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# Action Research Assessing the Perceptions of Arabic Military Flight Students Using a Gamified Learning Intervention During Flight School Training

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# ACTION RESEARCH ASSESSING THE PERCEPTIONS OF ARABIC MILITARY FLIGHT STUDENTS USING A GAMIFIED LEARNING INTERVENTION DURING FLIGHT SCHOOL TRAINING

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# DEDICATION

I was fortunate to meet my soulmate and wife, Angie, early in my life. Angie is my most dedicated fan and has pushed and prodded me to overcome seeming impossibilities in our lives. She has loved and supported me through this four-year Ed.D. program and during the lowest and highest times in our lives together. Angie has followed me from Seattle, Washington, to Riyadh, Saudi Arabia (the long way). She has also had to wait by the phone while I was deployed to foreign and sometimes hostile countries. I will always be eternally grateful for her sacrifice in that. She has also given me the most incredible gifts any person could ever give: Gavin and Isabella. "Thanks for all the Fish!"

I would also like to dedicate this dissertation to Gavin and Isabella. I hope I can inspire them to be the best they can be. They are brilliant—and I can only take half the credit for that. Gavin has always been able to ask and inquire about everything to make me learn more and strive to be one step ahead of him. Isabella is the most creative person I have ever met, and she has inspired me to be creative in my writing.

Lastly, I would like to dedicate this dissertation to my parents. My mother and father have always been there for my family and me. My father exemplifies what it is to be a provider and protector. My mother is an excellent example of the glue that holds a family together.

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My wife and my family are the first and foremost people in my life and I have just added Patricia Bromer and Harry to that circle. Patti, you are why this dissertation has happened, and you are not only a friend, but now part of my family. I do not think I will ever be able to repay the counseling and examples you have set for me. I appreciate all you have done for me. And Harry, thank you for sharing her.

# ABSTRACT

The purpose of this action research was to evaluate flight students' perceptions of a reward-based gamification intervention for their motivation to study outside the classroom while attending the Initial Entry Rotary Wing (IERW) flight school in the Kingdom of Saudi Arabia. Saudi Arabia has an ever-increasing population with a diverse number of teachers from all over the world teaching curricula not suited to Saudi Arabians; thus, the Kingdom is striving to improve its education system to motivate its students. The most popular way of enhancing the education system is by empowering and inspiring students to perform better. The Saudi Arabian Ministry of National Guard IERW flight school students' motivators are different than U.S. military students which creates problems when teaching U.S. military designed curricula. This study was guided by two research questions (1) What are the students' perceptions of the influence of gamification on their motivation? (2) What are the IERW students' perceptions of the influence of gamification on their performance (learning)? These research questions guided the study:

Study participants joined gamified activities to earn points that they could turn into rewards. Flight school classes consist of six to eight primarily Arabic-speaking students. A predominantly qualitative mixed methods approach was used to seek students' perceptions while using gamification as an intervention. Semi-structured interviews and Flipgrid videos served as qualitative data sources to elicit students' thoughts and feelings about how their motivation was perceived. A Weekly Motivation

Perception Survey and the Situational Motivation Scale Survey served as quantitative data to regularly measure students' perceptions. Qualitative data were analyzed using an inductive and thematic approach. Quantitative data were analyzed using descriptive statistics and a Friedman test.

The qualitative findings revealed three different themes: (1) students perceive that gamification is relevant for increasing their motivation, (2) participants perceive motivation within the gamification design architecture that can be improved, and (3) gamification helps students develop learning strategies, which in turn leads to enhanced test performance. The quantitative findings indicated that a perceived motivation increase occurred over weeks one through three, and a motivational decline occurred from weeks four through six. This study has implications for using gamified learning systems in teaching military students. Limitations and future research directions are discussed.

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# CHAPTER 1

## INTRODUCTION

### National Context

Motivation is the force that provides the impetus for human behavior, causing individuals to initiate and sustain goal-directed actions (Alkaabi, 2017). Motivation has been studied in many different disciplines and has wide variety of classifications (Lopez & Tucker, 2019). A simple search for "defining motivation" in a database of scholarly articles will return thousands of results. Motivation has been identified as worthy of study because it drives students to learn and, more importantly, retain information (Yildirim, 2017). Motivation is also essential for workers. Many motivational techniques have been tried in research studies, but few studies have attempted gamification as a motivational learning system for military training.

Motivation is an ever-increasing force that needs to be harnessed for learning to occur (Schug & Le Cor, 2017). There are approximately 33 million people in the Kingdom of Saudi Arabia (KSA; CIA, 2018). About 7.5 million people attend some formal schooling from K-12 through the undergraduate and graduate levels. The KSA employs more than 13.8 million of its citizens ("Education and Training," 2021) These numbers indicate the importance of education, as 64% of the KSA's population requires teaching and learning in some form (CIA, 2018). Businesses provide yearly training for their employees.

Saudi Arabia has an ever-increasing population; thus, the KSA strives to improve its education system (Alkaabi et al., 2017). Saudi Arabia imports expatriates to teach and help structure its educational system. Expatriates are people who work and live outside their own countries. In addition to Saudi Arabian schools, the KSA has schools from the U.S., Great Britain, France, Germany, and other countries that their students can attend. The expatriates who teach in these schools report significant motivational factors that affect students' learning (Habbash & Rao Idapalapati, 2016).

Expatriates have reported four distinct areas affected by a lack of motivation in their classrooms: attendance, grading, completing assignments, and studying (Duignan, 2012; Romero & Manjarres, 2017). Attendance is seen as negotiable within Saudi Arabian culture. Expatriates reported significant problems with Saudi Arabian students showing up late to school and class or not attending at all (Habbash & Rao Idapalapati, 2016). Grading is seen as an area that can be negotiated. Saudi Arabian students were reported as feeling that assignments were optional (Romero & Manjarres, 2017). Finally, teachers report that students are not studying outside of the classroom, that they will only work within the school time, and that many K-12 schools are set up that way (Springsteen, 2014).

Expatriate teachers who teach English as a Second Language (ESL) primarily do not know Arabic. They have many problems trying to motivate Saudi Arabian students due to not understanding the culture (Romero & Manjarres, 2017). In most American schools, attendance is mandatory, which includes showing up at the scheduled time. Most expatriates report that they have to remind students of class start times. Teachers stress to

students that showing up and starting class on time has a direct effect on their learning (Ahmad, 2015).

Grading is also a concern. Motivation on the students' part is challenging to uncover. Several researchers theorize that Saudi Arabian students do not want to look "bad" in front of their peers, so they try to negotiate their grades (Springsteen, 2014). On multiple occasions, Saudi Arabian students in universities fail to meet timelines for assignments (Habbash & Rao Idapalapati, 2016).

Individuals from foreign countries conduct most military training for the Royal Saudi Arabian Armed Forces and the Ministry of the National Guard (MNG). These outside individuals do not typically tailor the training to the Saudi Arabian military. The curricula and training programs that are taught are based in different cultures than those of the Saudi Arabian soldiers expected to adhere to them. For example, a typical U.S. helicopter flight training student works 10-13 hours a day. In contrast, a typical Saudi Arabian military student only works six to eight hours a day. A training time of more than double what the student is used to is not allowed. Contractors must extend courses and change curricula to fit the Saudi Arabian military's cultural norms.

Language is another struggle that instructors and students face. Military-specific jargon is not covered in basic ESL classes. Civilian aviation uses more than 50 different words that are not included in the primary ESL curriculum. The International Civilian Aeronautical Organization (ICAO) has deemed English for aviation crucial, and insists that pilots from non-English-speaking countries need to have an ICAO-approved test (Trippe & Baese-Berk, 2019). A promising way to motivate Saudi Arabian students in aviation school is through gamified learning. Gamification is a strategy that encourages

learners to study by rewarding positive behavior that encourages the student to perform the desired function (references). In this study, the desired behavior was for flight students to study outside of the classroom. This approach may lead to increased motivation to learn among Saudi Arabian military flight students.

## Local Context

The local context was the MNG Aviation Institute. The Aviation Institute has been providing instruction for five years. The Institute teaches more than 20 academic classes and 4 different flying classes. The flying classes consist of advanced qualification courses in the UH-60M Blackhawk, AH-64E Apache Guardian, and AH-6I. The Institute also teaches the MD530 helicopter used as the Initial Entry Rotary Wing (IERW) helicopter. The students are all Saudi Arabian males with age ranges between 23 and 28 years old who are officers in the National Guard.

Teachers have difficulty motivating students to meet the new requirements of aviation concepts for flying modern helicopters. The Aviation Institute has data for more than eight advanced qualification classes (AQC) for the MD530F helicopter that show grades in each training phase, and it is continually adding more classes. These classes are designed based on U.S. curricula that do not incorporate cultural responsiveness to Saudi Arabians. Cultural responsiveness involves understanding and considering people's cultural backgrounds (Heitner & Jennings, 2017). Teachers who teach AQC train aviators on how to fly a specific aircraft. Aviation Institute data show that students usually do well on academic tests but not on oral evaluations (MNG Aviation, 2019). After their training, teachers evaluate Saudi Arabian pilots every year. Comparisons of AQC testing data and real-world assessments show that students scored lower after the AQC. These students

did not study after the AQC. During AQC training, students simply memorize things while real-world assessment requires critical thinking and problem solving.

The Aviation Institute designs the curriculum for the MD530F AQC, in which course developers have tried many student-led techniques without any positive effects on evaluation scores. Curriculum changes to address lower evaluation scores have included more vocabulary and instruction on reading manuals or other aviation-specific documents.

Previous comments from instructors in the national context on students' attitudes have been seen in all of the Institute's classes. The IERW flight school is more than 10 months long. Flight students are introduced to every facet of aviation training, including basic combat skills and flying in the dark with night-vision goggles. Many of the students the institute receives have not had a break from education in more than five years. All of the students graduated from the Military Academy after graduating from grade 12. The Military Academy is three years long, and then the students immediately entered ESL training for another year. After their ESL training, they then entered specialized English training for another three months. After specialized English training, students start IERW. The same attitudes toward attendance, grades, and behavior are prevalent every day. Instructors are constantly trying to motivate students in different ways so that they can remember information. Gamification has never been tried at IERW, but students are constantly using apps on smartphones and other electronic devices that compete with teachers in other ways within and outside of the classroom.

## Statement of the Problem

Saudi Arabian MNG aviation students have poor motivation for learning in U.S. military-designed classes. A typical U.S. military aviation officer has a different background and upbringing than a typical MNG aviation officer in Saudi Arabia. Cultural differences between U.S. students and Saudi Arabian students clash in that U.S. curricula are centered on the individual being motivated to succeed. In contrast, Saudi Arabian students expect their teachers to motivate them (Alkaabi, 2017). Teachers are using their teaching and learning experiences in the U.S. to motivate Saudi Arabian students to perform well while learning complex aviation concepts (Romero & Manjarres, 2017). I have personally changed and rearranged teaching strategies and techniques to encourage changes in student motivation. The problem is complex. Motivators for Saudi Arabian students attending IERW need to be found. Motivations for Saudi Arabian learners need an implementation program for the curriculum, and the instruction must be formalized and adopted. The problem is twofold: motivators for Saudi Arabian officers are not identified within the curricula, and therefore, teachers are not equipped with the teaching strategies necessary to motivate Saudi Arabian students (Habbash & Rao Idapalapati, 2016).

## Statement of Purpose

The purpose of this action research was to evaluate flight students' perceptions of a reward-based gamification intervention to increase their motivation to study outside the classroom while attending the Initial Entry Rotary Wing (IERW) flight school in the Kingdom of Saudi Arabia.

## Research Questions

Two research questions guided this study:

1. What are the students' perceptions of the influence of gamification on their motivation?
2. What are the students' perceptions of the influence of gamification on their performance (learning)?

## Statement of Research Subjectivities and Positionality

I am a military veteran with more than 21 years of experience in the U.S. Army. I have been an aviation flight instructor for the last 20 years. I have taught students how to fly the UH-60 Blackhawk helicopter at the most premier flight schools in the world. More recently, I have become the lead flight instructor and course manager of the IERW flight school for the MNG in the KSA. My job includes integrating new technology and teaching methods into a curriculum that is more than 10 years old.

I have always had a love of technology and have been an avid gamer throughout my life. I have strived to learn and use technology in a variety of ways to accomplish my goals. After becoming a flight instructor, I integrated the use of technology into every class. I will be implementing the use of game theory in the IERW course. I believe educational technology is the future of learning. As someone famously said, "Do not teach your children like you were taught because they will not be experiencing the same things you did." I believe this is true, as we need to arm our students with the knowledge, they require in a way that they can understand.

In my field, which instructs U.S. Army helicopter pilots, teachers rely on

how they were taught in classes generated from Fort Rucker, Alabama. I have fallen into the trap of relying on old teaching methods and ways of doing things in the past. An experienced expert on educational technology should incorporate new technologies and techniques to help transition students into new ways of learning they can understand and embrace.

I am using pragmatism as my paradigm. Pragmatism focuses on finding the answer to the problem. I used a practical mixed methods approach to accomplish my research. I try to approach problems and issues in an analytical way. I start with the assumption that they can be fixed and work toward that end.

My research position was that of an outsider in collaboration with insiders, specifically because I was working with the local Saudi Arabian instructor pilots and students regarding what motivations were helping or hindering them (Webb, 2007). I enlisted Saudi Arabian teachers to ensure that I was not disrespectful of their culture. I also sought the advice of these teachers on cultural practices that may help students digest new information. I asked the students what they like and what helps them better understand the information and used their advice or comments in two keyways. First, soliciting their comments allowed the students to provide input to their training, which is one of Knowles' four learning principles (Clark, 2008). Second, I received input from the "insider," which I have always found helpful. My position was already established within the hierarchy since I had been an instructor for four years and had a good reputation. I believe this is one of the best aspects of action research—we are already positioned where the research needs to take place. Negotiating my positionality with the participants was unnecessary because I was the teacher. My position was strengthened by explaining

the purpose of the research and why it could help them improve. I explained how the research details would benefit them and increase their learning. I explained to the stakeholders how I could increase the knowledge of their officers. Vinnell Arabia (my current company) hired me specifically for the function of teaching and instructing their students. I will explain the benefits of the research to the stakeholders. My research problem had already been identified as an issue within the Aviation Institute.

## Definition of Terms

Some terms used throughout this study need to be defined or explained so that the reader and researcher have the same understanding of them (Barata et al., 2017; Gahbauer et al., 2004; MNG Aviation, 2019; Turabik & Baskan, 2015). Below is an alphabetical list of these terms and their operational definitions.

**Expatriate.** An expatriate is an individual living in a country other than their country of citizenship, often temporarily and for work reasons (Habbash & Rao Idapalapati, 2016).

**Extrinsic motivation.** Extrinsic motivation represents all the things that motivate an individual based on external rewards (Bagunaid et al., 2019).

**Gamification.** Gamification is an educational approach to motivating students to learn by using video game design and game elements in learning environments (Hamzah, Ali, Saman, et al., 2015).

**Intrinsic motivation.** Intrinsic motivation represents individuals motivations that are internal and do not seek outside rewards (Hattie et al., 2020).

**Primary.** Primary is a phase within the IERW course that concentrates on flying a helicopter without using any external cues. The pilot navigates via different instruments within the cockpit (MNG Aviation, 2019).

**Motivators.** Motivators are factors or situations that cause individuals to feel motivated to do something (Hattie et al., 2020).

**Stakeholders.** Stakeholders are individuals who have an interest in or concern for something (Mertler, 2017).

**Self-Study.** Self-study describes the study of something by oneself, such as through books, records, etc., without direct supervision or attendance in a class ("Self-Study," 2021).

# CHAPTER 2

## LITERATURE REVIEW

### Introduction

Teaching Saudi Arabian students is incredibly challenging experienced American teachers compared to teaching American students (Hamzah, Ali, Saman, et al., 2015). The motivation of Saudi Arabian students is different from that of American students, even though Saudi Arabian students must learn the same material in a language that is not their first (Springsteen, 2014).

The purpose of this action research was to evaluate the implementation of a gamification reward-based achievement system to increase the motivation of MNG students in the primary phase of the IERW flight school in the KSA. This study's specific research questions are as follows: (a) What are the students' perceptions of the influence of gamification on their motivation, and (b) What are the students' perceptions of the influence of gamification on their performance (learning)?

Moreso than American flight school students, Saudi Arabian learners who attend flight training rely upon their instructors to extrinsically motivate them to learn the curriculum to become military pilots (Habbash & Rao Idapalapati, 2016). The flight training program is designed by the U.S. military and is based upon the assumption that the learner is culturally American. It also assumes that the pilot has jumped hurdles to attain the selection to become a pilot meaning the learner already has intrinsic motivation

and does not usually require extrinsic motivation from their instructors (Al-Asmari & Rabb Khan, 2014; Cook, 2016).

A variety of strategies were used in the literature review search for articles relevant to this research study. Finding topics that were specific to Saudi Arabian military training was difficult. Most countries do not release specific documents about military training. Other searches that dealt with the U.S. military were more available. I used many different key terms to search for relevant articles. Many of the terms were combined with other topic terms to find relevant articles more efficiently, as outlined in Table 2.1.

**Table 2.1**

*Topics and Search Terms Used in Finding Relevant Articles*

| Topic | Search Terms |
|---|---|
| Military Aviation | aviation, training, flight training, military, helicopter |
| Saudi Arabia and ESL | ESL, Saudi Arabia, higher education, foreign countries, L2, learners, Arabic, UAE, cultural responsiveness |
| Learning theories | convergent parallel, persuasive, learning, self-determination theory, teaching/learning strategies, gamification, award-based achievement, game design elements, ARCS, ARCS+G, expectant theory, learning theory, and self-determination theory. |
| Motivation | motivation, intrinsic, extrinsic |
| Education Technologies | Studymate, SmartClass+, Quizlet |

Numerous databases were used in this literature search, including Academic Search Complete, APA PsycInfo, CINAHL, Education Research Complete, Education Source, Science Direct, ERIC, and Google Scholar. The primary search was for articles

published within the past five years. At times, the timeframe was stretched to include articles from the past ten years. The literature review will focus extensively on motivation and how teachers can spark intrinsic motivation by using extrinsic motivators with military flight school students. The literature review chapter is separated into four major sections: (1) motivation, (2) culture and motivation, (3) gamification, and (4) the use of gamification to increase motivation.

## Motivation

Motivation is a crucial ingredient in every learning experience. Teachers are expected to discern what a student's motivation is and tailor their teaching to encourage student learning through that motivational component. Thousands of studies have been conducted to explain, find, and foster motivating factors in students. Many different strategies have been explored to identify the motivations for students to do better in school. Finding what motivates students must be the primary goal of every teacher, curriculum designer, and instructional designer. Motivation involves arousing, persisting, sustaining, and directing students' desirable behavior (Griggs et al., 2019). Motivation describes people's actions and willingness to achieve their goals and is an integral part of the process of conceptual change in the building of knowledge within students. I will discuss motivation by explaining the following: (1) models of motivation, (2) motivation associated with academic/training performance, and (3) motivation in a military flight training setting.

### Models of Motivation

Theories of motivation are numerous and continually evolving. It is exceedingly difficult to define one motivational model that attempts to discover motivational factors within a set or group of people. Researchers have been trying to define motivational theory since the time of Aristotle and Plato. A meta-focus approach to motivation is needed, as many different motivational theories intersect with one another. John Hattie wrote an article entitled *Theories of Motivation: Integration and Ways Forward*, which investigated most of the current motivation models and distilled four basic concepts from them. Hattie stated that the four major parts of motivation are self, social, goals, and costs and benefits (Hattie et al., 2020). These four components can be found in all models of motivation.

The self-component of motivation looks at the person and how they perceive themselves. Their expectations of success, self-efficacy, confidence, or perceived capabilities to learn at different levels are examined. Students who demonstrate efficacy in learning work harder in cognitive activities and use effective training strategies. Students who are confident in their ability to learn educational material generally show more motivation (Anderman, 2020).

Students are not only worried about themselves; they also worry about what other students think of them (Sailer et al., 2017a). The social facet of motivation includes modeling, social comparisons, and relatedness. Social modeling means that the student is trying to imitate behaviors that will lead them to the desired goal. Social comparisons mean that the students continually compare themselves to each other, which breeds the motivation to be better than the other students. Relatedness is a more abstract concept in which students are motivated to feel connected to others and valued. Teachers can build

relatedness with their students by showing them how they can relate to and value each other (Rhee, 2019).

The goals component represents the most addressed concept of motivation. It is extremely common to say that people are motivated to meet their goals. Goals need to be attainable so that students can build positive motivation for self-efficacy, or their desired goals cannot be attained, which fosters negative motivation (Anderman, 2020). Goals should be attainable and should foster a sense of competence in the student. These goals can increase in difficulty as learning progresses.

Finally, the costs and benefits component are the fourth most common concept addressed in Hattie's paper. Students look at the costs of their time against the benefits they may receive. When considering cost, students include effort costs, opportunity costs, and emotional costs. Benefits can include intrinsic satisfaction, external rewards, identification of core values, compliance, autonomy or agency, and a sense of competence (Hattie et al., 2020).

Maslow's hierarchy of needs is one of the most well-known models of motivation (Trochim et al., 2016) and encompasses the four components of motivation. Maslow's model describes human motivation concerning what they need (Trochim et al., 2016). While Maslow's theory is the most popular theory of motivation, it is too broad for this paper and only described what motivates people as opposed to how they are motivated (Rhee, 2019). Maslow's theory can be explained as a subcategory of the content theory of motivation. Process theory more accurately portrays the research basis for this paper.

While researching models of motivation, two schools of motivational categories became apparent. Process theory and content theory are meta-categories into which all

models of motivation can fit (Rhee, 2019). Meta-categories are categories that categorize categories. Content theory emphasizes the reasons for changing human needs, while process theory focuses on the psychological processes that affect motivation, expectations, goals, and perceptions of equity (Rhee, 2019).

Content theory is the earliest theory related to the concept of motivation. Content theory emphasizes the reasons for motivating an individual (Su, 2017). It examines the essential requirements for motivating people. Maslow's hierarchy of needs theory is an example of content theory. Maslow's theory includes five basic needs: physiological, safety, belongingness, esteem, and self-actualization Maslow describes the five things needed for growth, which people either consider deficient (unmet) or satisfied. Unmet needs are considered deficiencies and are desired because they are unfulfilled (UYSAL et al., 2017). The need for human growth and says that the self-actualization deficit needs to be fulfilled before human growth can occur (UYSAL et al., 2017).

Process theory outlines individuals' behavioral patterns in fulfilling their needs and requirements (Rhee, 2019). Examples of different process theories include reinforcement theory, expectancy theory, equity theory, and goal-setting theory. Process theory explores how behavior is caused, sustained, or stopped by motivational factors (Rhee, 2019). Self-determination theory (SDT) is a subset of process theory because it tries to explain the "how" of motivation. Recognizing intrinsic motivators and how they can be improved upon is an example of the meta-category of the process theory.

The four components of motivation—self, social, goals, and costs and benefits—are the building blocks of all motivational theories. Motivational theories can be further classified into content and process theories that include all four motivational components

to different degrees. Motivation has a direct impact on how an individual learns. The effects of motivation are normally far-reaching because motivation increases an individual's energy level, determines their persistence in reaching a specific goal, and affects the types of learning techniques used and an individual's thinking processes (Karimi & Sanavi, 2014). SDT falls under the process theory umbrella and most accurately describes the research within this paper.

**Motivation Associated with Academic/Training Performance**

Motivation has been well established as a principal factor in adult students doing well in classes at the university level (Luke, 2015). Adult learners show a high propensity to do well in classes when properly motivated with specialized instruction in the classroom (Kálmán & Gutierrez Eugenio, 2015). Adult students have different objectives and require special modes of presenting and teaching in order to be reached (Kálmán & Gutierrez Eugenio, 2015). Intrinsically motivated students are pushed from within to do well. Extrinsically motivated individuals rely on tangible rewards such as money or other valuable items. For intrinsically motivated learners, the reward is often deeper insight or understanding. Additionally, an individual's perceptions of autonomy, competence, and relatedness are important when pursuing academic goals (Friedrich et al., 2019; Morrison et al., 2013).

