THE INTEGRATION OF A MOBILE PERVASIVE GAME

IN THE NEW EMPLOYEE ONBOARDING PROCESS

by

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ABSTRACT

This dissertation research aimed to determine if adding a digital game to an onboarding process could increase employee satisfaction, socialization, and content retention for new employees. Framed by Deci and Ryan's (1980) self-determination theory, this study explored two research questions: (a) Is there a difference in autonomy, competence, and relatedness in new employees based on their participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?, and (b) Is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

Literature was reviewed on research and practices of employee onboarding, game design and digital game-based learning, and self-determination theory in the context of both employee/work relations and game design. The study examined 40 new employee participants from a southeastern research university. Data were collected from a control group and a test group using a questionnaire, a pre- and post-test, two surveys, and a digital game activity. Information relevant to new employees was delivered to the test group via a digital game-based activity and to the control group via website hyperlinks.

There was no significant difference in the levels of autonomy, competence, and relatedness between the control group and the test group, nor was there a difference in the

retention of fundamental institutional information between the control group and the test group. The results, implications for practice, and recommendations for future research are discussed.

DEDICATION

This dissertation is dedicated to my husband, Moody Burns, who pushed me forward and gave me the time and space to pursue my goals. Thank you for reading so many papers that you found uninteresting (boring) and catching my grammatical mistakes. Thank you for listening to my rants about assignments or my writing inadequacies, my inferiority complex as a scholar, and my frustrations in not having enough time to be wife, mom, employee, volunteer, and student all at the same time. You are a wonderful husband and my best friend.

LIST OF ABBREVIATIONS AND SYMBOLS

a	Cronbach's measure of internal consistency
df	Degrees of freedom: number of values in a statistical calculation that are free to vary
F	F-statistic determines if there is a statistically significant difference between two populations' means
M	Mean: average of all numbers
SD	Standard Deviation: measures the variation of a set of data
SE	Standard Error: measure of the statistical accuracy of an estimate
p	Null hypothesis testing used to quantify the statistical significance of results
r	Pearson's r: measures the correlation between two variables

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CHAPTER I

INTRODUCTION

Helping an employee adjust to a new work environment is a vital responsibility of human resources departments (Schmidt & Akdere, 2007). The first few days and even weeks of a job may be stressful for new employees. Corporations that have an effective method of onboarding, the process of welcoming, guiding, and training new employees, can help ease the transition, reduce stress levels, and improve employee satisfaction (Wallace, 2009). For the purpose of this study, the process of employee onboarding includes all aspects of acclimating a new employee to the work environment from hire date to no less than 12 months post-hire date, including the orientation training session (Graybill, Carpenter, Offord, Piorun, & Shaffer, 2013; Krasman, 2015).

While there are a variety of approaches to onboarding programs, most include one or more orientation training sessions in which information is given about the organization's goals, missions, and direction, employment paperwork is completed, employee benefits are presented, and key company personnel are introduced (Klein & Weaver, 2000; Shih, Lee, Liu, & Mills, 2013; Srimannarayana, 2016; Wallace, 2009). These sessions are generally presented formally with structured, step-by-step programs (Bauer, 2010). Some companies do not employ a formal onboarding process and are able to informally guide new employees through completion of the needed paperwork and standard orientation information on the first day of employment (Bauer, 2010).

Modern computer technology has enabled routine onboarding tasks to be completed digitally through local intranet sites or web-based portals (Graybill et al., 2013; Klein & Polin, 2012; Krasman, 2015; Shih et al., 2013). Technology also allows employees to begin acclimating themselves to a new work environment by perusing the company website and web search engines to research the company, its activities, and even its employees prior to starting their new position (Depura & Garg, 2012). In addition, social media allows new employees to begin networking with colleagues before they begin working (Graybill et al., 2013).

Not only has technology changed how employees enter a new job, but the type of employee entering the workforce has also changed (Donovan, 2012; Mohl, 2014). Many of these new employees are from a generation with quite different intellectual styles and references than prior generations (Dingli & Seychell, 2015; Prensky, 2001). Individuals born into the digital era have most likely been exposed to electronic devices from a very early age (Dingli & Seychell, 2015; Prensky, 2001). This young generation is tech-savvy, ambitious, and highly connected to their peers and the world through online resources (Kapp, 2007; Kaufman & Horton, 2015). Owning a smart phone is not considered a material want, but a life necessity (Dingli & Seychell, 2015; Prensky, 2001). For this constantly connected generation, "learning is best accomplished through questions, discover[y], construction, interaction, and, above all, fun" (Prensky, 2001, p. 6). Traditional forms of corporate training such as classroom lectures may no longer be considered exciting and interesting (Depura & Garg, 2012; Donovan, 2012; Kapp, 2007).

Since many individuals of this young generation grew up playing video games of some type, either on a console, a computer, or a mobile device (Dingli & Seychell, 2015; Oblinger, 2004; Prensky, 2001), a game created specifically for new employees may be successful in helping employees continue learning through the first few weeks and months of employment.

According to West, Hoff, and Carlsson (2013), play, in any form, enhances creativity and increases intrinsic motivation, relieves stress, energizes, encourages experimentation, fosters openness and collaboration, and provides a safe place to make mistakes. Play in a learning environment creates active learning and active learning improves retention (Senderek, Brenken, & Stich, 2015).

One game genre that may be well suited for new employees is a digital scavenger hunt. In a digital scavenger hunt, players are given a list of items to locate or tasks to perform using digital devices, such as mobile phones, tablets, or computers. Hunts can be conducted individually or in teams. A hunt designed specifically for new employees may contribute to employee socialization, by helping the employee to become familiar with the organizational culture including its mission, values, taboos, and practices (Wallace, 2009). As a scavenger hunt enables players to explore specific geographic locations (Lu, Chao, & Parker, 2015), such an activity might engage new employees and help them quickly adjust to their working environment (Rogers et al., 2015; Wallace, 2009).

Statement of the Problem

New employee orientation can be overwhelming, as a great deal of information is covered in a short amount of time. This often results in employees leaving the orientation and not remembering where to find needed information or how to access all the benefits available to them (Dunn & Jasinski, 2009; Fayad, 2014; Wallace, 2009). Furthermore, orientation sessions may not fully cover everything human resources (HR) needs to share with employees due to time constraints (Wallace, 2009). Once an orientation session is completed, it is the responsibility of managers and coworkers to guide and develop new employees or, in some cases, it is left up to the new employee to seek out information independently (Evans, 2015). While new employees

are generally eager to learn and fit in with their peers (Dunn & Jasinski, 2009; Wanous & Reichers, 2000), learning a new job and establishing new relationships can be stressful (Acevedo & Yancey, 2011; Wallace, 2009) and new employees may not know what information is or is not important to seek out (Kapp, 2007). Furthermore, independent learning can frequently lead to inconsistent or incorrect knowledge acquisition (Schmidt & Akdere, 2007; Wallace, 2009).

At the large, public university in the United States, where this study takes place, orientation for new employees consists of formal classroom sessions and online training courses. While a satisfaction survey revealed employees are mostly satisfied with the face-to-face sessions (Burns, 2016), the short orientation time frame limits the content that can be covered. The university, as a whole, does not have a systematic onboarding program in place beyond the brief formal classroom sessions.

Purpose of the Study

The purpose of this study was to determine if adding a digital game, specifically a digital scavenger hunt, to the onboarding process could increase satisfaction, socialization, and content retention for new employees. More specifically, this study sought to determine if a digital scavenger hunt is an effective means of reinforcing information provided during the face-to-face orientation sessions, introducing new information, encouraging new personal connections, reducing stress, and fostering employee competence.

The research for this study was conducted at a university where its employees attend two half-day classroom orientation sessions plus a minimum of five e-learning compliance courses. The goal was not to replace the current orientation sessions, but to extend, enhance, and support the sessions with a game activity.

Significance

As employees entering the workforce are becoming increasingly accustomed to digital technologies, digital games, and independent learning (Depura & Garg, 2012; Perryer, Celestine, Scott-Ladd, & Leighton, 2016), there is a need for research to explore whether a digital game is a viable means of enhancing the onboarding process beyond formal orientation classroom sessions. Researchers have called for further study on employee orientation training (Schmidt & Akdere, 2007), including different methods of new employee orientation using quasi-experimental research designs (Holton, 1996). Researchers investigating the use of games for learning may also find value in this study, as few studies exist specifically designed to investigate the application of digital games to new employee onboarding. Additionally, the findings of this study may be beneficial to human resources departments that desire to maximize the information presented to new employees, increase content retention, and reduce stress in new employees.

Theoretical Framework

As this study sought to understand how a digital game affects new employees as they adapt to their new work culture and environment through a digital game activity, the motivational theory of self-determination theory (SDT), with its sub-theory of cognitive evaluation theory (CET), was used. Motivation is the driving force behind mobilizing others to act. “People can be motivated because they value an activity or because there is strong external coercion. They can be urged into action by an abiding interest or by a bribe” (Ryan & Deci, 2000, p. 69). SDT and CET are useful for understanding the motivational factors that drive employees and gamers.

Self-determination Theory

Self-determination theory (SDT) explores the motivational factors that encourage self-regulation and well-being (Deci & Ryan, 1980) Simply stated, humans are moved to action either by intrinsic motivators or extrinsic motivators. Intrinsically motivated activities are tasks people generally find interesting or enjoyable and are said to produce high-quality outcomes and creativity (Landers & Callen, 2011; Ryan & Deci, 2000). Intrinsic motivation heightens learning, creativity, and problem-solving (Pederson, 2003; Ryan & Deci, 2000). Extrinsically motivated activities, on the other hand, are tasks that may not be particularly interesting or enjoyable, but instead are done for external rewards (Ryan & Deci, 2000).

Cognitive Evaluation Theory

Cognitive evaluation theory (CET) is a sub-theory of SDT, which identifies autonomy, competence, and relatedness as the basic psychological needs that must be met to facilitate intrinsic motivation. According to Richter, Raban, and Rafaeli (2015), **"**Autonomy is the ownership of one's behavior. Competence is the ability to produce desired outcomes and to experience mastery and effectiveness. Relatedness is the feeling of being connected with others" (pp. 32-33). Studies have shown "people must not only experience competence or efficacy, they must also experience their behavior as self-determined for intrinsic motivation to be in evidence" (Deci & Ryan, 2000, p. 70). SDT and CET are useful for studying performance and adjustment in workplace environments (Baard, Deci, & Ryan, 2004). Intrinsic and extrinsic motivational factors within the workplace may include such benefits as pay, peer recognition, challenge, and positive feedback (Sauermann & Cohen, 2010). Autonomy, the first of the three basic psychological needs identified in CET, can "promote motivation by increasing learner interest, confidence, and sense of self-worth" (Pederson, 2003, p. 54). Competence satisfaction allows

new employees to adapt to environments and complex tasks (Van den Broeck, Vansteennskiste, De Witte, Soenens, & Lens, 2010). The need for relatedness is satisfied as employees integrate into the workplace, connect with others, and begin to feel a part of the community (Van den Broeck et al., 2010). When all three of these basic needs are met, employees are more likely to produce high levels of work, display job satisfaction, persistence, a positive attitude, and be psychologically adjusted (Gagné & Deci, 2005). Self-determination theory has also been used to understand the motivational factors that drive gamers to persist in game play (Perryer et al., 2016; Przybylski, Rigby, & Ryan, 2010; Uysal & Yildirim, 2016). The commonly held understanding is that a well-designed game provides an environment where the three basic psychological needs of autonomy, competence and relatedness can generally be achieved (Kapp, 2012). Players perceive themselves to act autonomously when choosing to play a game (Deterding, 2015; Ryan, Rigby, & Przybyski, 2006). Meeting challenges (Peng, Lin, Pfeiffer, & Winn, 2012), feedback, and rewards contribute to feelings of competency (Deterding, 2015; Przybylski et al., 2010). Players experience feelings of relatedness when challenges are accomplished through collaboration with others, either in the digital game environment or in real-world settings (Peng et al., 2012; Richter et al., 2015).

It is important to note that not all rewards have positive effects. In a meta-analysis of 128 experiments, Deci, Koestner, and Ryan (2001) determined that, “tangible rewards do significantly and substantially undermine intrinsic motivation” (p. 2). In these studies, verbal feedback increased motivation in children and college students when given in a non-controlling manner, especially among the older students. The key is to increase perceived autonomy and thus increase competency and intrinsic motivation.

Methods

The purpose of this quasi-experimental study was to determine if adding a digital game to the onboarding and orientation process could increase employee satisfaction, socialization, and content retention in new employees. The study, divided into three phases, consisted of a questionnaire, a pre- and posttest, two surveys, and a digital game activity. Participants included new employees of a research university. Further requirements specified participants be full-time, first-time hired employees who were 18 years of age or older. In the first phase, participants completed a demographic and gamer status questionnaire and a pre-test within 1 to 2 days after the classroom orientation sessions. The pretest was used to establish a baseline of prior knowledge about the research site. The demographic and game-play experience questionnaire provided information needed to place participants into a test group and a control group using a proportionate stratified convenience sampling method (Wildemuth, 2017). In Phase II, information relevant to new employees was delivered to the test group via a digital game-based activity and to the control group via website hyperlinks. Both groups were given 2 weeks to interact with the content. In Phase III, a posttest was administered to determine if participant knowledge of the new employer had increased. Data from the Psychological Need Satisfaction at Work Scale (Deci, Ryan, Gagné, Leone, Usunov, & Kornazheva, 2001; Ilardi, Leone, Kasser, & Ryan, 1993; Kasser, Davey, & Ryan, 1992) were analyzed to determine levels of employee satisfaction with their job in the areas of autonomy, competence, and relatedness. Additionally, the test group completed a Psychological Need Satisfaction in Game Play Survey to determine levels of satisfaction with the game-based activity.

Research Questions and Hypotheses

In order to determine if adding a digital game, specifically, a scavenger hunt, to the onboarding process had an effect on employee satisfaction, socialization, and content retention for new employees, the study sought to answer the following questions:

1. Is there a difference in autonomy, competence, and relatedness in new employees based on their participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

   H_0: Participants in the test group (onboarding game activity) will report equal levels of autonomy as the participants in the control group (no game activity).

   H_1: Participants in the test group (onboarding game activity) will report higher levels of autonomy than participants in the control group (no game activity).

   H_0. Participants in the test group (onboarding game activity) will report equal levels of competence as the participants in the control group (no game activity).

   H_2: Participants in the test group (onboarding game activity) will report higher levels of competence than participants in the control group (no game activity).

   H_0: Participants in the test group (onboarding game activity) will report equal levels of relatedness as the participants in the control group (no game activity).

   H_3: Participants in the test group (onboarding game activity) will report higher levels of relatedness than participants in the control group (no game activity).

2. Is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

H_0: There will be no difference in difference scores for participants in the test group compared to participants in the control group.

H_4: There will be a significant difference in difference scores for participants in the test group compared to participants in the control group.

H_0: Participants in the test group will score the same or lower on the posttest than on the pretest.

H_5: Participants in the test group will score higher on the posttest than on the pretest.

H_0: Participants in the control group will score the same or lower on the posttest than on the pretest.

H_6: Participants in the control group will score higher on the posttest than on the pretest.

Based on the literature reviewed and assuming the game was designed with relevant content, it was predicted that employees who participated in a digital scavenger hunt would find value in the content learned, feel confident as a member on campus, be able to navigate around the large campus, and would know more about the organization's history, landmarks, and programs than the employees who did not play the game. Wallace (2009) stated helping an employee "feel welcomed and comfortable, get his or her bearings, and become part of the team" are critical components of the onboarding process (p. 168). The exposure to this information at an early stage of employment helps instill confidence, impress, and encourage the employees to subscribe to the university mission and values.

Assumptions

For this study, it was assumed that

1. participants completed all components of the research project, regardless of the time interval between the initial contact and pretest to the posttest and final opinion survey.
2. participants in the test group owned, or had access to, an iPhone or Android mobile device with a data package and were willing to use said equipment to participate in the study.
3. participants were comfortable with learning new apps and were able to interact with the game with minimal instruction.
4. participants were physically able to interact with the game.
5. participants would interact with the game activity and submit answers to the missions.

Limitations

The results of this study depended greatly on the development, playability, and quality of the game activity. Good games are rarely designed by individuals but require a team of writers, coders, game designers, and visual artists (Oppermann & Slussareff, 2016; Schell, 2008; Valente, Feijó, & Leite, 2017). They are written, tested, rewritten, and retested, often making multiple iterations before the final release. In this project, the game was designed in collaboration with HR personnel who have experience and expertise with orientation content. However, there was only one iteration of the game. If the game was perceived as uninteresting or of little value, participants would quickly lose interest and either not complete the game or do so without truly engaging with the content (Gee, 2011).

Another limitation to the study was in recognizing that not all employees enjoy gaming, and not all have access to smart phones or data packages, which are required for game play. The game activity was designed to be a motivational factor in helping employees learn a new

environment. If, however, games of any type are not enjoyable to someone, then gameplay may be an ineffective method, or at best, an extrinsic motivator with limited effects (Armstrong, Landers, & Collmus, 2016; Gee, 2011)

It is difficult to find a single game that functions on all mobile devices, carriers, and data plans. GooseChase, the off-the-shelf gaming platform used for this study, is currently only available for Android and iPhone devices which may have eliminated some new employees from participation. Additionally, inclement weather may have deterred participants from interacting with the missions in the game activity that required physical exploration of the campus. However, several of the missions could be accomplished from participants' office computers. Finally, the time lag between the initial pretest and the posttest may negatively affect completion rates.

