to be eligible to apply for California state university. A poor grade was defined as a 'D'. Students were selected by school counselors and encouraged to validate the course or courses they initially earned a 'D'. Students in both groups were enrolled in their needed course for the same reason, and the course served the same purpose. This district initiated a districtwide program to increase the college going culture of the district, and this method is used at all the

seven comprehensive high schools in the district, using the same criterion. Counselors called each student in individually, or in groups, to explain the reason for enrolling in APEX Learning. They were all given forms to take home and had their parents sign, granting permission to stay after school for the designated times. Most students were juniors and seniors in high school, with some sophomores, and were encouraged to attend a four-year California university after high school graduation. The group of students who did not use gamification, took their courses from 2016 to 2018 school years. The seniors have since graduated and are no longer high school students. Students enrolled in the 2018-19 school year, used gamification in the form of ClassDojo. This was the first group of students using gamification for the purposes of completing their assigned course for validation

Data Collection

To collect data in this study, the researcher was given access to APEX learning, where all student information is stored. APEX Learning provides data which included course information regarding the start dates, end dates, final grades, and the percentage of final grades.

After speaking with the district's assistant superintendent, permission was given to use data from the district's validation program. The research project was presented, and the assistant superintendent gave sources for help in gathering data. Additionally, the assistant superintendent signed off on working with a site principal to arrange permission to use data from that school. The researcher met with the principal, explained that data will be compared from the previous year. The site principal gave permission to use the data.

The next step was acquiring direct access to data. Teachers on special assignment (TOSA) work out of the office of 7-12 instruction, and there is a TOSA specifically assigned to

the APEX Learning program. The TOSA has log in permissions for each of the seven comprehensive high schools, and the ability to create logins for those who have been granted authorization. A login was created for the researcher to access data from the high school where data was compared. APEX Learning saves data from each of the schools using their platform and archives them, so schools and districts can note progress of their programs. Teachers can see the progress of their students in real time. APEX Learning has gathered and archived data from students since 2014. The researcher was given full and direct access to download any data provided by APEX Learning. Moreover, the researcher contacted the district's liaison at APEX Learning for additional help and clarification.

Data Analysis

The standard Alpha level of .05 was used to determine the P value. If the P value was higher than .05, then the null hypothesis would be retained. However, if the P value was lower than .05, the null hypothesis would be rejected.

RQ1. What is the difference, if any, in the final grade percentage of those who complete a course using gamification?

The independent samples *t*-test was used to measure continuous level in RQ1 from 0-100. APEX Learning saves data of final grades both as a final letter grade and as a percentage on a 0-100 scale. The first assumption using the independent samples *t*-test is one dependent variable (Statistics, 2016). In both RQ 1 there was a single dependent variable.

The second assumption required for independent samples *t*-test, are two comparative groups (Statistics, 2016). In this research, the independent variable being tested was the use of gamification. There were two groups being tested, one using the independent variable of

gamification and the second group not using the independent variable of gamification. Archival data from courses not using gamification were compared to archival data of courses which used gamification.

The third assumption was the independence of observations (Statistics, 2016). Both groups in this research, were independent of each other and had no relationship. Groups were determined in separate years based on the criteria; in need of validating of a previous grade of 'D' in a course required for California state university admissions. Both groups were systematically assigned based on this criterion in different academic years. There was no duplication of students, and each group was a unique group of students.

Assumption four for the use of the independent samples *t*-test is there be no significant outliers in the two groups (Statistics, 2016). The assumption is that participant scores will not be significantly outside of the scores of groups (Statistics, 2016). If the researcher discovered outliers, then it would be necessary to determine the possible cause. The first area to consider would be whether there were data entry errors (Statistics, 2016). Data entry errors are easy to correct. If that were the situation, the researcher would make the appropriate corrections and run the test again. If data was entered correctly, the researcher would look at measurement errors (Statistics, 2016). Measurement errors would be equipment or out-of-range values (Statistics, 2016). There are two ways to deal with this type of error. The first would be to remove this aspect from the analysis (Statistics, 2016). Yet, if the researcher can determine the outlier is a result of out-of-range values, there is the possibility of changing the range to next largest value (Statistics, 2016). For example, the final grade as a percentage is on a scale of 0-100. If there was a score above 100, the researcher may be able to change the above 100 score to 100 to see if

this satisfies normality. If this is where the case, the integrity of the research can still be in tact because the outlier still represents the highest point (Statistics, 2016). If this is the method the researcher used, there would be a description of error, and explanation of how the researcher dealt the normality issue. If the issues is neither data entry error or measurement error, then the likelihood would be a genuine unusual value (Statistics, 2016). Genuinely unusual values are difficult to deal with, because they represent a true value, but not with the parameters of statistical analysis, so simply removing them would alter the findings (Statistics, 2016). The researcher also has the option of including the data as is. In this case, running the independent samples *t*-test with and without the data, to compare if there were significant difference which change the conclusions. In this study, the researcher did find outliers which were genuine. A total of 3 data points were removed and utilizing Boxplots, determined there were no remaining outliers, and the removal of the 3 data points did not compromise findings.

Assumption five states there should be a normal distribution of dependent variable (Statistics, 2016). However, the independent sample *t*-test can address violations of this assumption. The requirement can be approximately normal (Statistics, 2016). To test for normality, the researcher could have used either the Shapiro-Wilk test if the participant size were less than 50, or the Q-Q Plots Test if the participant size were more than 50. (Statistics, 2016). If there were violations to the normality of distribution, there are four options (Statistics, 2016). The first is to transform the data. However, the most difficult part of choosing this option is not working with the original data (Statistics, 2016). The second option is to use the Mann-Whitney U test (Statistics, 2016). However, the problem with this test, is that you may not have the same outcome with the null or alternative null hypothesis. There is also the option of simply carrying

on. The independent samples *t*-test has the ability deal with non-normal distributions providing the groups being compared are equal or close to equal, and the groups are not too small (Statistics, 2016). If the researcher decided to carry on, the researcher would include the issue of distribution in the narrative (Statistics, 2016). Finally, there is the option of running test comparisons (Statistics, 2016). Test comparisons is a more advanced option, and requires running the independent *t*-test on both transformed and non-transformed data (Statistics, 2016). The researcher ran a Q-Q Plots test, and concluded the distribution was normal.

The sixth and final assumption is the homogeneity of variance (Statistics, 2016). The assumption of homogeneity variance assumes the distances from the mean are the same (Statistics, 2016). To test the homogeneity of variance, the researcher used Levene's test for equality of variances. Levene's test for equality of variance determines if there is equality of variance from both groups (Statistics, 2016). If after testing for homogeneity of variance the researcher discovered there was unequal variance, then the researcher would have to determine how to proceed. Laerd.com gives two possibilities. The first is to use the Mann-Whitney U test instead of the independent-samples *t*-test. The Mann-Whitney U test would be appropriate if the shape and dispersion scores of both groups are alike (Statistics, 2016). However, if that is not the case, and the variances were not similar, the researcher would have to use the Welch *t*-test (Statistics, 2016). After running Levene's test for variance, the researcher discovered homogeneity of variance.