Literature about flight training motivators is limited to dealing with motivating companies to buy simulators. A study performed by Kendall (2019) showed that students in flight training at Jacksonville University who had taken pre-courses prior to their flight training did significantly better than students who did not. This study is important

because students who are motivated to study outside of the classroom will perform better on tests and hands on evaluations.

Because of the flight training costs to civilian helicopter pilots, they are likely to have many different motivations for learning how to fly—otherwise, they would not pay for such training. Civilian helicopter pilots must pay the entire amount of their flight training unless they have a civilian helicopter company pay for the training. Still, the employee will have to commit to a certain expense of time or pay for the training. Civilian helicopter pilots are extremely limited to course availability choices at a traditional four-year college that teaches helicopter training. Paying for flight training is a great motivator to ensure that students do well. The civilian helicopter pilot is still required to meet a minimum hour's requirement to qualify for a company's minimum insurance requirements. Most helicopter pilot jobs allow a helicopter pilot to build time starting at $33 per hour (Park et al., 2019). The financial costs are not incurred, but the time costs are by the military pilot.

Civilian and military helicopter pilots are trained differently and have different motivations for completing their training. While civilians have many reasons for finishing training, monetary reasons tend to be the foremost motivator (Proctor et al., 2007). Military helicopter pilots start with a duty to their country as a motivator. Military helicopter pilots can also start with a love of flying helicopters, but they do not get to try flying before they start flight training. They have to start and finish the training to be helicopter pilots or be discharged from the military, which is true for both the U.S. military and KSA pilots. Military helicopter pilots usually receive more academic and hands-on training than civilian pilots. They also receive more flight hours and do not

have to pay a monetary payment for the training. In fact, they are paid for attending and completing the training. Military pilots usually have an additional service obligation after their flight training. In smaller aviation communities, such as the MNG of Saudi Arabia, pilots also have a social reason to do well. The pilots are part of a small community, as there are only 75 military helicopter pilots in the MNG. If they do poorly in training, it will follow them for the rest of their careers. The top student in the class will also receive an additional month of military pay (MNG Aviation, 2019). Military helicopter pilots have service to country, different monetary compensation, and social pressures as motivations for learning how to fly.

**Motivation in a Military Flight Training Setting**

Motivation is integral to all learning. Military training requires similar motivational training as academic and corporate training programs (Goushey, 2020). The military is unique because it concentrates on a "hands-on" training regime and a supportive academic component (Alqahtani, 2020).

The motivation for academic military instruction needs to be high during flight training. Military flight academics primarily concentrate on training students to understand and effectuate the movements necessary to fly (Campbell, 2018). Academic instruction is the foundational knowledge for aviators to understand what is happening and how to respond while in the helicopter (Park et al., 2019). These students need to understand how the controls' movements affects the helicopter and how they affect the other controls. For example, movement of the collective stick, which is on the left side of the pilot, will pitch the nose of the aircraft up and turn the nose to the right, so a corresponding movement of the cyclic stick, which is in between the pilot's legs, and the

pedals are needed for the aircraft to properly hover (FAA, 2008). The student needs to understand gyroscopic procession and how flight controls interact to perform this maneuver properly.

During the primary phase of flight school for military aviators, they must memorize four different chapters within their flight manual and be familiar with more than 20 different manuals that outline required international aviation rules (MNG Aviation, 2019). Military students concentrate on learning basic helicopter flying techniques that require them to fly the helicopter safely. The students are learning how to employ the helicopter in wartime scenarios. These high stakes are why military aviators need to be motivated to learn, retain, and utilize the information they receive.

Military students have many impediments to being motivated. The first impediment to learning is that students do not know how to study the material they are trying to learn. They use habits defined by years of pedagogical teaching (Alrabai, 2016). The students use poor study techniques, such as studying everything at one time right before the test. These poor study habits are further enforced by testing that reinforces poor study techniques (Romero & Manjarres, 2017). One of Malcolm Knowles' principles of andragogy states that adult learners need to have a stake in what they are learning to learn it (Wilson, 2012). This principle is important because the students are right on the cusp of transitioning from pedagogical students to andragogical students.

A second reason behind lack of motivation is that the information is not tailored to the students' cultural backgrounds. Curricula designed for American military students may not be the right approach for MNG students. Students find the information boring, especially when they are in classes of 20 to 30 students (Järvenoja et al., 2018).

A third source of motivational lack is digital devices, especially smartphones. Smartphones are a continual distraction from learning and teaching in the classroom (Deif, 2017). Social sciences researcher Andrew Lepp recently related several smartphone usage problems that depend on whether the user is male or female. MNG students are all male and primarily use cell phones for calling and texting. In Lepp's (2016) study, a significant amount of cell phone use negatively affected males' schoolwork and motivation (Lepp et al., 2016). My research attempted to use smartphones to motivate students to learn by encouraging them to use the devices for learning.

Military aviation officers are primarily distracted for reasons unrelated to aviation. These distractors are due to being a military officer. Even during their aviation training, they still have other duties as military officers, such as being the officer for the day or performing administrative duties within their military unit. The MNG officers attending flight training have just completed three years at the Saudi Arabia Military Academy and one year of English language training, with no breaks in between. The students reported frustration and being tired of attending courses especially one that was ten months long. MNG soldiers not receiving a vacation, or any type of break tend to have lower motivation, which becomes a distractor during training. Saudi Arabian flight training students deal with motivational impediments to regular flight training, including cultural differences in a curriculum designed by a different country the United States.

## Culture and Motivation

Culture can affect the motivation of students. Being culturally-sensitive is one way to promote motivation toward learning experiences. Motivation has been construed as an individual construct that students just need to work harder to attain. However, motivational research has shown that it is shaped by the educational, social, and cultural contexts in which the learner works (Engin & Mckeown, 2012). For example, a student learning flight training within the U.S. would have different motivations than a student learning flight training within Saudi Arabia.

Saudi Arabian flight training was designed from American flight training (MNG Aviation, 2019). Cultural differences have been described in the training for the Saudi Arabian National Guard. Not enough research has been done to determine what motivates Saudi Arabian students. In this section, I will examine (a) the attributes of Saudi Arabian students; (b) Saudi Arabian culture; and (c) religion, (d) language, and (e) motivation in Saudi Arabia.

**Attributes of Saudi Arabian Students**

Many studies have been conducted on the attributes of Saudi Arabian students. Most of the research has centered on women or students learning English. For this research study, women will not be considered, as all students are men. The MNG does not allow females to be pilots. Expatriates are the primary research subjects for English as a Second Language (ESL) studies in Saudi Arabia. Expatriates are people from other countries working within the host country (Habbash & Rao Idapalapati, 2016). Most of the research concerning the differences in motivation between American and Saudi Arabian students is centered on extrinsic and intrinsic motivators. Research shows that Saudi Arabian students rely upon instructors to provide extrinsic motivators (Springsteen,

2014). Studies show that all learning is done in the classroom and that homework should not be assigned for Saudi Arabian students (Duignan, 2012; Habbash & Rao Idapalapati, 2016). Instructors are expected to provide all instruction. This is different from the American training system. Students in the U.S. not only have to do classroom work but also homework. Saudi Arabian students are more extrinsically motivated than their American counterparts (Goushey, 2020). Instructors should provide clear guidelines for students but teaching only what needs to be learned does not instill a sense of intrinsic motivation within the student (Kendall et al., 2019).

Saudi Arabian students believe that tests, grades, and attendance are negotiable (Thurston, 2018). Most universities and even military training programs have specific rules on test-taking days. After finishing a test, students will immediately leave the classroom, and all grading of tests will be done away from the students and in private (Goushey, 2020). Students who do not agree with their test scores can challenge the test, and if there were no mistakes on the test, they would lose five points (Springsteen, 2014). Most universities and testing centers require money for students to challenge the test (Springsteen, 2014).

Most of the literature concerning Arab learners focuses on how they are different and not on which motivational factors could encourage learning. Specifically, literature on gamification within Saudi Arabia does not exist. The Ministry of the Interior is starting to employ different gamification strategies within the KSA, but studies have not been completed (Romero & Manjarres, 2017). Studies on the MNG employing deliberate gamification techniques have not been published. For security reasons, military training details are not advertised, and training and instruction is considered proprietary.

## Saudi Arabian Culture

Saudi Arabia is a monarchy, and Saud's house has been ruling the country since they unified it in 1932. Saudi Arabians have varying cultural attitudes, depending on where they come from within Saudi Arabia. Saudi Arabians who have grown up within the city have more Western values than those who have grown up in more rural areas (Byrd, 2016). Saudi Arabia is divided into tribes. A Saudi Arabian tribe is like a massive extended family. They believe that each person in a tribe is related. This leads to many complicated interactions when Westerners call students by their last name only to find that there are four or five Qahtani's within a class (CIA, 2012). It is not unusual to see many Saudi Arabians have the same last name but be unfamiliar with each other. Saudi Arabians have strong family structures that are based around the father. Many students still talk about their fathers as a strong influence and often meet with their families (Razzak, 2016). Saudi Arabians value their time and family, this can be a powerful motivator for allowing them more family time (Habbash & Rao Idapalapati, 2016).

## Religion

Saudi Arabia is home to the two most holy mosques of the Islamic religion. Saudi Arabia is where Islam began. Islam permeates every portion of the country and leads many of its people to encourage and motivate each other to observe prayer times (Habbash & Rao Idapalapati, 2016). The entire country observes prayer times throughout the day, during which all businesses and school activities are required to shut down while Muslims pray within their mosques (Ahmad, 2015). The Islamic religion revolves around the foundational memorization of prayers and customs (Byrd, 2016). Practitioners are motivated to memorize prayers, which translates directly to how students approach

schooling. They memorize but do not understand exactly what they are memorizing (Springsteen, 2014). The Quran is the primary book of Islam. The Quran is also a motivator for students because it encourages learning during a Muslim's entire life (Razzak, 2016). Saudi Arabians prescribe devotion to the reading of the Quran. Islam is a required class in all schools (Razzak, 2016). These are different motivators for Saudi Arabian students when compared to American students.

**Language**

Language can be an impediment to learning, especially aviation terms and concepts which is what is taught in IERW. Students who do not understand a language can be amotivated by receiving instruction in that language (Rhodes, 2013). Saudi Arabia is primarily an Arabic-speaking country. All schools use Arabic, which is the official language of Saudi Arabia. Arabic is a language that is read from right to left—a detail that can significantly interfere with learning English, causing negative motivation for the student (Aiguo, 2007). English is taught as a language in Saudi Arabia, but English communicative learning is not stressed within the school system (Alrabai, 2016). English is taught as a language in Saudi Arabia, but English communicative speaking (the ability to establish conversation in English) is not stressed within the school system. Saudi Arabians start with motivation to learn the language, but then the excitement tapers off to not learning English anymore (Alkaabi et al., 2017).

**Motivation in Arabian Culture**

The motivation of Arabian students is different from that of American students. Arabian students are just as motivated as their American counterparts, but for different reasons. Saudi Arabian students do not emphasize grades and attendance (Alkaabi, 2016).

Saudi Arabian military officers seem to have less motivation than American military officers. The MNG uses different military systems to maintain its military and sometimes the different systems can clash. The MNG uses a British rank system that does not allow for Warrant Officers which the US Military does. The U.S. Military system allows regular officers (commissioned officers such as Captain's and Major's) to command units and people. Warrant Officers only fly helicopters and specialize in training and flying. This allows for pilots to become more specialized and not do other Officer duties. The Saudi Arabian Military does not have Warrant Officer's and their pilots are not specialized which an American curricula system depends upon. The U.S. is now doing the training, but the culture is Saudi Arabian. Finding what will motivate students is difficult and requires a detailed study. Saudi Arabian students face the motivational challenge of studying and preparing for each day but for different reasons then American students.

## Gamification

Gamification is not a new theory, but it is becoming more widespread due to its ability to motivate participants in different fields (Lara et al., 2020). Gamification in Saudi Arabian military training has not been extensively documented. Nonetheless, a strong case can be made that one element of gamification training is in effect: The student who scores the highest for the class will receive a bonus payment. Students who are distinguished honor graduates also receive monetary rewards. Students compete for

this payment (MNG Aviation, 2019). For example, they strive to do well on tests and will even study outside of class.

Flight school students generally display a personality type that also needs to be considered. Aviators tend toward being a type "A" personality (Yazici & Altun, 2013), which can be nurtured into motivating them to study harder and longer. Specifically, aviators tend to be competitive and work obsessed (Yazici & Altun, 2013). They believe that they can do better than other people and that they are among the best pilots (Barron et al., 2016). Saudi Arabians that have shown a passing grade within a subject believe that they do not need to be tested or trained within that subject again, displaying the type "A" personality (Nash, 2016).

The following section seeks to explain gamification based on the following: (a) the concept of gamification, (b) behavioral elements of gamification, (c) sociocultural approaches to gamification, and (d) motivational frameworks for gamification.

**Gamification Concept**

Gamification is simply defined as using game elements points, rewards, leaderboards, and competition in areas that are not games, like learning and education (Çetin & Solmaz, 2020; Feng et al., 2018; Lara et al., 2020). This definition is easy to quote but does not accurately explain the complexities of the word. Rewards in gamification exemplify or amplify extrinsic motivation and seeks to change the behavior of the learner. While participating within the gamified learning system the learner should think that completing activities is joyful, which will assess a positive motivator to a task that is trying to be taught (Hamzah et al., 2015).

Gamification theory uses different strategies to accomplish motivational change. In online games, players are encouraged to use diamonds or other forms of currency to engage in activities within the game. Clever game designers exploit the players by giving them free currency for rewards, and then allowing the free currency to expire. The player will still want the rewards afforded by the activities. The game designer offers the option of paying for the currency—or they can wait. The game designer changes the behavior of the player through an extrinsic motivator. The illusion of choice is a vital part of the sale (Chittaro & Buttussi, 2019).

A unified definition of gamification is difficult to interpret because of the many fields in which gamification is used. Seaborn and Fels concluded as recently as 2015 that a standard definition of gamification did not exist; however, a standard definition has begun to emerge, largely due to the seminal and frequently cited work of Sebastian Deterding (Deterding et al., 2011).

Gamification has insidiously inundated its way into everyday life; more people than ever are playing some type of video game or being influenced by gamification strategies (Statista, 2019). Gamification incorporates many different strategies; a reward-based achievement system was used in this research. This strategy is specifically used to reward an extrinsically motived behavior until it can become an intrinsically motivated behavior (Van Roy & Zaman, 2018).

### *Gamification Elements*

Gamification is used in many different situations in everyday life. Forms of gamification cannot only be seen in the games we play today but in education and corporate environments. Some researchers posit that actual games are subsets of

gamification, whereas others suggest that gamification is part of actual games (Landers & Armstrong, 2017). Different researchers have defined gamification differently depending upon the context and use (Kapp, 2012). The literature related to this portion of the review deals specifically with how different gamification users define the word. I will examine the definitions of gamification in its applications in the field of education, review the classification and definition of various game elements in corporate venues, and describe the differences between gamification and game-based learning (GBL). I aim to clarify the emerging conceptual understandings of gamification that informed this study.

Gamification is not a new concept. Games, game elements, and play have been used to motivate, engage, and instruct individuals throughout recorded history (Deterding et al., 2011). Children play games imitating the roles they are expected to adopt later in life; militaries and organizations such as the U.S. Army award badges for exceptional shooting and driving; and multinational corporations such as McDonald's leverage games such as Monopoly to increase customer engagement and boost sales (Landers & Armstrong, 2017). People can find elements of gamification in every walk of life. I use a gym app that awards me trophies for every workout I complete. I even have an app that congratulates me on the steps I take in a day. Why is gamification unique? What sets it apart from other strategies? Understanding the origins and contexts of gamification in an educational setting is pivotal.

### *Educational Contexts*

Though gamification may still be in its infancy, serious games have rich and well-developed literature bases and educational applications. Gamification is simply the extraction and application of game elements to non-game contexts, originated not in

corporate boardrooms but in the field of with the research of Groening and Binnewies (2019) into the into the intrinsically motivating elements of games (Groening & Binnewies, 2019). Malone's (2013) research identified three intrinsically motivating categories: challenge, fantasy, and curiosity. It is upon this work and the more recent hype around gamification (Finn, 2011) that the two main definitions of gamified learning are built. Perhaps the most comprehensive treatment of gamification from an educational perspective has been *The Gamification of Learning and Instruction* by Kapp (2012). Central to this definition is the notion of game thinking, which is described as "the idea of thinking about an everyday experience like jogging or running and converting it into an activity that has elements of competition, cooperation, exploration and storytelling" (Kapp, 2012, p. 11). Kapp emphasized the social aspect of this understanding of gamification. Subsequently, he emphasized that gamification is not merely badges, points, rewards, or the trivialization of learning. While this indicates a sociocultural approach to gamification, Kapp's definition also tends to model Zichermann's in that it conflates gamification and games (Malamed, 2012). This contrasts with Landers' (2017) definition of gamification as the use of "game elements, including action language, assessment, conflict/challenge, control, environment, game fiction, human interaction, immersion, and rules/goals, to facilitate learning and related outcomes" (Landers & Armstrong, 2017). In his definition, Landers attempts to align the research literature on serious games and gamification to develop a psychological theory of gamified learning.

**Behavioral Learning Theory and Gamification**

Gamification is a tool that can be used in any learning theory. I can make a case for a constructivist or a cognitivist approach to learning for gamification. For the

purposes of this research paper, behavioral learning theory is the most appropriate. Behaviorism is the most appropriate approach because of the Saudi Arabian cultural aspect, which will be discussed more thoroughly in a later section. In the following paragraphs, I examine behaviorism through operant conditioning and reinforcement.

Though there are several types of behaviorism (Barata et al., 2017), behaviorism theory can generally be described as an attempt to interpret all behavior in terms of the observed interactions between an organism and its environment (Budiman, 2017). Learning occurs when an individual demonstrates a proper response to a stimulus (Budiman, 2017). Thus, a behavioral approach to gamification posits that rewards and other environmental stimuli can be modified to change the behavior of players/students (Kapp, 2012). This can be best understood through Skinner's (1953) concept of operant conditioning and the specific functions of reinforcement and punishment.

### *Operant Conditioning*

In contrast to Pavlov's early work on classical conditioning, Skinner (1953) took the notion of operant conditioning a step further. He demonstrated how the behavior of an organism could be reinforced to produce responses that are not necessarily natural or inherent to its being. Pavlov's work consisted of a dog salivating in anticipation of being fed, which is a natural response that could be associated with a given stimulus, such as the chime of a bell (i.e., classical conditioning). An operant conditioning example is a rat pressing a lever to receive food, which is not a natural response. Through careful reinforcement, the rat can be conditioned to press the lever to receive food. When designing a gamified learning environment, educators can consider how reinforcement and punishment can modify and produce desired behaviors.

### *Positive and Negative Reinforcement*

Reinforcers are stimuli that have been observed to increase the likelihood of a behavior (Landers & Armstrong, 2017). Positive reinforcement includes game elements such as points, badges, and leveling up (Kapp, 2012). These game elements reward players for specific behaviors and, in so doing, encourage the same behavior in the future. On the other hand, negative reinforcement also seeks to encourage future behavior, albeit through the removal of a stimulus. As an example of this, Rapp et al. (2019) cite the game *Farmville*. In *Farmville*, a player's crops die if they are not harvested within a certain period; this negative reinforcement encourages players to open the game regularly and tend to their farm.

### *Positive and Negative Punishment*

While reinforcement uses stimuli to encourage future instances of a given behavior, punishment uses stimuli to discourage future instances of a given behavior (Rapp et al., 2019). Negative punishment removes a stimulus because of a player's behavior, while positive punishment adds a stimulus because of a player's behavior. For instance, in the popular game *World of Warcraft*, dying in a certain area causes the character to drop vital ingredients. This use of negative punishment discourages the player from engaging in whatever behavior led to this consequence. While punishments are used infrequently in gamified applications for products due to the fear that they will discourage customer engagement, they are a frequent mechanic used in actual games (Rapp et al., 2019).

## Sociocultural Approaches to Gamification

In general, sociocultural learning theories draw on the work of Vygotsky, Dewey, and critical theorists such as Habermas and Freire, and argue that learning is inseparable from social context (Gagné & Driscoll, 1988). Sociocultural theorists stress the interaction between developing people and the culture in which they live. Sociocultural theory is important to this research because the culture in which the research takes place is quite different from American culture. I believe that a sociocultural approach to gamification is imperative to achieving long-term positive impacts on student learning. These ideas have been conceptualized in the terms *situated cognition* and *distributed knowledge* and will be discussed below.

### *Situated Cognition*

The theory of situated cognition posits that knowledge is situated in the activity, context, and culture in which it is used (Villamizar Castrillón, 2017). Because traditional school culture is often divorced from authentic contexts and cultures, students struggle to transfer knowledge to situations outside of the classroom environment (Villamizar Castrillón, 2017). GBL in general and gamification in particular have the potential and are well positioned to address this problem and transform traditional learning environments (Kapp, 2012). For instance, introducing the game element of simulators allows learners to situate themselves in an authentic context to learn procedures associated with starting and flying aircraft (Chue & Nie, 2016), solve problems, collaborate with others, form a personal identity, and reflect upon their learning (Sailer & Homner, 2020).

### *Distributed Knowledge*.

Distributed knowledge (i.e., distributed cognition) bridges the theoretical approaches of cognitive and sociocultural learning theories (Villamizar Castrillón, 2017) in that it focuses on interactions and cognitive tools. Whereas cognitive approaches such as cognitive information processing theory seek to use the internal processes of the mind to explain learning (Gagné & Driscoll, 1988), distributed knowledge adds that cognition does not reside solely in the mind of an individual but also in the individual's interactions with others in a specific context (Rouse, 2013). This process relies on some deduction. For example, suppose my friend and I are inside a building and cannot see outside. We both notice another person who comes inside the building with us. The person who just came in is wet. My friend and I can deduce that it is raining outside. By working in collaborative learning environments with a common purpose, students can collectively construct knowledge structures to solve problems, develop identities, and reflect upon their learning (Mullins & Sabherwal, 2020).

**Motivational Frameworks for Gamification**

Integral to a behavioral and sociocultural approach to gamification is the notion of motivation in general. While extrinsic motivation is primarily external to the learner and may occur through operant conditioning methods, intrinsic motivation is primarily driven from within the learner. It must be explained according to psychological theories of motivation and guided by theory-based instructional design frameworks (Van Roy & Zaman, 2018). The purpose of this section is to briefly review the key motivational theories and frameworks used in the research literature to explain and implement gamified learning systems. Specifically, I will review (a) flow theory, and (b) self-determination theory (SDT).

### *Flow Theory*

Flow theory describes the mental state of being fully immersed in an activity (Oliveira dos Santos et al., 2018). A more colloquial phrase for this is *being in the zone*. The task needs to be optimally challenging; if the task is too easy, the player will become bored and exit the state of flow—but if the task is too difficult, the player will experience anxiety and lose flow (Oliveira dos Santos et al., 2018). While flow is difficult to achieve in a game or gamified learning environment, it can act as a framework and goal for which designers can aim (Kapp, 2012). Research indicates that the conditions for flow are especially prominent in a gamified learning environment (Taliaferro, 2018).

### *Self-Determination Theory*

Self-determination theory was chosen because the study aimed to determine whether we can change students' behavior by wanting them to intrinsically motivate themselves through a change with extrinsic motivators (Mekler et al., 2017a). Self-determination theory deals primarily with an individual's intrinsic motivations but also describes extrinsic motivation theories. This study sought information on the impact on motivation by implementing a gamification strategy to change extrinsic and intrinsic motivators.

Intrinsic motivation represents all the things that motivate an individual based on internal rewards (Hattie et al., 2020). Intrinsic motivation can be determined internally by the individual and externally by sources such as conditional variables and environmental factors (Hamzah, Ali, et al., 2015). Extrinsic motivation is associated with individuals who engage in learning because it is a means to an end that is relatively disassociated from the content and subject of learning (Buckley & Doyle, 2016).