Definition of Terms

Augmented Reality (AR): AR technology utilizes the global positioning system (GPS) capabilities and camera in mobile technologies, such as phones and tablets, to provide a unique real-world view overlaid with digital content (Dabbagh et al., 2016).

Context-aware: Context-aware is a term used to describe a device that "uses context to provide relevant information and/or services to the user, where relevancy depends on the user's task" (Valente et al., 2017, p. 141).

Game Dynamics: Game dynamics are often a result of the interaction of the player with the game mechanics. Some examples of game dynamics include self-expression, competition, status, and achievement (Bunchball, 2016).

Game Elements: According to Schell (2008), every game consists of four elements: mechanics, story, aesthetics, and technology. Game mechanics are rules and mechanisms within

a game that bound and direct a player's actions (Deterding, 2015; Sicart, 2008). Some examples of game mechanics may include points, levels, virtual goods, and leaderboards (Bunchball, 2016). The story guides the game play through events (Schell, 2008). Aesthetics is how the game looks and feels. The aesthetics of the game should support the story. Technology refers to anything that make the game possible (i.e., computer, pencil, paper, etc.).

Game-based learning: Game-based learning is a method of using games to provide instruction rather than to merely entertain. However, an educational game should also be entertaining (Dabbaugh et al., 2016).

Game: As pointed out by Salen and Zimmermen (2003) and Stenros (2017), there is no universally accepted definition of a game. Much depends on the context and purpose of a game's use. For this research project, a game was defined as "a problem-solving activity approached with a playful attitude" (Schell, 2008, p. 35).

Gamification: Depending on the application, gamification can have multiple meanings. However, the most commonly accepted definition of gamification is "the use of game design elements in non-game contexts" (Deterding, Dixon, Khaled, & Nacke, 2011, p. 10).

Onboarding: Onboarding is the formal or informal process of assimilating a new employee into a company over an extended period of time, usually between 3 to 12 months (Graybill et al., 2013; Krasman, 2015).

Orientation: Typically a single event, orientation is the process of welcoming a new employee, providing general, necessary information about the business, benefits, mission statement, and leadership team (Graybill et al., 2013; Wanous & Reichers, 2000).

Pervasive Games: Pervasive is a term used to describe the nature of a game—one that moves in and out of both the physical (real) world and the game world. Viewed as a game genre

by Stenros, Waern, and Montola (2012), pervasive games include many sub-game types such as hybrid games, mobile games, and location-based games.

Pervasive Mobile Games: A pervasive mobile game uses context-aware mobile devices to blend interactions between physical and virtual worlds during game play (Valente et al., 2017).

Scavenger Hunt: A scavenger hunt is a pervasive game, either digital or paper-based, in which players are given a list of items to locate or tasks to perform. A hunt may be played by individuals or by teams and is often time-limited (Stenros et al., 2012).

Serious Games: Full games, not just elements of a game, designed to entertain and aid learning (Gee, 2011). Donovan (2012) referred to serious games simply as educational games. Deterding et al. (2011) defined serious games as full-fledged games designed for non-entertainment purposes.

Treasure Hunt: A treasure hunt is a type of game in which players search for "treasure" using a list of clues (Stenros et al., 2012).

Summary

Acclimating employees to a new employer, as quickly as possible, benefits the financial bottom line of the business and encourages long-time commitment by the employee. This study evaluated the implementation of a digital scavenger hunt as a means of guiding new employees to learn and discover their new work environment and culture beyond the initial orientation sessions provided by Human Resources. The present chapter discussed the challenges of orientation programs to both employers and employees, presented the theoretical framework of the study, and presented the study's potential significance.

Chapter II provides a literature review of the most relevant, current research and practices of employee onboarding, a review of game design and digital games used in a learning context, and a review of SDT in the context of both employee/work relations and game design. Chapter III provides the research methodology for this quasi-experimental study, including participants, instrumentation, and data collection; game activity design; procedures; and data analysis. In Chapter IV, the results of the quantitative analysis are presented. Finally, Chapter V includes a discussion of the results, implications for practice, and recommendations for future research.

CHAPTER II

LITERATURE REVIEW

Orientation and Onboarding

Organizations often spend a great deal of resources recruiting and hiring talented employees (Bauer & Erdogan, 2011). For that reason, once an employee is hired, it is vital that good talent is retained. The retention of good talent begins with the initial onboarding process (Krasman, 2015). The terms orientation and onboarding are sometimes used interchangeably and can mean the same thing depending on the organization. In much of the literature, however, the two terms are distinguished differently by time and content. Consistent with the current onboarding processes at the research site, orientation is considered one of the components of the onboarding process.

Employee Onboarding

Onboarding is frequently considered development rather than training as it encompasses all the processes needed to fully advance a new employee into a productive, seasoned employee (Holton, 1996). Bauer (2010) defined onboarding as "the process of helping new hires adjust to social and performance aspects of their new jobs quickly and smoothly" (p. 1). The terms onboarding and socialization are used interchangeably by some researchers as socialization is a large part of the onboarding process (Bauer, 2010; Graybill et al., 2013; Holton, 1996; Wallace, 2009; Wanous & Reichers, 2000). Onboarding consists of the period before the 1st day on the job, includes the orientation training sessions, and extends to 6 months, 1 year, or even 2 years, depending on the organization (Graybill et al., 2013; Krasman, 2015). Socialization focuses on

the processes newcomers go through as they learn the culture, norms, and values to find their fit within the organization (Holton, 1996; Klein & Weaver, 2000). The socialization process generally begins during formal classroom orientation sessions and continues as the employee integrates into and moves across the organization; therefore, the responsibility for socialization of newcomers often falls to the employee's manager and coworkers (Caruth, Caruth, & Pane Haden, 2010).

Employee Orientation

Employee orientation is generally recognized as an event that occurs either on the 1st day of employment or within the first few weeks and often begins with transactional tasks, like the completion of paperwork for payroll and benefits (Graybill et al., 2013; Wanous & Reichers, 2000). According to Klein and Weaver (2000), "Orientation programs are a form of employee training designed to introduce new employees to their job, the people they will be working with, and the larger organization" (p. 48). Graybill et al. (2013) described orientation as a stand-alone event hosted by human resources that provides basic employee/employer information. The purpose of orientation is to provide fundamental information, help the employee learn their way around, and feel like a part of the team (Wallace, 2009).

Beyond relaying information, orientation also holds an emotional purpose. It is not uncommon for new employees to experience regret or "buyer's remorse" during the first few days or weeks at a new organization (Caruth et al., 2010; Krasman, 2015). For this reason, orientation training is an additional opportunity for an organization to make a good impression on a new employee (Malikaveetil, 2015). Orientation should make it clear to new employees that they are cared for, welcomed, and accepted as a part of the organization. Orientation should impart to new employees that they will find satisfaction in the work to be performed in order to

instill in them a desire to stay with the organization for a long time (Wallace, 2009; Wanous & Reichers, 2000). Furthermore, as the employee acclimates to the new environment, orientation sessions should provide support and assistance, instill trust and a sense of value, relieve stress and anxiety, and increase self-confidence (Holton, 1996; Krasman, 2015; Srimannarayana, 2016; Wallace, 2009; Wanous & Reichers, 2000).

Delivery Methods

Onboarding processes, including orientation, may be formal or informal or a combination thereof. An informal process is generally loosely structured, customizable, and focused on introducing the new employee to coworkers, filling out mandatory paperwork, and relaying job-specific information (Klein & Weaver, 2000). A manual or online resources may provide the organization's history, mission, and vision statement (Caruth et al., 2010).

Formal processes may look similar to the informal process, but also include training or information sessions conducted by human resources personnel. In such a setting, employees are introduced to general information including the organizations' history, traditions, culture, policy, and benefits information (Caruth et al., 2010). Human resources personnel are typically well equipped to deliver orientation training that applies to all employees such as medical benefits, direct deposit, holiday and vacation time, and company-sponsored life insurance. A session led by human resources personnel also ensures all employees receive a consistent message, have an opportunity to correct any false statements made during the recruiting process, and serve as a means of clarifying any unrealistic expectations (Allee, 2012). Job- or department-specific information is typically provided at a later time by individual managers or co-workers.

Formal orientation sessions primarily occur in group or classroom-type settings. A group delivery method gives new employees an opportunity to meet their peers and employees from

other departments (Allee, 2012). While formal orientation sessions are beneficial for a variety of reasons, employees tend to retain only a small amount of the information presented (Holton, 1996; Wallace, 2009). Orientation sessions generally occur within the 1st day or weeks of employment when employees are consuming a great deal of new information in a brief amount of time (Dunn & Jasinki, 2009; Fayad, 2014; Wallace, 2009).

Human resources personnel, supervisors, and immediate co-workers play important roles in helping new employees adjust to the new work environment and their specific job (Holton, 1996). However, all other employees affect the impression of the organization made on the new employee. Involving multiple people in onboarding a new employee allows for new relationships to develop, capitalizes on different individual's areas of expertise, and takes some of the work off the supervisor (Wallace, 2009). Without proper guidance by multiple individuals throughout the onboarding process, an employee may become frustrated and leave the organization (Caruth et al., 2010).

Recently there has been a shift to make use of alternate orientation delivery methods such as face-to-face meetings, online e-learning resources, web portals, and social media (Graybill, 2013). Ease of access to technology has prompted many organizations to provide much, if not all, of their orientation program online (Krasman, 2015). However, too much online information may cause information overload (Allee, 2012). It is recommended that a portion of the orientation content be available online, such as compliance tutorials and tutorials for document completion, but a face-to-face component is also necessary for the relational component of orientation (Krasman, 2015). In other words, it is important to find a balance and use technology to enhance, but not replace, face-to-face orientation sessions. A blended approach with

complementary methods can aid newcomers in establishing relationships and dealing with the stress that comes with starting a new job (Allee, 2012; Wanous & Reichers, 2000).

When exploring the design of onboarding and orientation programs, Srimannarayana (2016) found that 65% of the 46 manufacturing organizations participating in the study used a blended approach, combining face-to-face orientation and online sessions. Another study conducted at an organization using online tutorials and video tapes for employee orientation, found that online orientation can be perceived as as effective, if not more effective, than traditional face-to-face orientation (Mason & Spencer, 2009).

Moreover, when an organization has many locations, a fully online orientation may be appropriate (Batalla-Busquets & Pacheco-Bernal, 2013). Such was the case for a study conducted by Shih et al. (2013) at a healthcare facility. The data indicated most of the participants preferred the online training for reasons of convenience and ability to learn at their own pace. The online quizzes and activities allowed multiple attempts and feedback which helped resolve learning gaps. However, some learners preferred the personalization of a face-to-face orientation and instant feedback from an instructor.

Summary of Onboarding and Orientation

In this section, the terms orientation, onboarding, and socialization have been defined. Onboarding needs to be flexible and, to a certain degree, customized, "incorporating a variety of mediums and methods to engage learners, applying adult learning theories, and designing the program for the employee's perspective to maximize learning and retention" (Klein & Polin, 2012, p. 278). Regardless of the terminology used or the method of delivery, it is important that all new employees of an organization receive the information they need to become successful, happy, and motivated workers. From the 1st day on the job, new employees should feel they are

valued by their employer and that they made the right decision in joining the organization (Wallace, 2009).

Onboarding With a Digital Game

The available research on the use of games or game-like activities as a method of onboarding is scarce (Armstrong et al., 2016). Vendors, like Bunchball and MindTickle, promote on websites that their business gaming services, among other things, promise to raise employee satisfaction and reduce turnover rates through incentives such as social networks, interactive games, points, leaderboards, and badges (Bunchball, n.d.; MindTickle, n.d.). The posted success stories are encouraging but lack empirical research.

In a case study presented by Depura and Garg (2012), new employee information was presented to young college graduate employees at a Fortune 100 company through a proprietary online game platform in two stages. During the pre-employment game activity, employees were introduced to the company's branding, history, mission, leadership, and other items regarding the company. By answering trivia questions, employees won medals (digital badges) and appeared on the leaderboard, creating a sense of accomplishment and competition. Many participants spent extended periods of time learning about the company prior to their 1st day of work. Since the employees were new to the company, the information was relevant and timely. Furthermore, the game required online social interactions which encouraged bonding and team building, thereby reducing operations cost by increasing time to productivity. Finally, a second game was developed to present all new employee-related materials through an interactive learning experience. Using a map-type interface, employees learned specific things about the company by solving challenges as they moved through various points (Depura & Garg, 2012). The findings

indicated that participants perceived the gaming method of learning to be engaging, informative, and valuable.

At a cost of over $100,000, Sun Microsystems created two games for onboarding of new employees (Zielinski, 2010). The science fiction fantasy games were designed to teach employees "the company structure, strategy and history; to make them feel welcome," and "to portray the company as an innovative enterprise with strong values" (Zielinski, 2010, p. 66). Both games taught the same content, but one game was storyline based while the other was an arcade video game. The two game styles were created to accommodate different types of gamers. While quantitative data were not collected, the human resource managers indicated the anecdotal feedback was positive (Zielinski, 2010).

In a document analysis, Laborde Torres (2016) used a grounded theory approach to determine if gamification can be used to enhance organizational onboarding outcomes. The analysis concentrated on literature of video games, educational video games, learning outcomes, and onboarding programs. The results indicated that video game elements in an onboarding or orientation program can contribute to satisfying employee psychological needs. With or without gaming integration, the overall effectiveness of an onboarding program is dependent on an employees' attitudes and motivation, facilitator and organizational support, and supplemental learning methods (Laborde Torres, 2016). Additional practitioner case studies are available to support the claims of the effectiveness of serious games and gamification in new employee onboarding, but empirical research is minimal, at best ("Sales Enabled Case Studies," n.d.; "Success Story LiveOps," n.d.; "Thompson Cruises," n.d.).

Games

A review of games is necessary to better understand how digital games can be useful in an organization. This section establishes a working definition of games, explores how games apply in organizational and educational settings, reviews the applicable game genres, and, finally, discusses game design and evaluation.

Games Defined

There are multiple definitions of the term “game.” Salen and Zimmerman (2003) defined a game as "a system in which players engage in an artificial conflict, defined by rules, that result in a quantifiable outcome" (p. 80). Juul (2005) defined games as

> a rule-based system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels emotionally attached to the outcome, and the consequences of the activity are optional and negotiable. (p. 6).

When explaining how rules function within a game, Juul stated that “Playing a game is an activity of improving skills in order to overcome challenges, and playing a game is therefore fundamentally a learning experience” (p. 5).

Commonalities within the varying definitions are that games are rule-based, responsive, challenging, goal-oriented, and include conflict and fantasy (Gee, 2008; Salen & Zimmerman, 2003; Schell, 2008). Since there are multiple definitions of what constitutes a game, this study will use Schell’s (2008) definition which defined a game as “a problem-solving activity, approached with a playful attitude” (p. 37).

At its core, a game consists of a combination of mechanics and dynamics. Game mechanics are reoccurring “elements of a game that allow for a fun and engaging user experience, including goals, points, collecting badges, awards, trophies, ranking/leaderboard levels, exchange of virtual goods and currencies, and feedback loops” (Clark et al., 2015, p. 110).

Game dynamics are “the types of activities that emerge when players interact with mechanics. Game dynamics can include behaviors ranging from aggression to passivity, or traits such as leadership and team building” (Clark et al., 2015, p. 108). When designing serious games for education, it is necessary to combine mechanics, dynamics, content, and pedagogy to make games educational, challenging, and fun (McClarty et al., 2012).

Serious Games

A serious game, as defined by Dörner, Göbel, Effelsberg, and Wiemeyer (2016), is “a digital game created with the intention to entertain and to achieve at least one additional goal (e.g., learning or health). These additional goals are named characterizing goals” (p. 3). For example, exercise games encourage physical fitness and educational games teach. Serious games can be any type of digital game genre like adventure, sports, or simulations (Dörner et al., 2016).

Applications of serious games commonly appear in business corporations, education settings, health and fitness industries, and government and military organizations (Dörner et al., 2016). In the corporate sector, serious games are useful for recruitment, onboarding, and leadership training (Donovan, 2012).

> Serious games provide employees with a compelling context-relevant storyline, achievable goals, constant feedback on their progress and rewards such as achievement badges and public recognition. They also provide employees with opportunities to fail, learn from their mistakes, and try again in safe environments. (Donovan, 2012, p. 19)

Furthermore, game analytics provide employee performance data useful for evaluation of training impact and employee support (Donovan, 2012; Gibson & Jakl, 2015).

Beyond the corporate sectors, virtual training environments for military, police, and medical personnel allow users to practice in a safe environment free of consequences from failure (Dörner et al., 2016). In a recent presentation, Major General Gervais (2019) described a military program focused on a synthetic training environment designed to prepare new soldiers

for combat. The goal of the program was for each new soldier to fight 25 “bloodless battles” (virtual) before ever seeing a real battle. The simulations modelled real combat locations including buildings, natural environments, people, and languages. Serious games designed for high stakes situations, such as combat, may ultimately save lives.

Serious games are not only used for training, but for many other areas such as sales and marketing, employee and volunteer recruiting, and medical care (Dörner et al., 2016). One such example is an online serious game created by the Army to recruit new soldiers (Knight, 2002). In the medical field, a virtual reality game was used in attempt to distract burn patients receiving painful medical procedures (Hoffman, Doctor, Patterson, Carrougher, & Furness, 2000). There are many more examples of serious games with goals other than teaching but they will not be discussed here as this study focuses on game-based learning.

Digital Game-based Learning

Several studies have shown that digital games can be used as instructional tools (Garris, Ahlers, & Driskell, 2002; Ke, 2011; Sitzmann, 2011, Van Eck, 2006). When digital games are designed as a means of instruction and not for entertainment, it is called *digital game-based learning* which has been part of the educational industry for many years (Van Eck, 2015).