RQ2. What is the difference, if any, in the time of course completion using gamification and not using gamification?

As with RQ1, the independent samples *t*-test was used to measure time as days in RQ2. APEX Learning keeps track of the number of days a student is enrolled to completion. Time was the dependent variable which was used. To the same degree as in RQ1, verification for assumptions using the independent samples *t*-test were applied (Statistics, 2016). There was one dependent variable of time, comparing two different unrelated groups (Statistics, 2016). The researcher used the same test for significant outliers, and test for normal distribution as stated in RQ1(Statistics, 2016). Finally, the researcher used Levene's test for homogeneity of variance to verify the distance from the mean was the same (Autry, 2017). All six assumptions for the independent samples *t*-test were confirmed in both RQ 1 and RQ 2.

Validity and Reliability

The test of validity in relationship to the research questions of this study was measured in time and the final grade as an earned percentage. Data were analyzed from students who completed an online course. From those data representing a completed course, students' final grades as a percentage were compared. Time is predictable and regular, so time is valid. Completion of the course was measured in days, a standard measurement for the passage of time. A week in September is the same time as a week in May. Therefore, time is a valid measurement. A variety of studies, in a variety of disciplines use time as a foundation for research. From cognition, to learning, research uses the measurement of time to indicate significance (Hirano, Kubota, Tanabe, Koizume, & Funase, 2015). One study set out to discover the amount of time needed for motor skill learning, assessed improvements a day after interventions were implemented (Hirano et al., 2015). Another study used the measurement of weeks to determine correlations of sleep patterns to stillbirths (McClure & Goldenberg, 2018).

Even in the field of computer science and machine learning, time was used to predict traffic based on days, weeks, and months to design simulations (Choudhury, Lynch, Thakur, & Tse, 2018). Furthermore, statistical analysis is often difficult to understand, especially for those who are not familiar with their principles (Baird & Pain, 2018). Time is a more understandable universal measurement which does not require a thorough understanding of statistical analysis (Baird & Pain, 2018). Therefore, time becomes an easier method of describing important information. Time as a measurement is included in various studies, for various purposes as a valid measurement for progress.

The measurement of percentage is a consistent measurement scale of progress. The higher the percentage, the higher the final grade. Using the final grade as a percentage gave more precise information for comparison than using 'A', 'B', or 'C'. A letter grade is a general description of the final grade for comparing. However, a percentage is more specific and can be compared to discover if there are any differences in student achievement who for example, all have 'B's. Ten students can receive a 'B', but the same 'B' can be represented on a scale from 80% to 89 percent. In the example of a letter grade, ten students can all have the same grade, but the percentage of the grade gives a more precise explanation of difference. Comparing scores on a numeric scale, gives a precise indication of achievement, and is commonly used when calculating a student's grade point average (GPA). GPA is calculated on a four-point scale, 0 for 'F', 1 for 'D', 2 for 'C', 3 for 'B' and 4 for 'A'. When the GPA is calculated, the average score is a percentage of every grade. Students can have GPAs which can look like 3.2, 2.2, or 4.0, all indicating whether a student had more 'B's than 'C's, or more 'A's than 'B's (Anderson, 2018). "When applied to education and used as a noun, a grade is a position on a continuum of quality,

proficiency, intensity or value" (Anderson, 2018, p. 3). It is an accepted method of determining student achievement in education. Numerical representations of student achievement are often used to measure what students have learned, and in what environments students learn best (Emerson, English, & McGoldrick, 2017). Furthermore, research comparing GPA, a numeric representation of achievement, to ACT scores, also a numeric measurement, has been conducted to predict success in college (Townsley & Varga, 2018). It is common to interpret academic success in numeric terms.

For this research, two groups were compared. Group A was a group of students who took an online course without the use of gamification. Group B was a different group of students enrolled in the same online program with the use of gamification. Group B tested the independent variable of gamification by using ClassDojo.

Other research studies have used ClassDojo to determine differences between the use of gamification and non-use as it relates to student achievement (Homer, Hew, & Tan, 2016). Homer et al. (2016) used ClassDojo in a study of English learning elementary students. Their study focused on behavior and learning objectives attained (Homer et al., 2016). Moreover, in a study of elementary students with dyslexia, researchers used ClassDojo as their testing tool to determine if its use increased student achievement (Gooch et al., 2016). In a study of eighth graders' engagement, ClassDojo was used to analyze academic achievement (da Rocha Seixas et al., 2016). Da Roca Seixas et al., 2016, found a significant increase in achievement using ClassDojo with students in this study (da Rocha Seixas et al., 2016). William Blake Ford (2017), in research for a dissertation, used ClassDojo with the Good Behavior Game to study student engagement and behavior. The use of ClassDojo to determine differences in student outcomes

with its use has been utilized by a variety of researchers. Its use in peer-reviewed articles and published dissertations speaks to the validity and reliability of its use in further studies. This research study used ClassDojo to determine differences in student outcomes. ClassDojo represents a valid use of gamification as it uses points and badges to reward students for specific behaviors and tasks completed as determined by their teachers

Ethical Considerations

Permission for using data was granted by the highest authorities in the district. The researcher had no direct contact with teachers or students at high school where data was compared for the purposes of this research. There was no conflict of interest as the researcher was not assigned to the school where data were being analyzed and had no assigned position at that school. Additionally, the principal of the school, in seeking methods of motivating students presented the use of gamification and instructed teachers to institute its use, with ClassDojo, to increase completion rates. No harm came to the students in the study as the program for validation is a district wide program, with an established set of criterions. Students only had contact with their assigned teachers, and school assigned staff. Every employee of the district has been entrusted with care of students, and the same principles apply to this validation program, as with any other program sponsored by the district. At the end of the semester, the researcher was given access and download the data directly from the APEX Learning website, with a provided login.

Conclusion/Summary

The researcher desired to investigate the impact of gamification on student motivation. The researcher gathered data from online high school courses to determine whether there were

any significant differences in student achievement when using gamification, compared with students not exposed to gamification elements. The two research questions were the comparison between the final grade as a percentage, and the time it took to complete a course. Data was gathered from APEX learning, who provided the coursework and tracked student progress. In comparing time to completion and the percentage of those who completed the researcher identified if there was a significant difference in student achievement.

Chapter 4: Results

Introduction

The purpose of this quantitative causal-comparative study was to examine to what extent, if any, the use of gamification has on final grades as a percentage and the time to complete an online high school course. Gamification in this study was the inclusion of ClassDojo as a motivator for student work habits to increase grades and course completion times. Students were awarded points and badges for completion of teacher determined tasks. The school used in this study has a history of validation courses for those students wishing to apply to a California university. After receiving a D in a class, the student must retake the same course to achieve a C or higher grade. In the Fall semester of 2018, the high school principal instructed the teachers to use ClassDojo to help motivate students. This was the first time ClassDojo, or any gamification element was used in this program. This study retrieved archival data to compare and determine if there were any differences in student achievement, finale grade percentage and time to completion, using gamification elements.