SDT proposes that humans are active organisms. People are continually expanding their consciousness and conquering obstacles as they see them. SDT creates new experiences and allows the new experiences to define them as people. This perspective also identifies three innate needs that must be satisfied for an optimal existence: autonomy, competence, and relatedness (Sailer et al., 2017).

Autonomy is the desire to be the guiding force in one's own life. Autonomy does not mean that they must be separate from people, but it does mean that they have to be true to their own self (Mekler et al., 2017a). Students need to feel that they have autonomy in the choices they make toward their learning (Anderman, 2020). When students have a greater choice in selecting how they will learn, they can feel a greater sense of autonomy, thereby increasing their motivation (Jiang et al., 2018).

Competence is defined as a student seeking to control the outcome and experience mastery of what they are trying to learn. Competence is the prime reason the self-determination theory was chosen—because praise delivered at the right time can increase students' intrinsic motivation (Sailer et al., 2017). Teaching flight school allows teachers to give instant praise and feedback to help increase students' competence. Instructors are continually giving students praise or corrections immediately following maneuvers in the aircraft so students can increase their performance on the next attempt. Students in flight training need to not only master the academics but also the physical aspects of flying.

The self-determination theory states that relatedness is how students interact with and connect to other students. Relatedness recognizes that students will seek to stay within a social group and feel a sense of belonging (Deci & Ryan, 2015) Students can have a greater sense of motivation when they are doing well. They can react differently

depending upon their status within the classroom. For example, being behind in grade point average can either demotivate or motivate a student, depending upon that student. Relatedness can also refer to how students treat each other and how they either help or belittle them (Sailer & Homner, 2020). Education fosters this theory by creating cohorts.

## Chapter Summary

Saudi Arabian students' lack of motivation to study outside the classroom is a significant problem for expatriates teaching in Saudi Arabia. Many ESL teachers report a substantial difference between American and Saudi Arabian students in terms of attendance, grades, and motivation. Saudi Arabian flight school students are required to work extensively outside the classroom to complete and understand assignments for their flight training.

A behaviorist approach to teaching flight school students will be tried by using gamification as an intervention. Specifically, an operant conditioning theory of behaviorism will be used to motivate students to study outside of the classroom. Self-determination theory is also important for students in choosing how they will participate in this research study. Gamification has been shown to increase students' motivation to study.

The literature gap indicates a need for gamification to be used on Saudi Arabian students and in a military setting. There is no available literature indicating studies on Saudi Arabian military students. Some literature exists concerning American military students, but this does not necessarily translate across cultures.

# CHAPTER 3

# METHODS

## Research Design

Action research is best defined as any systematic inquiry conducted by teachers, administrators, counselors, or others with a vested interest in the teaching and learning process or environment to gather information about how their schools operate, how they teach, and how their students learn (Mertler, 2017). I currently manage the IERW course for the Saudi Arabian National Guard. I have noticed a lack of students studying outside the classroom. I have asked students whether they study at home, and they almost always answer with a negative. After classes, students continually leave their study materials on their desks. This action research study sought information on students' perceptions of their motivations by adding gamification as an intervention. Action research involves the researcher as a participant with a vested interest in the purpose of the study (Mertler, 2017).

Action research is an appropriate method for exploring MNG students' motivational issues because I conducted the research within my own professional context. This study sought information regarding MNG students' motivational changes based on a program that used the students' inherent desire to do well by encouraging them to compete to increase their knowledge and motivation. Action research allowed me to examine the motivational problem by implementing an evaluation of their learning

process within my course and examining gamification's effects on increasing students' motivation to learn.

Action research concentrates on a problem that is within the researcher's purview (Mertler, 2017). Traditional research uses a more generalized approach, and the data is more generalizable—not specific, like action research. This action research study was an appropriate approach because it is related to the students I teach. This study sought to integrate a gamification system to motivate students. By allowing the students to compete and earn awards with gamification, this study encouraged them to be involved in their learning process.

This study featured data collection and analysis using the convergent parallel mixed methods. This type of research design utilizes both qualitative and quantitative data (Mese & Dursun, 2019). The convergent parallel mixed method merges both types of data to provide a comprehensive analysis of the problem (Creswell, 2018). This research design is suitable because I needed to collect qualitative and quantitative data at the same time, at both the beginning and the end of the data collection period. This research relied heavily on qualitative data. A portion of the data collection was quantitative, which aided in the triangulation of the data. The predominantly qualitative approach was critical to understand the students' feelings and thoughts about the gamified intervention. Quantitative data were collected from the MNG students' pre- and post-tests using the SIMS. It was essential to include a quantitative data approach because it lent rigor and trustworthiness to this study by strengthening and supporting the qualitative data through triangulation.

## Research Setting and Participants

### Research Setting

This study took place at the Aviation Training Institute in Dirab, Saudi Arabia—the premier MNG training institute. The setting for the research can be understood in three significant contexts: (a) student background, (b) student difficulties, and (c) instructional setting.

#### *Student Background*

IERW students first start their military careers at the Military Academy. The Military Academy is taught exclusively in Arabic, and classes consist primarily of history and military tactics. After the Military Academy, the students completed approximately one year of English language training and a specialized English course designed specifically for aviation operations. The IERW training consists of four training phases: primary, instruments, basic combat skills, and night vision goggles. All four phases require intense study and a thorough understanding of all aviation materials. IERW itself consists of 84 formal classes and many informal classes. The curriculum is adapted from the U.S. Army's IERW course. Changes have been made to accommodate longer flight times and increased academics to teach the lessons in a second language (i.e., English) for the students.

#### *Student Difficulties*

The primary phase of the training is the most academic and provides the best data-gathering opportunity for action research. The primary phase occurs at the beginning of the training program. Students beginning IERW are typically overwhelmed by the amount of information they must learn and remember. They are also trying to adjust to an

entirely new learning system. Understanding all the new aviation materials in a second language (English) and using a unique learning methodology can be daunting. Students begin IERW in the primary phase, which consists of four weeks of academics and five weeks of flying. The primary phase also includes four academic tests and a flight evaluation. Students tend to have more self-confidence and start to relax after passing the academic tests. Students are generally familiar with the IERW process and not burdened by adapting to a new learning process.

Students expressed difficulty in learning aviation concepts in English. English uses different rules and syntax than Arabic. Arabic tends to be a phonetic language, and English uses many rules and words from other languages. Differences in languages tend to frustrate students (Romero & Manjarres, 2017). When asked direct questions, students will answer affirmatively even if they do not know the answer, because they do not want to look like they do not understand. Students also have trepidation over the presentation of material and classroom discipline. The IERW training was modeled after an American military flight school. As such, there is strict adherence to punctuality, regular attendance, and prior preparation for class, which are not as crucial in Saudi Arabian culture (Springsteen, 2014). As a result, the differences between students' and their teachers' cultural upbringings and educational backgrounds reveal a lack of motivation for students to study the material and appropriately prepare for class.

### *Instructional Setting*

This action research study took place in the IERW wing of the Aviation Institute Training Division (AITD) and the AITD training area, which encompasses three different buildings and approximately 120 square kilometers of desert. Specifically, the class was

taught in AITD building. Other training locations included an MD530F simulator and other airfields. The MD530F simulator is a non-motion simulator that replicates the use of instrumentation provided in the aircraft for navigation and cockpit procedural training. Procedural training in the simulator is safer for the aircraft, as there is less chance of damage to the helicopter when the students start inside the aircraft or when the instructors simulate emergency procedures that require immediate action by the pilot. Students were provided with a desktop computer. The classroom had a 65-inch touch-screen computer board. Students spent 10 hours in the simulator, 10.2 hours of flight, and 125 hours in academic training. Finally, students were encouraged to use their smartphones while on a break to access Quizlet, one of the tools used in the intervention.

**Participants**

The student population for the IERW courses is 24 students per year. All students are MNG officers who have recently graduated from the MNG Academy, the equivalent of the U.S. Army's West Point. Students are required to complete a K-12 education, just as in the U.S.

The participants for this action research study were chosen using the purposeful sampling method. Purposeful sampling is a non-probability method that the researcher can use to select a population based on the specific characteristics of the study's objectives (Creswell & Creswell, 2018). The MNG does not permit females to participate in military service, so all participants were males 23–28 years of age. This action research study focused on eight then-current students as participants, as they were the only students receiving the primary phase of training during the timeframe of data collection. Students were given different names to keep their identities confidential.

One student had attended a military school in the U.S. All the other students have only attended schools within Saudi Arabia. All students have attended the Aviation Institutes one-year English language training. The English language training is a proficiency-based school. Flight School students are required to score an 80 out of 100 on the American Language Course Placement Test (ALCPT). The ALCPT assesses English proficiency through items that evaluate comprehension of grammar and vocabulary through the modes of listening, and reading (MNG Aviation, 2019).

It is vital to maintain their confidentiality because their performance will be remembered for the rest of their MNG careers. The MNG is a small unit, and commanders talk about students.

## Intervention

This action research used gamification as a tool to provide an arena within which students could compete. Specifically, it assessed the effects of using gamification to increase the motivation of flight school students. Gamification has become a widespread technique in which teachers use game elements in non-game contexts (reference). Teachers can increase participation by rewarding desired behavior (Landers & Armstrong, 2017). The gamification intervention in this study was designed based on a robust theoretical background, which is described as follows.

### Theoretical Background

The intervention was shaped by three theories: gamification, self-determination, and operant conditioning. Each of these theories played a role in informing the design of the gamification intervention. The following sections describe and illustrate the components of each theory within the intervention design.

Gamification was the main theoretical framework of the intervention. Gamification theory uses different strategies to accomplish a change in motivation. It is defined as the use of game attributes outside the context of a game with the purpose of affecting learning-related behaviors or attitudes (Fulton & Howard, 2019). The specific activities were designed according to flow theory. Flow theory describes the mental state of being fully immersed in an activity (Oliveira dos Santos et al., 2018). Activities were designed to add a level of difficulty to the students but not make it to hard that they could not complete the activities.

The intervention incorporated the gamification elements of badges, achievements, rewards, and points. Badges are a strategy that involves a setting and a recognition device that motivates players to work hard toward gamification objectives (Van Roy & Zaman, 2018). When participants in a gamified initiative are regularly notified of their goals and achievements, this feedback allows for a sense of progression, motivating them to learn more and achieve better results (Domínguez et al., 2013). The thought of achieving the reward motivates the student to study more and become an expert on the topic, leading to better retention and recall. Points are a way to track progress and provide feedback to students. Points can be awarded based on an achieved objective or desired behavior (Deterding et al., 2011). Rewards in e-learning gamification create a sense of achievement and recognition among students that makes them feel like they have accomplished something (Deterding et al., 2011). These gamification elements aimed to encourage students to be more motivated to perform more independent study. This study used Quizlet, worksheets, and IERW course-mandated activities (such as tests, homework, and students' discipline) to compete against each other. Students were

awarded points for each activity they completed. Independent study activities were awarded more points.

Self-Determination Theory is incorporated into gamification to help students build competence, autonomy, and relatedness (Deci & Ryan, 2015). Recognizing competence is vital to students because it lets them feel like their hard work leads to accomplishments (Springsteen, 2014). When students completed an independent study session, they were rewarded after every study session at the end of every week. Independent study sessions were scored online with immediate feedback. Students could also choose not to complete any independent studies and still be allowed to participate within the gamification system. Autonomy allows students to select how they will accomplish their goals (Alrabai, 2016). In the intervention, students could choose which independent study methods they would like to complete each week. Connections to peers and the intervention program were essential for students to see so they could understand that they were participating in the same extensive experience with others (Alrabai, 2016). From the leaderboard, students saw their total earned points and where this placed them in relation to their peers.

Another theory that guided the intervention design was operant conditioning, which is a sub-theory of the learning theory of behaviorism. According to operant conditioning, behavior is controlled by consequential historical contingencies, particularly reinforcement, which is a stimulus that increases the probability of performing actions (references). Punishment is another stimulus that decreases this likelihood (Goushey, 2020). Operant conditioning theory is compatible with a gamified learning environment (Budiman, 2017) because operant conditioning theory rewards

positive behavior. This intervention used only positive reinforcement instead of both positive and negative as per operant conditioning theory. The intervention was designed to provide points that students could redeem for rewards. According to operant conditioning theory, a theoretical change in motivation would be encouraged by rewarding students' independent study (Budiman, 2017). Table 3.1 shows how these three learning theories were incorporated within the gamification intervention.

**Table 3.1**

*Alignment of Theories to the Gamification Intervention*

| Learning Theories | Components of Theory | Incorporation of the Theory into the Intervention |
|---|---|---|
| Gamification | 1. Badges | - Badges were awarded upon receiving different desired behaviors. |
| | 2. Achievements | - Achievements were awarded upon attaining milestones within the intervention. |
| | 3. Points | - Points were awarded for completing desired behaviors |
| | 4. Rewards | - Rewards were issued upon turning in points. |
| | 5. Leaderboards | - Leaderboards were displayed for students to compare with each other. |
| Self-Determination | 1. Competence | - Badges, achievements, and points allowed students to perceive a sense of accomplishment for completing activities. |
| | 2. Autonomy | - Students could choose the independent study activities in which they would like to participate.<br>- In addition to independent study, students received points from numerous activities that they were mandated to complete, but they chose how much they participated. |

| | | | |
|---|---|---|---|
| | 3. Connections | - | Leaderboards provided a sense of connection between other students completing the activities and struggles. |
| Operant Conditioning | 1. Positive reinforcement | - | Badges, achievements, rewards, and points were awarded to students upon completion of the desired behaviors. |

Classic gamification elements such as badges, achievements, rewards, and points were embedded into the intervention for the flight students to transition from the video games they played regularly (Call of Duty and PUBG) to the intervention experiences. The intervention presented similar gamification components that introduced flight students to learning concepts and behaviors to increase their motivation to study individually (Deterding et al., 2011; Landers & Armstrong, 2017). Students who join flight school tend to be competitive, and a gamification system, informed and designed by learning theory, leverages that trait to promote learning and motivation (Yazici & Altun, 2013).

**Intervention Design**

My intervention design focused on key gamification elements. The aim of this study was that, when combined in a meaningful way, these various gamification elements would support a beneficial learning experience. I organized the following sections into (a) activities; (b) frequency, badges, and achievements; (c) rewards; and (d) leaderboard.

**Table 3.2**

*Gamification Activities per Week*

| Week | Activities |
|---|---|
| One | - Quizlet assessments<br>- Work Sheet<br>- Flipgrid video |

| | |
|---|---|
| | - Academic Test<br>- Behavior check-in |
| Two | - Quizlet assessments<br>- Work Sheet<br>- Flipgrid video<br>- Academic Test<br>- Behavior check-in |
| Three | - Quizlet assessments<br>- Work Sheet<br>- Flipgrid videos<br>- Academic Test<br>- Behavior check-in |
| Four | - Quizlet assessments<br>- Work Sheet<br>- Flipgrid video<br>- Academic Test<br>- Behavior check-in |
| Five | - Quizlet assessments<br>- Work Sheet<br>- Flipgrid video<br>- Homework assessments<br>- Behavior check-in |
| Six | - Quizlet assessments<br>- Work Sheet<br>- Flipgrid video<br>- Homework assessments<br>- Behavior check-in |

***Activities***

The gamification intervention was divided into six modules, as shown in Table 3.2, with each module consisting of gamified activities. The module weeks started on Sunday and ended on Saturday. Points were a currency for rewards that a student could select for performing activities. Each module had a total of 100 potential points. The total

number of topics was reset to zero at the end of each module. Students were unable to carry assignments into the next module to earn more points.

**Table 3.2**

*Gamification Maximum Points per Activity*

| Activity | Week One | Week Two | Week Three | Week Four | Week Five | Week Six |
|---|---|---|---|---|---|---|
| Quizlet assessments | 30 | 30 | 30 | 30 | 30 | 30 |
| Work Sheet | 30 | 30 | 30 | 30 | 30 | 30 |
| Flipgrid videos | 10 | 10 | 10 | 10 | 10 | 10 |
| Academic Tests | 20 | 20 | 20 | 20 | NA | NA |
| Homework assessments | 0 | 0 | 0 | 0 | 20 | 20 |
| Behavior check-ins | 10 | 10 | 10 | 10 | 10 | 10 |
| **Total Badge Points Possible** | **100** | **100** | **100** | **100** | **100** | **100** |

The gamification system involved six activities: Quizlet assessments, worksheets, Flipgrid videos, academic tests, homework assignments, and behavior check-ins. The three first assessments were classified as independent studies, whereas the latter were classified as mandatory studies. The students engaged in each activity regularly during each week of the intervention implementation. The following sections will address each activity in detail.

### *Quizlet Assessments*

Quizlet is an online multimedia program that provides quizzes, games, and tests to increase learning. Quizlet reintroduced topics that the students may have forgotten and supplemented students' learning through a digital medium with which students were familiar. Students were able to download the Quizlet application onto their phones for an easy way to study. Quizlet was not mandated within the IERW curriculum. This was considered an independent study method for achieving points. The Quizlet assessments of this intervention were worth 10 points each and were weighted more heavily than the

other activities because they were done outside of the classroom. Students had to complete the daily assignment within Quizlet to earn the full points. Points for Quizlet assessments were tallied at the end of each week. For students who did not complete an activity, the total number of points earned per activity was still averaged based on five days' worth of assignments. For example, a student who completed three days of Quizlet earned 30 points, which would be entered on the gamification leaderboard.

### *Worksheets*

Worksheets were an optional way to earn points within the gamification intervention. Worksheets were a conglomeration of check on learning questions (questions within the course material) within the PowerPoints (class presentations), student handouts, and lectures. Each worksheet was specific to the test the students took that week. Table 3.3 displays which worksheets were available for the students to complete during each module and their subject matter.

**Table 3.3**

*Worksheet Assigned by Module to Include Subjects*

| Module | Subject |
|---|---|
| 1 | Aeromedical principles, terms, and theories |
| 2 | Aerodynamic principles, terms, and theories |
| 3 | MD530F Systems 01 |
| 4 | MD530F Systems 02 |
| 5 | Traffic Pattern Flight |
| 6 | Visual meteorological conditions: take off, maneuvers, and approaches |

### *Flipgrid videos*

Flipgrid is an online journaling tool designed for students to make small videos. This intervention used Flipgrid as a way for students to earn points during each module by journaling. Students were to respond to the same three questions each week and record their answers in 45-second videos. The questions were designed to relate directly to the research questions. Students received points based on submitting answers only.

### *Academic Tests*

Academic tests are mandatory in IERW and are essential for the course to gauge how well students are performing. One academic test was conducted each week for four weeks. The academic tests measured how much the student had retained from lectures, class materials, and studying outside the classroom. Academic tests were scored for a total point value of 100 but were modified for inclusion within the intervention. The academic test score was multiplied by the student's score from the test and then annotated on the gamification leaderboard. The academic test's percentage score was multiplied by the maximum points available to determine the student's score. For example, if a student received a score of 76% on their test, the value of 0.76 was multiplied by a point value of 40 (the maximum points available), equaling 30.4. The 30.4 would then be entered into the gamification worksheet for the applicable student.

### *Homework Assessments*

Homework was designed for the flying portion of the IERW course and occurred only within weeks five and six. Homework was intended for the students to respond to short-answer questions and indicate whether they found the answer within their study materials. The questions consisted of short answers that the students would have to find within their study materials. The homework consisted of five sets of questions designed

to be completed daily. Students received two points each day they completed the homework. Students received points based for the days they completed homework within the week.

### *Behavior Check-Ins*

Appropriate behavior that is conducive to learning is essential for the dissemination of information and for enforcing rules within the classroom. Detrimental conduct for this activity's purposes included being late, speaking in Arabic, using a cell phone at an inappropriate time, not being prepared for class, and talking out of turn. Each student began each class with 10 behavior points. Behavior is an activity such as attendance that is required for the Ministry of National Guard every day. Students would never lose points within the intervention for inappropriate behavior they would just not receive points.

### *Frequency, Badges, and Achievements*

Table 3.2 displays the badges and achievements students could earn and the frequency with which each was awarded. Achievements are things done successfully that require effort, skill, or courage (Hamza & Helal, 2013). Academic tests were given at the end of each week after completing the test within each module, and achievements for these activities were earned weekly. Achievements and badges for Quizlet assessments, homework assessments, and behavior check-ins were issued only at the end of the sixth week. Behavior check-ins comprised two additional achievements for students.

Badges are a visual representation of achievements (Çetin & Solmaz, 2020). Badges were a mark of honor that the students were able to see on the leaderboard. They were designed to resemble the aviator wings that the students would earn upon

completion of flight training. The names for the badges were consistent with a military naming convention that sees *Master* as the highest badge and *Pilot* as the lowest or entry-level badge. The badges were colored to denote the status of the badge. Gold was the highest, followed by silver and then bronze. Students could earn the *Most Present* achievement for not missing any periods during the six weeks. Students could also earn the *English Master* title for not speaking Arabic within the classroom.

**Table 3.4**

*Gamification Module Achievements and Badges*

| | **Awarded (Frequency)** | **Badges (Specific to Achievement)** | **Achievements (Points earned)** |
|---|---|---|---|
| **Quizlet Assessments** | Week Six | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 162-180<br>Senior = 144-161<br>Pilot = 143-144 |
| **Work Sheet** | Week Six | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 162-180<br>Senior = 144-161<br>Pilot = 143-144 |
| **Flipgrid Videos** | Week Six | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 162-180<br>Senior = 144-161<br>Pilot = 143-144 |
| **Academic Test** | After Each Weekly Test | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 162-180<br>Senior = 144-161<br>Pilot = 143-144 |
| **Homework Assessments** | Week Six | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 36-40<br>Senior = 32-35<br>Pilot = 28-31 |
| **Behavior Check-Ins** | Week Six | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 54-60<br>Senior = 48-53<br>Pilot = 42-47<br>Most Present<br>English Master |
| **Total** | Week Six | Master – Gold<br>Senior – Silver<br>Pilot – Bronze | Master = 540-600<br>Senior = 480-539<br>Pilot = 420-479 |

***Rewards***

Points were a currency given to students to measure against other students and were used to purchase rewards. I distributed points to students based on how well they completed gamification elements. For example, completing modules within Quizlet, earning high grades on academic tests, demonstrating desirable behavior, and submitting successful homework were ways to earn points. Table 3.5 outlines how students could earn points per activity.

**Table 3.5**

*Gamification Awarding of Points per Activity*

| Gamification Activity | How to earn points per week | Point amount awarded |
|---|---|---|
| Quizlet Assessments | - Complete "Learn" function within Quizlet | - One completion is equal to six points |
| Worksheets | - Complete all questions within the worksheet | - Full point allowance |
| Flipgrid Videos | - Answer all three questions | - Full points for completion |
| Academic Tests | - Complete test | - Academic tests are modified per score. |
| Homework Assessments | - Complete Homework | - Full point allowance |
| Behavior Check-Ins | - Good behavior each day | - Points are awarded as a percentage of days |

Students completed activities to earn points they could redeem for rewards. Table 3.6 outlines the rewards and how many points each was worth. The phases apply to the students' then-current training phase. The academic phase was the first phase and spanned the first four weeks. The flight phase was the last two weeks. The type of reward

was specific to each phase of training. Each of these rewards was the ultimate reason for students to continue learning outside of the classroom.

**Table 3.6**

*Gamification Rewards per Week*

| Reward | Phase | Price (points) |
|---|---|---|
| Take a day off | Flight | 300 |
| Skip one iteration of homework | Flight | 60 |
| Go home after flight | Flight | 100 |
| Make a friend do the daily brief | Flight | 30 |
| Cancel one period of being late | Any | 60 |
| Does not have to answer questions from the daily class | Academics | 60 |
| Miss study hall | Academics | 50 |

***Leaderboard***

The leaderboard displayed the current total point leader and was updated daily. The leaderboard was communicated to the students on the 65-inch monitor at the beginning of the day. Students were also able to access the leaderboard via their phone on Google Drive. I used the Google sheet in Figure 3.1. The leaderboard was maintained on Google Drive so that all students could see it. The student with the greatest number of overall points was displayed first on the leaderboard. The leaderboard also displayed points earned and the number of unredeemed points the students had. Within those meta-categories, a current breakdown of points per category was also shown. The students chose names that were known too only themselves and me.