One of the main draws for digital games in education is their ability to motivate (Garris et al., 2002; Gee, 2008; Mildner & Mueller, 2016; Plass, Homer, & Kinzer, 2015; Senderek et al., 2015). However, that is not to insinuate that all games motivate. Only good games will hold the attention of a learner, whereas a bad game will leave the learner disengaged and uninterested (Gee, 2011).

Digital games motivate through challenge, fantasy, curiosity, control, and competition (Malone, 1981). Engagement is another attraction for educational digital games as they can

engage the learner physically, mentally, emotionally, and socially (Plass et al., 2015). The level of engagement depends on the game design, learning objectives, learner characteristics, and environment (Plass et al., 2015). Learning opportunities occur as users interact and progress through a game (McClarty et al., 2012).

Digital games are appealing to trainers and educators as they encourage users to interact with content longer and more intentionally than they might in other learning methods (Garris et al., 2002). Educational digital games encourage practice through repetition and trial and error, develop decision-making and problem-solving skills, and develop higher order thinking skills (Hogle, 1996; Shute & Ke, 2012). When played as a group, digital games can promote collaborative learning (Moreno-Ger, Burgos, & Torrente, 2009). The collaboration can occur through a single game play experience, through an online gaming environment, or through social networks (Moreno-Ger et al., 2009).

Although not considered serious games, entertainment games like SimCity and Civilization can become teaching tools if accompanied by teacher instruction, reflection, and consistent debriefing (Dörner, et al., 2016; Moreno-Ger, Burgos, Martínez-Ortiz, Sierra, & Fernández-Manjón, 2008). For instance, Civilization can be used to teach history and SimCity can teach civil engineering and government (Egenfeldt-Nielsen, 2007; Foster, 2012; Van Eck, 2006). RollerCoaster Tycoon is a game that not only provides lessons for engineering students, but it also teaches subjects like business management, writing, finance, and leadership (Van Eck, 2006). Such use of games serves to motivate students to learn content in an interesting and entertaining manner.

Pervasive Mobile Games

Pervasive games, unlike many other game genres, are not restricted to a single location, a single player, or even a single action and therefore "pervade, bend, and blur the traditional boundaries of game, bleeding from the domain of the game to the domain of the ordinary" (Montola, Stenros, & Waern, 2009, p. 12). Pervasive mobile games expand traditional computer games utilizing mobile technology in real-world activities to solve tasks (Rogers et al., 2015; Valente et al., 2017; Zender, Metzler, & Lucke, 2014). Mobile technologies allow for location-sensitive and context-sensitive interactions between the physical environment and the virtual environment within the game (Oppermann & Slussareff, 2016). Pokémon Go, for example, is a mobile game that exploits augmented reality and GPS, requiring players to navigate through the real-world environment to catch Pokémon or compete in battles within the mobile game (Oppermann & Slussareff, 2016). Such augmented reality is referred to as *location-aware* or *location-based augmented reality* (AR) and utilizes the global positioning system (GPS) capabilities and camera in mobile technologies to engage with digital content (Dabbagh et al., 2016).

Pervasive games designed for short play sessions allow the player to leave and return to the game at any time without lessening the chance of winning (Montola et al., 2009; Zender et al., 2014). Many pervasive games are designed to be played anytime, anywhere, and with anybody, including bystanders unaware of the game play around them (Oppermann & Slussareff, 2016). This removal of strict geographic boundaries and rules can lead to enjoyable, unplanned game experiences (Montola et al., 2009).

The travel and tourism industry has capitalized on the navigational aspects of pervasive games as a means of providing personal, unique, and memorable experiences to travelers

(Montola et al., 2009). Usually for a fee, tourists can download a game designed for the city or location of their choosing. The game provides information about landmarks, attractions, streets, or people and then challenges the players to answer questions and submit pictures, typically within a preset time limit. One such game, operational in 2007 and 2008, was REXplorer which took tourists through the popular tourist city of Regensburg, Germany looking for "spirits" who provided stories and clues through the "paranormal activity detector" (i.e., a Nokia cell phone and GPS receiver) (Göbel, 2016, p. 393).

While some game designers may distinguish pervasive games as a genre all their own (Shklovski & de Souza e Silva, 2013), Montola et al. (2009) described pervasive games as a high-level umbrella genre with eight sub-genres: (a) treasure hunts, (b) assassination games, (c) pervasive live-action role-playing games, (d) alternative reality games, (e) reality games, (f) smart street sports, (g) playful public performances, and (h) urban adventure games. Only treasure hunts and urban games will be discussed here, as they are the most relevant to the study.

Treasure hunts and scavenger hunts. The oldest genre of pervasive games is the treasure hunt where players try to find certain objects (Montola et al., 2009). Geocaching is one example of a treasure hunt in which players hide and locate treasures (known as geocaches) by using GPS coordinates and then log their experience at the official geocaching website, www.geocaching.com (Mayben, 2010). Historically, a scavenger hunt was like a treasure hunt, but instead of trying to find something desired (i.e., treasure), players tried to find something discarded (i.e., scavenged) (Montola et al., 2009). A modern-day scavenger hunt typically includes a list of items to locate or things to accomplish within a limited timeframe, whereas a treasure hunt allows players to make discoveries on their own (Economou, Bouki, Kounenis, Mentzelopoulos, & Georgalas, 2015; Lu et al., 2015).

At museums, digital hunts have been used to provide visitors an enhanced method of exploring exhibits. For example, archeologists at a museum used a mobile treasure hunt to guide visitors at the museum and visitors at a remote, archeological dig site to work collaboratively to locate artifacts (Economou et al., 2015). Once located, further details were given about the artifacts allowing players to better understand the items in context to the original location.

Educators can make use of scavenger hunts by turning traditional classroom lessons into busy, interactive activities (Chalmers, 2003). For instance, a lesson on shapes and a lesson on nutrition can be combined with a scavenger hunt in which students are given a list of shapes to locate as they walk through a community garden or the produce department of a grocery store. Additionally, scavenger hunts are frequently used in new student orientation programs at colleges and universities (Hartman & Stewart, 2003; Rogers et al., 2015; Segrist & Nordstrom, 2007). FreshUP, a digital educational pervasive game, was designed and implemented to help incoming college freshmen navigate their new environment and complete required tasks in a motivating and playful manner (Zender et al., 2014). The study reported positive results in student socialization and study competencies. After playing a similar game for new undergraduate students in a computer science program, students reported a sense of community with peers and department staff as well as an increased comfort level in navigating the campus (Talton, Peterson, Kamin, Israel, & Al-Muhtadi, 2006). Wesp and Baumann (2012) implemented a scavenger hunt to encourage students from two different cultures to mingle and get acquainted during a study-abroad course. After the game activity, students reported an increased awareness and acceptance of cultural diversity.

Urban games. Urban games, similar to treasure hunts and scavenger hunts, are puzzle-type games requiring physical world interaction and exploration. Urban games are multiplayer

pervasive games that require some form of direct, local urban engagement and may or may not utilize AR technologies (Shklovski & de Souza e Sliva, 2013). Urban games turn cities into playful spaces and are sometimes referred to as urban "adventure" games because they blend stories and puzzles using an urban location as the game board (De Souza e Silva & Hjorth, 2009; Montola et al., 2009). In addition to being entertaining and enjoyable, urban games may help players to discover or rediscover a city, create social spaces online or in the physical world, or provide data for city mapping authorities.

Shklovski and de Souza e Silva (2013) explored how players expanded their geographical boundaries through social online connections during urban game play. In Combat, one of the games used for the study, players solved puzzles online to receive instructions for completing missions at designated physical locations. Each completed mission awarded a new game code which could be used to advance to the next level of puzzles and missions. Individual game play was not the real focus of the study, however. The focus was on the social connections, or relatedness, which revealed that acceptance and membership into a group can change a person's perspective of their physical community (city, town, or neighborhood) and their online community.

Gamification

Another digital game-based learning method is gamification. Gamification is defined as "the use of game elements and design in a non-game context" (Deterding et al., 2011, p. 10). The gaming industry generally recognizes gamification as "the repurposing and extension of games beyond entertainment in the private home" (Deterding et al., 2011, p. 11). While most of the literature reviewed generalized the definition in a non-specific context, Landers and Callan (2011) directed the definition to include educational or training programs while Hamari (2015)

associated gamification with consumer services alone. Both gamification and serious games are designed to leverage game aspects for something other than entertainment (Richter et al., 2015).

The purpose of using gamification is to arouse user interest in hopes of making content intrinsically interesting and thereby motivating the user to engage with the material longer than they might have otherwise (Deterding et al., 2011; Landers & Callan, 2011; Sarangi & Shah, 2015). Gamification is not a complete game but provides a game-like experience including rewarding elements that encourage motivation and repeated behavior (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015). Gamification has been applied in educational settings (e.g., DuoLingo), to societal issues (e.g., Pain Squad), and to self-improvement programs (e.g., Nike+ running mobile app and SparkPeople health app). When the game-like experience is satisfying, players may repeat the behavior (Robson et al., 2015).

Gamification uses extrinsic rewards such as badges, points, and levels while trying to increase feelings of autonomy, achievement, and a sense of belonging (Richter et al., 2015). In the business sector, training programs incorporate game design elements to increase participation, persistence, and achievements (Richter et al., 2015).

In the marketing and advertising sector, gamification can be a means of capturing and maintaining an audience of potential buyers. For instance, Starbucks and McDonalds have used gamification as marketing strategies to increase brand awareness and loyalty (Chou, 2017). Mobile apps such as Ibotta and Checkout 51 give cash rebates for buying specific products at retail stores. Airlines and credit card companies give points to their faithful customers that can be exchanged for airline trips, merchandise, or cash (Landers & Callan, 2011). Nissan Leaf encourages less energy consumption (Hamari 2015; Robson et al., 2015). Health and fitness services like Fitocracy (Hamari & Koivisto, 2015), SparkPeople, FitBit and Nike provide

gamified apps and services to help people achieve their physical goals. In this study, a full game, not just elements of a game, was used in a non-game context (onboarding) which, as defined by Deterding et al. (2011), is not gamification but considered to be a serious game.

Game Design

A serious game is designed to teach and entertain at the same time. Therefore, game design must include instructional design and the necessary parts (rules, graphics, challenges, etc.) to make the game motivating and engaging. There is no straightforward method of designing a game, but there are models and approaches that can be used to support the design process (Braad, Žavcer, & Sandovar, 2016).

Game design is inherently multidisciplinary requiring a team approach (Dörner et al., 2016; Valente et al., 2017). The team may include programmers, artists, game designers, and a domain or subject matter experts (Mildner & Mueller, 2016). The planning, or pre-production stage, should consider the allotted time frame for development, technology, audience, budget, and business or educational stakeholders. Designing a digital game from the bottom up can take months or years and cost thousands of dollars (Braad et al., 2016). On the other hand, limited budgets may hinder the quality, resulting in a less than optimal balance of fun parts and the serious parts of the game (Mildner & Mueller, 2016).

However, there are methods of creating digital games without the need for the technical skills of computer programmers (Squire, 2008). Companies like Adobe and TechSmith have created add-ons to existing software enabling the user (often the domain expert or instructional designer) to create short game activities frequently found in gamification applications. Game creation systems like the one proposed for this research project, GooseChase, provide the structure of the game, leaving the domain expert to develop the content in the form of questions,

activities, and missions (Braad et al., 2016). Other game creation systems, such as MindTickle and gLearn, market to training professionals with little or no computer programming experience and promise full analytics and reporting to maximize employee learning (Donovan, 2012). The lure of quick game design with pre-packaged content, however, can cause problems as the focus can easily shift to the experience and not to the intended education and training (Squire, 2008).

When it comes to game design process models, perhaps the simplest is known as the Magic Circle of playful learning (Plass et al., 2015). The model "consists of three key elements: a challenge, a response, and feedback" (Plass et al., 2015, p. 262). When the feedback initiates a new challenge or response, the loop begins again. This continual pattern is recognizable throughout most games.

Garris et al. (2002) suggested a game should be designed with the end goal in mind. In a training or educational context, the goal is to have a motivated learner. To accomplish this goal, Garris et al. (2002) presented an input-process-output model. The input includes instructional content with game characteristics. Next, the process is a cycle where the user makes decisions about the game and content based off the feedback received during the game. This is a cycle that continues until the game ends or the player discontinues the game. The output portion of the model leads to debriefing of the learning outcomes. Bahji, Lefdaoui, and Alami (2011) approached game design using three perspectives: educational, computer science, and psychological. This approach resulted in a three-layer gaming model called S2P in which a *Formal Learning Strategy* is defined first, which informs the *Learning Platform* decisions which support the *Learning Process*. The cycle begins again with a return for adjustment of the initial learning strategy.

Another prominent design and development process model is ADDIE; a high-level model often used in instructional design, although Branch (2009) referred to ADDIE as a paradigm and not a model. ADDIE stands for Analyze, Design, Develop, Implement, and Evaluate (Braad et al., 2016) and is frequently used in game design (Hirumi, Appelman, Rieber, & Van Eck, 2010; Malikaveetil, 2015; Smith, Caris, & Drobisz, 2013; Squire, 2008; Warren & Bigenho, 2012).

As previously discussed, games consist of mechanics and dynamics. These are the elements or characteristics that are needed to produce fun and enjoyment from a game. The most commonly used components of instructional games, according to Plass et al. (2015), are game mechanics, visual aesthetics, narrative, incentives, musical score, learning objectives, and learning content. Garris et al. (2002) proposed six game elements are needed in a game: imagination, rules/goals, sensory stimuli, challenge, inquisitiveness, and control. Focusing attention on designing instructional games specifically for the workplace, Reeves and Read (2009) provided 10 elements of great games: self-representation with avatars; three-dimensional environments; narrative context; feedback; reputations, ranks, and levels; marketplaces and economies; competition under rules that are explicit and enforced; teams; parallel communication systems that can be easily reconfigured; and time pressure. As the cost and time of designing a game with all these ingredients would be substantial, the elements can be used individually or in combinations. After exploring the game elements presented by several other researchers, Mildner and Mueller (2015) determined a set of common denominators. This list includes play, rules, challenge, storytelling, aesthetics, social factors, and learning. A discussion of each is provided in Chapter III as this model is followed in the design of the scavenger hunt game used for this research project. While there are many approaches to game design, no one

particular game design model or single game element is more important than another (Schell, 2015).

Pervasive Game Design

When designing pervasive games as a learning experience, "the players are in the position of independent learners so not the application provides learning outcomes but the individual outdoor experience itself" (Oppermann & Slussareff, 2016, p. 495). Open-ended challenges present the best opportunities for creativity and application of prior knowledge (Oppermann & Slussareff, 2016). Schwabe and Göth (2005) created a mobile game to help orient executive graduate students to their campus and learn to access the many available resources in a short amount of time. Although the game was a prototype and focused on usability of the game, early findings indicated "[t]he game at least moves them [the students] into a state where they are mentally ready for learning, where they are in the right environment for learning and where they also already experience some socially oriented learning" (Schwabe & Göth, 2005, p. 215). Played in groups over several days, the students both competed and cooperated with each other. Tasks involved visiting designated locations before receiving the next challenge. The research project was designed using Prensky's (2001) six structural elements of game design: rules; goals and objectives; outcome and feedback; conflict, competition, challenge, and opposition; interaction; and representation or story. As pervasive games are played in the real world, game designers must be aware that many factors of the player's experience cannot be controlled. Such things as weather, traffic, other people (non-players), and public events (a parade or street performance) impact outdoor interactions (Montola et al., 2009).

Thomas (2006) presented a conceptual model for designing pervasive games, suggesting four criteria: community (relationship building), autonomy (control), locationality (choice), and

relationality (personalization). Community refers to relationship building. Through these relationships, the learner becomes both the teacher and the learner at different times and in different situations. Through autonomy, learners construct learning experiences and control the learning process. Learners acknowledge that not every question has a single correct answer, but instead has diverse possibilities (Thomas, 2006). Locationality acknowledges that meaningful and relevant learning experiences can occur at any time and any place. Finally, relationality refers to learning that occurs when a learner is able to connect to and construct the learning content to their daily life. All four criteria correlate with the psychological needs of autonomy, competence, and relatedness as established in CET and were considerations when designing the scavenger hunt for the proposed research.

Synthesis of Self-Determination Theory and Cognitive Evaluation Theory

As previously discussed, self-determination theory (SDT) is a theory of human motivation and is the framework for this study. Deci and Ryan (1985) distinguished between intrinsic motivation as naturally or internally driven and extrinsic motivation as externally driven. Cognitive evaluation theory (CET), a sub-theory of SDT, identifies autonomy, competence, and relatedness as the three basic psychological needs required to facilitate intrinsic motivation, which is generally preferred to sustain behavioral change. SDT has been researched in many settings and domains, such as education, health care, sports, parenting, environmental protection (Ryan & Deci, 2000), workplace environments (Van den Broeck et al., 2010), and in digital games (Przybylski et al., 2010; Ryan et al., 2006;). This review focuses on SDT in the workplace, in game play, and, finally, in games in the workplace.

One of the most predominant findings when reviewing literature on SDT is that extrinsic rewards can have negative effects on the motivation of individuals' intrinsic motivation. Such

extrinsic rewards include tangible rewards, threats, deadlines, directives, and competition pressure (Amabile, DeJong, & Lepper, 1976; Deci, Connell, & Ryan, 1989). In one of the early studies of motivation, Ryan (1982) explored controlling rewards and informational rewards. Controlling rewards are defined as feedback that is used to coerce or entice an individual to perform or act a certain way. Informational rewards are defined as any information that is behaviorally relevant to the individual when not given or received out of pressure or coercion. Results confirmed that controlling feedback undermined intrinsic motivation.