A causal-comparative model was used in this study, because the groups were naturally occurring, so there were no ethical problems in either offering or not offering a strategy which could enhance student outcomes. This approach used data from courses which had already taken place. The following research questions and hypothesis were used to guide this research:

RQ1. To what extent is there a difference, if any, in the final grade percentage of those who complete a course using gamification and those not using gamification?

$H1_{01}$. There is no significant difference in the final grade percentage of those who complete a course using gamification with those not using gamification.

$H1_{a1}$. There is a significant difference in the final grade percentage of those who complete a course using gamification versus those not using gamification.

RQ2. To what extent is the difference, if any, in the time of course completion using gamification and not using gamification?

$H2_{02}$. There is no significant difference in the time of course completion using gamification and not using gamification.

$H2_{a2}$. There is a significant difference in the time of course completion using gamification and not using gamification.

The research questions and hypothesis were the guiding source in determining to what extent, if any, did the use of ClassDojo increase, decrease or have no effect on the two research questions.

To conduct this study, the researcher was given access to data stored and gathered by APEX Learning, the platform used for the validation courses. In the following section the sample will be described and analyzed.

Descriptive Data

This research utilized a southern California high school, implementing gamification for the first time. The study consists of archival data from an online validation program. The number of students in the non-gamification group in number of days to complete a course was 67 (N= 67). The number of students using gamification was 32 students (N=32). There was a total of 57 girls and 42 boys. Seventeen girls were in the group using gamification and 40 girls were in the group not using gamification, and 15 boys in the gamification group. In the non-gamification group, there were 40 girls and 27 boys.

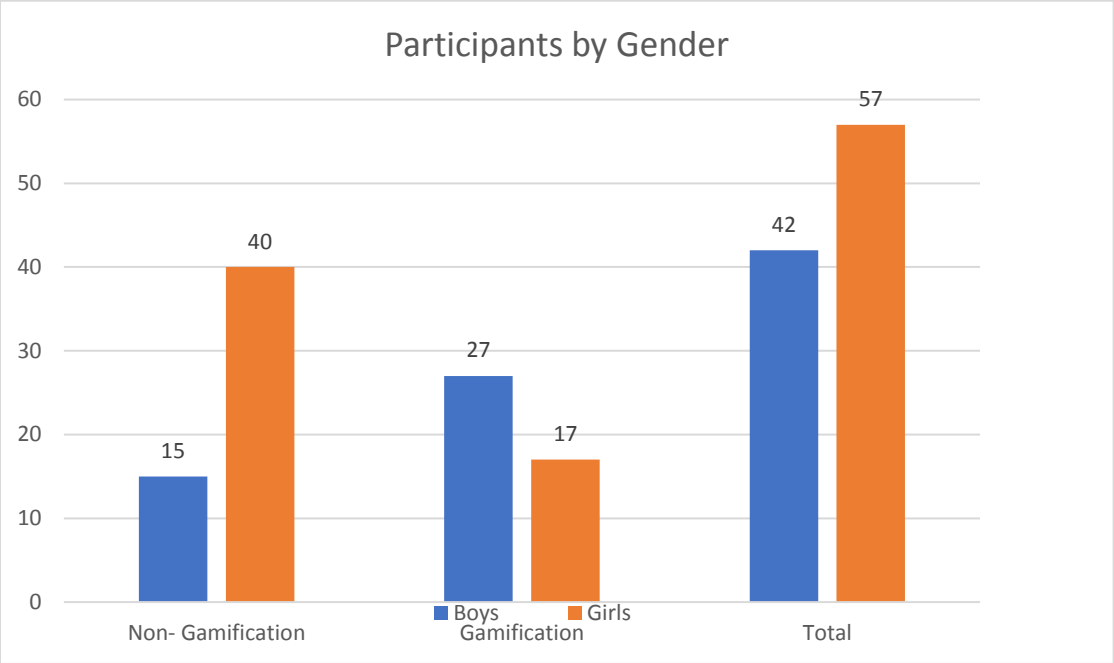

Figure 1. Participants by Gender

The total participants for the study was 99. There were 67 students who took a course not using gamification, and there were 32 students who took a course where gamification was used. In the non-gamification group, there was a total of 6 12th graders, 51 11th graders and 10 10th graders. Students in the gamification group were 18 12th graders, 13 11th graders and 1 10th grader. Table 2 illustrates the breakdown of students by grade level who were involved in a course with gamification and those in a course not using gamification.