*Leaderboard Display*

| | | | | | Totals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Student Name | Rank | | Current Points | Total Points | Quizlet (30) | Worksheet (30) | Flipgrid (10) | Assign/Home | Academic Test (20) | Behavior (10) |
| Leopardo | 1st LT | 1 | 60 | 60 | 30 | 30 | 0 | 0 | 0 | 0 |
| G.O.A.T | 2nd LT | 2 | 60 | 60 | 30 | 30 | 0 | 0 | 0 | 0 |
| Lord | 2nd LT | 3 | 60 | 60 | 30 | 30 | 0 | 0 | 0 | 0 |
| black blast | 2nd LT | 3 | 60 | 60 | 30 | 30 | 0 | 0 | 0 | 0 |
| sharp | 2nd LT | 2 | 60 | 60 | 30 | 30 | 0 | 0 | 0 | 0 |
| Nys | 2nd LT | 2 | 60 | 60 | 30 | 30 | 0 | 0 | 0 | 0 |

*Figure 3.1. Leaderboard Display*. The leaderboard shows what the intervention leaderboard displayed within Google Sheets.

## Data Collection

This study employed four different data sources to answer the research questions. Three were qualitative data sources: student interviews, the Weekly Motivational Perception Survey (WMPS), and Flipgrid videos. Two were quantitative data sources: the SIMS and the first five questions of the WMPS. A team of translators helped shape the instruments to capture responses with the same accuracy as if I were posing the questions to native English speakers. The instruments are presented below, including what elements were modified to tailor them to this research. This study also sought Institutional Review Board (IRB) approval before implementing the intervention. The IRB approval letter is in Appendix A. Table 3.7 shows the alignment between the research questions and the data collection sources.

**Table 3.7**

*Data Source Alignment Table*

| Research Question | Data Source |
|---|---|

| | |
|---|---|
| 1. What are flight students' perceptions of the influence of gamification on their motivation? | - Student Interview<br>- WMPS<br>- Flipgrid videos<br>- SIMS |
| 2. What are flight students' perceptions of the influence of gamification on their performance (learning)? | - Student Interview<br>- Flipgrid videos<br>- SIMS |

**Qualitative Sources**

***Student Interviews***

Due to the small size of the IERW classes, all students were invited to participate in the student interviews. The questions for the interview protocol in Appendix C were modified from the SIMS to examine the research questions. I created the student interview questions to explore the different perceptions that existed between the students and myself. Knowing the perception differences that motivate Saudi Arabian students will allow me to motivate them better to learn. My modifications were inspired by my literature review and were designed to explore the problem of student motivation or the problem of the students' motivation.

The first four questions originated from the SIMS and were modified specifically to ask about gamification. They were designed to explore the perceptions of the students before and after the implementation of gamification. The pre–intervention interview examined the students' perceptions of gamification as a motivator prior to the intervention, and the post–intervention interview examined their perceptions of gamification as a motivator after the intervention.

- The next three questions originated from the SIMS (Standage et al., 2003)and were designed to examine students' perceptions of learning from gamification. I chose

these three questions because it is essential to ask the students what they think will help them be more motivated (Wilson, 2012). The final three questions also originated from the SIMS (Standage et al., 2003) and were modified to ask about the students' perceptions of gamification as a good motivator. For example, "I believe doing gamification activities will be good for me," was changed to "Do you think gamification will affect your performance, and why?"

They were also designed to ask the students what they thought would motivate them besides gamification. These questions were important to capture the participants' feelings and thoughts within the learning process and if they perceive gamification as a worthwhile intervention.

The post-intervention interview questions were modified from the SIMS and changed to show past tense from the pre-intervention interview questions. The questions were shaped by the literature review (Ahmad, 2015; Romero & Manjarres, 2017). Because I structured the gamification intervention around behavioral learning theory, I modified the interview questions from the SIMS using operant conditioning theory and reinforcers. Questions were included such as "Please tell me about your use of gamification, was it useful?" and "Do you think the rewards are enough to motivate you to do more studying and why?" These questions asked about the reinforcers, which are part of operant conditioning theory.

I also had my review team look at each of the interview questions, and they found them to be appropriate for the students to answer. They also verified that the questions were related to the research questions. A semi-structured interview was conducted with each participant. A semi-structured interview changes the order of the questions and

allows for different interview strategies to clarify or probe specific responses when appropriate (Creswell, 2018). The interviews lasted approximately 20–30 minutes. Abdullah, the translator, was present during the semi-structured interviews.

The students were primarily Arabic speakers with potential difficulties understanding the syntax of questions or fully expressing their thoughts and meanings in English. Follow-up interviews were scheduled if trends and themes required additional data. An interview protocol is a guide plan used to develop interview questions that align with the research questions (Creswell, 2018). The student interviews followed protocols that addressed the research questions. Follow-up questions were used when necessary. The students' perceptions of how gamification affected their motivation levels were collected to compare against students' SIMS surveys.

The interview questions were aligned with the research questions. The interview design sought to explore the perceptions of the students participating in the study. Table 3.8 shows the relationship between the research questions and the interview questions.

**Table 3.8**

*Research Question and Interview Question Alignment*

| **Research Question** | **Pre-intervention Interview Questions** | **Post-intervention Interview Questions** |
|---|---|---|
| 1) What are flight students' perceptions of the influence of gamification on their motivation? | - Do you think gamification will be useful to you, and why?<br>- Do you think gamification will motivate you to work outside of the classroom, and why?<br>- Do you think the activities involving gamification will | - Did you find gamification useful, and why?<br>- Did you feel motivated by using gamification to study outside the classroom, and why?<br>- Did the gamification activities alter the way you studied, and how? |

| | | |
|---|---|---|
| | motivate you to study more, and why?<br>- What motivates you to study outside of the classroom?<br>- Do you think the rewards are enough to motivate you to do more studying, and why?<br>- Can you describe any other methods or strategies that might positively impact your motivation, and why? | - Did gamification motivate you to study outside the classroom, and how?<br>- Were the rewards enough to motivate you to do more studying, and why?<br>- Can you describe any other methods or strategies that might positively impact your motivation, and why? |
| 2) What are flight students' perceptions of the influence of gamification on their performance (learning)? | - Do you think gamification will affect your performance, and why?<br>- Do you think the repetition of activities will help you retain information better, and why?<br>- Do you think gamification could help you learn more, and how? | - Can you describe how gamification affected your performance, and why?<br>- Do you think the repetition of activities helped you retain information better, and why?<br>- Do you think gamification helped you learn more, and how? |

***Weekly Motivational Perception Survey***

Open-ended questions allow students to express their thoughts and feelings without being contained within a structured answer format (Carter et al., 2014). I chose a weekly survey format because having students journal their experiences was not practical due to my student population. I talked to my review team about journaling, and each of them thought it would not be a good idea because the students would not write a lot. They agreed that Likert scale items and short answer questions were the best methods for

eliciting the intended data. IERW students are asked to work 10 hours a day, giving them little time for activities that do not involve studying. The last day of the week is shortened to allow the students a break. I gave the students the WMPS before revealing their point totals on the last workday of the week. I chose this time to answer the questions so that their perceptions would not be clouded by their point totals.

The open-ended questions consisted of (a) What rewards do you want to earn next week? and (b) How would you improve this gamification system? The rewards question was essential because it gave the students a chance to express what types of rewards were important to them. Open-ended questions were created to apply to RQ 1 because it was used to modify rewards and improve gamification as a motivator. I chose this question because most of the selected rewards would be based upon an American's needs and wants. It is important to understand what a Saudi Arabian student would want to receive as a reward (Da Rocha Seixas et al., 2016). This question was taken from the end-of-phase and end-of-course surveys that are regularly given to the students. They have received these types of surveys since they started English training.

The last question aligns with RQ 2. It was also taken directly from the last student interview question. For example, if a student says, "that more points should be given for academic tests," then a change to the gamification intervention can be made. This question was crucial because it is exceedingly difficult to understand what problems or issues students have with gamification. After all, they will not tell you. Students are more apt to anonymously write what they think of gamification (Çetin & Solmaz, 2020). Students are familiar with this type of question format and its meaning, since it is a

standard question asked on all end-of-phase and course surveys. The WMPS is in Appendix C.

**Flipgrid Videos**

Flipgrid was used as an activity each week. Students were required to make videos with a length of at least 60 seconds and answer the three questions in Table 3.9 to earn their points for the week. Students used accounts that were set up for them prior to day one. The questions were designed from the research questions and the research question to question alignment is in Table 3.9. They were then modified for ease of understanding by ESL students. Flipgrid was chosen as a journaling tool to capture any thoughts the students might have that were not captured by the other data collection tools. All three questions were chosen because they relate to the research questions. I reworded the Flipgrid questions to ask the students what their perceptions were based on the research questions. I also had my translation team inspect all three questions for ease of understanding for the students. Table 3.9 describes the questions for Flipgrid and how they align within this study.

**Table 3.9**

*Research Question and Flipgrid Question Alignment*

| Research Question | Flipgrid Question |
|---|---|
| 1. What are flight students' perceptions of the influence of gamification on their motivation? | - Please explain whether the activities this week have motivated you. If they have, how so?<br>- Please explain if you think completing activities is a good tool for motivation. Why or why not? |
| 2. What are flight students' perceptions of the influence of | - Please explain if you think participating in the activities has |

| | | |
|---|---|---|
| | gamification on their performance (learning)? | helped you do better on tests. If so, how? |

## Quantitative Sources

### Situational Motivation Scale

Changes in motivation were measured quantitatively by evaluating the participants' responses to the Situational Motivation Scale (SIMS) before and after the intervention. The SIMS (Guay et al., 2000) was developed to measure the motivation individuals experience when they are currently engaging in an activity. It refers to the "here-and-now" of motivation (Vallerand, 1997). In this study, the activity in question incorporated gamification in the classroom. The SIMS was used to gather data on the effect of gamification on student's perceptions of motivation. The SIMS was developed under the premise of self-determination theory (Deci & Ryan, 1985).

Self-determination theory posits that these different types of motivation underlie different aspects of human behavior. The SIMS broke down motivation to incorporate gamification into four different types: intrinsic motivation, external regulation, identified regulation, and amotivation. Intrinsic motivation describes behaviors that are engaged in for their own sake (Deci, 2017). In the context of this study, it describes students performing activities in the intervention for their own pleasure or benefit. External regulation occurs when a behavior is motivated by external rewards or by a desire to avoid external consequences. External regulation describes students working on activities to gain points for doing so (Schneider et al., 2018). Identified regulation occurs when a behavior is undertaken because it is perceived as important but is still done to the necessary end (Chue & Nie, 2016). It would include students incorporating activities into

their daily schedules because they see the importance but not because they find any pleasure in doing so. Amotivation occurs when the participant sees no motivation to participate in the activity. This category describes students with no motivation to integrate activities within their daily schedules (Deci & Ryan, 2015).

Items on the SIMS were slightly modified to fit specific activities within this study. For example, the SIMS items for this study were modified to reflect students' attitudes toward the gamified intervention. The items were also modified for language. Words that did not directly correlate to Arabic were removed for better understanding of the questions. For instance, the item "Because I think that this activity is interesting" was changed to "I believe that participating in activities will be interesting" (Romero & Manjarres, 2017). The pre-test and post-test surveys reflected a change in verb tense between them. For example, "I am willing to do this activity because I think it is useful" was changed to "I am willing to do this activity again because I think it was useful" for the post-test.

The original Likert scale for the SIMS ranged from (1) *Not at all true* to (7) *Very true*. The scale was changed to a range from (1) *Strongly disagree* to (5) *Strongly agree*. I changed the SIMS' Likert scale based on the language skills of the students. My translation team suggested that the 7-point Likert scale changes to a 5-point Likert scale because the students would not be able to accurately identify scales that reflect a negative connotation; the students would not really understand the nuance of the 7-point scale. My specialized English instructors cautioned me about using "not." From their experience, Saudi Arabian students who use negative modifiers to nouns do not understand the modifier. For example, a question that asks, "Which word is not a noun?" does not

register as “pick the word that is not a noun.” The students will usually pick the first noun they see. I have also seen this and have changed each test question to avoid being constructed with negative modifiers. That is one of the reasons I changed the wording from “not at all true” to “strongly disagree.” It is easier for Saudi Arabian students to understand.

The SIMS was chosen for this study because it has been used in numerous studies related to motivation and gamification (Standage et al., 2003).The four subscales of the SIMS was tested for reliability in a study involving 439 students (Standage et al., 2003). The four subscales intrinsic motivation, external regulation, identified regulation, and amotivation were found to have a reliability coefficient equaling or greater than .70 (Standage et al., 2003). According to DeVellis (1991) reliability coefficients of .70 and higher are considered to have a good reliability. Given its reliability and validity in measuring motivation, the SIMS was an appropriate instrument for the present study. I adjusted the SIMS to measure motivation as a whole. The SIMS questions were aligned within the following subscales in Table 3.12

**Table 3.12**

*SIMS Scoring*

| Intrinsic Motivation | Identified Regulation | Extrinsic Motivation | Amotivation |
|---|---|---|---|
| 1, 5, 9, 13 | 2, 6, 10, 14 | 3,7, 11, 15 | 4, 8, 12, 16 |

***Weekly Motivational Perception Survey***

I provided a WMPS that asked five Likert-style questions ranging on a scale from (1) *Strongly Disagree* to (5) *Strongly Agree*. I chose the same Likert scale-type questions

as the SIMS so that the students would be familiar with the survey format. The Likert-style questions engaged gamification as a tool and described what students were trying to receive as an award or badge. I chose a Likert scale because of my experience working with Saudi Arabian students and upon the advice of my review team. ESL students would have had difficulty finding words that expressed how they felt. The Likert scale made it easier for them to accurately annotate what they perceived (Habbash & Rao Idapalapati, 2016).

All five questions were vetted through my translation team. They ensured that each question met three different criteria. First, the question did not have any words that were abnormal for a non-English speaker. For example, the word "convey" is not normally taught to these students. Words that were found to be abnormal were eliminated, and more appropriate words were substituted. Second, the questions were scrubbed for syntax. Any syntax that was hard to follow was simplified. For example, the use of negative meanings was eliminated and rewritten. Third, terminology used within English Specialized Training (ESP) was substituted as much as possible. The ESP instructors helped modify questions for students to understand more easily what was being asked.

Questions 1 and 5 were chosen to determine whether students perceived a motivation to receive points and rewards. Points and rewards are classic positive reinforcers that show extrinsic motivation. I modified similar questions within the SIMS to structure questions 1 and 2. Questions 2 and 4 were chosen because they tried to quantify the students' study time. Spaced practice for ESL students works very well for learning and retaining information (Habbash & Rao Idapalapati, 2016). Question 3

reflects a basic perception of the student upon using Quizlet as a learning tool. Quizlet was vital for the students to use for retrieval practice, which is a useful study habit for learning new information (Barata et al., 2017). Question 2 was also chosen because Quizlet is being discussed as a possible addition to the curriculum. Table 3.10 shows the relationship between the WMPS questions and the research questions.

**Table 3.10**

*Weekly Motivational Perception Survey Question Alignment*

| Research Question | WMPS Question |
|---|---|
| **1.** What are flight students' perceptions of the influence of gamification on their motivation? | - I studied at least five hours this week to get an award.<br>- I think that earning points has motivated me to study. |
| **2.** What are flight students' perceptions of the influence of gamification on their performance (learning)? | - I care about the points I will receive this week.<br>- I think Quizlet is a good study tool.<br>- I used Quizlet five times this week. |

## Team Translation

My team of reviewers consisted of two native Arabic speakers and two specialized English teachers. My reviewers did not have research expertise. My data sources were primarily gathered in English, while my students' primary language was Arabic. Native Arabic speakers are used to a different syntax when speaking Arabic than when speaking English. Many nuanced meanings can be missed due to the students trying to translate the words (Romero & Manjarres, 2017). This miscommunication is common when students translate between different languages (Romero & Manjarres, 2017). I collaborated with a group of reviewers to ensure that the students' perceptions of what

the questions were trying to ask were translated properly. They also reviewed all the data collection materials. I used pseudonyms for the two translators.

My first translator was Ahmad. He has been an instructor pilot for the last 35 years and is an instructor pilot in the IERW course. He has a unique perspective on what the flight school students were experiencing because he also learned how to fly in English. He primarily reviewed all my questions and the written material I gave to the students. Ahmed is a retired Admiral in the Saudi Arabian Navy. Students are 2nd Lieutenants, which is a significant rank difference between Ahmed and the students. I did not select Ahmad to be present for the interviews because he could potentially be intimidating to lower-ranking military officers.

The second translator was Abdullah, who was approximately the same age as the students and had spent six years in the U.S. I selected Abdullah based on three qualities: the ability to translate Arabic into English and vice versa, possession of aviation knowledge, and being close to the age of the students. The first quality is needed for a translator. The second quality was needed so Abdullah would understand aviation concepts and terms. The third quality was necessary because Saudi Arabian culture places great importance on age and how young people are supposed to act toward older people. Students would feel more at ease talking to someone their age and might explain more during the interview (Habbash & Rao Idapalapati, 2016). When my Saudi Arabian instructors talked to students, the conversations took on the tone of a father/son relationship.

I briefed Abdullah on what I was trying to accomplish through my interviews with the students. I informed the translator about the research and what the research

questions meant. I then briefed him on how we would conduct the interviews. I would pose all the questions in English first, and if the student looked confused, I would have Abdullah ask in Arabic. Abdullah would also need to explain whether the student could not accurately describe his perceptions in English. I would ask the student to respond in Arabic and have Abdullah translate into English for me.

I also work with two specialized English instructors who will not be specified. The specialized English instructors were Americans who taught a specialized form of English for entry into the IERW course. They were specifically trained in teaching Arabic speakers how to learn aviation terms in English. They are experts on which vocabulary and syntax are specific to what the students have learned before.

## Data Analysis

Three different analysis methods were used from three different data collection sources. Quantitative data was analyzed with descriptive statistics and a Friedman test. Qualitative data was analyzed with inductive and thematic analysis Table 3.11 outlines the relationship between the research questions, the data sources, and the data analysis methods.

**Table 3.11**

*Data Analysis Alignment Table*

| Research Questions | Data Sources | Data Analysis Methods |
|---|---|---|
| 1. What are flight students' perceptions of the influence of gamification on their motivation? | - Student Interview<br>- Flipgrid videos<br>- WMPS<br><br>- WMPS<br>- SIMS | **Qualitative**<br>- Inductive and Thematic analysis<br><br>**Quantitative**<br>- Descriptive statistics – measures of central tendency and variation |

| | | |
|---|---|---|
| 2. What are flight students' perceptions of the influence of gamification on their performance (learning)? | - Student Interview<br>- Flipgrid videos<br>- SIMS | **Qualitative**<br>- Inductive thematic analysis<br><br>**Quantitative**<br>- Descriptive statistics – measures of central tendency and variation |

**Qualitative Data Analysis**

A qualitative research approach involves a continuous relationship between data collection and data analysis (Strauss & Corbin, 1994). Consistent with the qualitative research approach, data analysis was ongoing, starting with the first interviews, to identify patterns and facilitate succeeding data collection (Strauss & Corbin, 1990). Student interviews were transcribed. Data analysis for the interview transcriptions began with an inductive approach (Creswell, 2018). In contrast to quantitative content analysis techniques, which enable researchers to derive quantitative measures from non-numerical information sources, inductive analysis is well suited for research where few or no previous studies of the phenomenon in question exist. The inductive approach enables researchers to identify key themes in an area of interest by reducing the material to a set of themes or categories (Kraft et al., 2015).

Inductive data analysis starts with a bottom-up process of organizing data from abstract units into a more comprehensive set of themes (Creswell & Creswell, 2018). Inductive analysis occurs when there are no predetermined themes, such as using a theory. In the data analysis for this study, an iterative process was constituted to develop a theory from the data collection. The iterative process consisted of three types of data coding: open coding, *in vivo* coding, and focused coding (Heath & Cowley, 2004). Open

coding was the first process used to categorize the data. Open coding is an open process that explores data without making any prior assumptions about what might be discovered (Saldana, 2017).

The second type of coding was *in vivo*. *In vivo* coding seeks words or short phrases from the participant's own language in the data record as codes. It may include colloquial or native terms of a particular culture, subculture, or microculture to suggest the existence of the group's cultural categories (Saldana, 2017).

The third type of coding is focused coding. Focused coding searches for the most frequent or significant initial codes to develop the most salient categories in the data (Saldana, 2017). I chose focused coding so that I could narrow down codes and categories to understand better what the qualitative data were trying to say.

**Quantitative Data Analysis**

Data from the SIMS survey and the first five questions on the WMPS were analyzed via descriptive statistics for the quantitative component of this research. Descriptive statistics are statistical techniques that use mathematics to organize, simplify, and summarize numerical data (Mertler, 2017). Descriptive statistics interpret, organize, and summarize large amounts of data (Corbin & Strauss, 1990). There are three basic types of descriptive statistics: measures of frequency (i.e., frequencies and percentages), measures of central tendency (i.e., mean, median, and mode), and measures of variation (i.e., range and standard deviation) (Adams & Lawrence, 2019). For this study, I compared the means to determine any differences in motivation changes.

The Friedman test was ran as a non-parametric statistical test, which was developed by Milton Friedman (Zimmerman & Zumbo, 1993). Similar to the parametric

repeated measures ANOVA, it is used to detect differences in data across multiple test attempts such as weeks. The procedure involves ranking each row together, then considering the values of ranks by columns. The Friedman test was ran on the individual WMPS questions and the WMPS questions that were aligned with the research questions.

## Procedures and Timeline

The procedures for this study were conducted in three phases. Table 3.9 summarizes each phase to include their activities and time frames. Delineating the researcher's role and the participants' roles at each stage is vital (Creswell, 2018).

**Table 3.13**

*Procedures and Timeline*

| **Phase I: Preparation** | | |
|---|---|---|
| | Activities | Time Frame |
| **Researcher's Role** | - Finalize the design and construct consent forms for participants<br>- Finalize the modified SIMS questionnaire to include cultural differences and aviation-specific information is complete<br>- Finalize an information packet and video outlining how the gamification process will be implemented<br>- Finalize an information packet and a video showing how to use Quizlet<br>- Finalize videos and instructions for participants<br>- Finalize worksheets | - Before the start of the course<br>- One week before the start of the course |
| **Phase II: Data Collection** | | |
| | Activities | Time Frame |
| **Researcher's Role** | - Issue briefs about the gamification process<br>- Issue briefs about how to use Quizlet<br>- Ensure students can log in to Quizlet and have watched videos about the gamification process for the research project | - Day 1 |

| | | |
|---|---|---|
| | - Issue out the pretest SIMS questionnaire and have participants complete it<br>- Conduct interviews<br>- Process weekly distribution of points, awards, badges, and achievements<br>- Score worksheets<br>- Issue points, awards, badges, and achievements<br>- Evaluate Flipgrid answers<br>- Ensure each student completes the modified posttest SIMS questionnaire<br>- Conduct last interviews | - Weekly for 6 weeks<br><br>-Week 8 |
| **Participants' Role** | - Complete in-processing to include a brief about the gamification process, videos about the gamification process, and how to use Quizlet<br>- Login to Quizlet<br>- Participate in pre interviews<br>- Login into Quizlet and complete activities to earn points<br>- Complete the WMPS<br>- Select rewards as per the number of points, awards, badges, and achievements issued<br>- Complete Flipgrid videos<br>- Complete worksheets<br>- Complete the post-SIMS questionnaire<br>- Participate in a post interview | - Day 1 of the course<br><br>- Weekly for 6 weeks<br><br>- Week 8 |
| **Phase III: Data Analysis** | | |
| | Activities | Time Frame |
| **Researcher's Role** | - Ensure all data is stored correctly and sorted<br>- Conduct simple descriptive statistics of WMPS and SIMS data<br>- Classify, sort, and perform an inductive analysis of the data to include student interviews, Flipgrid videos, and WMPS<br>- Engage in peer debriefing | - Week 9<br>- Week 10<br>- Weeks 11-14<br>- Weeks 15-16 |

**Phase I: Preparation**

A modified SIMS was created. Students completed informed consent and assent forms. An informational video was created and an instructional packet on how the rules of the gamification process work. I also created an informational video and instructional packet explaining how Quizlet is used. These products were finalized one week before the start of the course.