In a meta-analysis of 128 laboratory experiments, Deci, Koestner, and Ryan (1999) evaluated expected rewards compared to unexpected rewards. Expected rewards, like controlling rewards, are contingent upon a behavior or performed task and are typically used to persuade people to do things they would not normally do. The results determined that expected tangible rewards undermine intrinsic motivation whereas positive feedback (a nontangible reward) enhances intrinsic motivation when given with a controlling interpersonal style.

Motivation in the Work Environment

Specific to employee work relations, Uzonna (2013) surveyed monetary motivation variables compared to non-monetary variables of 134 bank employees finding participants preferred recognition, authority, advancement, autonomy, responsibility, and challenging work over salary, bonuses, and fringe benefits. Similarly, Olafsen, Halvari, Forest, and Deci (2015) surveyed 166 bank employees finding the most important factor in promoting intrinsic work motivation was not tangible, financial rewards, but the need for strong managerial support. These findings support previous findings by Deci et al. (1999) that nontangible rewards enhance intrinsic motivation.

While much research confirms that employees are generally more motivated by positive feedback and recognition than by financial rewards, an employee's motivation depends on the perception of the reward. Landry, Forest, Zigarmi, Houson, and Boucher (2017) explored employee perceptions of cash rewards as a method of work motivation. Employees who perceived the cash reward incentive as informational, indicated greater levels of motivation, psychological health, and job satisfaction. Employees who perceived the cash reward as controlling or threatening, expressed frustration and lower levels of job satisfaction.

Perception is also an important consideration in corporate training programs. While some employees may consider training as an employee investment and opportunity for growth and development, others may perceive training to be controlling and an increase in workload (Scheckle, 2014). People are more motivated to act when able to make their own choices. In a study of the impact of training and development on employee outcomes, Sung and Choi (2018) determined that voluntary participation in high quality, relevant training resulted in an indirect effect of more competent and committed employees. Voluntary participation may also alleviate negative feelings and help strengthen the employee-employer relationship (Sung & Choi, 2018).

Training for new employees is particularly important during the initial adjustment period (Acevedo & Yancey, 2011). Employees may experience uncertainty as they engage with new coworkers, supervisors, and job responsibilities. The need for early support and interpersonal interactions with supervisors and coworkers was evident in a study by Kammeyer-Mueller, Wanberg, Rubenstein, and Song (2013). The longitudinal study of 264 new employees found a correlation in positive support and undermining support to employee outcomes in the first 90 days. Furthermore, employees who feel related to others tend to internalize the values and ideas

of those to which they are socially connected which may encourage long-term commitment and loyalty to the organization (Gagné & Deci, 2005).

Gagné and Deci (2005) best explained the value of CET in organizations:

> … work climates that promote satisfaction of the three basic psychological needs will enhance employees' intrinsic motivation and promote full internalization of extrinsic motivation and that this will in turn yield the important work outcomes of (1) persistence and maintained behavior change; (2) effective performance, particularly on tasks requiring creativity, cognitive flexibility, and conceptual understanding; (3) job satisfaction; (4) positive work-related attitudes; (5) organizational citizenship behaviors; and (6) psychological adjustment and well-being. (p. 337)

Motivation in Game Play

Self-determination theory has been shown to be a viable framework for examining games and player motivation. Empirical research on SDT applied to digital games is most prevalent in academic settings and used for educational purposes. Rigby and Przybylski (2009) proposed that the "same intrinsic need satisfactions that have been found to facilitate and deepen learning are also those that deepen fun and sustained engagement with games" making SDT a natural bridge connecting both domains (p. 221).

Malone (1981), one of the earliest to present a theory of intrinsically motivating instruction relating to gameplay experience, posed three functions of games that are intrinsically motivating to players: challenge, fantasy, and curiosity. Later, control, cooperation, competition, and recognition were added to complete the "Heuristics for Designing Intrinsically Motivating Instructional Environments" (Malone & Lepper, 1987, p. 248). Other researchers have expanded Malone and Lepper's (1987) theory of motivation by evaluating how gameplay can meet the psychological needs of competence, autonomy, and relatedness.

Ryan et al. (2006) conducted four studies examining the motivation for video gameplay through the application of SDT finding "both game enjoyment and preference for future play

were significantly accounted for by psychological need satisfaction" (p. 361). In a follow-up study, Przybylski et al. (2010) confirmed the original findings and indicated that the broad appeal of games, regardless of player demographics or game genre, is based on the satisfaction of the psychological needs of autonomy, competence, and relatedness within the game. Sheldon and Filak (2008) manipulated all three psychological needs during a game-learning experiment with college student participants finding each to be equally important human needs and the lack of support for any one of the three may undermine intrinsic motivation for an activity.

As the word *enjoyment* is often associated with gameplay, Tamborini, Bowman, Eden, Grizzard, and Organ (2010) created a model of enjoyment in entertainment by defining enjoyment as the satisfaction of the three needs attributed to psychological well-being in addition to mere pleasure seeking. Peng et al. (2012) also studied enjoyment and need satisfaction by manipulating autonomy and competence supportive game features in an exergame (a game that incorporates physical activity), finding positive outcomes resulting in increased motivation and engagement.

Feedback as a reward can have peculiar effects on motivating behaviors based on how the feedback is delivered and how the feedback is perceived by the individual. With a focus on educational and behavior-change type games, Burgers, Eden, van Engelenburg, and Buningh (2015) determined that negative feedback compelled users to repair or improve performance during the current game but decreased intrinsic motivation for future play. Conversely, positive feedback promoted satisfaction of autonomy and competence needs and thereby increased intrinsic motivation for future play.

With an understanding of how gameplay relates to SDT and CET, it is logical that a game activity could serve to motivate employees in the work environment. However, most of the

literature identified focuses on the implementation of gamification in a workplace setting rather than the application of a serious game. Games in the workplace may positively affect employees if they present obtainable challenges allowing the individual to achieve feelings of competence and improve employee performance (Mollick & Rothbard, 2014).

Summary

A review of the literature has shown that if properly designed, a digital game can be used as a mechanism for motivation and learning by supporting the three psychological needs in CET. Games support the need for autonomy as the user is given many choices and encouraged to move about independently (Montola et al., 2009). Completion of challenges supports competence (Deterding, 2015) and interaction with the work environment and coworkers supports relatedness (Przybylski et al., 2010). Furthermore, findings in the reviewed literature revealed the positive contribution of pervasive games in building community among participants as well as an increased comfort level of participants with the physical environment explored during game play.

Literature Review Summary

As stated previously, there is limited empirical research on the application of digital games in new employee onboarding in the business sector and, thus far, none identified in colleges or universities. A few studies have been conducted on games used in adult training programs within the business sector, but few specifically applied to new employee onboarding processes, including orientation.

New employee onboarding has a huge impact on organizations being able to acquire and retain good employees (Klein & Weaver, 2000). New employee orientation sessions are, in essence, a first impression, and demonstrate how much an organization values its employees.

Onboarding should be relevant and timely with content continually evolving as the business and the people evolve.

The literature supports SDT and CET as a valid framework for the research project applicable to employees at a workplace and to gameplay. It was hoped that the game activity would, in part, encourage employee engagement and facilitate learning.

CHAPTER III

METHODOLOGY

The purpose of this quasi-experimental study was to determine if adding a digital game to the onboarding process could increase employee satisfaction, socialization, and content retention in new employees. Self-Determination Theory (SDT) and Cognitive Evaluation Theory (CET) were used to guide the study. Both SDT and CET have been used to explore human motivation in various settings and were applicable as this study explored the motivating factors of individuals in both job satisfaction and in game play experiences (Van den Broeck et al., 2010). Many practitioner papers discuss the importance of new employee onboarding and guidelines for best practices, but empirical research on the implementation of digital games or elearning methods for new employee onboarding is limited (Rapp, 2015). This study contributes to the research needed to explore the effect of a digital game activity implemented in the new employee onboarding process.

The research questions guiding this study were

1. Is there a difference in autonomy, competence, and relatedness in new employees based on their participation in a game-based onboarding activity compared to those who did not participate in a game-based onboarding activity?

2. Is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who did not participate in a game-based onboarding activity?

Participants and Setting

The study was conducted at a university in the Southeastern region of the United States. The Human Resources (HR) department at the research site assisted with the recruitment of participants which occurred during the bi-weekly new employee orientation sessions. All new employees were informed about the study including the purpose, approximate duration, and that participation in the study would provide them an opportunity to win a $100 Amazon gift card. Participants were limited to full-time, first-time hired staff over the age of 18 who had access to an iPhone or Android smart phone with a data package. Those who had previously worked for the research site were not included in the study since the employees were most likely already familiar with the campus. Faculty and student employees were not invited to participate as they attend different orientation sessions.

A total of 56 new employees were recruited for participation in the study, with 40 completing all three phases. Participants were placed into groups using a proportionate stratified convenience sampling method, which provided similarity between groups (Wildemuth, 2017). Using the data from the Demographic and Gamer Status Questionnaire (see Appendix A), participants were divided each recruitment week into a test group and a control group based on campus familiarity and gamer status. Without this method of clustering, it is possible a random selection would result in an imbalance of participants (e.g., a disproportionate number of hard-core gamers or long-term local residents).

To prevent unconscious bias and to ensure all components of the study were completed, participants were asked to create a unique identifier (ID) using the following guidelines: the last two digits of the employee's identification number, the two digits of the employee's birthday month, and the employee's middle initial (if the employee has a middle name). A master list

connecting email addresses to ID number was maintained. The list included a record of all instruments to be completed and the date of completion in a Microsoft Excel 2016 spreadsheet file, securely kept in a password-protected folder online through a cloud storage service. Furthermore, the ID number enabled participants in the test group to remain anonymous to other players during the game activity. Email addresses of the participants were removed from the master list once all components were completed and were not revealed or discussed in the final reports.

The design of this study required the use of statistical tests (MANOVA and an ANOVA) in order to answer the research questions. To estimate the sample size needed to make generalizable claims about study findings and confidently detect a medium effect size, two separate a priori statistical power analyses were conducted using G* Power 3.1 (Faul, Erfelder, Lang, & Buchner, 2007). Each power analysis used Cohen's (1988) criteria for detecting a medium effect size.

With an alpha = .05 and power = .80, the projected sample size needed to detect a medium effect size was 46 for the MANOVA test that was employed for Research Question One. Question One sought to determine whether the participation in a game-based onboarding activity contributed to the psychological needs of autonomy, competence, and relatedness in new employees. With an alpha = .05 and power = .80, the projected sample size needed to detect a medium effect size was 40 for the ANOVA test that was employed for Research Question Two. Question Two asked if there was a difference in the retention of fundamental institutional information based on employee participation in the game-based onboarding activity compared to those who did not participate in the game-based onboarding activity. This study took place following Institutional Review Board (IRB) approval (see Appendix B).

Instrumentation

The questionnaires and surveys were created in Qualtrics and distributed to participants electronically via email. Quantitative data were collected via opinion surveys, a pretest, and a posttest of information covered in the orientation sessions and on the HR website. The test group was asked to answer additional questions regarding the game experience.

As an incentive, participants who completed all components of the research project had the opportunity to enter into a drawing for an Amazon gift card. There were two gift cards awarded: one to a participant in the test group and one to a participant in the control group. Initially, the amount of the gift cards was set at $50, but in an effort to increase participation, the amount was increased to $100 for each card after receiving approval from IRB.

This study utilized five instruments for data collection. For clarification and simplification purposes, the instruments are named and defined below.

Demographics and Digital Game Usage Questionnaire (see Appendix A)

The demographic portion of the questionnaire was developed by the researcher and included such items as gender, age range, and job status. To establish familiarity with the campus prior to employment, participants were asked: “How familiar are you with the university and its campus?” and “Are you an alumnus of the university? If so, please list degree(s) earned.”

Questions to establish the participant’s digital game usage and the likelihood that the participant would play and/or complete the scavenger hunt activity were derived from McCauley (2014) and included, “How often do you play games on your computer or smartphone?”, “Please describe your gamer status”, and “Which games do you play?” The questionnaire presented three options for gamer status: non-gamer (do not play digital games at all or very seldom), casual

gamer (sometimes play games on the computer or mobile phone), and hardcore gamer (play games a lot and on different devices).

Psychological Need Satisfaction at Work Scale (see Appendix C)

Questions regarding feelings of autonomy, competence, and relatedness at work were derived from the Basic Psychological Need Satisfaction at Work Scale (Deci et al., 2001; Ilardi et al., 1993; Kasser et al., 1992). The survey consists of 21 items and uses a 1-7 Likert-type scale with a 1 being equivalent to *not at all true*, 4 to *somewhat true*, and 7 being equivalent to *very true*. The wording was adapted on one item. Item 9 originally stated, "I consider the people I work with to be my friends." To account for the large size of the research site, the item was changed to, "I consider the people I regularly interact with at work to be my friends."

Psychological Need Satisfaction in Game Play Survey (see Appendix D)

Questions regarding feelings of autonomy, competence, and relatedness in game play, given to the test group post-game play, were derived from the Perceived Competence Scales (Williams & Deci, 1996; Williams, Freedman, & Deci, 1998) and the Player Experience Needs Scale (PENS) (Ryan et al., 2006). To further evaluate the game play experience, items from the Post-Experimental Intrinsic Motivation Inventory scale (Ryan, 1982) were also included to assess participants' interest/enjoyment, effort, value/usefulness, and perceived choice while participating in the game activity. The survey consisted of 22 items and used a 1-7 Likert-type scale with a 1 being equivalent to *not at all true*, 4 to *somewhat true*, and 7 being equivalent to *very true*. Sample items included, "I experienced a lot of freedom in the game," I am satisfied with my performance at this game," and "I was able to achieve the goals of the game."

Pretest and Posttest (see Appendix E)

A single test was administered online as a pretest to establish prior knowledge and a posttest to measure the degree of change. The 20-item test was written by the researcher in conjunction with HR personnel at the research site. Each question connects to one of the core categories as established by HR at the research site: tradition, community, engagement, success, and next steps. To differentiate between prior knowledge and acquired knowledge, the test contained information covered during the orientation sessions, as well as additional information relevant to new employees. However, the single pre- and posttest design has some threats to internal validity such as time lapse, maturation, and prior testing. A short time lapse between pre- and posttest is important to prevent alternative explanations of any differences found between scores (Bell, 2012). The order of questions on the pretest was different from the order of the questions on the posttest.

The Game Environment (see Appendix F)

Human Resources had direct input into the game's design ensuring new employee orientation goals were met and a consistent message was presented to all participants. The game used in this study was developed using the publicly available scavenger hunt game design platform called GooseChase. While other scavenger hunt platforms were available, GooseChase offers educational use discounts, has a simple user-interface, and offers three question types: photo and video, text, and GPS. Furthermore, GooseChase offered a free license for use in this study.

GooseChase refers to questions as *missions*. Each mission consists of a name, description, point value, and an optional link or photo. The researcher served as the game administrator and was able to view all answer submissions as represented in Figure 1.

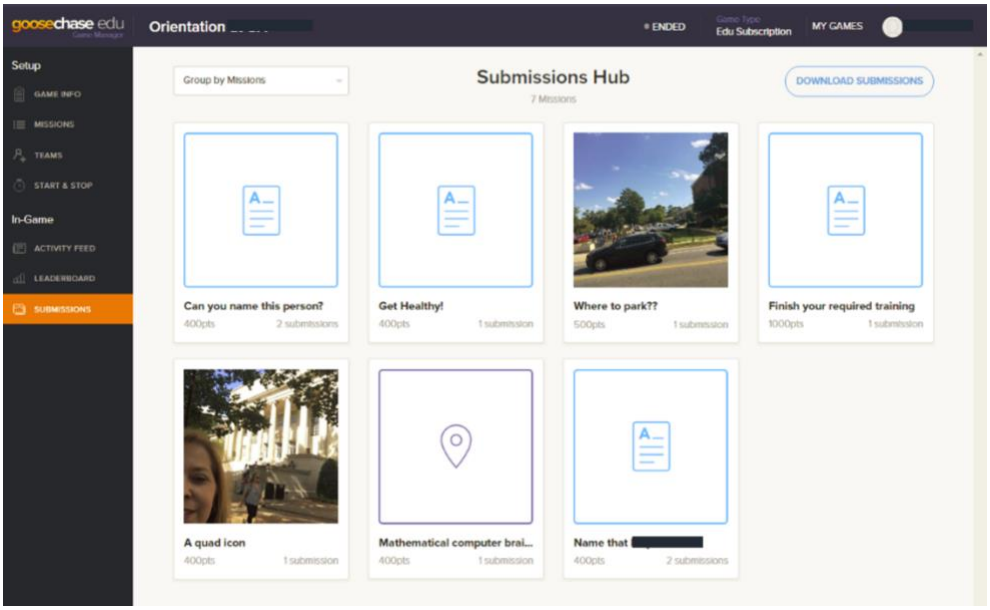

Figure 1. Submissions hub in game administrator panel.

Each game had a start and stop time as assigned by the game administrator. For this study, continuous games began on a Monday at 7:00 am and ended 12 days later (a Friday) at 5:00 pm. Participants could interact with the game as often as they liked during this timeframe; however, the game was designed to take no more than 3 to 4 hours to complete.

Although the game was designed for individual play, participants were able to interact with each other during gameplay. For instance, two employees may have completed missions together, but each submitted their own answers. Players could scroll through all missions and had full control over when the questions were answered and in which order.