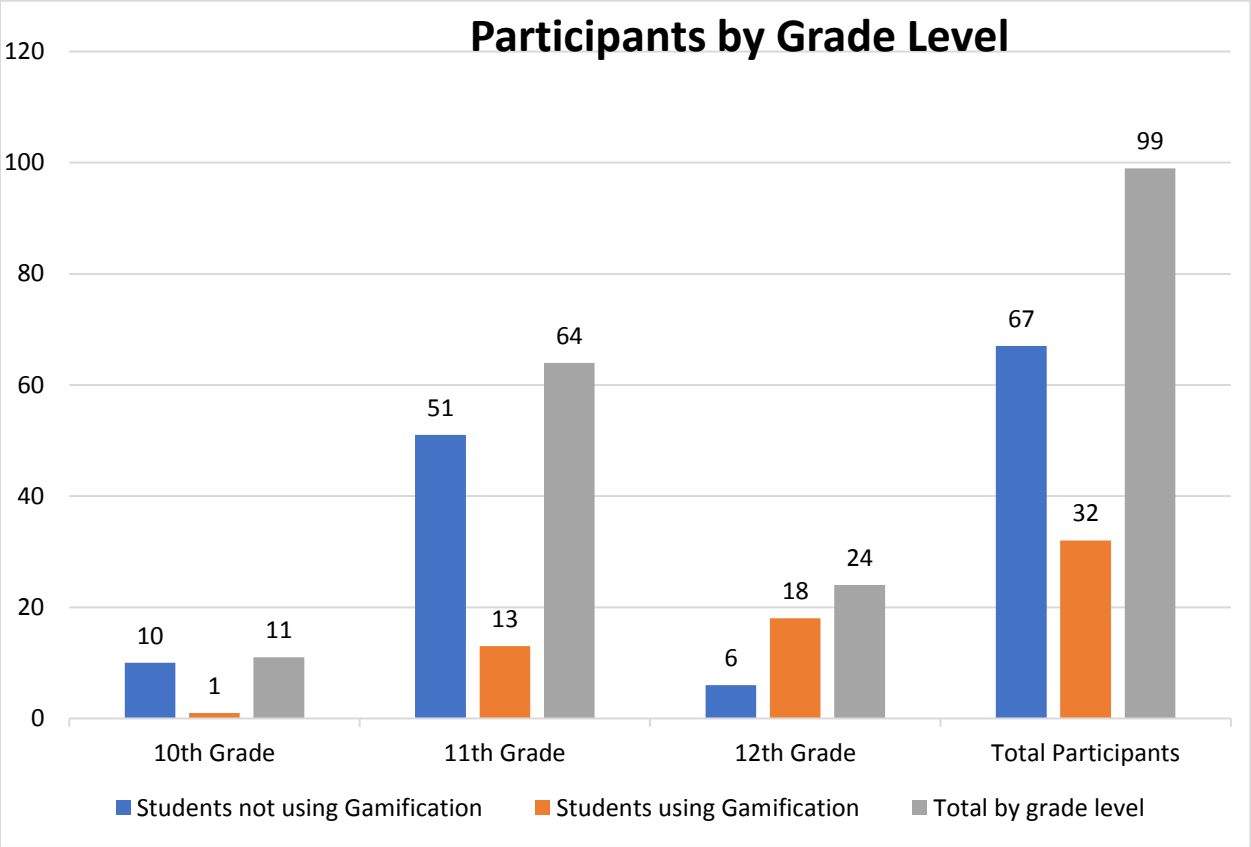

Figure 2. Participants by grade level courses with and without gamification

For course completion, students not using gamification completed their course in an average of 74.1 days. Students using gamification completed a course in an average of 90.5 days. The final grades for students not using gamification was 83.57%. Students using gamification, had an average grade of 83.9%.

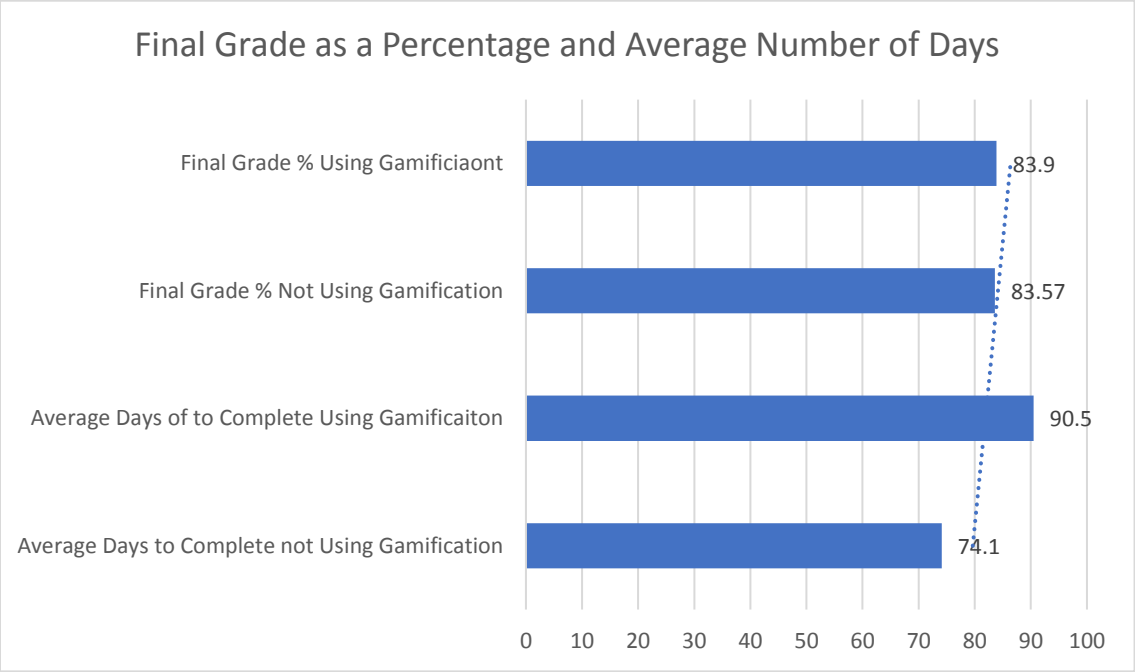

Figure 3. Final grade percentage and average days to completion

Students in the group not using gamification were enrolled in the course between February 17, 2016 and July 2018, while the group using gamification was enrolled between September 14, 2018 and January 8, 2019.

Results

Research Question 1. To what extent is there a difference, if any, in the final grade percentage of those who complete a course using gamification and those not using gamification?

To assess the first research question, the researcher used SPSS to determine to what extent was there a difference if any, in the final grade as a percentage of those who completed a course using gamification and those not using gamification. The first assumption in the independent samples *t*-test is continuous data. The final grade was reported on a continuous level on a 100-point scale using the final grade as a percentage. The second assumption the

independent samples *t*-test is having two comparative groups. To answer RQ 1, a group not using gamification was compared to a group using gamification. The third assumption when using the independent samples *t*-test is independence of observation. After looking at the data, it was determined the groups were two separate, unrelated groups. Each group had different students.

The fourth assumption using the independent samples *t*-test, is to determine the data has no outliers. The researcher removed a total of three data points. After the first run, the researcher observed the Boxplot output and discovered two data points as being outliers. The researcher removed the two data points and ran SPSS a second time. After running SPSS Boxplots, a second time, the researcher discovered an additional outlier. The researcher removed the third outlier and ran SPSS for a third time. After removing the three data points, representing the outliers, SPSS Boxplots confirmed removing outlier data achieved compliance with the assumption for the independent *t*-test, and there were no longer any outliers.

The fifth assumption in independent *t*-test is normal distribution. The researcher ran SPSS descriptive data for Q-Q Plots test. After reviewing the data, the plot points all traveled in a normally distributed line. Figure 1 shows the Q-Q Plots for the final grade as a percentage with no ClassDojo. Figure 2 shows the final grade as a percentage with ClassDojo