**Phase II: Intervention and Data Collection**

On the first day of the course, I briefed the participants on how gamification would work and ensured that I had received all assents and consents. I explained how the points, awards, badges, and achievement system worked within the intervention. I then had participants complete the modified SIMS, helped them log in to Quizlet and Flipgrid, and ensured that they joined the correct created classes. I ensured that the participants were familiar with the locations of the Quizlet instructions. The first week also consisted of semi-structured interviews with the participants. The interviews comprised three stages: the greeting and introduction, the interview questions, and the conclusion. The greeting and introduction consisted of me reading the first portion of the consent sheet to the student. I also explained the procedures and the translator's role in the interviews. Stage two consisted of asking the interview questions used to support the research questions. The students were allowed to answer any questions and ask follow-up questions if needed. The translator and I marked any non-verbal cues as necessary. Finally, the last stage included a brief overview of the questions I had asked and elicited any follow-up answers that the student may have had. Questions for the second semi-structured interview were modified based on responses from the first interview and

performed on Training Days 29 or 30. After week one, students had the opportunity to complete the first worksheet and Quizlet activities.

Weeks two through eight consisted of a weekly tallying of points and collecting data from Quizlet, worksheets, and academic tests. Points from Quizlet and other sources were tallied and entered every Thursday, the last day of the workweek. I awarded extra points to participants who had achieved the highest totals for the week and announced what they had earned. Participants logged in to Quizlet to complete activities to earn points. Students spent points to receive rewards. Badges and achievements were rewarded weekly based on activities and reset weekly on Thursday. Academic test data were gathered and entered when the academic test was completed.

Week eight marked the completion of the modified SIMS. The modified SIMS questionnaire instructed students to reflect on the gamification intervention as they answered the questions. The students also participated in semi-structured interviews with a translator and me. The responses from the WMPS informed the second semi-structured interview.

**Phase III: Data Analysis**

Interviews were conducted with the students, a translator, and me. I recorded the conversations for later transcriptions. I conducted the interviews in one of our approved debriefing rooms. The first interviews took place on the first day after explaining how the gamification intervention would work. The second set of interviews took place after the final rewards were given. The second interview could have been Training Day 29 or 30, depending on the rewards selected during the data collection phase. An alias was assigned to each participant to secure and preserve anonymity.

Upon completion of the interviews, the translator and I transcribed the notes and recordings. I took special care to ensure that the syntax was clear between English and Arabic. The translator and I double-checked the translations by listening to the recordings. We adjusted for any transcription errors as necessary. We also compared notes as to non-verbal cues and ensured that they were in the transcription notes. When the translator and I finished transcribing, we provided a copy of the transcript to the student and verified that they found it to be correct. We have corrected any errors regarding what the student may have said or meant. After completion of editing by the interviewer and the participants, the transcripts were saved on my password-protected computer.

I conducted member checking and peer debriefing between weeks 15 and 16. I used member checking to ensure the accuracy of my data by having students review their interviews and my findings and ensure that they were correct. They confirmed my findings and all other pertinent data. Peer debriefings were done with my research partner to ensure that the process and data were well thought out.

All data were collected and stored correctly for further analysis. During week 11, I compared the descriptive data from the pre-and post-tests from the modified SIMS and WMPS using JASP Team (2022). I also cross-checked data from the amount of time spent on Quizlet and annotated the students' time spent performing Quizlet activities on an Excel spreadsheet. Weeks 11-14 involved using Delve for an inductive analysis of the participant interviews, WMPS, and Flipgrid. The inductive analysis consisted of coding and searching for common themes among the data.

## Rigor and Trustworthiness

For a research study to be considered high-quality, credible, and trustworthy, it must meet the criteria and standards of sound practice (Mertler, 2017). Standards of sound practice include rigor, quality, and trustworthiness, that is, the accuracy and believability of the study (Mertler, 2017). Validity and reliability are the metrics used to measure rigor and trustworthiness in quantitative studies. Validity measures an instrument's accuracy while reliability measures the consistency of the collected data (Mertler, 2017). Common practices to ensure a data set's credibility and trustworthiness include triangulation, member checking, peer debriefing, and an audit trail (Creswell & Creswell, 2018; Mertler, 2017; Trochim et al., 2016). Each of these practices were used in this research study to ensure rigor and trustworthiness.

**Triangulation**

Triangulation is a method of measuring rigor and trustworthiness that incorporates multiple data sources to get a more accurate and comprehensive view of the research study (Trochim, Donnelly, & Arora, 2016). The convergence of multiple data sources accomplishes triangulation to build a coherent picture of the research study (Creswell & Creswell, 2018). Triangulation has four types: methodological, research, data, and theoretical. Methodological triangulation supports the weakness of one method weakness by strengthening it with another method. For example, a survey is not the best way to understand a question's exact nuances, but an interview will allow the student to explain their answer better.

Research triangulation relies heavily on researcher interpretations, which can be strengthened by using different researchers. Data triangulation seeks to garner data at other times and in a more random way. Theoretical triangulation is probably the most

used triangulation method for mixed-method research because it uses different qualitative and quantitative methodologies (Carter et al., 2014). I used different types of triangulation to ensure the interpretations are trustworthy. First, I used methodological triangulation to see a complete picture of my students' motivation. I compared the interview data and WMPS questions to strengthen my research questions' answers. Second, I used data triangulation when I performed the WMPS questions. Conducting WMPS increased the trustworthiness of my data. Lastly, I used theoretical triangulation by comparing my qualitative data to my quantitative data. Comparing my qualitative data (interviews and WMPS) to my quantitative data (surveys) strengthened my research questions.

**Member Checking**

Member checking allows the participants to verify the account of the data and improve the trustworthiness of a research study (Creswell, 2014). I allowed the participants the opportunity to ensure that their interview data was correct and that their words were accurate. After the data was collected and screened, I issued a presentation to the participants and a copy of the relevant research. Allowing participants to review their data and the findings enabled them to have a greater buy-in to the study that was conducted to impact a change to the motivational problems within the Institute (Carter et al., 2014).

**Peer Debriefing**

Peer debriefing is a way of talking to a peer about my research. A peer might have additional perspectives and viewpoints to help strengthen my study. Peer debriefing is a method for verifying the research processes and enhancing the study's accuracy (Creswell

& Creswell, 2018; Mertler, 2017). Peer debriefing was accomplished through conferencing with other professionals, colleagues, peers, and advisors to review, critique, and reflect on the research process (Mertler, 2017). Peer debriefing strengthened the credibility of the research study. I have used peer debriefing during all phases of my research project. My first level of peer debriefing was done with my research writing partner. We were continually reading, editing, and commenting on each other's writing. We repeatedly ask each other questions about our research and try to find different ways to help each other's approaches and strategies to complete our research. My second level of peer debriefing was done with my advisor. My advisor continued to ask questions and probe for deeper thinking in areas my writing partner and I missed. These different peer debriefing levels helped ensure that my data and findings were valid, reliable, and credible.

**Audit Trail**

The last method of measuring rigor and trustworthiness is using an audit trail. An audit trail is a process of documenting using notes, memos, or journal entries, the researcher's thought process as to how the dots were connected, and why decisions were made throughout the analysis portion of the research (Carcary, 2009). It was crucial to ensure that a clear trail of my data collection was annotated and could be followed. The path started when I collected my data and then begin coding the data to find my themes. My audit trail provided a logical road to show how the clusters of data were together. This documentation process provided written evidence about the thought process down the logical path taken from coding data to creating themes as to why codes were clustered together. An audit trail showed a logical way of reaching my decisions. I used a project

management application called Notion. Notion stored all my information with dates, times, and any other relevant data I needed. Notion also provided timelines and additional project management information to include journals and blog posts. I have started using Notion as of December 2019 until I completed my dissertation.

## Plan for Sharing and Communicating Findings

The primary purpose of this action research paper is to improve the motivation of the Saudi Arabian National Guard IERW students. Other implications of this research paper can be adapted for other Institute courses. Sharing of this research will also appeal to a larger audience of Military training facilities within Saudi Arabia. (Efron and Ravid, 2013) identify the importance of sharing one's findings with educators and students in their schools to encourage reflective practice. Mertler (2017) noted that one of the significant aims of action research is to bridge the gap between theoretical researchers and practicing educators. While the results of my action research will undoubtedly benefit myself and the students involved, sharing the research process can help the Institute and other schools and training facilities within the Kingdom of Saudi Arabia (Efron & Ravid, 2013; Lawson, 2015). Thus, it is imperative to form a plan for sharing and communicating findings.

Firstly, I will share my findings and experience with the instructors and students within my department. They would benefit from any additional motivational techniques to encourage students to study. I will share my findings with the students who participated. I will be careful to ensure the language of the study will be understandable to English as a second language (ESL) student. Presentations of the findings and information will be given both within a presentation and a brief report summarizing the

findings.

Secondly, I will share my findings with the curriculum developers within the Institute. The curriculum developers would need to know what worked and what did not work within the study concerning gamification to their curricula. I will include a small handout with points that should be highlighted for inclusion in all Institute curricula for the curriculum developers. Presentations of the findings and information will be given both within a PowerPoint presentation and a brief report summarizing the findings.

Lastly, the leaders of Aviation Saudi Arabian National Guard and Vinnell Arabia will be aware of the findings. Vinnell Arabia is the company I work for, which is contracted to provide training and advisors for the Saudi Arabian National Guard. I will give a short presentation and briefing points for both the Institute Commander and Vinnell Arabia to outline what can be done with future courses and plans for current classes.

Keeping participant identities confidential is vital since the participants are Military Officers who will be serving within the National Guard, with whom the findings will be shared. This research report will use different names for each student, and all identifying data will be disguised as much as possible. The MNG may consider the study to be sensitive as it contains elements of training of military officers that most militaries keep secret. Any research that is to be released outside of the Institute will require their approval.

# CHAPTER 4

## ANALYSIS AND FINDINGS

The purpose of this action research was to evaluate students' perceptions of a gamification reward-based achievement system's ability to increase their motivation to study outside the classroom while attending the Initial Entry Rotary Wing (IERW) flight school in the Kingdom of Saudi Arabia. The following research questions guided this study:

1. What are the IERW students' perceptions of the influence of gamification on their motivation?
2. What are the IERW students' perceptions of the influence of gamification on their performance (learning)?

This chapter is divided into three sections. The first section presents the quantitative data analysis and findings from the Situational Motivation Scale Survey (SIMS) and the Weekly Motivational Perception Survey (WMPS). The second section presents the qualitative data analysis and findings from the open-ended questions in the WMPS and student interviews. The final section offers an integration of the quantitative and qualitative findings.

### Quantitative Analysis and Findings

This section presents findings from two different quantitative data collection instruments, the SIMS (Standage et al., 2003) and the WMPS. Data for SIMS were collected at the beginning and conclusion of the gamification intervention

implementation. The WMPS data were collected at the end of each week before awarding points and rewards, totaling six data collection points for this survey. Descriptive statistics were analyzed using JASP (Version 0.16), an open-source statistical analysis software supported by the University of Amsterdam. The SIMS data and analysis findings are presented first, followed by the WMPS data.

**Situational Motivation Scale**

The SIMS (Standage et al., 2003) pretest was administered to the participants after an initial introduction of the gamification intervention, but before the intervention began. The SIMS posttest was given after the intervention in the sixth week. The SIMS (Appendix B) is a questionnaire that consists of 25 self-reported questions. The questionnaire is further broken down into four subscales: Intrinsic Motivation (IM), Identified Regulation (IR), Extrinsic Motivation (EM), and Amotivation (AM). The SIMS questionnaire was modified to a 5-point Likert-type scale questionnaire. The participants were asked what their level of agreement was with a statement with the following choices: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree.

***Descriptive Statistics***

The SIMS data were first analyzed with JASP using descriptive statistics, as presented in Table 4.1. The largest increase in subscales was found in participants' extrinsic motivation between the pretest ($M$ = 4.03, $SD$ = .54) and posttest ($M$ = 4.56, $SD$ = .40). The intrinsic motivation subscale had the highest overall mean response for the presurvey ($M$ = 4.38. $SD$ = .40) and the postsurvey ($M$ = 4.44, $SD$ = .48). The amotivation subscale showed the smallest difference in mean response and best overall mean response

score for both the presurvey ($M$ = 3.13, $SD$ = .40) and the postsurvey ($M$ = 3.4, $SD$ = .33). All four subscales slightly increased from the presurvey to the postsurvey responses (Figure 4.1).

**Table 4.1**

*Descriptive Statistics – Situational Motivation Scale*

| Subscales | | *M* | *SD* |
|---|---|---|---|
| Intrinsic Motivation | Pretest | 4.38 | .40 |
| | Posttest | 4.44 | .48 |
| Identified Regulation | Pretest | 4.00 | .52 |
| | Posttest | 4.06 | .59 |
| Extrinsic Motivation | Pretest | 4.03 | .54 |
| | Posttest | 4.56 | .26 |
| Amotivation | Pretest | 3.13 | .40 |
| | Posttest | 3.40 | .33 |

*Note.* Based on a 5-point Likert-type scale between 1 and 5, $n$ = 8.

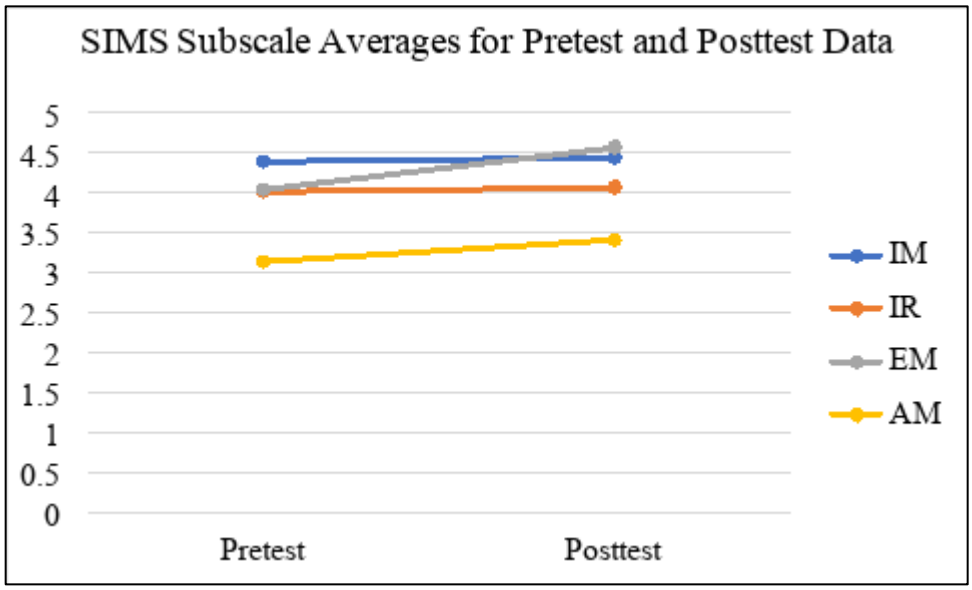


*Figure 4.1.* SIMS Subscale Averages for Pretest and Posttest Data. This chart compares the pretest and posttest data from each subscale of the SIMS, based on a 5-point Likert-type scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).

## Weekly Motivational Perception Survey

The Weekly Motivational Perception Survey was administered to the participants for six weeks at the end of each week. The WMPS (Appendix C) is a self-reported Likert-type survey consisting of five questions. The questions were aligned into subscale one, which refers to research question one (RQ1), and subscale two, which refers to research question two (RQ2). The WMPS supports both research questions. Specifically, questions one, two, and five from the WMPS support RQ1, and questions three and four from the WMPS support RQ2. The WMPS questionnaire was modified to a 5-point Likert-type scale questionnaire. The participants were asked what their level of agreement was with each statement with the following choices: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree.

### *Descriptive Statistics*

The WMPS data were initially analyzed with descriptive statistics using JASP, as presented in Table 4.2. Participants responses were aligned for each week according to RQ subscales and added into one column according to the week in which the responses were annotated in JASP and then a descriptive analysis was analyzed in JASP. The results showed a slight decrease in students' perceptions of gamification as a motivator reported responses was in students' perceptions of gamification as a learning enhancer between week three ($M = 4.25$, $SD = .86$) and week four ($M = 3.69$, $SD = 1.14$). The students' perceptions of gamification as a motivator did not show any change between week one ($M = 4.67$, $SD = 0.57$) and week two ($M = 4.67$, $SD = 0.57$). Both research question responses showed a decline of at least .67 of the mean subscales between weeks one and six. (Figure 4.2).

**Table 4.2**

*Descriptive Statistics – Weekly Motivation Perception Survey*

| | Subscales | | *M* | *SD* |
|---|---|---|---|---|
| RQ1 | Students' perceptions of motivation after the introduction of gamification | Week 1 | 4.67 | .57 |
| | | Week 2 | 4.67 | 0.57 |
| | | Week 3 | 4.29 | 1.00 |
| | | Week 4 | 4.46 | 0.83 |
| | | Week 5 | 4.21 | 1.01 |
| | | Week 6 | 4.00 | 1.103 |
| RQ2 | Students' perceptions of gamification as a learning enhancer | Week 1 | 4.43 | 0.73 |
| | | Week 2 | 4.38 | 0.81 |
| | | Week 3 | 4.25 | 0.86 |
| | | Week 4 | 3.69 | 1.14 |
| | | Week 5 | 3.68 | 1.35 |
| | | Week 6 | 3.56 | 1.50 |

*Note.* Based on a five-point Likert-type scale between 1 and 5, $n = 8$.

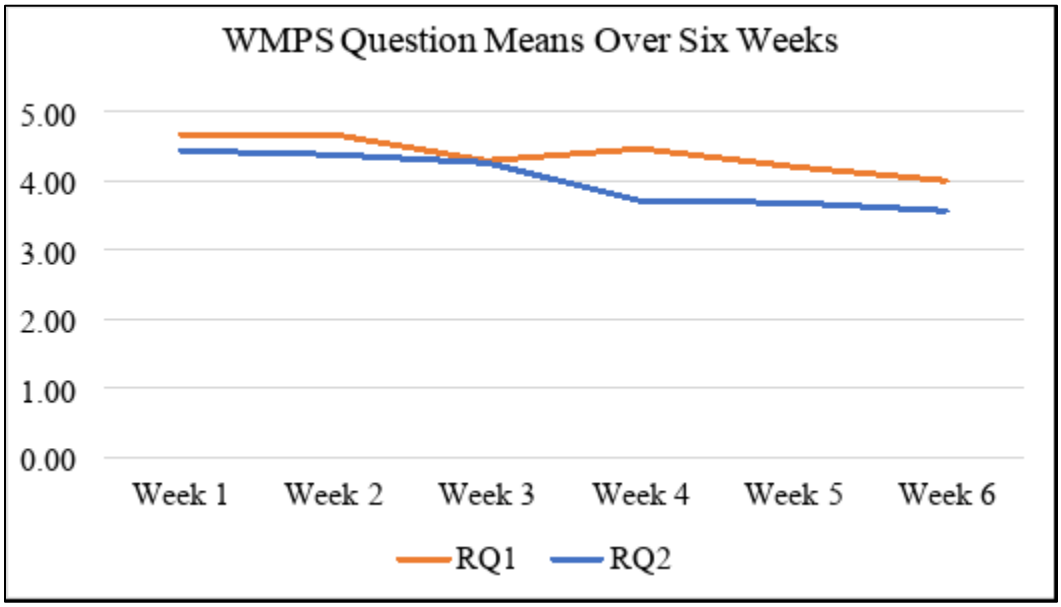


*Figure 4.2.* WMPS Weekly Means Averages This chart compares the average mean of all WMPS questions and the questions supporting RQ1 and RQ2. The questions were based on a 5-point Likert-type scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

The survey questions were also analyzed individually with descriptive statistics using JASP, as presented in Table 4.3. The largest decline was in the students' responses about using activities five times a week, which started at ($M$ = 3.83, $SD$ = 0.60) and finished at ($M$ = 2.06, $SD$ = 0.83). The largest difference in responses was the students' motivation toward earning points and receiving rewards in week five at ($M$ = 4.31, $SD$ = 0.70) and week six at ($M$ = 3.15, $SD$ = 1.32). Participants' responses to questions showed a general decline in responses during the intervention (Figure 4.3).

**Table 4.3**

*Descriptive Statistics – WMPS Question Means Over Six Weeks*

| Week | Q1 | | Q2 | | Q3 | | Q4 | | Q5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Week 1 | 4.56 | .70 | 4.35 | .48 | 5.00 | .00 | 3.83 | .60 | 5.00 | .00 |
| Week 2 | 4.56 | .70 | 4.47 | .50 | 4.56 | .70 | 4.05 | .78 | 4.86 | .33 |
| Week 3 | 4.69 | .66 | 3.34 | 1.00 | 4.86 | .33 | 3.54 | .70 | 4.56 | .70 |
| Week 4 | 5.00 | .33 | 3.44 | .71 | 4.08 | .60 | 2.93 | 1.30 | 5.00 | .00 |
| Week 5 | 5.00 | .00 | 2.95 | 1.20 | 4.73 | .43 | 2.41 | .99 | 4.31 | .70 |
| Week 6 | 3.96 | 1.05 | 4.35 | .48 | 4.86 | .33 | 2.06 | .83 | 3.15 | 1.32 |

*Note.* Based on a 5-point Likert-type scale between 1 and 5, $n$ = 8.

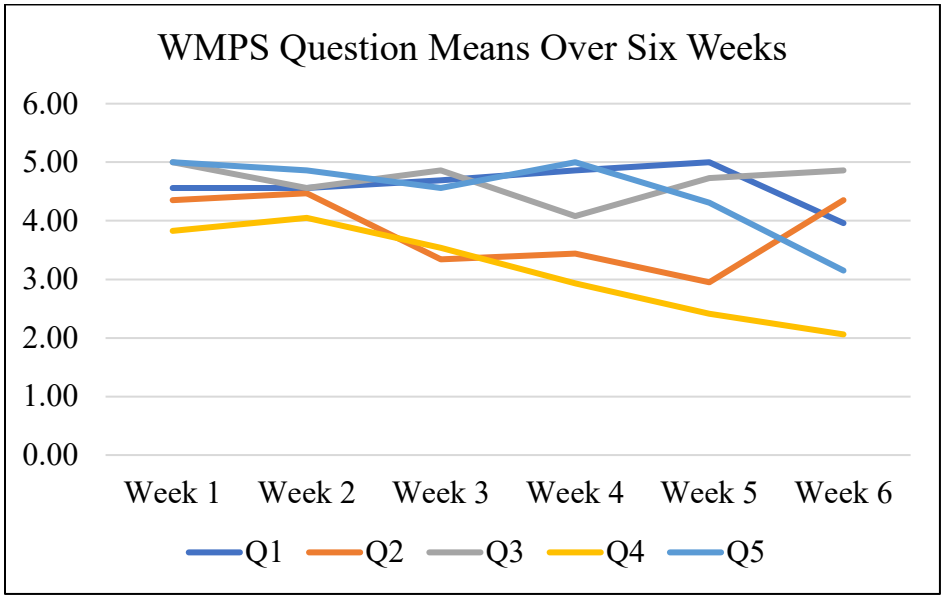

*Figure 4.3.* WMPS Question Means Over Six Weeks. This chart compares five questions asked on the WMPS over six weeks. The questions were based on a 5-point Likert-type scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).