Some questions could be answered by searching the research site's intranet and internet sites. For example, "Our institution was originally founded in what year?" could be answered by searching the institution's public website. Other questions provided hints about a location and could only be answered with GPS coordinates, which means the players must have physically been within 100 feet of the location to submit the coordinates. A sample of the mobile game interface with icons representing each of the three mission types is shown in Figure 2.

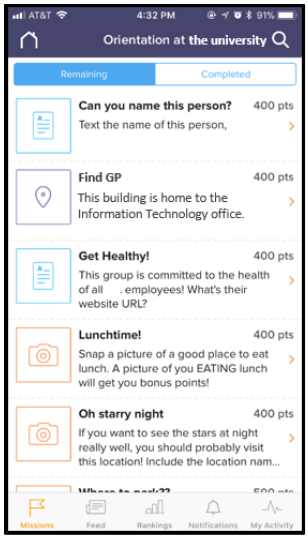

Figure 2. Mobile game interface.

Not all questions in the game had specific answers. For example, to complete the mission *Lunchtime*, players may have submitted a picture of a nearby restaurant, a breakroom, or a park bench. Subjective questions such as this allowed participants to demonstrate creativity and individuality. Figure 3 illustrates a photo mission.

Figure 3. Photo mission.

Each question was assigned a point value. GPS submissions received 600 points, photo submissions received 500 points, and text submissions received 400 points. Immediate feedback was given on questions that had right and wrong answers. Subjective answers received automatic points but could be adjusted positively or negatively at any time by the game administrator. The activity feed and leaderboard (shown in Figure 4) were available to all participants within the current game. Some participants completed all the missions in 1 day, while others only completed a few missions.

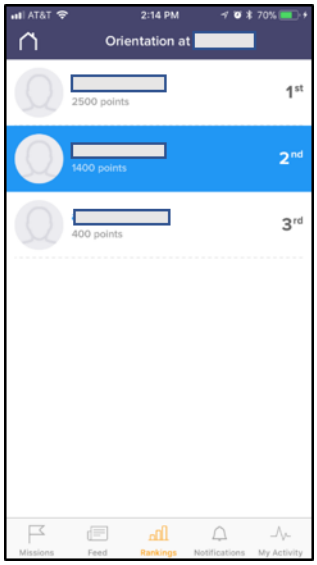

Figure 4. Game leaderboard.

Design of the Game Activity and Independent Exploration Activity

The first three phases of ADDIE model of instructional design were followed throughout this research project. The acronym ADDIE stands for analyze, design, develop, implement and evaluate (Branch, 2009). The game activity and independent exploration activity were developed over many months and required knowledge of HR orientation content, identification of a suitable publicly available digital game platform, and a review of similar activities. The knowledge content for the test questions, game activity, and independent exploration were created by a

review of HR's website, the institution's webpages relevant to staff, a face-to-face meeting with HR staff, attending New Staff Orientation Day One session, and a review of printed materials provided during New Staff Orientation Day One session.

To begin the analysis phase of ADDIE, the researcher met with HR personnel to gain an understanding of the information deemed critical for employees and the items covered in the orientation sessions. The discussion revealed items that HR identified as "quickly forgotten" by new employees such as where to access payroll stubs or HR's online training systems. Lack of such information can account for slow time to productivity for new employees (Klein, 2013). While attending the Day One orientation session, the researcher made notes regarding what items HR presenters emphasized and focused on those items when generating pre- and posttest questions. Items targeted for use in the game activity were derived from printed material given to all attendees, as well as material discussed during the session, but not thoroughly covered.

Goals and Objectives

To begin the design stage of ADDIE, goals and objectives were created. The purpose of the game activity was to reinforce information dispersed during the orientation sessions and to introduce new information in an engaging manner consistent with the conditions of an instructional serious, pervasive game. Therefore, the first step in designing the game was to review HR's goals and objectives for the orientation sessions and then to develop the goals and learning objectives of the game activity. According to the HR Learning and Development manager at the research site, the goals and objectives of the orientation sessions stated

> New Staff Orientation welcomes new employees to The University by introducing them to the people, places, programs, policies and benefits that make The University a great place to work, learn and grow. The theme of Day One-New Staff Orientation is—Develop Your Potential ~ Direct Your Future, and the objective in addition to providing a university welcome, is to cover information in the following categories: University

Traditions, Campus Community, Employee Engagement, Employee Success, Onboarding Next Steps. (Personal communication, June 2, 2018)

An instructional goal is a broad statement of the task or expected learning outcome (Branch, 2009). The goal of the game activity and the independent exploration was therefore written as, *Through interaction with a digital game activity or independent exploration, participants will discover people, places, programs and benefits relevant to full-time staff at the university according to criteria established by HR. More specifically, the game activity or independent exploration will*

- *Help employees become comfortable navigating key university websites.*
- *Foster a sense of belonging to the university as a community.*
- *Encourage feelings of autonomy and individual choice through self-directed exploration.*
- *Create a memorable experience.*
- *Broaden the knowledge of new employees about the university.*

Objectives, generally measurable and defined by a completion date, are more specific than goals (Branch, 2009). The objectives for the game activity and independent exploration were not specific enough to require completion dates, but provided a detailed guideline for construction of the orientation content. The objectives of the game activity or independent exploration were that participants would be able to recall information presented during orientation sessions and demonstrate the ability to navigate websites and physical work environment through interaction with the game activity or independent exploration. Specifically, participants would be able to

- Identify and locate key campus buildings and landmarks relevant to all or the majority of employees.

- Identify one or more parking areas designated for faculty and staff.
- Identify one or more campus dining locations.
- Locate and identify professional development opportunities.
- Locate employee benefit information relevant to their personal needs (colleague, website exploration, written material, etc.).

With the instructional goals and objectives of the game aligned with the goals and objectives of human resource orientation sessions, the game activity was designed. A review of digital scavenger hunt gaming companies, as well as city tour companies like Big City Hunt (scavengerhunt.com) and Urban Adventure Quest (urbanadventurequest.com), was conducted. Appendix G provides a comprehensive comparison list of possible solutions for platforms. As indicated and explained in the previous section, The Game Environment, GooseChase, was selected as the game platform for this project.

While searching for examples of scavenger hunt questions and missions used for onboarding or orientation games, two notable accounts were identified. The University of Arizona Environmental Scavenger Hunt 2018 is a photo-based hunt used to introduce students to buildings and features supporting sustainability ("RDI Discover Days Environmental Scavenger Hunt," n.d.). The game lasted 1 week and occurred during an event to celebrate research and development. A game app was not used but instead, participants were given a printed list of clues and instructed to submit photos to an online cloud storage folder. While there was no type of public leaderboard or instant feedback, prizes were awarded at the end of the game.

North Carolina State University libraries offered a mobile scavenger hunt for student teams to explore and learn about the library (Burke, 2018). The 12-question, 25-minute game was hosted as an event in which students used paper-based clues and submitted photo-based

answers into a Snapchat account. Scoring was managed through a spreadsheet by a librarian. This is an example of a low tech, short game (Burke, 2018). Although neither account reflected employee orientation or onboarding, the review of these games provided examples of possible missions and identified potential problems. These items were useful when designing the game for this project.

Progressing to the develop stage of ADDIE, the missions and questions were developed with a focus on the commonly used game design elements of play, rules, challenge, aesthetics, social factors, and learning (Mildner & Mueller, 2016). An explanation of how each element was represented in the game activity is provided below:

- Play—As much as possible, the game used relaxed, conversational wording. The missions were written in riddle-type form or in open form allowing room for subjectivity and creativity. Players were given feedback throughout the game and in most cases, given an opportunity to get the question right without penalty.
- Rules—The rules of the game were simple: follow the instructions within the game app to solve the missions within the allotted timeframe.
- Challenge—The game included missions at various levels of difficulty. Some were simple and could be accomplished in the comfort of the players' office or by visiting a website. More difficult missions required the player to spend time searching for specific information. Physical missions required moving to a location and gathering items or acting out a scene.
- Aesthetics—The game had a simple, user-friendly intuitive interface void of extraneous graphics or text.

- Social factors were minimal as, for this research project, the game was designed for individual play. Employees could ask a co-worker to join him or her on the physical missions or answer knowledge-based questions, but it was not a focus of the original design. A few of the missions required interaction with other employees.
- Learning—As previously discussed, learning objectives were built into the game that correlated with HRs' orientation objectives. The majority of all missions were designed to result in either new knowledge gained or prior knowledge recall.

Finally, when constructing the game, it was necessary to consider how each mission may or may not contribute to the psychological needs of autonomy, competence, and relatedness as discussed by Thomas (2006) and Deci and Ryan (1980). The missions that allowed the participants to be creative in their interpretation of an appropriate submission, encouraged feelings of control or autonomy. For example, the mission titled "Where to Park" asked users to identify the closest faculty/staff parking lot to their work location. Users could submit images of a single parking spot, an entire lot, a parking sign, or perhaps a parking deck. Creativity was encouraged and the simple task ensured the new employee was aware of the spots reserved for staff so the employee would not get a parking ticket.

Many of the missions that require moving to a physical location encourage self-confidence as participants become familiar with the campus. Employees may discover additional buildings or landmarks en route to fulfill a mission. For example, the mission titled "Iron and Steel" asked the user to identify and then visit "a very large, heavy, and tired collection of metal". A quick search on the internet using similar phrasing, plus the hint "tired" revealed the name and location of an iron sculpture. Other sculptures are in the area, plus the buildings surrounding the sculpture have historical significance that may be of interest to new employees.

Activities that require interaction with others on campus, such as “Ride a Bus” and “Network Collection” encouraged relatedness. “Ride a Bus” asked the user to hop on a campus bus and either take a picture of the driver or take a photo together which required the user to ask permission from the driver. “Network Collection” encouraged relationship building as the employees were asked to collect five different business cards. Bonus points were available for most all of the missions based on creativity of the photo submissions.

Several factors were considered before establishing the duration for gameplay. Participants needed ample time to complete all the missions and interact with other players yet not have so much time that interest would be diminished. The game began on a Monday and continued for 12 days. Participants interacted with the game as many times as they liked. In meta-analyses on games for learning, Sitzman (2011) and Wouters, van Nimwegen, van Oostendorp, and van der Spek (2013) found that participants who interacted with a game for more than one session demonstrated significantly better outcomes compared to those who only participated in one session. However, a limited time frame encouraged frequent gameplay and competition among other participants as time limits heighten competition ensuring participants feel a sense of urgency (Butler, 2015). Additionally, the 12-day duration allowed for variables such as an employee’s heavy workload or inclement weather that could adversely affect a participant’s ability to interact with the game or independently explore the new work environment if the time frame were shorter.

Before the game was implemented, it was evaluated (the final stage of ADDIE) by a panel of experts in the area of game-based learning, game design, and instructional design. HR Training and Development personnel reviewed all materials for accuracy of content, value to HR’s goals and objectives, and game play enjoyment. A list of the expert panel is provided in

Appendix H. A table of all the missions and how they related to Human Resources orientation objectives and the pre- and posttest is presented in Appendix I.

Procedures and Data Collection

During HR's new employee orientation sessions, which are conducted bi-weekly, employees were informed about the study. Employees who were interested in participating were given a written explanation of the study, the requirements for participation, and a form to complete and initiate participation (see Appendix J). Respondents were contacted via a Qualtrics-generated email and given further instructions to begin the study.

Phase I—Consent Form, Demographics, Digital Game Usage Questionnaire, and Pretest

Participants began Phase I of the study within 1 to 2 days following the orientation sessions and were given 1 week to progress through four sections:

1. Consent form
2. Demographic questions
3. Digital game usage questionnaire
4. Pretest

Participants were divided into the test group and the control group based on two questions in the Demographics and Digital Game Usage questionnaire: "How familiar are you with the university and its campus?" (1—Not at all familiar to 5—Extremely familiar) and "How often do you play games on your computer or smart phone?" (1—Never to 7—Continuously throughout the day). Using the total score of the two questions, participants were divided to ensure there were equal amounts of "gamers" and "non-gamers" in both the test and the control group, as well as participants who were "extremely familiar" with the campus and those who were "not at all familiar" with the campus. A spreadsheet was used to organize participants into

the two groups and track participant completion (see Appendix K). The test group continued onboarding through a game-based activity. The control group continued onboarding through independent exploration of web or physical spaces, manager and co-worker communication, and any other method the participant deemed appropriate.

Each group contained an equal (or near equal) number of participants based on digital game usage and familiarity with the research site. This helped to ensure, for example, that not all participants in the test group self-reported as hard-core gamers and were all familiar with the campus. The recruitment of participants through new employee orientation continued until the required number of participants was recruited and the study completed.

Phase II—Game Play or Independent Exploration

Phase II began the following Monday after the participant completed Phase I and ended 12 days later. Test group participants received instructions to locate and download the GooseChase app and sign into the game using their unique ID number as the username (see Appendix L). The game administrator was not able to see the participants' email addresses in the game, only the username.

Participants in the control group received an email containing resources for fundamental information provided during the orientation sessions as well as the additional information presented through the game activity. This included links to a virtual campus map and other university webpages (Appendix M).

Phase III—Posttest, Psychological Need Satisfaction at Work Scale, and Psychological Need Satisfaction in Game Play Survey

Upon completion of Phase II, participants from both the test group and the control group were sent a link via email to the posttest and Psychological Need Satisfaction at Work Scale. The

test group also received a link to the Psychological Need Satisfaction in Game Play survey. Participants were given 7 days to complete Phase III.

At the end of the posttest, each participant was thanked for his or her time and asked to answer one last question to be entered into the drawing for a $100 Amazon gift card. Participants who selected the correct answer were prompted to enter their email address to be officially entered in the drawing. Two weeks after data collection was completed, one email from the control group and one email from the test group were randomly selected to receive the Amazon gift cards using a random number formula (=INDEX($A:$A,RANDBETWEEN (1,COUNTA($A:$A)),1)) in the Participant Tracking Sheet.

Regarding the timeline, approximately 33 days were needed to gather data from each participant. This timeline consisted of 7 days from date of initial contact to questionnaire and pretest completion, 12 days of game play or independent web exploration, and 7 days for the posttest and final surveys. Table 1 provides a breakdown of the three phases and the instruments used in each phase.

Table 1

Study Procedures

Test Group	**Control Group**
Phase I—7 days • Demographic and gamer status questionnaire • Pretest	Phase I—7 days • Demographic and gamer status questionnaire • Pretest
Phase II—12 days • Game Activity	Phase II—12 days • Independent learning

Table 1 (con't)

Test Group	Control Group
Phase III—7 days • Posttest • Psychological Need Satisfaction at Work Scale • Psychological Need Satisfaction in Game Play Survey	Phase III—7 days • Posttest • Psychological Need Satisfaction at Work Scale

Data Analysis

Quantitative data were analyzed using *Statistical Package for the Social Sciences* (SPSS)®. A significance level of .05 was used for each analysis. Research Question One, is there a difference in autonomy, competence, and relatedness among new employees based on their participation in a game-based onboarding activity compared to those who did not participate in a game-based onboarding activity, was answered by a MANOVA analysis using the two dependent variables (the test group and the control group) to determine if there were group differences. Research Question Two, is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who did not participate in a game-based onboarding activity, was answered by an ANOVA. The study sought to measure the change or difference in means under two different conditions between the experimental group who continued learning about the new work environment through a game activity and the control group who continued learning through independent web exploration. Table 2 presents the methodology used to answer each research question.

Table 2

Research Question Methodology

Research Question	Methodology
1. Is there a difference in autonomy, competence, and relatedness in new employees based on their participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?	The Psychological Need Satisfaction at Work Scale provided data for this research question. Data were analyzed using a MANOVA with two dependent variables (the test group and the control group).
2. Is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?	The pretest and posttest provided data for this research question. The data were analyzed using a repeated measures ANOVA and paired *t*-test.

Risks and Benefits

There were no known risks to participants in the control group. There were minimal risks for those participants of this study within the test condition. During gameplay, participants were advised to use caution when exploring the campus, watch for traffic, and obey all posted signs. Beneficially, participants may have learned information about the research site, became familiar with buildings and landmarks, and made connections with other employees. The results of the study may inform hiring managers and human resource professionals of employee perceptions of orientation processes including interactive game play activities. This information may help to improve future onboarding and orientation procedures and activities.

Summary

The implementation of an extended orientation by way of a digital scavenger hunt fills the gap between the formal classroom sessions where all attendees are given the same general information and the more individualistic training provided by the employees' managers and

coworkers. The game activity presented content that was covered during the orientation sessions, as well as introduced content that was not covered. Play is an active form of learning and introducing orientation content in a playful manner, such as a game activity, may entice, motivate, and enable employees to engage, meet fellow new employees, retain vital information, and explore the campus. In this study, participants were asked to take an orientation quiz, participate in a digital scavenger hunt, and complete a questionnaire regarding their game play experience. The results of the study could be useful to improve and enhance the current onboarding process at the research site and other large organizations.

CHAPTER IV

DATA ANALYSIS

The purpose of this study was to determine if adding a digital game to the orientation and onboarding process of new employees at a public university in the southeast could increase employee satisfaction, socialization, and content retention in new employees. Empirical research has been conducted on the psychological need satisfactions of gamers and on individuals adjusting to a new job, but only minimally on using a digital game as part of the new employee onboarding process. This study examined if there were differences between employees who interacted with the game activity and those who did not. Employee satisfaction and socialization were measured using the Psychological Needs Satisfaction Scale and employee content retention was measured by a pretest and a posttest. Quantitative data were analyzed for the research questions.