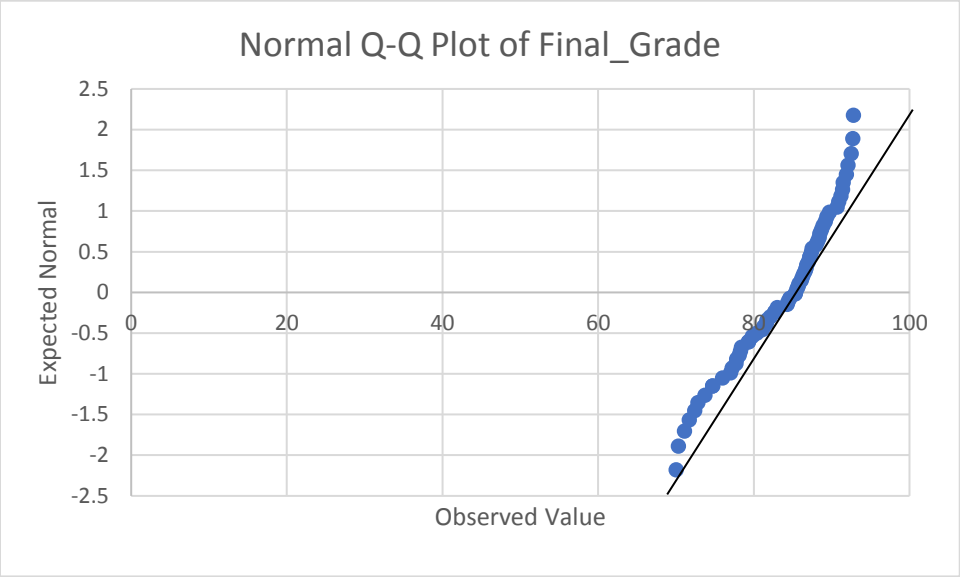

Figure 4. Final grade as a percentage non using gamification

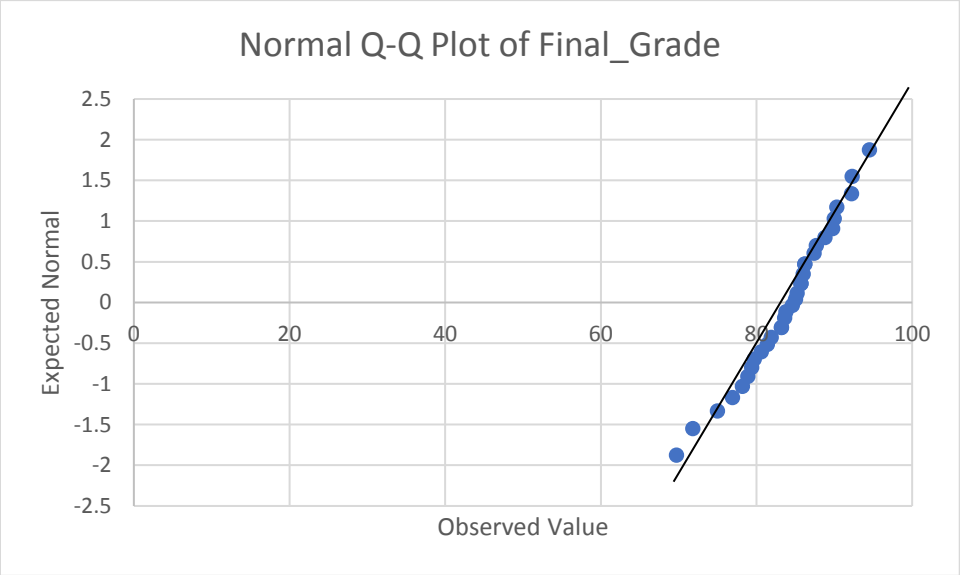

Figure 5. Final grade as a percentage using gamification

The sixth assumption for the independent samples *t*-test is homogeneity of variance. The researcher used SPSS to determine this assumption was achieved. For the final grade as a percentage, Levene's test was not significant .263. Again, using a α = of .05, Levene's test result was the null hypothesis was retained. t (97) =.249, p= .804

Research Question 2. To what extent is the difference, if any, in the time of course completion using gamification and not using gamification?

To assess the second research question, the researcher ran SPSS Independent Samples *t*-test to determine to what extent is there a difference if any, in the time to completion of those who completed a course using gamification and those not using gamification. The first assumption in the independent samples *t*-test is continuous level. The number of days to completion was reported on a continuous level using days as a measurement of time. The second assumption the independent samples *t*-test is having two comparative groups. To answer RQ 2, a group not using gamification was compared to a group using gamification. The third assumption when using the independent samples *t*-test is independence of observation. After looking at the data, it was determined the groups were two separate, unrelated groups. Each group had different students.

The fourth assumption using the independent samples *t*-test, is to determine the data has no outliers. The researcher removed a total of three data points. After the first run, the researcher observed the Boxplot output and discovered two data points as being outliers. The researcher removed the two data points and ran SPSS Independent Samples *t*-test a second time. After running SPSS Boxplots, a second time, the researcher discovered an additional outlier. The researcher removed the third outlier and ran SPSS for a third time. After removing the three data points, representing the outliers, SPSS Boxplots confirmed removing outlier data achieved compliance with the assumption for the independent *t*-test, and there were no longer any outliers.

The fifth assumption in independent *t*-test is normal distribution. The researcher ran SPSS descriptive data for Q-Q Plots test. After reviewing the data, the plot points all traveled in

a normally distributed line. Figured 3, shows the Q-Q Plots for the number of days to completion when gamification was not a part of the course. Figure 4 shows the number of days to completion when gamification was used. This confirmed normal distribution.