*Friedman Test*

A nonparametric Friedman test was used because the samples were collected from the same group, the dependent variable was measured at the ordinal level, and measurements were repeated over several time points (Zimmerman & Zumbo, 1993). Another point of note is the Kendall’s W. The Kendall’s W statistic shows participant agreement from 0 to 1 (Gearhart et al., 2013). The closer to 1, the more agreement in the group. The closer to 0 indicates less agreement.

Specifically, data were collected every week for six weeks. Ordinal numbers were weekly collected for each research question and inputted into JASP. The questions were aligned into subscale one, which refers to RQ1, and subscale two, which refers to RQ2. The WMPS supports both research questions. Specifically, questions one, two, and five from the WMPS support RQ1, and questions three and four from the WMPS support RQ2. Participants responses were aligned for each week according to RQ subscales and added into one column according to the week in which the responses were annotated in JASP. Then, the non-parametric Friedman test was performed in JASP. For example, participant responses for RQ1 (WMPS question one, two, and five) week one through week six were added under each week and then analyzed into JASP. Since two tests were conducted on the same sets of data, a Bonferroni correction was calculated to prevent possible bias of repeated testing effects (i.e., Type I errors) (Zimmerman & Zumbo, 1993). Accordingly, the desired alpha significance level of .05 was divided by two, which resulted in $p = .03$ for the data to be considered statistically significant.

**Gamification as a Motivator**. Students reported a statistically significant change in motivation due to gamification in participants' motivational responses to the WMPS based on weekly scoring ($\chi^2$ (5) = 12.61, $p$ = .027, Kendall's W = .105). It was noticeable that the results yielded a very low Kendall's W, which asseses agreement among participants. Very low agreement was found, which is partially explained by the very small sample size is n = 8 in this study. The Friedman test showed a decline in students' perceptions of gamification as a motivator. A Conover's post hoc comparison revealed that week's one and two were equal and had a higher favorable response than week six ($p$ = .004), although weeks one and two did not differ significantly from week three ($p$ = .104), week four ($p$ = .231), and week five ($p$ = .074). Figure 4.4 displays the mean of the students' responses to gamification as a motivator.

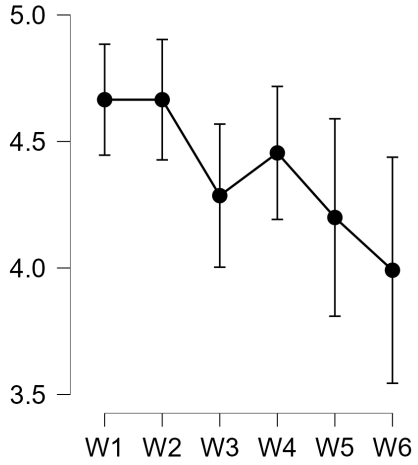


*Figure 4.4.* Gamification Influence on Motivation. This chart displays the mean student responses to gamification as a motivator asked on the WMPS over six weeks.

**Gamification as a Learning Enhancer.** Students reported a statistically significant change in motivational responses to the WMPS based on weekly scoring ($\chi^2$ (5) = 12.35, $p$ = .029, Kendall's W = .154). ). It was noticeable that the results yielded a very low Kendall's W, which asseses agreement among participants. Very low agreement

was found, which is partially explained by the very small sample size is n = 8 in this study. The Friedman test showed a decline in students' perceptions of gamification as a learning enhancer. A Conover's post hoc comparison revealed that week six had a lower favorable response than week one ($p$ = .028) and week four ($p$ < .01. Week one did not significantly differ from week two ($p$ = .0.63), week three ($p$ = .0.43), or week five ($p$ = .032). Figure 4.5 displays the mean of students' responses to whether they thought gamification was a good learning enhancer.

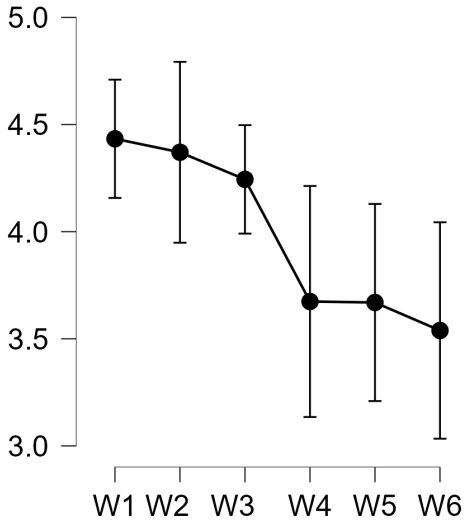


*Figure 4.5.* Gamification as a Learning Enhancer. This chart displays the mean student responses to whether students thought it was a learning enhancer, asked on the WMPS over six weeks.

## Qualitative Analysis and Findings

Qualitative data were collected from three different sources: open-ended interview questions, Flipgrid videos, and one open-ended question on the WMPS. Open-ended interview questions were asked at the beginning and end of the intervention. Students completed Flipgrid videos at the end of each week for six weeks. The WMPS qualitative data were gathered after each week. All participants' names have been

replaced with pseudonyms for all quotes and excerpts. Interviews were recorded and then digitally transcribed. Flipgrid videos were transcribed into digital form. Interviews, Flipgrid videos, and WMPS digital data were entered into Delve for analysis. Through inductive analysis (Creswell & Creswell, 2018; Mertler, 2017), 46 unique codes were identified and subsequently refined into eight categories and four emergent themes. The following sections describe the qualitative analysis used to identify categories, themes, and a comprehensive presentation of the findings. Table 4.4 describes the number of codes from the data sources.

**Table 4.4**

*Data Source for a Number-of-Code Relationship*

| Data source | Number | Number of codes |
|---|---|---|
| Student interviews | 16 | 25 |
| Flipgrid videos | 30 | 15 |
| Weekly motivation perception survey | 48 | 6 |
| Overall | 94 | 46 |

**Student Interviews**

The interviews were digitally recorded using the Notability app on an iPad11 and then manually transcribed into Microsoft Word. Interviews took place before and after the gamification intervention. During the interviews, the participants were asked nine open-ended questions. The first six questions focused on gamification as a motivator, and the final three questions focused on gamification as a learning enhancer.

Abdullah was present during all student interviews to ensure that participants could express their thoughts in Arabic and English. I confirmed with Ahmad what his role was supposed to be during the interviews. He had very little interaction with the participants during any of the interviews. I asked all the questions, and he spoke only

when I asked him to. I used Ahmad only when a participant looked confused. For example, I would look at a participant's body language for signs of thinking overly much or taking too much time to answer a question (Ahmad, 2015). I would then explain the question to Ahmad, and I would have him repeat the question back to me. Ahmad would then ask the participant, and they would discuss the answer in Arabic. Ahmad would then tell me the participant's response. I would then ask the participant what Ahmad told me the participant had answered in English. I did this to ensure that I would be able to code all the data without Ahmad and that the communication between Ahmad and me was accurate. This worked for all interactions without a follow-up translation between the participant and Ahmad. The participants mostly understood what the question was asking and gave thoughtful answers. I had to use Ahmad twice in the pre-intervention student interviews. I did not have to use Ahmad during the post interviews.

I used Ahmad for the translation of question seven during the pre-interview: "Can you describe any other methods or strategies that might positively impact your motivation and why?" Mohammed, an interviewee, said that he did not understand what methods or strategies meant. Ahmad was able to explain what the question was asking.

**Flipgrid Videos**

Students earned points by completing Flipgrid videos each week. Flipgrid is a free journaling tool integrated into the intervention that allows users to make short videos using electronic devices. Participants responded to three questions that aligned with the research questions; for example, "Please explain if this week's activities have motivated you. If they have, how so?" Participants were encouraged to complete a 45-second video. A time limit was established so that students would be more motivated to participate

because of the short response. Students recorded their responses with their mobile phones in English. Some students did not complete a weekly Flipgrid video. The location of the video responses ranged from the students' houses to their farms and vehicles. After each weekly journaling session, I would transcribe the videos in the same way as the interviews, including by using the participants' voices in a Microsoft Word document.

**Weekly Motivational Perception Survey**

The WMPS is a written weekly survey of five questions to which students responded. Only one question was used for qualitative data: "How would you change one element of gamification?" Three of the WMPS questions were Likert scale questions, and one question asked the students if they would like to exchange their points for a reward. The WMPS asked about how the participants would change gamification to motivate themselves. Each student completed the WMPS at the end of each week on a piece of paper before they saw how many weekly points they had earned. The student's answers were taken verbatim from the WMPS and added to a Microsoft Word document.

**Qualitative Analysis**

I started transcribing the pre- and post-interviews within one week of completing them. I strove to transcribe the data within 24 hours to increase data accuracy (Saldana, 2017). Transcriptions of the audio files were imported into Microsoft Word. I used a format that would allow for easy migration into Delve. While transcribing the data, I tried to use the participants' own words as much as possible to capture each participant's "voice." I knew that this would be important for coding (Saldana, 2017). Each student's interview responses, Flipgrid videos, and WMPS responses were combined into one Microsoft Word document and separated by different headings within the document. I

imported each participant's Microsoft Word document into Delve for analysis through coding. I coded each participant's full transcript at one time. Before beginning the coding, I read through the participant's responses several times to familiarize myself with the data. Two cycles of coding were performed on each data source.

### *First Cycle Coding*

My first cycle of coding involved two iterations of open and two iterations of in vivo coding. Open coding aims to develop substantial codes describing, naming, or classifying the phenomenon under consideration (Saldana, 2017). My second iteration of coding was in vivo coding, which involves using the student's own words and descriptions (Kraft et al., 2015).

I completed two iterations of open coding, which I chose to immerse myself in the data and form initial impressions of the participants' thoughts and feelings (Saldana, 2017). In the first iteration of open coding, I read through the data closely (i.e., line by line) and assigned codes pertaining to my initial first impressions of the data. This resulted in long and wordy codes; for example, *Students perceive gamification as helpful because it is what's on the test* (Figure 4.6). In subsequent open coding iterations, I made refinements to the codes for minor corrections, and combined improvements such as "Students liked gamified activities" and "Students really enjoyed activities" into "Students liked activities."

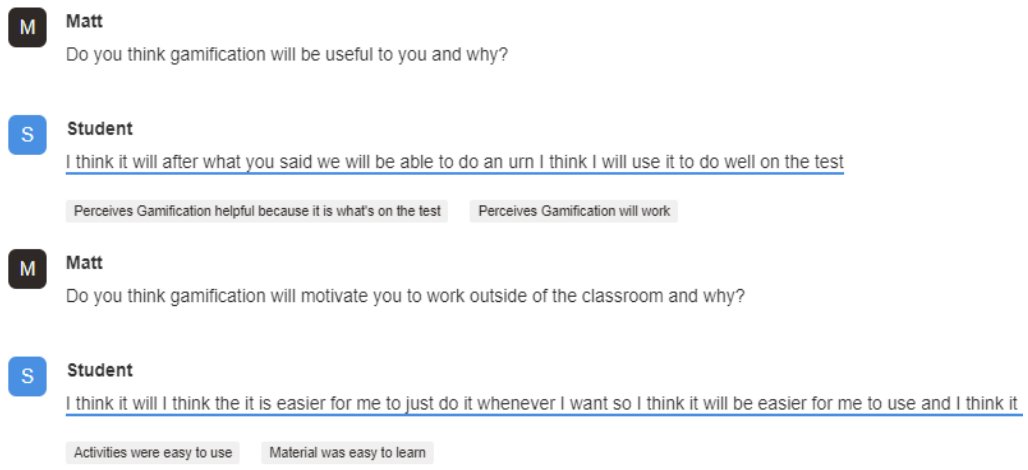


*Figure 4.6* Screenshot of Open Coding in Delve.

The second iteration of the first cycle coding consisted of in vivo coding to capture a participant's "voice" (Saldana, 2017). I used the in vivo codes to capture salient points about what the participants were trying to say. The charged phrases included the participants' perceptions of how gamification activities were preparing them for the tests. For example, Abdullah commented, "I want to see that I do well, and I hope my friends do well, but I am not interested as much in competing." Using participants' voices helped ensure that the meanings of their statements were not diluted or distorted.

***Second Cycle Coding***

My second cycle of coding used focused and pattern coding. Focused coding searches for the most frequent or significant initial codes to develop the most salient categories in the data corpus (Saldana, 2017). Finally, I used pattern coding to identify patterns in the data, group them into categories based on those patterns, and develop themes (Saldana, 2017). I exported the data from Delve into a Microsoft Excel file so that I could easily manipulate it. I stripped the erroneous data and kept the "Category" and

"Code Name" columns (Figure 4.7). Erroneous data from Delve includes "nested level" and "number of snippets." I also numbered the entries to trace their origins.

| | Category | Code Name |
|---|---|---|
| 2 | | Have tables Compete |
| 3 | | Fix week 4-6 |
| 4 | | Gamification was good as motivational tool |
| 5 | | Rewards are adequate for motivating |
| 6 | | Perceives Gamification as useful |
| 7 | | Students value time |
| 8 | | Material was easy to learn |
| 9 | | Daily questions better for studying |

*Figure 4.7* Screenshot of Adjusting Initial Delve Data Within Excel.

I conducted multiple iterations of focused coding, which involved an analysis of the data and the initial codes to categorize and organize the codes into more comprehensive categories (Charmaz, 2014). My first iteration of focused coding involved creating preliminary categories based on similar codes; for example, "Motivated by not getting into trouble" received the category "Negative emotion." I then adjusted all the codes to line up with the appropriate categories and colorized them for ease of reading.

The second iteration of focused coding consisted of refining the categories based on the initial categories. I performed a minor restructuring to provide greater clarification of codes; for example, "Negative emotion" was transformed into "Activities of gamification were not supportive of motivating students." The second iteration also consisted of lining up categories with the codes and color-coding data for a visual representation of the data (Figure 4.8).

| 1 | Number | Category | New Category | Code Name |
|---|---|---|---|---|
| 5 | 76 | Gamification supporting Extrinsic motivation | Gamification was positive for motivation: Extrinsic | Rewards can help with real life problems |
| 6 | 85 | Gamification supporting Intrinsic motivation | Gamification was positive for motivation: Intrinsic | Activities learned a lot |
| 7 | 54 | Gamification supporting Intrinsic motivation | Gamification was positive for motivation: Intrinsic | I was worried about standing in class |
| 8 | 39 | Gamification supporting Intrinsic motivation | Gamification was positive for motivation: Intrinsic | Gamification was useful to learn how to study |

*Figure 4.8* Screenshot of Adjusting Second Cycle Focused Data within Excel.

My last two iterations of second cycle coding were to use pattern coding. Pattern coding is a category label that identifies similarly coded data (Ahmad, 2015). My first iteration of pattern coding consisted of discovering and refining codes and categories to reflect a participant's thoughts on the research questions. I made a new column in my Excel workbook and began a new tab that displayed the research question and its relationship to the codes. At this point in the coding, I needed to delineate the difference between RQ1 and RQ2. RQ1 would sort out students' perceptions of motivation in general, and RQ2 would deal with students' motivation to do well on tests or activities. For example, the code "Activities let me choose my own pace and strategies" would align with RQ1, while "Gamified activities help with test performance" would align with RQ2.

I then examined each code and category to ensure that codes that integrated with RQ1 did not incorporate RQ2. Six codes were developed that would suit both research questions. For example, "Activities helped practice studying better" applies to RQ1 and RQ2. An example of a students' comment for this code were, "Yes, I studied hard this week because aerodynamics is hard, and the worksheet and Quizlet helped because I got 100 on the test."

My second iteration of pattern coding consisted of adding "Definition" and "Excerpts from transcripts" columns to my workbook to ensure that codes and categories

were clearly defined and grounded within the transcripts of data (Saldana, 2017). This last iteration of pattern coding allowed me to better reflect upon the codes and categories I had seen evolve within the data. While performing this coding, three main themes emerged.

### *Development of Themes*

I consulted with my dissertation advisor throughout the entire coding process to ensure that I was analyzing the data correctly. At this point, after refining the data, we analyzed the data for developing themes. Thematic analysis was used to create themes that emerged from the data, codes, and categories during the study of the transcripts (Kraft et al., 2015; Mertler, 2017). I created a column to show where the themes would present themselves within the data (Figure 4.9).

| 1 | Number | New Category | Code Name | Definition | Excerpts from Transcripts | RQ# | Theme |
|---|---|---|---|---|---|---|---|
| 39 | 1 | Gamification activities are seen as relevant to academic performance | Gamification activities are useful for memorization | Student thought using the activites would make them do better on th tests because they used memorization | I definitely think that's the activities we're very useful and I use them very often, because they helped on tests | 2 | Students believe that gamification is relevant and will increase their performance on tests |
| 40 | 10 | Gamification activities are seen as relevant to academic performance | Gamification activities are seen as relevant to learning information | Students were motivated to study because they think studying irrelevant for learning | I really liked the first three weeks because I could see that the studying really was helpful for the tests | 2 | |
| 41 | 2 | Gamification activities are seen as relevant to academic performance | Gamified activities help with test performance | Students were motivated to study because thinks that doing the activity will help perform better on the test | I think gamification will help my performance because if I know what to study and if I know what's going to be on | 2 | |
| 42 | 86 | Improved self-regulated learning | Activities helped practice studying better | Students report that they studied more than what they usually studied | Yes, I studied hard this week because aerodynamics is hard and the worksheet and Quizlet really helped because I got 100 | 1,2 | Gamified activities helped students develop self-regulated learning strategies, which in turn led to enhanced test performance |
| 43 | 89 | Improved self-regulated learning | I studied more than usual | Gamification increased studying outside of the classroom | I do not know if gamification will help me but knowing what to study for is very good | 1,2 | |
| 44 | 54 | Improved self-regulated learning | I was worried about my ranks in class | Student was motivated to keep a top rank in the classroom within the | I wanted to make sure I was very high I n the class | 1,2 | |
| 45 | 39 | Improved self-regulated learning | Gamification was useful to learn how to study | Students believe gamification is a good method for motivating them to study | I think gamification will be better for me to study. | 1,2 | |
| 46 | 37 | Improved self-regulated learning | Activities let me choose my own pace and strategies | Students expressed that having autonomy to choose their pace and learning strategies was empowering | I got to do it at my own pace which I really liked | 1,2 | |

Figure 4.9 An Example of the Relationship of Themes to Categories and Codes.

My dissertation advisor and I realized that three themes were needed to describe what was occurring within the data accurately. Two themes were related to RQ1 and one theme to RQ2. Finally, my dissertation advisor and I examined the themes, categories, and codes for alignment and vigor. Table 4.5 demonstrates the relationship of themes that emerged from the coding cycles, along with the categories and sample excerpts.

**Table 4.5**

*Themes, Categories, and Excerpts from Coding Data*

| Themes | Categories | Sample excerpts |
|---|---|---|
| Participants perceive that gamification is relevant for increasing their motivation (RQ1) | Gamification is positive for motivation: Extrinsic | "I think like taking an absence away from my grade or maybe improving my grades." (Faisal) |
| | Gamification is positive for motivation: Intrinsic | "I think gamification will help me to do better, and I want to do well." (Hussain) |
| | Students were motivated to learn because it was easy to study | "I got to do it at my own pace, which I liked." (Nasser) |
| Participants perceive motivation within the gamification design architecture that can be improved | Amotivation factors to gamification | "I did not care about competing, but I wanted to do well with my friends." (Naif) |
| | Design features to be improved | "I didn't do them as much because I started flying this week, which is a lot more fun than studying." (Faisal) |
| Gamification helps students develop learning strategies, which in turn leads to enhanced test performance | Gamification activities are seen as relevant to academic performance | "I really liked the first three weeks because I could see that the studying really was helpful for the tests" (Shaya) |
| | Improved self-regulated learning | "I think gamification will be better for me to study." (Tamimi) |

## Qualitative Themes

In individual student interviews, Flipgrid videos, and the WMPS, participants were asked questions pertaining to motivational factors they felt were impacted by the gamification intervention and to their perceptions of increased performance by using gamification. The questions pertaining to RQ1 and RQ2 were aligned with gamification elements, particularly the motivation to learn aeronautics, self-efficacy, and self-determination, and to the motivational aspects of self-determination theory: competence, autonomy, and relatedness (Kálmán & Gutierrez, 2015).

Three distinct themes emerged from the qualitative data. The themes were: (1) students perceive that gamification is relevant for increasing their motivation, (2) participants perceive motivation within the gamification design architecture that can be improved , and (3) gamification helps students develop learning strategies, which in turn leads to enhanced test performance. These themes will be introduced and explained in this section.

### *Theme 1: Students Perceive that Gamification is Relevant for Increasing their Motivation*

This theme, which was associated with RQ1, presents the benefits of gamification as a motivator. Many participants reported a high degree of motivation related to participating in the gamification intervention. Two major categories emerged within this theme: (1) gamification is positive for motivation: extrinsic, and (2) gamification is positive for motivation: intrinsic.

**Gamification is Positive for Motivation: Extrinsic.** Many participants associated motivation with studying to earn rewards, which is a form of extrinsic

motivation and a major component of operant conditioning theory (Budiman, 2017). Operant conditioning theory is a method of learning that employs rewards and punishments for behavior (Staddon & Cerutti, 2003). Extrinsic motivation can be a highly effective practice for teaching new habits and actions to students with poor or inefficient study habits (Lopez & Brown, 2017).

During this study, participants earned points to buy rewards. For example, a reward could be deleting one absence from a student's attendance record. The gamification intervention afforded the students many ways to earn points that they could redeem for rewards. Participants primarily used rewards to increase grade point averages or to skip more difficult daily tasks in front of the class, such as student presentations or reading answers from the front of the class. Abdullah said, "I like taking an absence away from my grade if I am late or sleep in." Attendance is added to students' final grades and affects the cash incentive that students can receive based on their ranking at the end of the course. This incentive is not part of the gamification intervention but is a standard incentive for all military systems. The participants were most excited by the activities to earn a day off from school. All participants cited a day off as a reason to continue performing within the intervention. Muitari said, "I want to get the day-off reward." All participants used rewards to take a day off.

**Gamification is Positive for Motivation: Intrinsic.** Gamification is a popular intervention that is prevalent in schools and workplace settings for increasing extrinsic motivation, but it has an almost opposite effect on intrinsic motivation (Clarke et al., 2019). In short, Ryan and Deci (2015) found that tangible rewards reliably undermined intrinsic motivation for exciting activities, even when real rewards were offered as good

performance indicators (Deci & Ryan, 2015). Students such as Naif said, “I want to make sure that I know the material.”

In the present study, while most participants reported extrinsic rewards as motivating, a few participants still reported being intrinsically motivated by the gamified activities. These participants reported that they saw gamification as a strategy to help them learn the content and perform well on assignments and tests. Mohammed said, “I think gamification will help me do better, and I want to do well during the interview.” One way that intrinsic motivation was noticeable among participants was their reported desire to do well in the learning unit without explicit references to external rewards. As Mohammed noted, “I think gamification will help me to do better, and I want to do well.”

Autonomy is a concept associated with self-determination theory (SDT) and is one of the significant factors that increases a participant’s intrinsic motivation to study. Naif remarked, “I want to do well, and I liked the fact that I could choose which activities to do.” Autonomy states that people need to feel that they have control of their actions and can choose how they participate (Schneider et al., 2018). Participants reported that they liked choosing to study either by participating in Quizlet or by learning the worksheets. Shaya said, “I like that I can do activities as many times as possible.” The participants chose to perform activities repeatedly when they only received points for starting an activity. The participants would receive points only for beginning the activity in some cases, such as Quizlet and the worksheet.

Relatedness is a subcomponent of SDT. It is defined as the interconnectedness of the learner to other learners or teachers who facilitate feedback, discussion, and inquiry during the learning experience (Rutledge et al., 2018). The participants expressed a

general feeling of wanting their peers to do well, as Nasser explained: “I want to see that I do well and hope my friends do well.” They were also very supportive of their classmates and were excited when the class did well on a test. Naif said, “It made us happy when we all got 100% on the tests.”