The research questions guiding this study were

1. Is there a difference in autonomy, competence, and relatedness in new employees based on their participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

2. Is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

Profile of Respondents

A total of 56 participants agreed to participate in the study, with 40 participants completing all three phases of the project. This included a pre- and posttest, the Psychological Need Satisfaction at Work Scale, and a Psychological Need Satisfaction in Game Play survey. Of the 40 respondents, there were 14 males and 26 females. The age of respondents varied with 43% between the ages of 18 and 29 years old, 38% between the ages of 30 and 45 years old, and 20% between 46 and 60 years old. There were no respondents in the 61+ years of age category.

When asked to rate familiarity with the campus, 15% were not at all familiar, 33% were slightly familiar, 20% were somewhat familiar, 13% were moderately familiar, and 20% were extremely familiar. Thirty-five percent of the participants graduated from the research institution, which may account for the somewhat high familiarity rates. Table 3 presents participants' campus familiarity by group.

Table 3

Campus Familiarity by Group

Group	Not at all	Slightly	Somewhat	Moderately	Extremely	Total
Control	3	6	2	2	6	19
Test	3	7	6	3	2	21
Total	6	13	8	5	8	40

Gamer Status

The second section of the demographic questionnaire focused on the participants' game play experience. When asked how frequently a participant played games on the computer or smart phone, 20% reported never playing games, 25% reported playing once a month, 8% played once a week, 25% played a few times a week, 13% reported playing once a day, and 10% reported playing a few times a day. See Table 4 for participants game play frequency by group.

Table 4

Game Play Frequency by Group

Group	Never	Once a month	Once a week	A few times a week	Once a day	A few times a day	Total
Control	5	5	1	5	1	2	19
Test	3	5	2	5	4	2	21
Total	8 (20%)	10 (25%)	3 (8%)	10 (25%)	5 (13%)	4 (10%)	40

Participants were asked to describe themselves in regard to digital game play as either a non-gamer (someone who never plays games on the computer or mobile phone), a casual gamer (someone who sometimes plays games on the computer or mobile phone), or a hardcore gamer (someone who plays games a lot on different devices). Of the total respondents, 58% identified as a casual gamer, 25% as a non-gamer, and 18% as a hardcore gamer. Table 5 depicts gamer self-description by group.

Table 5

Gamer Self-Description

Group	Non-gamer	Causal gamer	Hardcore gamer	Total
Control	6	10	3	19
Test	4	13	4	32
Total	10 (25%)	23 (58%)	7 (18%)	40

Research Question One

Research Question One was addressed using the Basic Psychological Need Satisfaction at Work Scale. The scale has documented construct validity (Deci et al., 2001; Ilardi et al., 1993; Kasser et al., 1992) and consists of three subscales: autonomy, competence, and relatedness. Reliability was confirmed using Cronbach's alpha for the total need satisfaction scale ($\alpha = .85$). According to Pyrczak (1999), values of .70 or above indicate adequate internal consistency. A

one-way multivariate analysis of variance (MANOVA) with an alpha level significance criterion of .05 was conducted on the test scores to determine any effect of the two types of onboarding (website resources and a game activity) on the three dependent variables of autonomy, competence, and relatedness.

Assumptions

Prior to conducting the MANOVA, assumptions were checked and met. A Shapiro-Wilk's test and a visual inspection of their histograms, normal Q-Q plots and box plots showed that the Psychological Needs Satisfaction at Work scores were approximately normally distributed for the control group, with a skewness of -.352 (SE = .524) and a kurtosis of -1.341 (SE = 1.014). However, the test group slightly violated the normality with a skewness of -1.008 (SE = .501) and a kurtosis of .974 (SE = .972) (Cramer, 1998; Cramer & Howitt, 2004; Doane & Seward, 2011). The violation of the normality is minor (+ 2.01) and should not cause major problems since the sample size is not greater than 40 (Ghasemi & Zahediasl, 2012).

A Box's M value (equality of covariance matrices test) of 4.419 was associated with a *p* value of .672 which indicated equal covariance matrices between the test group and the control group (Huberty & Petoskey, 2000). As outliers can negatively influence the validity of results (Aguinis, Gottfredson, & Joo, 2013), an analysis of Z-scores and box plots was conducted and no multivariate outliers were identified.

Results of Question One

The multivariate test indicated no significant difference in the psychological need satisfaction scores between the control group and the test group, Wilk's $\Lambda = .907$, $F(3, 36) = 1.232$, $p = .312$. An additional MANOVA was conducted to explore campus familiarity as a covariate, yielding similar results, Wilk's $\Lambda = .860$, $F(3, 35) = 1.903$, $p = .147$.

To further explore the individual subscales, three hypotheses were made. Hypothesis 1 stated the test group would report equal levels of autonomy as the participants in the control group (no game activity). Items 1, 5, 8, 11, 13, 17, and 20 contained statements related to feelings of autonomy. The results were not significant for hypothesis 1, $F(1, 38) = 2.87$, $p = 0.10$, indicating that the game activity had no significant effect on the psychological needs satisfaction of autonomy compared to the web links, coworkers and manager engagement, and self-exploration. Table 6 provides the mean scores for each item in the autonomy subscale.

Table 6

Items Regarding Feelings of Autonomy

Autonomy Subscale	Group	Mean
1. I feel I can make a lot of inputs to deciding how my job gets done.	Control	5.53
	Test	5.71
5. I feel pressured at work.	Control	5.21
	Test	5.90
8. I am free to express my ideas and opinions.	Control	5.37
	Test	6.05
11. When I am at work, I have to do what I am told.	Control	3.11
	Test	2.90
13. My feelings are taken into consideration at work.	Control	5.37
	Test	5.90
17. I feel like I can pretty much be myself at work.	Control	5.11
	Test	5.76
20. There is not much opportunity for me to decide for myself how to go about my work.	Control	5.74
	Test	6.05

Hypothesis 2 stated that the test group would report equal levels of competence as the participants in the control group. Items 3, 4, 10, 12, 14, and 19 contained items related to feelings of competence. The results were not significant for hypothesis 2, $F(1, 38) = 1.56$, $p = 0.22$, indicating that the game activity had no significant effect on the psychological needs satisfaction

of competence compared to the web links, coworkers and manager engagement, and self-exploration. Table 7 provides the mean scores for each item in the competence subscale.

Table 7

Items Regarding Feelings of Competence

Competence Subscale	Group	Mean
3. I do not feel competent when I am at work.	Control	1.89
	Test	1.95
4. People at work tell me I am good at what I do.	Control	4.74
	Test	5.00
10. I have been able to learn interesting new skills on my job.	Control	5.53
	Test	5.76
12. Most days I feel a sense of accomplishment from working.	Control	4.89
	Test	6.05
14. On my job, I do not get much chance to show how capable I am.	Control	5.16
	Test	5.81
19. When I am working, I often do not feel very capable.	Control	6.26
	Test	6.10

Hypothesis 3 stated that the test group would report equal levels of relatedness as the participants in the control group. Items 2, 6, 7, 9, 15, 16, 18, and 21 contained statements related to feelings of relatedness. The results were not significant for hypothesis 3, $F(1, 38) = .007$, $p = 0.94$, indicating that the game activity had no significant effect the psychological needs satisfaction of relatedness compared to the web links, coworkers and manager engagement, and self-exploration. Table 8 provides the mean scores for each item in the relatedness subscale.

Table 8

Items Regarding Feelings of Relatedness

Relatedness Subscale	Group	Mean
2. I really like the people I interact with at work.	Control	6.21
	Test	6.43
6. I get along with people I come in contact with at work.	Control	6.47
	Test	6.62
7. I pretty much keep to myself when I am at work.	Control	4.68
	Test	5.00
9. I consider the people I regularly interact with at work to be my friends.	Control	4.53
	Test	4.52
15. People at work care about me.	Control	5.21
	Test	5.71
16. There are not many people at work that I am close to.	Control	4.89
	Test	3.86
18. The people I work with do not seem to like me much.	Control	6.32
	Test	6.67
21. People are generally pretty friendly towards me at work.	Control	6.11
	Test	6.62

Table 9 presents the mean scores and standard deviations for each group and subscale. Considering the midpoint score for each variable was 4, all participants indicated an above average level of need satisfaction with autonomy, competence, and relatedness.

Table 9

Mean Scores of the Basic Psychological Needs Satisfaction at Work Instrument

	Control Group (n = 19) M (SD)	Test Group (n = 21) M (SD)	Total (n = 40) M (SD)
Need for Autonomy	5.06 (.175)	5.47 (.166)	5.27 (.121)
Need for Competence	5.45 (.200)	5.79 (.190)	5.62 (.138)
Need for Relatedness	5.56 (.168)	5.54 (.159)	5.55 (.116)

Research Question Two

Research Question Two was addressed using a pre- and posttest. An analysis of variance (ANOVA) with an alpha level significance criterion of .05 was conducted to evaluate the relationship between the onboarding method and the change in the orientation test scores from the pretest to the posttest. The independent variable, the method of onboarding, included two groups: the control group and the test group. The control group received optional web resources to review while the test group participated in the digital game activity. The dependent variable was the change in the orientation knowledge quiz scores from the pretest to the posttest. The tests consisted of 20 questions covering five categories: Tradition, Campus Community, Employee Engagement, Employee Success, and Onboarding Next Steps. A paired samples *t*-test analyzed the within subjects data (pretest and posttest for each group).

Assumptions

Prior to data analysis, the pretest and posttest scores from both groups were tested for normal distribution. A Shapiro-Wilk's test (Razali & Wah, 2011; Shapiro & Wilk, 1965) and a visual inspection of their histograms, normal Q-Q plots, and box plots indicated the tests scores were approximately normally distributed for the control group and the test group (see Table 10). All skewness and kurtosis statistics were within reasonable limits. A Box's M value of 5.167 was associated with a *p* value of .672, which indicates equal covariance matrices between the test group and the control group (Huberty & Petoskey, 2000).

Table 10

Shapiro-Wilk Test of Normality

	Group	Statistic	df	Sig.
Pre-test	Control	.915	17	.123
	Test	.946	15	.464
Post-test	Control	.904	17	.080
	Test	.973	15	.902

Results of Question Two

Hypothesis 4 stated that there will be no difference in difference scores for participants in the test group compared to participants in the control group. The ANOVA revealed no significant difference in the test scores between the groups, $F(1, 38) = 3.633$, $p = 0.064$. The results indicate that the game activity had no significant effect on content retention compared to the web links, coworker and manager engagement, and self-exploration.

A paired-samples *t*-test was conducted to compare the within group scores from pretest to posttest. Hypothesis 5 stated that the test group would score the same or lower on the posttest than on the pretest. Within the test group, there was no significant difference in pretest scores (M = 15.90, SD = 2.0) and posttest scores (M = 16.19, SD = 1.69); $t(20) = -1.19$, $p = 0.249$, indicating that the game activity did not increase knowledge of fundamental information of the institution.

Hypothesis 6 stated that the control group would score the same or slightly lower on the posttest than on the pretest. Within the control group, there was a significant difference in the pretest scores (M = 15.47, SD = 2.46) and the posttest scores (M = 16.58, SD = 2.43); $t(18) = -3.021$, $p = 0.007$, indicating that the standard method of orientation and onboarding at the

institution significantly increases knowledge of fundamental information of the institution. Table 11 presents the mean scores of the tests within each group.

Table 11

Mean Scores of the Pretest and the Posttest Within Groups

	Control Group (n = 19) M (SD)	Test Group (n = 21) M (SD)
Pre-test	15.47 (2.46)	15.90 (2.00)
Post-test	16.58 (2.43)	16.19 (1.69)

Summary

This chapter presented the findings from three types of analyses used to test all hypotheses for research question one and research question two. No significant findings were found, indicating that new employees who participated in this study experienced the same amount of psychological needs satisfaction and content retention regardless of the onboarding process method. Chapter V will present a discussion of the findings and implications for future research.

CHAPTER V

RESULTS

The study explored the application of a digital game as an enhancement to the onboarding process of new employees. The goal of the activity was to increase employee satisfaction, socialization, and content retention. This study allowed new employees of a southeastern research university to explore their working environment, test their knowledge of fundamental institutional information, and self-assess their experience with the game platform and their new job.

Summary of the Study

Onboarding is an important facet of employment. Traditional methods of face-to-face information sharing is still the predominant method, as human connections are a vital part of human resource services (Wallace, 2009). In order to improve the onboarding process, human resources departments are exploring the use of games or game-like activities. However, very little empirical research exists to determine the effectiveness of this approach. Many of the reported findings base success on employee perception of the gaming method rather than its direct impact on motivation or content retention (Depura & Garg, 2012; Zielinski, 2010.

In this study, digital game-based learning was employed as a means of conveying information to new employees. The goal of the game activity was to motivate participants to engage with the game and turn routine new employee tasks into a playful learning activity. Self-determination theory and cognitive evaluation theory were used to frame the study as both theories can apply to employees in the work setting as well as players interacting with a game.

The Basic Psychological Need Satisfaction at Work scale was used to determine participants' levels of autonomy, competence, and relatedness regarding experiences on their new jobs. High levels of satisfaction of all three needs is indicative of employees' overall attitudes and job satisfaction (Gagné & Deci, 2005). No significant findings were found. An online pretest and posttest measured content retention of fundamental information relevant to new employees. Although no significant findings were made, on average, the posttest scores were slightly higher than the pretest scores for all participants.

Discussion

This quasi-experimental study was guided by two research questions.

Research Question One

Is there a difference in autonomy, competence, and relatedness in new employees based on their participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

This study found that the addition of a digital scavenger hunt to an employee onboarding process had no significant influence on the satisfaction of the psychological needs of autonomy, competence, or relatedness in regard to work. It should be noted that all participants indicated an above average level of autonomy, competence, and relatedness. This may be the result of quality orientation sessions by Human Resources (HR) and of the onboarding experience provided by the employees' departments. The study occurred during the first 30 days of employment at a time when new employees demonstrate a natural intrinsic motivation to learn a new job and become part of the team (Wallace, 2009). Managers and coworkers who are supportive and offer assistance help ease the transition and reinforce levels of competence and relatedness for new employees (Gagné & Deci, 2005). Holton noted, "Much critical information about an

organization is contained in culture that is not written down and often not even formalized" (1996, p. 243).

While pay is often the primary motivation for work, intrinsic motivators are what make employees happy and willing to stay with an employer for a long time (Olafsen et al., 2015). The satisfaction of all three psychological needs produce important outcomes including effective performance, job satisfaction, positive attitudes, and psychological adjustment and well-being (Gagné & Deci, 2005). As Laborde Torres (2016) noted, the overall effectiveness of an onboarding program is dependent on many factors, some controllable and some uncontrollable. Human Resources at the research site has a consistent method of conducting orientation training to new employees. Seasoned human resources personnel convey the same information each session. They ensure the training room is comfortable, provide snacks, coffee and sodas, and converse with individuals to create a relaxed atmosphere.

New employees enter the training sessions with expectations, past experiences, attitudes, and values that either positively or negatively affect the learning experience (Holton, 1996). When a game is added to the learning process, effectiveness may rely on employee perceptions of video games, favor or disfavor about games, and experiences with them (Laborde Torres, 2016; Perryer et al., 2016; Sarangi & Shah, 2015). Laborde Torres (2016) noted that individuals who favor video games can benefit more and perform better from an onboarding process that includes video game elements. For this study, both groups contained participants who favored and disfavored video games. Interestingly, the frequency of game play as recorded by the participants in the initial questionnaire made very little difference in the total and type of missions completed in the game activity as reflected in Figure 5.

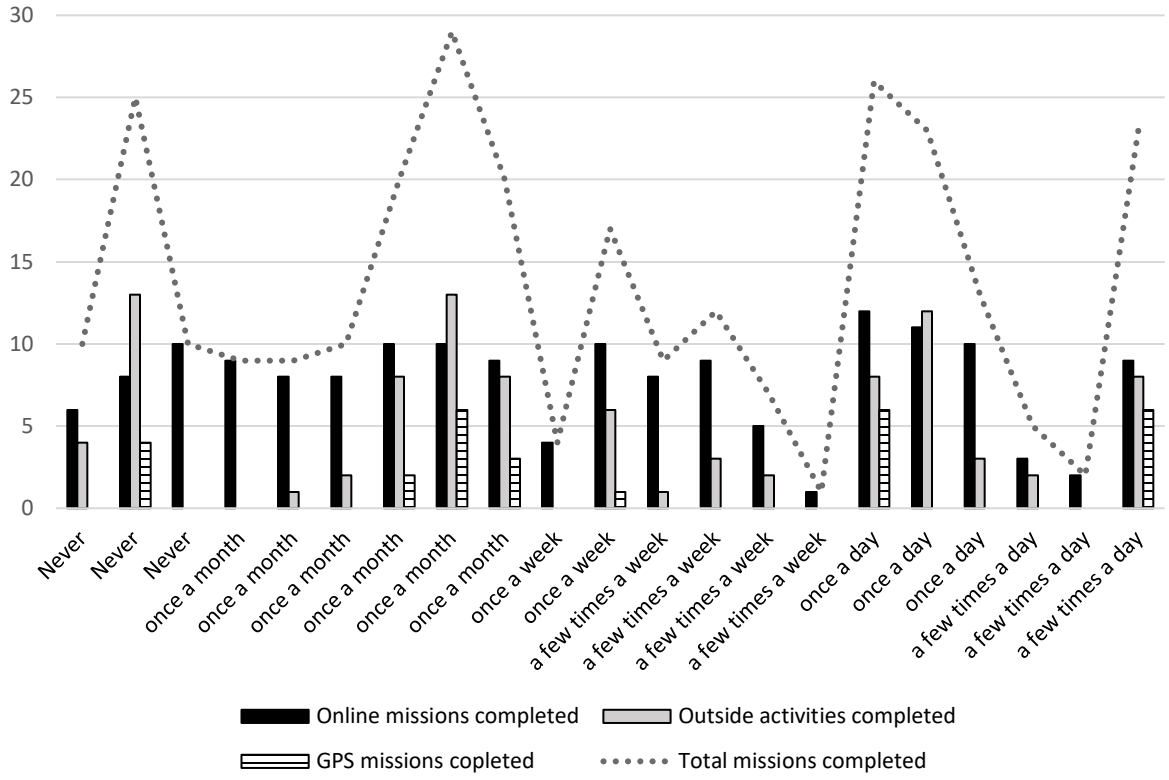

Figure 5. Total missions completed by type.