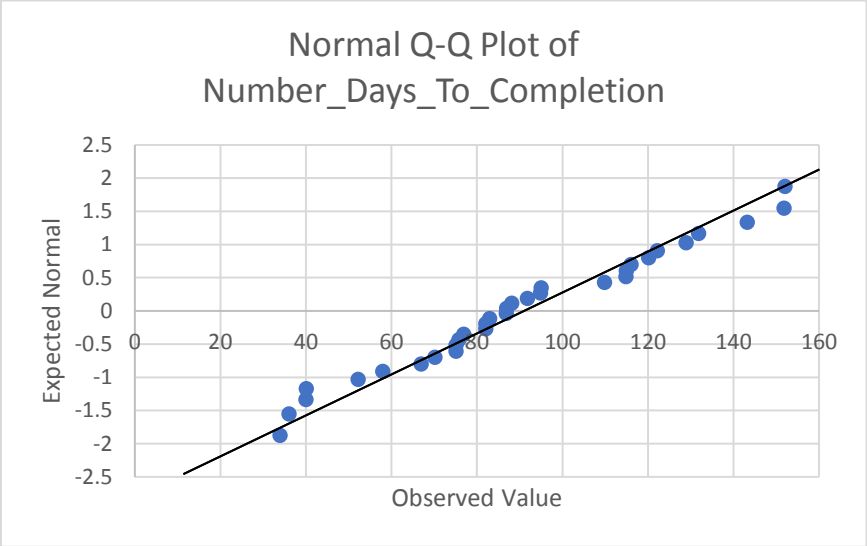

Figure 6. Number of days to completion using gamification

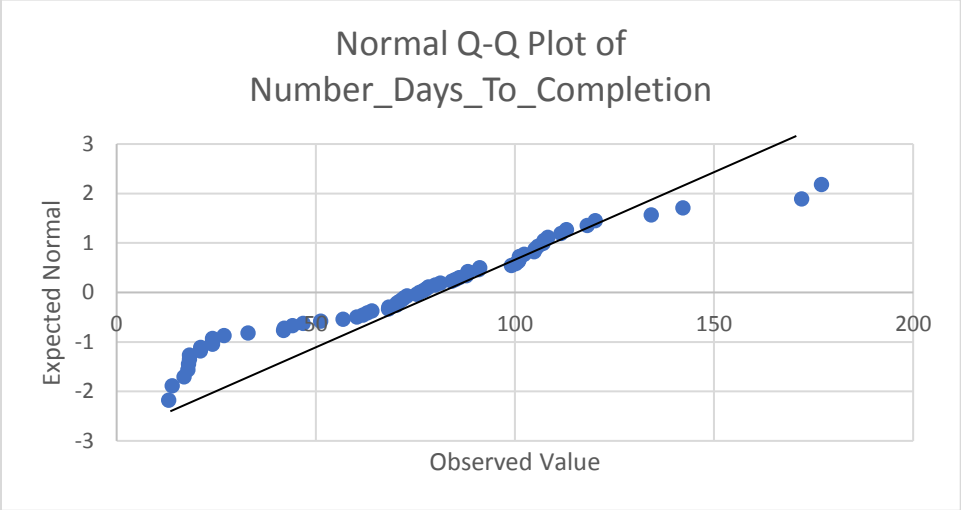

Figure 7. Number of days to completion not using gamification

The sixth assumption for the independent samples *t*-test is homogeneity of variance. The researcher used SPSS to determine this assumption was achieved. For the number of days to

complete a course, Levene's test was not significant p=.510. This result is greater than then α = value of .05, so the null hypothesis was retained. $t(97) = 2.11$, $p = 0.37$.

Summary

Reviewing the results of the Independence samples *t*-tests the researcher determined, the use of gamification did not result in significant differences in either the final grade as a percentage or the number of days to complete a course using ClassDojo. The results of this quantitative study showed both the RQ 1 and RQ 2 retained the null hypothesis. The inclusion of gamification using ClassDojo, did not result in significant differences when compared with courses not using ClassDojo.

Chapter 5: Summary, Conclusions and Recommendations

Introduction

The purpose of this quantitative causal-comparative study was to determine to what extent there were any differences, if any, when comparing final grades as a percentage and time to completion of an online course with the implementation of gamification elements in an online validation course. Gamification in this study was examined using ClassDojo, a popular tool used by teachers in classrooms around the US and the world (ClassDojo, 2018). Gamification is the attempt to bring game elements and design, into non-gaming environments. The psychological foundations of learning in gamification come from three primary schools of thought. The first is Self-Determination Theory. In Self-Determination Theory, Edward Deci and Richard Ryan argue to increase student learning, the elements of competence, autonomy and social relatedness need to be present (Cherry, 2017). The second theory representing the foundation of gamification is Flow-Theory. Flow-Theory describes the phenomenon of loss of time in the pursuit of a goal or function. Mihaly Csikszentmihalyi argues the combination of competence and fun creates a sense of senselessness, which is commonly found in high achieving athletes and artists (Art, 2017). The third theory in the discussion of gamification is Albert Bandura's Self-Efficacy Theory, which states the belief in being able to do something, is a stronger motivator than actually being able to do something (Tandon, 2017). In education, gamification has been used to motivate students to complete tasks and engage them in learning. As gamification is a new and growing strategy in education, it is important for research to determine its proper usage in the classroom (Nacke & Deterding, 2017). This study used archival data from

a southern California high school to explore the research questions of this study. The research questions where the guiding force in this study.

Overview of the Study

This study was a quantitative causal-comparative research design, which used archival data from a southern California high school. Because of the nature of the study, the researcher did not have control over how the independent variable was introduced or used. While there is considerable research with post-secondary and elementary students regarding gamification, there is a gap of research specifically with high school age students (Hamari, 2017). There was one independent variable, which tested two dependent variables. Those dependent variables were the final grades in an online course as a percentage, and the number of days to complete an online course. The independent variable used to test the dependent variables was ClassDojo, a gamification tool. ClassDojo is a widely used web-based application for motivating students to complete those tasks assigned by the teacher (ClassDojo, 2018). The researcher was able to compare previous year's data where ClassDojo was not implemented, with the most current semester where students were exposed to ClassDojo. Causal-comparative design was appropriate for this study because all data was archival, the researcher had no contact with the students or teachers and compared data from two independent groups. Causal comparative research uses archival data to make comparisons. Since research is based on these data, there was no contact with participants. The results of this study were completely based on the comparison of data. The researcher used SPSS and conducting an independent samples *t*-test, determined continuous levels, two comparative groups and independence of observation. Furthermore, the researcher used a Boxplot test to determine there were no outliers which might

skew the findings, Q-Q Plots to determine normal distribution and the Levene's test of variance to find homogeneity of variance.

Summary of Findings and Conclusions

Research question one. To what extent was there a difference, if any, in the final grade percentage of those who completed a course using gamification and those not using gamification? The researcher found in this comparison, there was no significant difference in the grade percentage of students using or not using gamification. In question one, the null hypothesis was retained. In this study, the use of ClassDojo had no effect, positively or negatively on student achievement examined.

Research question two. To what extent was there a difference, if any, in the number of days to completion using gamification and not using gamification? The researcher found again, there was no significant difference in the number of days to complete a course using gamification. Using SPSS and the independent samples *t*-test, the researcher determined there was no significant increase or decrease in the number of days to complete a course.

Discussion

Gamification is used as tool in many schools in many districts across the country. Moreover, there are a variety of gamification tools available for implementation with instruction. Software and technology have commonly been cited as gamification. However, in alignment with other research, this researcher recommends a comprehensive understanding of gamification. Comprehensive gamification is not a simple inclusion of a technology tool, but a carefully designed environment, which gives students autonomy, competence and social connection (Hasan, 2018). Games are not simply technology, but well-designed mechanisms to illicit

competition, a sense of urgency, fun and to instill a passion to complete the parameters of the game. Games create a desired environment by clearly stating the goal and how to achieve the goal. While K-12 education has been utilizing software applications, this researcher agrees with other current researchers in that simply using technology does not constitute gamification (Hasan, 2018). Nor does simply using a technological tool make a significant impact on learning and achievement. For gamification to truly be effective, teachers need to understand game design and game elements in the context of effective pedagogy.