Many participants perceived that gamification would make them study more. Different theories, such as the expectance theory, propose that people can be motivated by the anticipation of expecting a positive or negative reward or consequence ( Lloyd & Mertens, 2018). For example, Mohammed said, “I think this will motivate me to study outside of the classroom.” Mohammed was unsure of how and why he should study outside of the classroom. Tamimi was excited and said, “I think gamification will make me want to study more.” His primary school education relied heavily on teaching everything within the school day, so students were not required to review it away from school (Razzak, 2016).

**Students were Motivated to Learn Because it was Easy to Study.** One of the design goals of this gamification intervention was to provide activities that were easy to use and repeatable. All participants reported an acknowledgment of easy accessibility to the activities. Students had favorable feelings about using the activities on their mobile phones and being able to repeat activities they had already completed. Students repeat Quizlet and their worksheets many times to help them improve their knowledge. Nasser said, “I used Quizlet many times this week to improve my knowledge of aerodynamics.” Making activities easy to access motivates students to use the technological medium (Fernandez-Antolin et al., 2020).

Quizlet, worksheets, and Flipgrid videos allowed participants to use their mobile phones, which participants found to be helpful for studying. Faisal said, “I would use Quizlet while waiting for my mom and sister to finish shopping.” Faisal also commented, “I like being able to review materials over and over.” Making the study materials and information accessible on the internet was considered beneficial to the participants during the study.

### *Theme 2: Participants Perceive Motivation Within the Gamification Design Architecture That Can Be Improved*

This theme was associated with RQ1, and it was an unexpected intervention outcome. I included this theme because it is essential to understand the participants’ perceptions. It is vital to receive feedback from participants to understand their thoughts and feelings better and improve gamification for further (Min et al., 2019). This theme focuses on design features that can be enhanced to increase participant motivation and gamification intervention features that do not motivate participants.

**Design Features to be Improved.** While students reacted positively to most design elements within the gamification intervention, they remarked on two major areas that they perceived as relevant to revamping the gamification intervention: competition was not relevant to the participant’s goals, and activities did not have an immediate, beneficial academic use.

Competition between individuals or teams is a tenet of gamification (Çetin & Solmaz, 2020), and it is inherent within this gamification intervention. Participants did not feel compelled to compete against each other but may be motivated by working in teams. Abdullah remarked, “I also think that we should have instead of the students

compete the tables compete against each other." Multiple participants echoed Abdullah's sentiment. The indifference of Abdullah and his peer toward competing was repeated by Mutairi, who commented, "I want to see that I do well, and I hope my friends do well, but I am not interested as much in competing."

Activities had a positive impact when the participant's immediate goal was easily foreseeable. For example, Quizlet participation was very high among students when a unit was completing within a week and an academic test was being administered. Quizlet use declined during weeks four through six, when the information was not going to be immediately used for testing the participant. Faisal stated, "I don't think this was good for this week. I just got on Quizlet to get my points, and I didn't really look at it [Quizlet]." Faisal's statement shows a lack of activities that were judged necessary for studying by the participants. Mohammed was concerned with maximizing his study time to obtain relevant information. He said, "I was more worried about my daily questions, but they did not really align with what I needed to know for that day. I hope that they [daily questions] were more relevant to what I was learning in class that day."

**Amotivation Factors to Gamification.** Amotivation is defined as reducing the motivation to initiate or persist in goal-directed behavior (Taylor et al., 2014). The concept of amotivation was present in the coding process, where a participant was redirected away from the intervention. An example of amotivation is when an instructor tells a participant to study something outside of the intervention. In this case, the student is still motivated but not toward the aim of the intervention.

Participants reported that the instructor redirected their study efforts away from the intervention to focus on accomplishing their other activities. As Hamad explained, "I

stopped doing Quizlet because my instructor wanted me to study other things for the next day." Faisal verbalized taking a break from gamified activities when he said, "I did what my instructor told me to do." In this research context, students are expected to study many subjects during flight school, and instructors help students focus on areas they perceive as crucial for subsequent days.

The intervention was not designed to produce any negative motivators, but the students still perceived negative motivators. Negative motivation is behavior that is being performed not to incur a punishment or negative consequence (Deci & Ryan, 2015). Participating in activities did not have any negative effects, such as reducing points or revoking rewards. Students such as Mohammed remarked, "If I fail, then I will be set back to another class." Nasser said, "I did the activities so that I would not fail."

### *Theme 3: Gamification Helps Students Develop Learning Strategies, Which in Turn Leads to Enhanced Test Performance*

This theme aligns with RQ2, and it encompasses two categories. Both categories include concepts relating to a student's perception of the intervention, thereby increasing their quantifiable performance on tests or daily instructor grades. The categories are gamification activities that are seen as relevant to academic performance and improved identified regulation.

**Gamification Activities are Seen as Relevant to Academic Performance.** Students could understand and foresee how activities would help them with the tests. Mohammed said, "I liked the first three weeks because I could see that the studying was helpful for the tests." During the first three weeks of the intervention, it was easy for the participants to see the cause (using the activities) and effect (doing well on the tests),

because testing occurred immediately after the instruction. Faisal reinforced this category by saying, “I like doing the activities because they tell me what to study for the test.” Most participants remarked that they started studying the activities for the second and third weeks because, as Naif says, “The activities helped me do well on the tests.”

The participants noticed more competence in studying and test scores. Nasser said, “I feel better about the tests after I do the activities.” The participants were focused on test performance, and they valued all activities in the intervention that were directly related to testing. Competence is a need within self-determination theory and states that participants seek to control an outcome and experience mastery (Hoaas, 2014). Participants reported a greater understanding of the academic material and perceived more robust knowledge about performing the activities. Mutari remarked, “I think I have a better understanding of aerodynamics now.” All participants commented positively on the activities, increasing their perception of doing well on the tests.

**Improved Identified Regulation.** Identified regulation involves awarding a conscious value to behavior so that the action is accepted when it is personally important (Deci & Ryan, 2015). Codes within this category entailed participants recognizing that an activity is important for doing well, not just for getting points for a reward. Mohammed’s comment is an excellent example of identified regulation. It exemplifies other participants’ comments: “I studied hard this week because aerodynamics is hard, and the worksheet and Quizlet helped because I got 100 on the test.” Another participant, Shaya, reflected on the pace of learning as a factor that promoted motivation. Shaya said, “Performing the activities at my pace increased my desire to do them.” Shaya expressed a willingness to perform the activities to do well on a test, not for the activity’s points.

Participants remarked about wanting to do the activities because it was a better study method. Tamimi expressed his desire to perform the activities because they helped him learn to study: “I think this way of learning is very good. It was easy for me.” Naif said, “I see why studying the activities is a good way to learn the material.”

## CHAPTER SUMMARY

This chapter reviewed the data analysis methods and presented the quantitative and qualitative findings from the data collected in this study. Quantitative data for the Situational Motivation Scale (SIMS) were collected at the beginning and at the conclusion of the gamification intervention implementation. The SIMS data were analyzed using descriptive statistics. The Weekly Motivational Perception Survey was administered to the participants for six weeks at the end of each week. Descriptive statistics were run on the WMPS questions aligned with the research questions and showed a statistically significant decline from week one to week six. Descriptive statistics were also run on each question, which showed a general reduction in motivation over the full six weeks. A Friedman test on both WMPS research questions showed a statistically significant change between week one and week six for both research questions. After analyzing the means from both research questions, the statistically significant difference was determined to be a decline in motivation over six weeks, with the largest drop between weeks four through six.

Qualitative data from student interviews, Flipgrid videos, and the WMPS were analyzed using inductive analysis. The qualitative findings revealed three different themes: (1) students perceive that gamification is relevant for increasing their motivation, (2) participants perceive motivation within the gamification design architecture that can

be improved, and (3) gamification helps students develop learning strategies, which in turn leads to enhanced test performance.

# CHAPTER 5

## DISCUSSION, IMPLICATIONS, AND LIMITATIONS

This action research aimed to evaluate participants' perceptions of a gamification reward-based achievement system's ability to increase their motivation to study outside the classroom while attending the Initial Entry Rotary Wing (IERW) flight school in the Kingdom of Saudi Arabia. The following research questions guided this study: (1) What are the students' perceptions of the influence of gamification on their motivation? (2) What are the IERW students' perceptions of the influence of gamification on their performance (learning)? This chapter discusses the findings related to the research questions, the implications of the study findings, and the study limitations.

### Discussion

Synthesizing the results of this study requires situating the findings in the existing research literature on gamification, motivation, and learning. To answer the research questions, the data were combined and analyzed by examining motivational and sociocultural theories of learning and dialogue and recent research findings in operant conditioning theory and self-determination theory (SDT) in relation to gamification. The qualitative findings revealed the following three themes: (1) participants perceive that gamification is relevant for increasing their motivation, (2) participants perceive motivation within the gamification design architecture that can be improved, and (3) gamification helps participants develop learning strategies, which in turn leads to enhanced test performance.

## Research Question 1: What Are the Students' Perceptions of the Influence of Gamification on Their Motivation?

This research question aimed to evaluate participants' perceptions of gamification as it relates to their motivation to learn aviation concepts. The students' reflections on gamification's influence on their motivation are categorized into (a) extrinsic motivation, (b) intrinsic motivation, and (c) amotivation.

### *Extrinsic Motivation*

Gamified learning systems can positively affect participants' attitudes toward studying outside the classroom. Saudi Arabian flight school participants reported an increase in extrinsic motivation in interviews, WMPS, and SIMS posttest surveys, which aligns with previous studies conducted on gamification (Fernandez-Antolin et al., 2020; Tan, 2018). The largest increase in participants' motivation was found in their extrinsic motivation between the pretest ($M = 4.03$, $SD = .54$) and posttest ($M = 4.56$, $SD = .40$). This is likely due to participants' selections of activities within the gamified learning system to increase the number of points they could earn for rewards. Many other studies conducted on gamified learning systems have concluded that an increase in extrinsic motivation is seen among participants who recognize rewards within gamified learning systems (Deci & Ryan, 2015; Kálmán & Gutierrez Eugenio, 2015; Pilkington, 2018).

The increase in extrinsic motivation among the participants reflects an improvement in finding rewards those Saudi Arabian learner's desire. Participants were most excited about doing activities to earn a day off from school. All participants cited a day off as a reason to continue performing within the intervention. Extrinsic motivation posits that participants will be motivated by external demand (Kálmán & Gutierrez

Eugenio, 2015). In this study, participants earned points by participating in activities related to studying outside the classroom and selecting activities to join in. External rewards can be a highly effective practice for teaching new habits and actions to participants with poor or inefficient study habits, according to operant conditioning theory (Lopez & Brown, 2017).

Participants perceived attending class on time and studying outside of the classroom as critical to earning points and doing well. English as a Second Language (ESL) Saudi Arabian learners have been found to experience discipline issues related to attendance and homework that cannot be completed within the classroom (Ahmad, 2015), although in these studies attitudes toward attendance and studying were considered to be culturally different between American culture and Saudi Arabian culture (Habbash & Rao Idapalapati, 2016; Nash, 2016). This study used gamification to award points for good attendance and studying outside the classroom. Participants reported studying and attending class on time to earn points, which aligns with operant conditioning theory of motivation because participants sought to earn external rewards and avoid punishment (Buckley & Doyle, 2016; Budiman, 2017) such as low grades.

### *Intrinsic Motivation*

The participants' intrinsic motivation showed little change from the start to the end of the gamification intervention. Saudi Arabian flight school participants reported a slight increase in intrinsic motivation in interviews, WMPS, and SIMS posttest surveys, which is in line with previous studies conducted on gamification (Anderman, 2020; Rutledge et al., 2018). Participants were more likely motivated by the "day-off" reward than by an internal motivation to do well. Tangible rewards reliably undermine intrinsic

motivation, even when real rewards are offered as good performance indicators (Deci & Ryan, 2015), which aligns with the findings in this study.

The intrinsic motivation subscale had the highest overall mean response for the presurvey ($M$ = 4.38. $SD$ = .40) and the postsurvey ($M$ = 4.44, $SD$ = .48). While the quantitative data showed that the participants were intrinsically motivated during the intervention, a significant change due to the intervention could not be established. This data is in line with the current literature concerning intrinsic motivation and gamified learning systems (Treiblmaier & Putz, 2020) showing that gamification is not the best approach to increase intrinsic motivation. Other expatriates researchers and the literature associated with Saudi Arabian learners report very little increase in intrinsic motivation with gamification (Habbash & Rao Idapalapati, 2016), as did this study.

The autonomy to earn and redeem rewards allowed participants in the intervention to use different study methods, which helped them feel more in control of how they learned. Participants liked that they could use either worksheets or Quizlet to study for tests. They also liked that the activities were available online and accessible on their phones. Autonomy is a concept associated with SDT. It states that people need to feel that they have control of their actions and can choose how they participate (Schneider et al., 2018). Several participants explained that they appreciated the ability to choose which activities to complete during the intervention because they were not used to the material as it was presented. Most participants had very little exposure to studying outside of the classroom and were not ready to transition into an American curriculum, such as IERW flight school. Gamification allows researchers and participants to try new

activities to explore what the participants like to use (Buckley & Doyle, 2016; DeHaan & Ryan, 2014; Tan, 2018).

Participants did not embrace the gamification competition feature but started to feel part of a team and wanted their peers to do well. Specifically, several participants explained that they did not feel interested in competing as part of the intervention. According to SDT, relatedness is defined as the interconnectedness of the learner with other learners or teachers who facilitate feedback, discussion, and inquiry during the learning experience (Rutledge et al., 2018). The participants in this study expressed a general feeling of wanting their peers to do well. Many of the participants wanted to see how they compared to other participants in the class, and they continually talked about how everyone was doing well within the category. However, their relatedness was not reflected in a desire to compete against one another in the intervention but in a willingness to compete against each other in teams. Relatedness refers to feelings of belonging to a social group and is a subcomponent of SDT (Deci & Ryan, 2015).

### *Amotivation*

Saudi Arabian flight school participants were amotivated by a redirection of motivation from gamified activities. Amotivation is a reduction in the motivation to initiate or persist in goal-directed behavior (Taylor et al., 2014). It can be defined as a detractor of the desired effect of the intervention. In other studies, amotivation has shown a strong negative relationship to achievement (Taylor et al., 2014). The WMPS showed a decline in motivation over six weeks. The WMPS started week one at ($M$ = 4.67, $SD$ = 0.57) and finished week six at ($M$ = 4.00, $SD$ = 1.103). Participants reported that other factors, such as different instructors and having no academic tests to study for, affected

how they used the activities within the intervention. The participants did not think of motivation detractors at the beginning or end of the gamified intervention, but only weekly. They did not process a significant difference in amotivation between the pretest and posttest of the SIMS. The amotivation subscale showed the smallest difference in mean response between the presurvey ($M$ = 3.13, $SD$ = .40) and the postsurvey ($M$ = 3.4, $SD$ = .33). They showed an increase in amotivation. Participants show a higher rate of motivation to learn when they are properly motivated, and finding what motivates participants may be difficult (Jiang et al., 2018).

Participants reported a decrease in motivation between intervention weeks four and six. This was most likely due to activities not immediately being followed by an academic test and participants' motivation being redirected. A Friedman test showed a significant decrease in motivation over the intervention period ($\chi^2$ (5) = 12.61, $p$ = .027, Kendall's W = .105). This amotivation can be attributed to the design of the intervention, which did not anticipate other instructors, or the lack of tests in weeks four through six. The student-to-instructor ratio started at 8:1 in weeks one through three and finished at 2:1 for weeks four through six. The first three weeks were in a classroom with a lecture delivery of information. Weeks four through six consisted of individualized training within the curriculum. Weeks four through six are designed for the instructor to analyze and introduce the scheduled training to students in a personalized manner. This difference allowed the instructor to personalize instruction to participants, but also redirected instruction away from gamified activities. In weeks four through six, instructors redirected participants' efforts to other material that the instructor thought was important but was not in the intervention.

The novelty effect may explain the decline in weeks four through six as shown in the Friedman test results. The novelty effect states that users' perceived benefits from a gamified service decreased as the time using that service increased (Rodrigues et al., 2022). The Friedman tests results showed a statistically significant decline from week one through week six for both RQ1 and RQ2. Rodrigues (2022) proposes that students are enamored with novel tools and approaches, such as gamified activities, but their interest starts to wane as students continue working on the same activities.

## Research Question 2: What Are the IERW Students' Perceptions of the Influence of Gamification on Their Performance (Learning)?

### *Gamification Activities Were Seen as Relevant to Performance and Increased the Motivation of Participants*

This question aimed to evaluate the participants' perceptions of how a gamified learning system prepared them for tests and evaluations. I reviewed gamification and theories associated with motivation to address this question. I used the SIMS, the WMPS, open-ended interview questions, and Flipgrid videos to determine the types of factors that participants perceived to be helpful in doing well on tests and evaluations. Among the factors that influenced participants' motivation were (a) gamification activities were seen as relevant to academic performance and (b) improved identified regulation.

### *Gamification Activities Are Seen as Relevant to Academic Performance*

The participants were motivated to study outside the classroom because they saw an immediate return through academic test scores. They were more motivated by activities that were relevant to the behaviors desired by the curriculum (Taylor et al., 2014). Many participants reported that after doing the activities for the first test, they

could see that they were helpful and would participate even more. It was essential for participants to display a need to recognize the activities because they have reported that IERW is difficult, and students are not used to the American style tests. Saudi Arabian learners, like other nationalities, show decreased motivation to perform activities that are not directly related to tests or evaluations (Duignan, 2012). The participants in this study used many different learning strategies to accomplish studying outside of the classroom.

During the first three weeks of the intervention, it was easy for participants to see the cause (using the activities) and effect (doing well on the tests), because testing occurred immediately after the instruction. Students who see a direct relationship between an activity and a positive outcome will be more motivated to continue doing that activity (Deci & Ryan, 2015; DeHaan & Ryan, 2014; Mekler et al., 2017b). A Friedman test to measure participants' perceptions of the intervention showed a decline between weeks four and six in activities that would help evaluations and tests. Students that did not perceive a relevance for tasks or activities that would have an immediate positive effect was not seen as essential and summarily disregarded. This is because academic tests were not immediately conducted within those weeks.

***Identified Regulation***

Saudi Arabian flight school participants showed increased identified regulation mixed within the literature on gamification. Identified regulation is an important concept to understand because it is close to intrinsic motivation on the motivation scale (Chue & Nie, 2016). Participants reported an understanding of the activities and saw they were worthwhile, but still felt like they had to do the activity. Identified regulation involves awarding a conscious value to behavior to accept the action when it is personally

essential (Deci & Ryan, 2015). The SIMS test showed very little change in participants' identified regulation between the presurvey ($M$ = 4.00, $SD$ = .52) and the postsurvey ($M$ = 4.06, $SD$ = .59). These results seem to reflect a high level of determination of identified regulation by participants before the intervention. Still, a qualitative analysis showed an increase in identified regulation after seeing a marked increase in test scores when using activities that directly reflected the test questions. Increasing identified regulation is a step in the right direction, but a study comparing American participants to international participants concluded that identified regulation increased international participants' surface learning approach to academics (Chue & Nie, 2016).

Participants were performing activities to receive a reward, but they were starting to see positive effects from studying outside the classroom. Many participants expressed a desire to do well and requested that I make more activities for them to commit to doing better on the academic tests. The intervention showed participants different study methods and exposed them to actions to increase their performance on American curricula. In many studies, Saudi Arabian participants have demonstrated study habits that do not translate well into American curricula (Habbash & Rao Idapalapati, 2016; Romero & Manjarres, 2017; Springsteen, 2014). Participants remarked about wanting to do the activities because it was a better study method.

## Implications

This action research study and its findings will contribute to gamified learning systems and expatriates teaching Saudi Arabian learners to increase their learning and comprehension of curricula taught in a second language. This section will discuss these

implications in terms of (1) personal implications, (2) implications for motivating participants in the aviation institute, and (3) implications for future research.

## Personal Implications

I have continuously reflected while conducting this research and learned several lessons that enabled my continued growth and effectiveness as a program manager and helped me make informed choices regarding curriculum and instruction. These lessons include: (a) reviewing the literature critically, (b) collecting and analyzing data methodically and judgmentally, and (c) capturing and analyzing participants' voices and perceptions.

### *Reviewing the Literature Critically*

A decision to institute new ideas and different approaches to learning must have a foundation within existing research. Educators rely upon policymakers and stakeholders to engage participants in research-based practices and make decisions based on research and critically reviewed papers (Trochim, 2016). I often consulted the existing literature and allowed my discoveries to guide me in identifying the problem (i.e., Saudi Arabian participant's lack of study outside of the classroom), the intervention (i.e., gamification), and methods for evaluating the impact of the intervention (i.e., mixed-methods data collection and analysis). Conducting an extensive review of the research literature on gamified learning systems and various types of motivation before my intervention allowed me to understand and implement research-based knowledge in my instruction. For example, my initial review of the research literature displayed a potentially harmful effect of earning rewards on intrinsic motivation (Deci & Ryan, 2015). This revelation allowed me to implement different controls in my gamified intervention. I chose, for

instance, to show the participants many ways of studying and learning (e.g., Quizlet, worksheets) to increase their motivation through SDT, autonomy specifically, and nurture their intrinsic motivation. If I had not comprehensively reviewed the research literature before designing the gamified learning intervention, I would have made less informed decisions that would have led to poor outcomes.

In addition to learning how to conduct a comprehensive literature review, I have also gained the skills of a critical literature researcher. A critical researcher can examine the method and limitations of a study rather than accepting findings at face value and can also consider whether findings are applicable or inappropriate. For instance, a journal article reporting a gamification intervention for ESL participants from China may not be appropriate for a dissertation or ESL participants from Saudi Arabia. Similarly, the findings of a study conducted over five years may not be suitable for a study that will finish in six weeks. Understanding the subtleties and constraints inherent in all methods and studies will enable me to critically evaluate research and use this knowledge to make informed decisions in the other flight programs I manage.

***Collecting and Analyzing Data in a Methodical and Critical Way***

Another lesson I learned from this research is how to make decisions with supporting data. This includes the collection and analysis of both quantitative and qualitative data. While quantitative data (e.g., WMPS) enables critical understanding and can be helpful with large populations, qualitative data provide clarity and explanation to numerical data. For example, when I analyzed quantitative data via the SIMS, it suggested that gamification positively impacted participants' extrinsic motivation; however, it did not provide insight into the processes by which gamification had this

effect. Analyzing participants' responses to pretest and posttest interviews, on the other hand, allowed me to understand precisely how Quizlet, worksheets, and daily questions influenced participants' experiences with gamification. Combining both data types allowed for a more comprehensive and reliable understanding of the research findings.

Through this research, I also learned invaluable skills in analyzing these types of data. I have never had to use statistics to analyze the data that I have garnered from resources. I am now familiar with many ways of expressing the significance of data, whether as descriptive data or in a Friedman test. With qualitative data, I have learned how to conduct inductive analysis (Creswell, 2014) to construct categories, themes, and assertions from data. In the future, I will be able to use these skills to analyze various types of data, such as tests of student learning and surveys of student opinions. The analysis and interpretation of these data will enable me to plan and develop effective curricula for my students and clients.

### *Valuing the Voices and Perspectives of Participants*

The final lesson I have learned from this research is listening to and valuing participants' perspectives. By engaging participants in dialogue through student interviews and Flipgrid and soliciting their honest feedback on how to improve instruction, I was able to gain valuable insights into my instructional practices that I would not have gained through mere observation or analysis of test scores. Furthermore, while I do not currently have the data to verify this, I suspect that listening to the participants and allowing them to express their thoughts and feelings about all aspects of the gamified intervention empowered them and increased their sense of autonomy. It is essential to analyze what participants feel and to determine motivators that increase their

participation. In the future, I will continue to dialogue with the participants and try to ascertain their motivators.

## Implications for Motivating Participants in the Aviation Institute

This study evaluated the impact of a gamified intervention at a military aviation institute in Saudi Arabia on participants' motivation to study outside the classroom. It examined how gamification activities such as Quizlet and other activities affected participants' motivation. This section discusses the implications of this study for aviation institute instruction in terms of (a) deficit beliefs and (b) gamification as an instructional option.