As stated in the literature, a game has to be received as a learning tool before video game elements can begin to affect an individual. The employer who sets expectations ahead of time will help employees understand the value of the game activity (Klein, 2013). The game activity in this study was presented as a research-based, voluntary opportunity to learn more about the organization. Individuals may have been more eager to participate if the activity was presented as an already integrated part of the onboarding process and not as an experiment.

Research Question Two

Is there a difference in the retention of fundamental institutional information based on employee participation in a game-based onboarding activity compared to those who do not participate in a game-based onboarding activity?

The game activity had no significant effect on increasing the amount of fundamental institutional information learned or retained. However, the difference in pre- to posttest scores within the control group was significant. One possible reason is the ease of access to information during the posttest. In Phase II, the control group received a single email with links to the same information that was in the game activity. The control group may have used those links for quick reference while taking the posttest. The test group was not sent the links directly through this study but, as public knowledge to the campus, the information was present. Learning opportunities occurred through multiple channels as individuals from both groups interacted with colleagues, managers, office spaces, and areas of campus that were deemed relevant to fulfilling work-related tasks.

It is also possible that the control group interacted with the website content more completely than the test group interacted with the information provided in the game activity. There was no tracking of the control group participants to determine how many links were accessed or how much time was spent at each website. The number of missions completed by the test group, however, was tracked. Not one of the participants completed all 30 missions and only eight participants completed 15 or more missions. Greater interaction with the game activity may have increased the posttest scores.

Another consideration is the sequence of the orientation sessions and the pretest administration. In this study, the pretest was given shortly after the orientation sessions, at a time

when the information was most likely still fresh on the minds of the participants. If the pretest was given prior to the orientation sessions, there may be a difference in posttest scores as the test would measure the employee's knowledge before receiving any training. However, the goal of the game activity was not to replace orientation, but to enhance it. If the pretest were given before orientation, it would not be possible to differentiate between participants' learning during the orientation sessions and participants' learning during the game activity.

When looking at the individual test items, both control and test groups either retained or increased their score from pre- to posttest for 16 of the 20 questions. The control group scored lower on the posttest than on the pretest on three items (questions, 1, 3, and 18) while the test group scored lower on the posttest than the pretest on one item (question 9). The items are reflected in Table 12.

Table 12

Pre- to Posttest Items With Negative Increases

Question	Control Group	Test Group
1. We value our history. A timeline of important events is found at http://institutionsite.edu. What year did the institution open its doors as the flagship higher education institution for the state? (1831)	Pre—100% Post—84%	Pre—90% Post—100%
3. All faculty, staff, and students must have an ACTion card. What is the purpose of having a card?	Pre—95% Post—89%	Pre—89% Post—100%
9. All employees have access to learning opportunities and professional development. Which website provides links to ALL online learning portals provided by HR?	Pre—11% Post—32%	Pre—29% Post—24%
18. How many students were enrolled Fall 2017?	Pre—95% Post—79%	Pre—90% Post—95%

Familiarity with the campus was an important factor in this study. It was assumed that individuals familiar with the campus would score higher on the pre- and posttest than individuals who were unfamiliar with the campus. Exploring the means of the pretest and posttest scores

revealed very little differences, with individuals not at all familiar with the campus (M = 15.52) only scoring slightly lower than individuals extremely familiar (M = 15.75). The mean scores are displayed in Table 13. All participants who were either moderately or extremely familiar with the campus were alumni of the institution.

Table 13

Mean Pretest and Posttest Score by Campus Familiarity

Campus Familiarity	Alumni	Pretest Mean	Posttest Mean
Not at all familiar (N = 6)	0	15.52	16.33
Slightly familiar (N = 13)	0	15.68	16.38
Somewhat familiar (N = 8)	1	15.62	16.43
Moderately familiar (N = 5)	5	15.88	16.36
Extremely familiar (N = 8)	8	15.75	16.47

Gamer Status

Participants were asked to self-report their gamer status and game play frequency, as described in Chapter IV. The game play frequency data was one of the determining factors when placing participants into groups. An interesting observation is that of the participants who indicated they played games a few times a week, one self-described as a non-gamer, nine self-described as a casual gamer, and two self-described as a hardcore gamer. The survey did not inquire about length of play, which may possibly be the difference in how individuals perceived themselves. Someone who plays a few minutes a few times a week may consider themselves a non-gamer whereas someone who plays for several hours a few times a week might consider themselves a hardcore gamer. Incorporating hours of play into the questionnaire may provide data that are more accurate. Figure 6 illustrates the correlation in gamer-status and game play frequency. The majority of participants considered themselves to be casual gamers (58%).

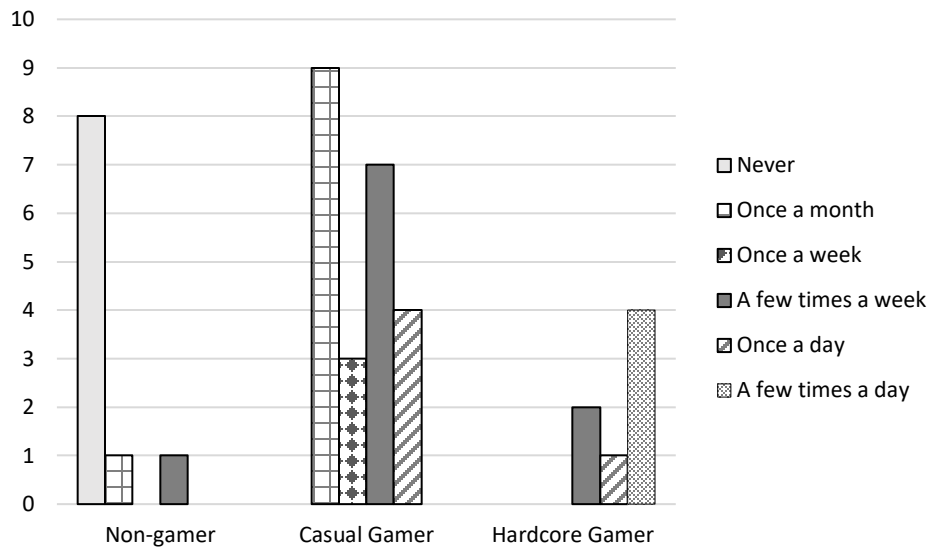

Figure 6. Gamer self-description and game play frequency.

Limitations

As anticipated, there were some limitations to the usefulness and generalizability to the study including statistical power, pretest and posttest, weather, holidays, self-reporting, and game design. The details of each limitation are discussed.

Statistical Power

A limitation of the MANOVA analysis used to answer Research Question One is the lack of statistical power, thus increasing the risk of making a Type II error (Greenland et al., 2016). The power analysis suggested a sample size of 46 was needed to detect a medium effect size yet the study only had 40 participants. In a study comparing two groups, such as this one, an underpowered study may not be able to detect a true difference between the groups (Greenland et al., 2016).

Pretest and Posttest

The administration method for the pretest and posttest was restricted due to time constraints and structure in HR's orientation sessions. A limitation of the quasi-experimental pre-

and posttest study design is that the study cannot isolate participants completely (Shuttleworth, 2009). This leaves in question the accuracy of the pretest in determining prior knowledge. Both tests were administered to employees through an online survey delivered to their email addresses. While completing the tests, it was anticipated that participants might use the internet or other resources to answer the questions. However, the ability to seek out and locate information is also an important part of learning an organization. It is conceivable that learning may have occurred during the tests but was not measurable through the pre/posttest instrument. Administering the tests with supervision may be a more reliable method. Furthermore, this pre/posttest was a newly created instrument and it is likely that it should be evaluated and revised by human resource personnel to better measure prior knowledge.

As previously discussed, the pretest was administered online to measure participant prior knowledge and again as a posttest to measure the degree of change. Some researchers argued that score differences is an unreliable method of analyzing pre/posttest measures (Edwards, 2001). Salkind (2007), however, stated that difference scores should be used when examining predictors of change, such as a test to measure the degree of change in prior knowledge.

Weather and Holidays

The game activity used in this study included missions of two types: those that require exploration of the campus intranet and internet sites and those that require physical exploration of the campus. The physical missions encouraged players to take photos, locate buildings and landmarks, and submit GPS coordinates. The recruitment period, mid-October through April, experienced many wet and cold days, which may have discouraged game play for the physical missions. One participant, however, was creative and found a way to circumnavigate the missions that required outside exploration by submitting pre-existing photos of the outside

locations from the internet. While that was not the original intent of the mission, it demonstrated creativity in the absence of strict rules, which is characteristic of pervasive games (Montola et al., 2009).

Holidays may have also limited game play activity. During the data collection period, there were several holidays in which the research institution was closed. More specifically, the university closed 3 days for Thanksgiving, 10 days for end of year holidays, and 5 days for Spring Break. The interruptions may have been a contributing factor in the incompletion rates found across all phases of the study.

Self-reporting

Self-reported data is another limitation. This study asked participants to self-report their familiarity with the campus, game-play frequency, and gamer status. Self-reporting measures can be unreliable and subject to bias as individuals may exaggerate, answer how they think the researcher wants them to answer, or answer erroneously (Jupp, 2006; Wheelan, 2013).

Game Design

In teaching, quality course design is an essential part of helping students achieve desired learning outcomes. Likewise, games used for learning rely on quality game design. As discussed in Chapter II, a game is typically designed by a team of individuals with varying skillsets. While the game platform, GooseChase, was created by a team of experts, the missions for the game used in this study were written by a single person and play-tested by only a few individuals. It is highly probable that improvements and adjustments are needed to the missions to increase learner motivation.

Other considerations for improving the game design include

- Provide collaboration opportunities. Although some of the missions were designed to instill feelings of relatedness (i.e., Network Collection and Ride a Bus), social interactions were minimal during game play. Participants were welcome to include co-workers in the game activity, but it is unknown if any participants did so. A team approach to the game activity would enable collaboration and open possibilities for team-based missions.
- Provide a chance to level up. The 30 missions in the game were available to the employees throughout the game. Graybill et al. (2013) recommended providing small doses of information to new employees over their 1st year. Therefore, the game could be designed with an adaptive release mechanism so that new missions become available after reaching certain milestones or goals. This would reinforce feelings of competence as goals are achieved and create a type of "level up" feel to the game, appealing to competitive individuals (Garris et al., 2002).
- Review the content. The majority of information presented through the activities was relevant to all employees. A review of the participation rates of each mission along with qualitative feedback may reveal where changes are needed. Furthermore, department- or job-specific missions could be added to provide individualized learning.
- Discover motivational appeal. The missions within the game were intended to be informational, which according to Ryan (1982) enhanced intrinsic motivation and therefore encouraged game play. However, controlling rewards, like points or gift cards, can undermine intrinsic motivation (Ryan, 1982). There was very little focus

placed on the leaderboard within the game and the only financial reward was an opportunity to win a gift card, but not a guarantee. Should this study be replicated, it is recommended that participants are given the opportunity to express why they played or did not participate in the game activity.

Conclusions

In conclusion, this study found that participants from both groups self-reported above average levels of satisfaction in the psychological needs of autonomy, competence, and relatedness. This indicates that most employees in this study received adequate support and felt socially connected to their peers during their initial adjustment period. As Gagné and Deci (2005) noted, such supportive work climates enhance employees' intrinsic and extrinsic motivations yielding high work outcomes.

Additionally, this study found that the majority of new employees who participated in the study have knowledge of fundamental institutional information, with 55% of participants scoring 80% or greater on the pretest and 73% of participants scoring 80% or greater on the posttest. However, this increase of knowledge cannot be attributed to one source as all participants, including the test group who interacted with the game-based activity, also engaged with coworkers, supervisors, and a broad array of campus media (email, intranet, internet, campus news, etc.) during the study. It is possible that, at the very least, a portion of the information was retained from HR's orientation sessions since the pretest occurred shortly afterwards. The literature reviewed on employee onboarding placed a high value on orientation training as it not only provides vital benefit information, but also welcomes new employees, making them feel accepted and a part of the organization (Graybill et al., 2013; Klein & Weaver, 2000; Krasman, 2015; Wanous & Reichers, 2000).

Implications

This research contributes to the literature on SDT, human resources, and game design. This research can further the understanding of employee motivation and engagement, recognizing the importance of meeting the psychological needs of autonomy, competence, and relatedness in new employee onboarding processes and in designing engaging game activities.

Human Resource Professionals

Data from the pre- and posttest can provide human resources with ideas of where employees lack knowledge. For instance, in this study, Human Resource's central location for all online learning was an area about which participants reported the least knowledge (20% answered correctly on pretest; 28% answered correctly on posttest). This may suggest that improvements in training and/or communication on this topic are needed. Teaching how to access information is just as important as teaching the information itself (Wallace, 2009). Conversely, questions in which 100% of participants answered correctly, like the color zone designated for faculty and staff parking, may demonstrate the effectiveness of the orientation training sessions.

Considering the younger generations joining the workforce, this research can impact assessments of formal orientation sessions and how they are conducted. Incoming young employees tend to expect a digital interface for much of their information (Kapp, 2017). Individuals who prefer less classroom, lecture-based training may benefit from an online or mobile game method of obtaining information. Almost half (43%) of participants in this current study were between the ages of 18 and 29 years indicating a high number of those under 30 were willing to interact with the digital learning activity.

Game Designers

Game designers may find this study useful as it is one of the few research studies on the implementation of a digital game in the employee onboarding process. The game activity for this study focused on individual play, yet team play may be better suited for helping new employees connect and explore the work environment (Perryer, 2016; Srimannarayana, 2016). Team play would also expand the opportunities for designing missions that require collaboration and teamwork to complete.

In addition to team play, creating more than one version of the game might be beneficial. This would enable players to choose a level of difficulty based on prior knowledge of the organization. Perhaps a version of the game with missions that only require answering questions that can be answered through a web search may appeal to workers who are unable to leave their office space.

When creating the missions for a game, consider persons with disabilities. Provide missions that are universally accessible or provide appropriate accommodations. Most of the missions in this study requiring physical exploration were written to allow the participant to be creative, which helped facilitate play for persons of disability. For instance, one of the missions ask the participants to take a photo "in front of" a particular building. Participants may have climbed to the top of the stairs to take the photo, or they could have been a distance away from it. Either way, they were still "in front of" the building.

Recommendations for Future Research

In mobile games, such as scavenger hunts, physical missions encourage exploration and embed a playful meaning, requiring the player to move around and venture into places he or she

would not normally go (de Souza e Silva & Hjorth, 2009). The addition of a pervasive game in the onboarding process opens opportunities for further research.

Human Resources Hosted Event

It would be interesting to explore the impact of a similar game activity hosted as an event by Human Resources. Such an event would need to obtain support from managers throughout the organization, as it would take extra time from the employee's normal duties. Wallace (2008) noted that companies often celebrate when people leave but neglect to celebrate when an employee joins an organization. Companies should be just as eager to say "welcome" as they are to say "thank you and farewell".

Participation in a gaming event, however, should be voluntary and not required or gameplay may be considered "mandatory fun" rather than actual fun (Mollick & Rothbard, 2014). In a gamified customer call center experiment, Armstrong et al. (2016) partially contributed their success to the fact that the game implemented was optional. Employees had a choice to play the game or continue performing their tasks as usual "without losing autonomy or feeling coerced" (Armstrong et al., 2016, p. 155).

Team Play

In the reviewed literature, all scavenger hunts studied included team play (Economou, 2015; Hartman & Stewart, 2003; Rogers et al., 2015; Segrist & Nordstrom, 2007; Talton et al., 2006; Wesp & Baumann, 2012; Zender et al., 2014). Perryer et al. (2016) noted that gaming elements "that encompass a social element are generally experienced by users as more enjoyable and engaging than 'single-player' elements" (p. 332). The game activity in this study had minimal support for the psychological need for relatedness. Sheldon and Filak (2008) determined that all three needs (autonomy, competence, and relatedness) are equally important and the lack

of support for any one of the three needs may lead to a decrease in intrinsic motivation. In team play, players encourage each other and accomplish missions together. Such activity can develop team skills, which are in high demand in the workplace (Segrist & Nordstrom, 2007). New connections made with team members can instill feelings of relatedness.

Qualitative Data Collection

A hosted game event may also provide an opportunity for debriefing and to gather qualitative data. Debriefing adds value to the experience and fosters learning from the experience (Slussareff, Braad, Wilkinson, & Strråât, 2016). Without qualitative feedback from participants, it is difficult to obtain individual insight into the game-activity. Games are complex and understanding why individuals play games is even more complex as there are a multitude of social, psychological, emotional, and physical factors involved (Lieberoth & Roepstorff, 2015). Focus groups and interviews are recommended methods of collecting data on user experiences that may offer insight into the game design (Emmerich, Bogacheva, Bockholt, & Wendel, 2016).