Practical implications. It was beyond the parameters of this study, but the researcher notes, the way in which gamification tools are used could make a difference. A limitation of this study was the parameters of how gamification was implemented was not known. It is possible the teacher using gamification did not understand, believe or have a real desire to include it. The principal of the school required its inclusion. Additionally, it was not known if the principal truly believed gamification was important, or merely required it to report having used a new, innovative tool. For gamification to be viable, a comprehensive approach is advised. Comprehensive gamification is the reference to an instructor's knowledge of gamification as a pedagogical approach to teaching. This is very different from using an online tool. However, to create comprehensive gamification in the classroom, careful time and energy should be taken to ensure the game design elements are incorporated. Furthermore, it is important for teachers to understand which elements are most effective in context with subject matter and assignments. Technology is an incredibly useful tool in setting up the structure, but it is does not by itself make a difference. Technology makes the use of elements such as leaderboards, badges and points easier, but the use of these elements does not alone create a game-like environment. Nor

does using gamification tools constitute a comprehensive gamification learning environment. For gamification to be an effective instructional strategy, it must have real consequence to improving learning. In this study, there was no significant change in end of course grade. Nor, did the use of gamification significantly change the time to complete a course. To have a level of significant difference, gamification must make an impact in the areas in which it is being used. The questions of this study asked if gamification made a difference. Using ClassDojo in this study did not make a difference. When a real, comprehensive environment is created, gamification is more than a gimmick, it is an impactful strategy, which motivates and supports learning. Professional development of teachers is an important aspect of gamification becoming an impactful pedagogy. It is important for educators to understand the difference between the elements of games and a game-like experience when creating lessons. Professional development which focus on the foundational components of gamification as a pedagogy, will increase the effectiveness of gamification. While it may not be feasible for a teacher to convert their classroom entirely to a gamified format, it is important for instructors to understand the purpose of using gamification tools for learning. When choosing a game tool, this researcher suggests making certain of the intent of a its application and choose a tool which fits the purpose. Moreover, teachers need also to determine when the effectiveness of tools reach saturation, and it becomes a gimmick, detracting from the learning experience. From games, we learn there are always updates and upgrades, and the same must be true for the comprehensive gamification in the classroom. This process requires instructors to be knowledgeable about gamification and game elements and utilize professional development in pursuit of continued learning.

Future implications. Game design is an element of gamification which needs further research and implementation. Currently, most products, such as ClassDojo, utilize a shallow version of games in the larger picture of game design. The elements which are found in games, and require dedication and concentration, are those games which have multiple layers in their designs. Massively online games, and PC games for example, use quests, provide for social interaction, offer immediate feedback, unlimited lives, and tutorials. ClassDojo uses badges and medals, which may or may not be effective in every context of the classroom or for every grade level of students.

The implications for utilizing comprehensive gamification in the classroom, requires a re-design of traditional classrooms where all students are required to learn the same material at the same time, in the same way. Comprehensive gamification would be total implementation of gamification design. This level of implementation could revolutionize learning. In a completely gamified classroom, students would be able to work on skills independently and together in groups, to reach the goal of mastery in a given time frame. Some students in this type of environment will advance quickly, and others will move more slowly, and need more time to practice. The point of learning in a gamified environment, is not how slow or quick learning takes place, but that learning happens effectively. Students given a specific amount of time such as a quarter or semester, are presented with the challenge of mastering a series of skills and understanding. Students are then given options to put into practice what has been learned. For gamification to work, this researcher believes there must be a carefully structured plan to match learning and game elements. When the larger picture of gamification is understood, it can also be broken down into smaller parts and time frames. For example, providing unlimited lives is a

powerful design tool which can be used to help those students who take longer on the road to mastery.

Most gamification tools utilize a shallow understanding creating a gameful environment. The simple use of points and badges may not be adequate to motivate students. This limitation too, is beyond the scope of this study and has implications for designers. Teachers can only use technology tools which are available, unless teachers possess the skills to create applications. This is a real concern in gamification. High school students are more sophisticated and more comfortable with complex games. Massively online games, PC games and smart phone application games have increased the knowledge and experience level of the typical high school student. In the opinion of the researcher, this reality makes comprehensive gamification more important when constructing a gamified learning environment and including technology-based programs. Educational coders and programmers must understand game design elements and incorporate them into gamification tools. Specifically, using technology for gamification, there needs to be more age appropriate and compelling designs. Likewise, teachers need to understand game design elements when they are choosing a technology tool to guide the parameters of a gamified classroom, lesson or project. A tool should not be thrown in because it is convenient, or easy for the teacher to use. Gamification tools must have an impact on learning for the students if gamification is to make an impact on learning. As part of software or application, the researcher advises teachers to be informed not just in how to use the technology, but how to implement it within the context of a comprehensive understanding of the foundations of gamification principles. While technology makes this more convenient, technology is not

necessary to institute comprehensive gamification. The knowledge of game designs and game elements is the foundation of prudent gamification principles.

Recommendations for Future Research

Implications for future research. As stated earlier, a key to success in implementing gamification is a carefully designed program, which offers students the main elements of autonomy to learn, the encouragement of competence and social connection. The researcher in this study had no contact whatsoever with the teachers or principal about how gamification was implemented in the comparison groups. The researcher relied on teachers to create an environment without knowing if the instructors believed in gamification, had a working knowledge of gamification or wanted to include gamification elements in this course. In this study, there was no way to know if the teachers did anything more than simply introduce ClassDojo on the first day of class. The use of ClassDojo as gamification, was tool, but there is no certainty the principal, or teachers thought carefully about how to implement its use. Nor is it certain the use of ClassDojo was considered in the backdrop of high school students and whether it was an appropriate application in this context. Careful thought on multiple levels is required to have a comprehensive gamification learning environment. There is no way of knowing, in this study, if the way in which gamification was implemented had a positive or negative effect on learning. Further study in how gamification is implemented needs to be addressed. Without the benefit of conducting interviews with teachers, there is no way of knowing if teachers understood the big picture of gamification. Purely looking at the data, was a good beginning in the pursuit of understanding what elements need further consideration. In comparison to other research, this study confirms there are still a great many questions and areas of study to consider.

As a quantitative casual comparative research study, it was beyond this research to determine teachers understanding of and belief in gamification. However, in future studies it is advised to use both a qualitative and mixed methods research, along with experimental designs. These research design methods give researchers the opportunity to interact with those implementing gamification and additionally, have control over how it is implemented.

Gamification elements. This researcher recommends further research to determine appropriate elements of gamification for specific disciplines. Current research, for example, has not adequately addressed the difference in using leaderboards or badges and if either have a greater or lesser degree of effectiveness in math than history. At the present time, gamification appears to be applied as one size fits all. The recognized elements of gamification are used in all disciplines, with all age groups and often, at the same time. Research to determine which elements have the greatest effect with respect to specific disciplines, will give a clearer understanding of gamification's effectiveness (Landers et al., 2018). Experimental research will be a tremendous aid in this pursuit. Experimental research design, developed for this purpose, will give the discipline of gamification a deeper awareness of how to implement its elements with the highest levels of effectiveness. Additionally, the inclusion of qualitative and mixed methods is important to address the limitations of a purely quantitative approach. With the addition of qualitative designs, researchers will be able to conduct interviews, and surveys to better understand specifically how gamification was implemented by teachers. Moreover, student interviews and surveys will give keen insight into the reception of gamification and the used tools. The inclusion of qualitative designs will give researchers the opportunity to gather data to address the specific issues of the sophistication of technology and how it helped or hurt

the reception of gamification. Furthermore, future research can design research to discover the attitudes of high school participants and the tools used by the researcher. Limitations of this research noted, both the possible juvenile platform of ClassDojo, and the motivational differences between it, and being college eligible. An experimental, qualitative or mixed method research design will be able to address these limitations.