### *Deficit Beliefs*

Deficit beliefs or deficit thinking is a structural way of thinking that blames a student for inadequacies instead of looking at learning systems (Nagarkar, 2011). I used gamification as an intervention within the aviation institute because I was trying to find ways to motivate Saudi Arabian soldiers while using a curriculum specific to a different culture and incorporating English as the primary language. Most other instructors' perceptions of Saudi Arabian soldiers at the aviation institute were that they were lazy, did not know how to study, and had no respect for discipline.

A systematic review of the literature pertaining to Saudi Arabian schools by expatriates revealed a similar perception in the beginning. A critical analysis of the research articles revealed several misinterpretations by instructors within the aviation institute. Saudi Arabian soldiers' experiences with education are very different from Americans' experiences with education systems. For example, Saudi Arabians are not

very strict about showing up on time for school. They are typically told precisely what to study for on tests.

For these reasons, cultural responsiveness training should be given to instructors. Aviation institute military instructors perceive these behaviors as participants being lazy or having little respect, when the student is acting within an educational reference they have been accustomed to their whole life. Gamification allows the introduction of military discipline and training (points for preferred behaviors) within the framework of Saudi Arabian soldiers' lived experiences.

### *Gamification as an Instructional Option*

This research suggests that gamification can be a viable way of motivating Saudi Arabian soldiers learning aviation from an American curriculum by using options that include (a) student competition and (b) activities and rewards that are relevant to test material.

**Student Competition.** Student competition is one of the attributes of a gamified learning system that can be implemented within an aviation institute to increase student motivation. Relatedness is a subcategory of SDT and is incorporated into gamification by participants competing against each other (Pilkington, 2018).

This research did not show an increase in relatedness from participating while competing. The participants commented that they did not really want to see their friends do poorly or that they were well above their friends. While reflecting on the posttest interviews, several participants described that competing might work if participants were paired into teams. The participants sat at tables that allowed two to sit together. They said they would be more engaged in competing if the pressure was off them alone and was

directed to them working as a team. Future researchers can increase the competitive spirit of the participants by allowing them to work within teams.

**Activities and Rewards That Are Relevant to the Test Material.** The findings from this study can help clarify what Saudi Arabian soldiers value as sufficient to motivate them to study outside of the classroom. Participants' self-efficacy and self-determination to study were increased due to their perception of an increased value of study material that was available in activities that would help them do well on tests. This was a distinct factor in selecting gamification as an intervention to increase Saudi Arabian soldiers' motivation.

Many different rewards were offered for the participants to spend the points they earned. Participants unanimously chose a day off, which would be redeemed on Thursday. This is observed as the last day of the week in Saudi Arabia. Many of the interviews with participants illuminated a valuation of personal time. Participants would not spend any points until they earned enough to purchase their day-off reward.

Participants also valued corrections for attendance. Most class standings of the participants were very close. Student attendance was taken every hour of every day. and attendance was awarded a certain percentage of the final grade. Two classes I have presided over have had the class leader decided by attendance. Participants were able to purchase corrections to absences to help offset being late. Future studies can use the "day-off" reward as a good motivator for Saudi Arabian students in the future. Saudi Arabian students value their time over school and work. This valuation of personal time over school has been well documented in Saudi Arabian culture (Habbash & Rao Idapalapati, 2016; Springsteen, 2014).

## Implications for Future Research

This research has suggestions and guidelines for future research. This study was developed on existing research, and it can also provide a foundation for further analysis in training and instructing Saudi Arabian military forces. In addition to these research guidelines are (a) examining the impact of gamification on different student groups, (b) incorporating additional game activities into the instructional design process, and (c) lengthening the duration of the study.

### *Examining the Impact of Gamification on Different Student Groups*

The present study examined how gamification affected the motivation of Saudi Arabian officers in flight school to study outside of the classroom. Future studies might examine the feasibility of gamification in a variety of different student groups. For example, previous studies have indicated varying effects of gamification on Saudi Arabians in K–12 and university settings (Bagunaid et al., 2019; Romero & Manjarres, 2017; Yadav & BaniAta, 2013). The literature showed a difference between university and K–12 participants. It would be helpful to determine whether gamification should be used with noncommissioned officers and soldiers. Typically, courses for noncommissioned officers and soldiers require a lower level of English comprehension. Likewise, future instances of action research could examine how gamification could influence different age groups within aviation institutes. Finally, future research could examine the impact of prior academic and military experience using gamification. For example, classes conducted after this gathering of data have seen a rise in knowledge and maturity among military officers that attended college within the United States versus military officers that graduated from a Saudi Arabian military academy.

### *Incorporating Additional Game Activities into the Instructional Design Process*

The second implication for future research is incorporating additional game activities into the instructional design process. In the present study, Quizlet and worksheets were available outside of the classroom to help participants study for academic tests and gain general aviation knowledge. Additional activities, such as preparing a five-minute class or providing other homework assignments for the participants to complete, should be incorporated into the design of follow-up research. However, other game elements and permutations may further enhance learning conclusions, and these merit future study. Although the participants did not generally accept introducing a single competition, designing competition around teams may work better for future research designs. Future designs could also examine the awarding of badges and distinctions, such as different colored hats or patches, for meeting specific goals within the course. For instance, participants completing their solo flight could be given a pin with the letter "S" to display on their unit patch.

### *Lengthening the Duration of the Study*

Finally, an implication for future action research cycles is lengthening the study's duration. A six-week-long study is insufficient in many researchers' eyes, and several researchers call for more longitudinal studies in gamification research (Chittaro & Buttussi, 2019; Kim & Lee, 2015; Lara et al., 2020). An increase in the implementation of gamification on learners' intrinsic motivation declined significantly as the weeks progressed (Chan et al., 2018). In line with this statement, careful observation and consideration are needed of the long-term effects of gamification. Further research into

gamification might observe instruction over phases, stages, or entire courses instead of one instructional unit.

## Limitations

This study was carefully designed, developed, and implemented to reduce the introduction of additional variables and extraneous influences on the data and findings; however, there were still some limitations that were not foreseen. The following section will discuss these limitations in terms of (a) the research design, (b) the participants, and (c) the researcher.

### Research Design

One of this study's limitations is that an action research approach was taken. Action research is an approach to educational research that an academic practitioner conducts in an instructional setting. It has implications for their specific educational practice, their institution, and their learners (Mertler, 2017). The findings from action research are not generalizable to larger populations in different contexts as a whole because of the contextual nature of the research (Mertler, 2017). Problems within action research and this study are not intended to be conclusive but to address particular issues of practice using findings and data to help stakeholders make informed decisions for future courses (Mertler, 2017).

Creswell and Creswell (2018) described several student interview pitfalls that may limit participants' comfort levels and responses. For example, interview locations are not in a natural location, such as the classroom. Student interviews were conducted in a separate briefing room. Student interviews may have been tainted by having another Saudi Arabian or the teacher–researcher–program manager within the discussion. The

translator who was present for the interviews or the researcher may have unintentionally introduced bias or stifled students' willingness to be honest in their discussions, despite all precautions being taken against this. It is a well-documented fact that Saudi Arabian participants will try to be overly respectful to teachers (Habbash & Rao Idapalapati, 2016), which may reduce openness and critical commenting.

Written surveys, such as the SIMS and WMPS, could have presented limitations to this study due to students' comprehension of the questions. Students are learning and trying to comprehend survey items in English, their second language. Self-reported measures generally rely on a student's ability to properly read, understand, and express their opinions (Boz et al., 2017). Self-reported measures are helpful in a student's reflection on the training they have received. Subtle nuances within the questions may not be interpreted correctly by participants using English as a second language (Romero & Manjarres, 2017). Finally, the WMPS was completed at the end of each week throughout the intervention, which could have allowed participants not to reflect upon the questions but to focus on leaving for the weekend.

The study length of six weeks may have imposed limitations. This study lasted six weeks and encompassed two different stages of flight training. Participants specifically noted that week's four through six were not as important to them because the activities were not relevant to the actions, they performed each day. Weeks eight through ten of the courses provide a flight evaluation, which may have increased the motivation of the participants to use the activities and to see them as relevant to studying. Alternatively, a sample of the first four weeks encompassing most of the academic training would have been more specific to motivating participants academically.

Lastly, gamification over relies on extrinsic motivation, and this is not sustainable over time (Deif, 2017). You cannot keep using extrinsic motivation to maintain motivation because it wanes over time. Gamification for this intervention was used to expose the students to new ways of studying for a curriculum that was being taught in a second language. The Friedman test showed a decline in motivation as the weeks continued. A longer study may need to have different activities or different rewards to keep the students interested in the intervention.

**Participants**

The number of participants ($n$ = 8) in this study was a limiting factor. Each Initial Entry Rotary Wing (IERW) is designed for eight participants because of aircraft, limited classroom space, instructors, training areas, and other aviation support elements. Action research is intended to be specific to problems experienced within the problem of practice and is not designed to be generalizable (Mertler, 2017). The low number of participants reduced the strength of the study findings. Potential participants all have the same attributes, such as being male, members of the military, and Arab, and their religion being Islam. Future studies could examine whether participants' different levels of education and English language experience impact the findings.

**Researcher**

Another limitation of the study is the immersive situation of the researcher, their personal experience with researching, and their personal involvement with this study. I had to struggle not to taint the participants with my biases about the training they were receiving and the gamification intervention. I have learned through being an accident

investigator that even the simplest head nods or smiles can influence interviewees' opinions and bias them toward certain things.

I had never worked in academia and was unfamiliar with best practices in instructional design. This led to many errors and modifications in the implementation of the intervention. For example, using Google Classroom became problematic because of not doing proper testing and structuring the daily activities to reflect on what was being shown by the instructors to these participants. I did not prepare lesson plans to outline instruction for other instructors, which led to instructors teaching however they felt like instructing. I could have instituted more automation through classroom instruction, including gamification activities, such as leaderboards, that stayed through the time the participants were within the class.

## Closing Thoughts

This action research study was designed to motivate IERW flight school participants and make their transition into flying easier. This study acknowledges the problem of flight school participants having to learn complicated aviation terms in a second language. Finding out what motivates participants to display the desired behavior was more difficult. The participants in this study had a favorable impression of gamification. When I was their flight commander in the instrument phase of flight school, they asked for gamification activities.

Military training is unique in that I do not have to explain to the participants what I do. Most of the time, I can just order them to do it, but this never instills the critical thinking that is necessary for successful aviation thought patterns. Military training has come a long way since my time at flight school.

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# APPENDIX A

UNIVERSITY OF SOUTH CAROLINA

**OFFICE OF RESEARCH COMPLIANCE**

**INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH**
**DECLARATION of NOT RESEARCH**

Matthew Middleton
1373 Bruceton Drive
Clarksville, TN 37042

Re: **Pro00113986**

Dear Mr. Matthew Middleton:

This is to certify that research study entitled ***ACTION RESEARCH ASSESSING THE PERCEPTIONS OF ARABIC MILITARY FLIGHT STUDENTS USING A GAMIFIED LEARNING INTERVENTION DURING FLIGHT SCHOOL TRAINING*** was reviewed on **8/16/2021** by the Office of Research Compliance, which is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). The Office of Research Compliance, on behalf of the Institutional Review Board, has determined that the referenced research study is not subject to the Protection of Human Subject Regulations in accordance with the Code of Federal Regulations 45 CFR 46 et. seq.

No further oversight by the USC IRB is required. However, the investigator should inform the Office of Research Compliance prior to making any substantive changes in the research methods, as this may alter the status of the project and require another review.

If you have questions, contact Lisa M. Johnson at lisaj@mailbox.sc.edu or (803) 777-6670.

Sincerely,

Lisa M. Johnson
ORC Associate Director and IRB Manager

# APPENDIX B

## The Situational Motivation Scale (SIMS)

**Directions:** Read each item carefully. Using the scale below, please circle the number that best describes your perception of using gamification. Answer each item according to the following scale: 1: corresponds not all, 2: corresponds very little, 3: corresponds a little, 4: corresponds moderately, 5: corresponds enough, 6: corresponds a lot, 7: corresponds exactly.

| **SIMS Survey Answers to the following question: Why are you currently engaged in this activity?** | **Pre-gamification Survey** | **Post-gamification Survey** |
|---|---|---|
| 1. Because I think that this activity is interesting. | 1. I believe that participating in gamification will be interesting. | 1. Participating in gamification was interesting. |
| 2. Because I am doing it for my own good. | 2. I believe doing gamification activities will be good for me. | 2. I believe the gamification activities were good for me. |
| 3. Because I am supposed to do it/ | 3. I will do the gamification activities because I am supposed to. | 3. I did the gamification activities because I had to. |
| 4. There may be good reasons to do this activity, but personally I don't see any. | 4. There may be good reasons to do gamification, but personally I do not see any. | 4. There may have been good reasons to do gamification, but I did not see any. |
| 5. Because I think that this activity is pleasant. | 5. I believe that this gamification will be pleasant (giving a sense of happy satisfaction or enjoyment). | 5. I believe that gamification was pleasant. |
| 6. Because I think that this activity is good for me. | 6. I think gamification will be good for me. | 6. I think gamification was good for me |
| 7. Because it is something that I must do. | 7. Gamification is something I must do. | 7. I think I had no choice except to participate in gamification. |

| | | |
|---|---|---|
| 8. I do this activity, but I am not sure if it is worth it. | 8. I do gamification activities, but I am not sure if it is worth it. | 8. I did gamification activities, but I am not sure if it is worth it. |
| 9. Because this activity is fun. | 9. I am going to do gamification because I think it is fun. | 9. I still think gamification was fun. |
| 10. By personal decision. | 10. I would participate in gamification by my own choice. | 10. I would participate in gamification again. |
| 11. Because I do not have any choice. | 11. I have no choice but to participate in gamification. | 11. I felt like I had no choice but to participate in gamification. |
| 12. I don't know; I don't see what this activity brings me. | 12. I do not know why I am participating in gamification, nor do I see what gamification is trying to do. | 12. I know why I was participating in gamification, and I understand what it was trying to teach me. |
| 13. Because I feel good when doing this activity. | 13. I think I will feel good when doing the gamification activities. | 13. I felt good performing the gamification activities. |
| 14. Because I believe that this activity is important for me. | 14. I feel like gamification activities are important for me. | 14. I still feel like gamification is important for me. |
| 15. Because I feel that I have to do it. | 15. I feel like I have to participate in the gamification activities. | 15. I feel like I had to participate in the gamification activities. |
| 16. I do this activity, but I am not sure it is a good thing to pursue it. | 16. I do this activity, but I am not sure it is a good thing to pursue it. | 16. I did this activity, but I am not sure it is a good thing to pursue it. |

**PRE-TEST Situational Motivation Scale**

**Directions:** Read each item carefully. Using the scale below, please circle the number that best describes your perception of using gamification. Answer each item according to the following scale: 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree.

| Number | Text | Explanation in Arabic |
|---|---|---|
| 1 | Strongly Disagree | لا أوافق بشدة |
| 2 | Disagree | تـعـا رض |
| 3 | Neutral | حيـا دي |
| 4 | Agree | يوافق على |
| 5 | Strongly Agree | مـو افـق بـشـد ة |

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

| Pre-gamification Survey | | | | | |
|---|---|---|---|---|---|
| 1. I believe that participating in gamification will be interesting. | 1 | 2 | 3 | 4 | 5 |
| 2. I believe doing gamification activities will be good for me. | 1 | 2 | 3 | 4 | 5 |
| 3. I will do the gamification activities because I am supposed to. | 1 | 2 | 3 | 4 | 5 |
| 4. There may be good reasons to do gamification, but personally I do not see any. | 1 | 2 | 3 | 4 | 5 |
| 5. I believe that this gamification will be pleasant (giving a sense of happy satisfaction or enjoyment). | 1 | 2 | 3 | 4 | 5 |
| 6. I think gamification will be good for me. | 1 | 2 | 3 | 4 | 5 |
| 7. Gamification is something I must do. | 1 | 2 | 3 | 4 | 5 |
| 8. I do gamification activities, but I am not sure if it is worth it. | 1 | 2 | 3 | 4 | 5 |
| 9. I am going to do gamification because I think it is fun. | 1 | 2 | 3 | 4 | 5 |
| 10. I would participate in gamification by my own choice. | 1 | 2 | 3 | 4 | 5 |
| 11. I have no choice but to participate in gamification. | 1 | 2 | 3 | 4 | 5 |
| 12. I do not know why I am participating in gamification, nor do I see what gamification is trying to teach me. | 1 | 2 | 3 | 4 | 5 |
| 13. I think I will feel good when doing the gamification activities. | 1 | 2 | 3 | 4 | 5 |
| 14. I feel like gamification activities are important for me. | 1 | 2 | 3 | 4 | 5 |
| 15. I feel like I have to participate in the gamification activities. | 1 | 2 | 3 | 4 | 5 |
| 16. I do this activity, but I am not sure it is a good thing to pursue it. | 1 | 2 | 3 | 4 | 5 |

**POST-TEST Situational Motivation Scale**

**Directions:** Read each item carefully. Using the scale below, please circle the number that best describes your perception of using gamification. Answer each item according to the following scale: 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree.

| Number | Text | Explanation in Arabic |
|---|---|---|
| 1 | Strongly Disagree | لا أوافق بشدة |
| 2 | Disagree | تـعـا رض |
| 3 | Neutral | حيـا دي |
| 4 | Agree | يوافق على |
| 5 | Strongly Agree | مـو افـق بـشـدة |

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

| Post-gamification Survey | | | | | |
|---|---|---|---|---|---|
| 1. Participating in gamification was interesting. | 1 | 2 | 3 | 4 | 5 |
| 2. I believe the gamification activities were good for me. | 1 | 2 | 3 | 4 | 5 |
| 3. I did the gamification activities because I had to. | 1 | 2 | 3 | 4 | 5 |
| 4. There may have been good reasons to do gamification, but I did not see any. | 1 | 2 | 3 | 4 | 5 |
| 5. I believe that gamification was pleasant. | 1 | 2 | 3 | 4 | 5 |
| 6. I think gamification was good for me. | 1 | 2 | 3 | 4 | 5 |
| 7. I think I had no choice except to participate in gamification. | 1 | 2 | 3 | 4 | 5 |
| 8. I did gamification activities, but I am not sure if it is worth it. | 1 | 2 | 3 | 4 | 5 |
| 9. I still think gamification was fun. | 1 | 2 | 3 | 4 | 5 |
| 10. I would participate in gamification again. | 1 | 2 | 3 | 4 | 5 |
| 11. I felt like I had no choice but to participate in gamification. | 1 | 2 | 3 | 4 | 5 |
| 12. I know why I am participating in gamification, and I understand what it was trying to teach me. | 1 | 2 | 3 | 4 | 5 |
| 13. I felt good performing the gamification activities. | 1 | 2 | 3 | 4 | 5 |
| 14. I still feel like gamification is important for me. | 1 | 2 | 3 | 4 | 5 |
| 15. I feel like I had to participate in the gamification activities. | 1 | 2 | 3 | 4 | 5 |
| 16. I did this activity, but I am not sure it was a good thing to pursue it. | 1 | 2 | 3 | 4 | 5 |

# APPENDIX C

## INTERVIEW PROTOCOL

*Note. The pre-intervention interview and post-intervention interview protocols only changed the tense of the sentence. Instead of asking, "Do you think gamification will help you study?" the post-intervention interview will ask, "Did gamification help you study?"*
Date and Time of Interview:

Interviewer:

Translator:

Interviewee:

Thank you for agreeing to participate in this research study. The purpose of this action research will be to evaluate your perception of gamification on your motivation to continue studying outside of regular school hours while you are in the Primary phase of IERW.

Thank you for agreeing to participate in this interview. This interview will last 20 to 30 minutes. There are no risks or rewards associated with your participation. I will remind you that your participation in this action research study is voluntary. You are free to withdraw from the study or interview at any time without fear of negative repercussions. Ethical research practices dictate that the interviewee agrees to be interviewed and understands how the data gathered will be used. The information obtained in this interview will be used for research purposes only. Your anonymous participation in this study will be preserved using a pseudonym (another name).
This consent form serves as confirmation that you understand the purpose of your involvement and agree to the conditions of your participation. Please read through the remainder of this consent form before you sign and date the form. Please sign at the bottom. Signing and dating this form indicates you agree with the following:

1. This interview will be conducted face-to-face and will be recorded.
2. Any interview content available through academic publications or other academic outlets will be anonymized with a pseudonym to preserve your anonymity. Care will be taken to ensure that any other information from the interview will not reveal your identity.

3. An interview transcript be sent to you to review and correct any factual errors.
4. The transcript of the interview will be analyzed by Matthew Middleton and XXXXX XXXXX, the researcher and translator.
5. The interview transcript will only be accessible by Matthew Middleton, XXXXX XXXXX, and university advisors to collaborate as part of the research process.
6. The audio recording and transcript will be stored on a password-protected computer and online site for the duration of the research study. They will be permanently deleted upon the conclusion of the research project.
7. All or part of the content of your interview may be used in academic papers or an archive of the project.
8. Any variation of the above conditions will only occur with your explicit approval.

By signing this form, I agree that:

1. My participation in this project is entirely voluntary, and I can withdraw from the study or stop the interview at any time.
2. I understand that I will not receive any benefit of payment for my participation.
3. I will receive a copy of the transcript of my interview and may make any edits I feel are necessary to ensure factual accuracy.
4. I understand the steps taken to preserve confidentiality and anonymity.
5. I understand that the transcribed interview or any excerpts from it may be used as described above.
6. I have been able to ask questions, and I understand that I am free to contact the researcher with any questions I may have in the future.
7. I have read and agree with all the information above.

Printed Name:

_____

Participant's Signature:

_____

Date: _____

NOTES Section:

| | |
|---|---|
| Age | |
| Degree | |
| Participated in gamification activities? | |

I would like to start this interview by thanking you for talking with me today. If you are unsure how to answer any of the questions, please feel free to ask or answer in Arabic, and our translator will annotate your answers.

Research Question One Questions:

- Do you think gamification will be useful to you, and why?
- Do you think gamification will motivate you to work outside of the classroom, and why?
- Do you think the activities involving gamification will motivate you to study more, and why?
- What motivates you to study outside of the classroom?
- Do you think the rewards are enough to motivate you to do more studying, and why?
- Do you think gamification will motivate you, or will a different strategy be more helpful?
- Can you describe any other methods or strategies that might positively impact your motivation, and why?

Research Question Two Questions:

- Do you think gamification will affect your performance, and why?
- Do you think the repetition of activities will help you retain information better, and why?
- Do you think gamification could help you learn more, and how?

This concludes my questions for this interview. To provide some closure, let me summarize what we have discussed in today's interview. Today, I have recorded and taken brief notes on our discussion of your perceptions of using gamification as a

motivator. This video/audio file will be stored digitally on a secure server for retrieval and transcription later. The information obtained in this interview will be used for research purposes only. After I have transcribed our interview, I will print and email you a copy for you to review for accuracy and any editing and clarification changes that need to be made. After completing any editing or clarification changes, the transcript will be saved on a secure server. Your anonymous participation in this study will be preserved using a pseudonym. At no time will your identity be revealed. When the final report has been finished, you will receive a copy of that final report via email. Do you have any questions or concerns that you feel were not addressed in this interview? I thank you for your time in sitting down with me for this interview.

# APPENDIX D

## WEEKLY MOTIVATIONAL PERCEPTION SURVEY

*Note. The WMPS will be administered on paper for the student to circle and write answers. These surveys will be done weekly on the last day of the week.*

Please circle your answer below using the scale provided. Please answer as accurately as possible.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | I care about the points I will receive this week. | 1 | 2 | 3 | 4 | 5 |
| 2 | I studied at least five times this week to get an award. | 1 | 2 | 3 | 4 | 5 |
| 3 | I think the activities will make me do well. | 1 | 2 | 3 | 4 | 5 |
| 4 | I used the activities five times this week. | 1 | 2 | 3 | 4 | 5 |
| 5 | I think that earning points has motivated me to study. | 1 | 2 | 3 | 4 | 5 |
| 6 | What reward are you trying to earn next week? | | | | | |
| 7 | How would you change one element of gamification? | | | | | |