Game design. The researcher additionally recommends creating studies which include both the use of technology tools, and game design, to better utilize what is known about games. There must be a collaboration of game design and pedagogy to truly understand how best to implement gamification and discover if it is truly a benefit or fad in education. One of the limitations of this study, was relying on the teacher's understanding of gamification. Currently, most products, such as ClassDojo, utilize a basic interpretation of gamification in the larger picture of game design (Kim, 2015). Research is needed to better understand and define which elements of gamification work best within the context of learning (Landers et al., 2018). Furthermore, research needs to expand and identify specific age appropriate tools and concepts. Game design integrates what we know about games, and how games are played. The design of the game creates an atmosphere. In the context of learning and education, game design informs the classroom about social interaction, objectives, and how to proceed. Simply utilizing an online tool does not create an atmosphere. The design of a game is what makes it enjoyable, interesting and fun.

Implications for high school students. An additional limitation of this study was the need to identify tools and settings more appropriate for high school students (Nacke & Deterding, 2017). As most research in the area of gamification has been conducted with

elementary and post-secondary students, there continues to be a need for research with secondary students (Hakulinen et al., 2015). In the limitations of this study it was acknowledged, the use of ClassDojo may be too juvenile. A possible way to ensure the growing knowledge base of gamification in high school classrooms, more experimental research needs to be conducted to find tools and elements most appropriate for high school students (Landers et al., 2018). Additionally, qualitative and/or mixed method research should be conducted to determine age appropriate tools for gamification. Quantitative research is an effective method for determining the effectiveness of tools for student achievement. However, without conducting interviews and using surveys, it is not possible to discover student attitudes of tools, and how they were perceived by high school students.

Recommendations for practice. For teachers in the classroom, the practice of utilizing gamification is encouraged. However, schools should provide professional development opportunities for teachers to learn and understand the foundations of gamification so they can choose tools wisely. Classroom instructors should make themselves aware of their intent in using a tool, and the most effective implementation. There should be careful consideration when introducing a tool or concept to a class of students. Students should know the objectives of implementing a tool or concept and what they will gain as a result from its utilization.

Gamification pedagogy. For gamification to truly be effective, there must be a change in the pedagogy of the classroom. To understand the aspects of gamification which are effective, it is important to look at game designs and compare them to traditional classroom settings. In traditional classrooms, students receive the same information at the same time and are expected to master the given information thusly. Games are not played like this. For example, games

allow the player to learn the skill necessary to move on to next levels, and are given practice, immediate feedback and unlimited lives. Once levels are achieved, there are not deduction for the length of time taken for skill mastery. Once mastery is proven, players move on to the next level. In a traditional classroom, students are all given the same time frame to learn, and the same practice time. Students who master, move on with confidence in their competence, however students who do poorly or fail, move on with confirmation they are not ready, reducing motivation of self-efficacy. For gamification to be an effective instructional strategy, instructors must incorporate concepts of game design into the classroom. True game like settings in the classroom would allow students to master material at an individual pace. Students would be graded not on their ability to learn at the pace set by the teacher, but by their own ability to show mastery as they progress. Ultimately, this would mean students advancing grade levels at different times as well as moving beyond what is required. In practice and theory, gamification could be a strategy which gives ownership and independence to students for their education.

If teachers are not willing to completely change their classrooms, it is important for them to understand gamification tools do not make their classes gamified, and thus should use tools for short term projects, assignments or quizzes. This may be the best way to utilize the tools and create an environment of gamification absent a deep understanding of the combination of game design, pedagogy and learning. Teachers need training so they can implement these tools with fidelity and competence.

Summary

Gamification is the incorporation of game design principles into non-gaming environments to reproduce the mood of games. Gamification is not a game, but a creation of the

feelings of games. When playing games, there are clear objectives, strategies, skills and information to master and reach the objectives. Gamification in education is a strategy of motivating students to learn necessary material. While there are variety of tools currently available for educators to choose, there remains gaps in the understanding of how to properly and effectively implement their use.

This study tested the significance of using a gamification tool in an online class to discover if its use had a significant effect on final grades as a percentage and the number of days to complete an online course. The researcher compared two groups of students. One group completed an online course without using gamification and the second group completed an online course using gamification. Using the independent samples *t*-test, the researcher compared the final grades as a percentage and the number of days to completion. ClassDojo was the gamification tool used in this high school course. The researcher found there was no significant difference between the two groups. ClassDojo did not have a meaningful effect on either research question. The researcher in this study determined the simple use of a gamification tool, does not truly represent comprehensive gamification, and did not significantly affect the outcome of the research questions. There is much work to be done to better understand how to implement comprehensive gamification, as gamification is a growing and developing field of study. While gamification tools are often used, there is still much to be discovered about their effectiveness. Further studies need to be developed and conducted to test the individual elements and game design. With the ubiquitous nature of technology, there undoubtedly will be more tools developed and there will be a continued need for research to discover how and if they are effective. Educational professionals need to equip themselves with the knowledge of what

gamification is and is not, to implement best practices. This researcher advises a collaboration between software developers and educators to bring together game theory and pedagogy. The combing of these two powerful disciplines can then equip the users of gamification tools with both the technology and pedagogy to positively implement its strategy. Continuing research will solidify best practices and applications to use. It is incumbent upon educators, if they are to use the tools, to understand game design and how it can most effectively be used for learning.

While the outcome of this study did not result in significant differences in the presence or absence of gamification, it did add to the body of knowledge regarding gamification. As a discipline, gamification is new and as information and research is added to the body of knowledge, more will be discovered about its effectiveness. This research supports the need for further studies to discover how best to use, create and implement gamification elements. A comprehensive approach which considers game design, and the effects of individual elements and subject matter continues to represent an ongoing gap in research. Furthermore, this researcher supports the possible motivational effects on students once there is a more comprehensive understanding of gamification. The popularity of gamification tools in education will continue to grow, and as such, educators must understand how to implement the use of these tools with fidelity if gamification is truly to be motivational tool.

In many studies, it is not clear which individual elements are being studied in connection with the desired outcomes (Landers et al., 2018). It is important to identify game elements, what they cause and in what combinations they are effective (Landers et al., 2018). Gamification is not a series of elements, put together to just create fun, or implement technology; gamification should be a tool, to solve specific problems and create challenges in the classroom (Dichev et al.,

2015). If teachers only add game elements, with no consideration or knowledge to game design principles, all they will have is a list of activities with no direction (Kim, 2015). Hung argued, those game-like elements do not indicate learning is taking place (Chia & Hung, 2017). For example, students who are given the ability to level up, by receiving points for logging into a platform, downloading files, and posting a thought, can do so without reading or learning the intended material. If gamification is to be a real tool for learning, the design must be more than points and leaderboards, and promote real learning (Chia & Hung, 2017). If educators are merely going to use gamification to indicate the number of points accrued and how often a student accesses a learning platform, then Ian Bogus is correct in that gamification is nothing more than pointsification, and an exploitation of game design (Chia & Hung, 2017).

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