Participant Profile

This study focused on new staff employees only, and omitted student employees and faculty members. The study also included individuals who considered themselves as gamers and individuals very familiar with the campus. The study could be replicated using a more focused sample of participants. Landers, Bauer, Callan, and Armstrong (2015) noted that characteristics such as prior experience, age, and attitudes toward gaming can greatly influence the relationship between game elements and motivation. For instance, many faculty members come from either out of state or out of the country and are completely new to the campus. Also, faculty generally have more liberties regarding time and freedom to explore the campus. Recognizing that younger faculty members may be more technology savvy, many may be receptive to the game as a

learning tool. Such a study may provide better results when determining the amount of learning that occurred because of the game activity.

Game Design Elements

There are many calls for further research to look beyond the basic question of "are games good for learning" and instead concentrate on the effects of individual game elements (Slussareff et al., 2016). As scavenger hunts have been used as a learning tool for many years and in many applications (Oppermann & Slussareff, 2015), there is a need to understand what are the design elements of a scavenger hunt that make them effective educational tools and what type of tasks or missions best support intrinsic motivation and psychological need satisfaction.

Summary

This study contributes to the research on new employee orientation and onboarding processes, serious games, and SDT. Participants in both groups rated above average levels of satisfaction in the psychological needs of autonomy, competence, and relatedness regarding their experience with the new job. Satisfaction in all three needs indicates the organization as a whole is a good fit for their needs and they are more likely to become productive quickly and remain an employee.

When considering the overall data, providing a game activity as a part of the new employee onboarding process may not have produced significant results, but the activity did not produce negative results, either. A review of the literature on game-based learning and employee orientation suggest a game or game-like activity may still be an effective method of guiding employees as they explore their new work environment.

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APPENDIX A

DEMOGRAPHICS AND GAMER STATUS SURVEY

(ADMINISTERED ONLINE VIA QUALTRICS TO ALL PARTICIPANTS)

Please create a unique identifier as follows and enter it on all components of the project:
Use the last two digits of your campus ID # and the two digits of your birthday month (01-12) and your middle initial (if you have one) - _ _-_ _-_

Unique Identifier: _____

Demographic questions

1. Gender
   - Male
   - Female
   - Other
2. Please indicate your age range
   - 18-29
   - 30-45
   - 46-60
   - 61 and older
3. Job Status
   - Full-time Exempt (monthly-paid)
   - Full-time Non-Exempt (hourly)
4. How familiar are you with The University and its campus?
   - Not at all familiar
   - Slightly familiar
   - Somewhat familiar
   - Moderately familiar
   - Extremely familiar
5. Are you an alumnus of The University?
   - Yes
   - No
6. If yes to question 5, please check all levels of degree earned
   - Undergraduate
   - Graduate Masters
   - Doctoral

Game attitude questions

7. How often do you play games on your computer or smart phone?
   - Never
   - Once a month
   - Once a week
   - A few times a week
   - Once a day
   - A few times a day
   - Continuously throughout the day

8. When thinking about digital games, how would you describe yourself?
   - Non-gamer: I never games on the computer or mobile phone
   - Casual gamer: I sometimes play games on the computer or mobile phone
   - Hardcore gamer: I play games a lot on different devices

9. Which games do you play? Please tick all that apply.
   - Sports & Racing (examples; Golf, Soccer, Basketball, Rugby, Tennis, Need for Speed, Fearless Wheels, Fifa 2013, Madden 2013)
   - Brain & Puzzle (examples; Words with Friends, Draw Something, Bejeweled, Tetris, Cut the Rope, Sudoku, Crossword, Chess, Trivia)
   - Arcade & Action (examples; Angry Birds, Temple Run, Fruit Ninja, Plants vs Zombies, Pinball, Call of Duty)
   - Strategy, Simulation & Role Playing Games (examples; Sims, Minecraft, Simcity, Farmville, Mafia Wars, Civilization, Command & Conquer, Worms)
   - Cards & Casino (examples; Poker, Texas Hold'em, Bingo, Blackjack, Slot, Solitaire, Baccarat)

APPENDIX B

IRB APPROVAL LETTERS

February 4, 2019

Karen Burns

Re: IRB # 18-OR-375-A "The Integration of a Mobile Pervasive Game in the New Employee Onboarding Process"

Dear Ms. Burns:

The University Institutional Review Board has reviewed the revision to your previously approved expedited protocol. The board has approved the change in your protocol.

Please remember that your protocol will expire on October 3, 2019.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants.

Good luck with your research.

Sincerely,

Director & Research Compliance Officer

Office of the Vice President for
Research & Economic Development
Office for Research Compliance

October 5, 2018

Karen Burns

Re: IRB # 18-OR-375, "The Integration of a Mobile Pervasive Game in the New Employee Onboarding Process"

Dear Ms. Burns:

The University Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of written documentation of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on October 3, 2019. If your research will continue beyond this date, please complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure form.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

Director & Research Compliance Officer
Office for Research Compliance

APPENDIX C

PSYCHOLOGICAL NEED SATISFACTION AT WORK SCALE

The following questions concern your feelings about your job. Please indicate how true each of the following statement is for you given your experiences on this job. Your boss will never know how you responded to the questions. Please use the following scale in responding to the items.

1	2	3	4	5	6	7
not at all true			somewhat true			very true

Unique Identifier: _____
(The last two digits of your and the two digits of your birthday month (01-12) and your middle initial (if you have one) - _ _-_ _-_)

1. I feel I can make a lot of inputs to deciding how my job gets done.
2. I really like the people I interact with at work.
3. I do not feel competent when I am at work.
4. People at work tell me I am good at what I do.
5. I feel pressured at work.
6. I get along with people I come in contact with at work.
7. I pretty much keep to myself when I am at work.
8. I am free to express my ideas and opinions.
9. I consider the people I regularly interact with at work to be my friends.
10. I have been able to learn interesting new skills on my job.
11. When I am at work, I have to do what I am told.
12. Most days I feel a sense of accomplishment from working.
13. My feelings are taken into consideration at work.
14. On my job, I do not get much chance to show how capable I am.
15. People at work care about me.
16. There are not many people at work that I am close to.
17. I feel like I can pretty much be myself at work.
18. The people I work with do not seem to like me much.
19. When I am working, I often do not feel very capable.
20. There is not much opportunity for me to decide for myself how to go about my work.
21. People are generally pretty friendly towards me at work.

Scoring: Form three subscale scores by averaging item responses for each subscale after reverse scoring the items that are worded in the negative direction. Specifically, any item that has (R) after it in the code below should be reverse scored by subtracting the person's response from 8. The subscales are:

Autonomy: 1, 5(R), 8, 11(R), 13, 17, 20(R)
Competence: 3(R), 4, 10, 12, 14(R), 19(R)
Relatedness: 2, 6, 7(R), 9, 15, 16(R), 18(R), 21

Page Two of Psychological Need Satisfaction at Work Scale

This concludes all required components of the research project. I sincerely thank you for your time and contribution! Click on the link below if you would like to be entered into a drawing for a $100 Amazon gift card.
[Qualtrics link]

(Text on final Qualtrics survey)
Thank you again for your participation! Please answer just one last question…
Which is the most appropriate greeting on our campus?

1. [illegible]
2. [illegible]le
3. [illegible]
4. [illegible]

Hooray! You answered correctly.
Enter your email address for a chance to win the $100 Amazon gift card in the space below and click Submit. The drawing will be held no more than two weeks after all data has been collected.

Thank you, again!

APPENDIX D

PSYCHOLOGICAL NEED SATISFACTION IN GAME PLAY SURVEY

The following questions concern your feelings about the game activity. Please indicate how true each of the following statement is for you given your experiences with the activity. Please use the following scale in responding to the items.

1	2	3	4	5	6	7
not at all true			somewhat true			very true

Unique Identifier: _____
(The last two digits of your and the two digits of your birthday month (01-12) and your middle initial (if you have one) - _ _-_ _-_)

1. I experienced a lot of freedom in the game.
2. I am satisfied with my performance at this game.
3. I feel that I probably got more missions correct than most people would get.
4. I feel very capable and effective when playing.
5. I thought this game was a boring activity.
6. While I was playing this game, I was thinking about how much I enjoyed it.
7. I would be willing to do this again because it has some value to me.
8. I put a lot of effort into this.
9. I feel competent at the game.
10. The game provides me with interesting options and choices.
11. The game was fun to do.
12. I believe playing this game could be beneficial to me.
13. It was important to me to do well at this game.
14. I think this is an important game.
15. After working at this game for a while, I felt pretty competent.
16. I was able to achieve the goals of the game.
17. The game lets you do interesting things.
18. I did not try very hard to do well at this game activity.
19. My ability to play the game is well matched with the game's challenges.
20. I believe this game could be of some value to me.
21. I would describe this game as very fun.
22. I enjoyed playing the game very much.

Scoring: Form five subscale scores by averaging item responses for each subscale. Any item that has (R) after it in the code below should be reverse scored by subtracting the person's response from 8. The subscales are:

Autonomy: 1, 10, 17; Competence: 2, 3, 4, 9, 15, 16, 19; Effort/Importance: 8, 13, 18(R)
Interest/Enjoyment: 5(R), 6, 11, 21, 22; Value/Usefulness: 7, 12, 14, 20

The survey was constructed from the PENS scale, Intrinsic Motivation Inventory (Ryan & Deci, 2000), and Perceived Competence Scales (Ryan & Deci, n.d., http://selfdeterminationtheory.org/).

APPENDIX E

ORIENTATION KNOWLEDGE QUIZ (PRETEST AND POSTTEST)

Unique Identifier: _____
(The last two digits of your campus ID# and the two digits of your birthday month (01-12) and your middle initial (if you have one) - _ _-_ _-_)

As a new employee, it's important you have knowledge of the people, places, programs, policies and benefits that make The University a great place to work, learn and grow. Test your knowledge by answering the questions below. It's okay if you don't know all the answers. You're not expected to! It takes time to acclimate to a new working environment.

Instructions: The purpose of this quiz is to test your *current* knowledge. Please answer the following questions from memory. Do not look up the answers or confer with others. You will be given a chance to retake this quiz at a later time.

1. The university values its history. A timeline of important events is found at /history. What year did the university open its doors as the flagship higher education institution for the state?
    a. 1829
    b. 1831
    c. 1838
    d. 1910
2. buses are everywhere on campus; or so it seems. How can you find out which route will take you to your destination?
    a. Look at the bus map on their website
    b. Use the Rider app
    c. Ask a driver
    d. Ask someone at a campus bus stop
    e. All of the above
3. All faculty, staff, and students must have an card. What is the purpose of having a card?
    a. Building access
    b. Use it like a debit card
    c. Get discounts at the supply store
    d. All of the above
4. cards can be requested and a photo submitted online via the card website. However, each employee must pick up their own card. Where is the Card office located?
    a. Student Center
    b. Human Resources Office
    c. Campus Drive Parking Deck
    d. Student Services Center

5. Parking on campus requires a permit. However, having a permit doesn't mean you can park anywhere you'd like. Each lot is identified by color zones. What color zone is designated for faculty and staff parking?
    a. Blue
    b. Red
    c. Yellow
    d. Green
    e. All of the above
6. Lakeside Complex, Corner, and refer to:
    a. Dining locations
    b. Study locations
    c. Lesser known libraries
    d. Movies
    e. All of the above
7. If there is a campus-wide emergency, the university will notify all students, faculty, and staff through:
    a. Alerts
    b. The home page of the website
    c. Campus PA systems
    d. TV & Radio
    e. All of the above
8. In case of an emergency or suspicious activity on campus, you should contact The University of Police Department at:
    a. 5555
    b. 1234
    c. 5454
    d. -2424
9. All employees have access to learning opportunities and professional development. Which website provides links to ALL online learning portals provided by HR?
    a. Grow
    b. FireUpYourCareer
    c. Spark
    d. Skillstuff
10. Every employee is encouraged to have a general knowledge of the leadership team at . Can you name our current president?
    a. Dr.
    b. Dr.
    c. Chancellor
    d. Dr.

11. is one of the most beautiful campuses in the US. What program specifically encourages employees to get out of their offices and walk the campus?
    Wel
    b. Healthy
    c. Walking
    d. fit
    e. All of the above
12. Library is located:
    a. Near the School
    b. On the north edge of the largest quad
    c. On the north edge of Quad
    d. On the first floor of Hall
13. is often referred to as "The Education". What does the term capstone mean?
    a. The
    b. The strongest
    c. The at a university or college
    d. The highest level at a university or college
14. What are some of the things you can do through Banner Self Service?
    a. Check my Leave balance
    b. View last year's W-2s
    c. View a previous pay stub
    d. Sign up for weather alerts
    e. All of the above
15. has five (5) core Competencies. The following statement describes which one? "Employees are expected to demonstrate behaviors in a way consistent with the University's values and principles. Individuals should work hard, exhibit integrity in all dealings, honor commitments, and show respect for others at all times."
    a. Adaptability/Flexibility
    b. Collaboration/Building Relationships
    c. Ethics/Integrity
    d. Self-Development
    e. Student/Customer Focused
16. During the War, troops burned all but seven buildings. What building still serves in its original capacity?
    a. The President's
    b. House
    c. The Observatory
    d. The dhouse

17. football team is now called the . What was it originally called in 18 ?
    a. The
    b. The Line

    e. All of the above
18. How many students were enrolled at Fall 2017?
    a. Between 20,000 and 20,999
    b. Between 30,000 and 30,999
    c. Between 40,000 and 40,999
    d. Greater than 50,000
19. Our Mission statement is: The University will advance the intellectual and social condition of the people of the state, the nation and the world through the creation, translation and dissemination of knowledge with an emphasis on quality programs in the areas of …
    a. Teaching, learning, and research
    b. Service to the campus, community, and world
    c. Research, service, and outreach
    d. Teaching, research and service
20. All employees are expected to:
    a. Treat others with respect at all times, regardless of differences in racial, ethnic, sexual orientation and cultural backgrounds, national origins, religious and political beliefs, ages, and physical abilities.
    b. Complete required compliance training within 30 days of notification
    c. Report any incidence of unethical conduct observed on campus
    d. Follow confidentiality and security guidelines as stated in the Employee Handbook
    e. All of the above

HR Orientation Session Categories and Pre-Test Question Correlation

Orientation Session Categories	Pre-Test questions
Tradition	**1, 13, 16, 17, 19**
Mission, History, Goals and Strategic Plan	
Campus Community	**10, 12, 18**
Leadership Team and Campus Community	
Employee Engagement	**2, 6, 7, 8, 11**
Information Services, Campus Resources, Safety and Well-Being	
Employee Success	**9, 15, 20**
Human Resources Team and Services, Employment Expectations and Requirements, Professional Development Resources	
Onboarding Next Steps	**3, 4, 5, 14**
Benefits Enrollment, Access to Systems and Services, Compliance Requirements	

APPENDIX F

THE GAME ENVIRONMENT

Game Administrator Platform

The administrator platform is accessed by a web browser only and not within the game app. The game location is at http://goosechase.com. Once the administrator creates and account and logs in, a game can be created using the main dashboard (see Figure 7), referred to by GooseChase as the Game Manager. This section provides a brief explanation of each screen within the game manager.

The Setup section appears at the top left of the game manager. Starting with the Game Info tab, the game administrator may add an image, game name, description, and location. For privacy, the game may also be password protected which will restrict gameplay by uninvited participants.

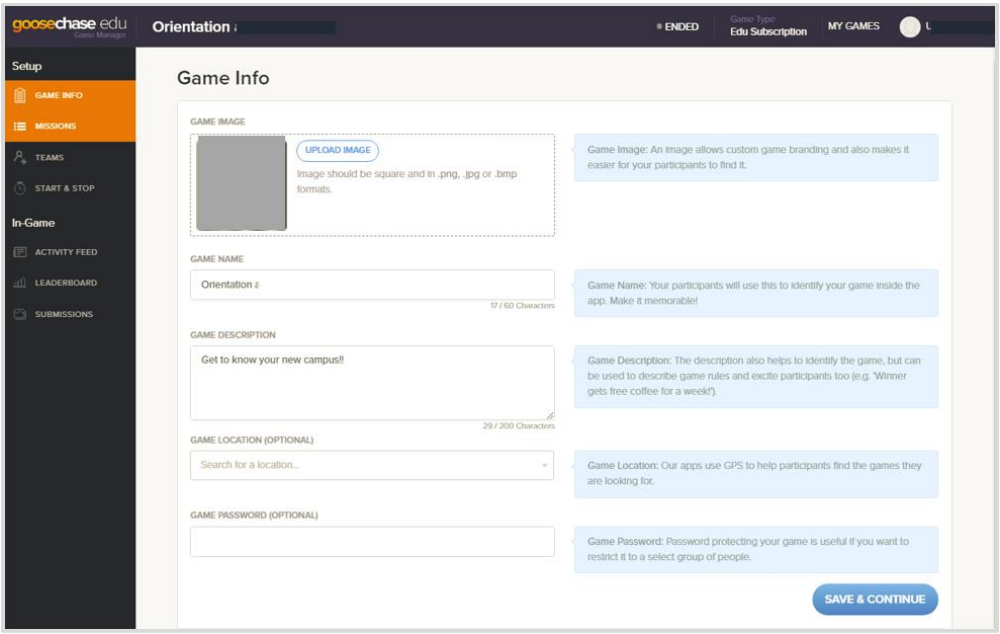

Figure 7. Administration panel, game information.

The Missions tab (Figure 8) is where new missions are created and previously created missions are displayed. There are three mission types: Photo/video, text, or GPS. A detailed explanation of each type is given in the section “The Game App” in this appendix. Missions may contain images or hyperlinks but all are awarded a point value.

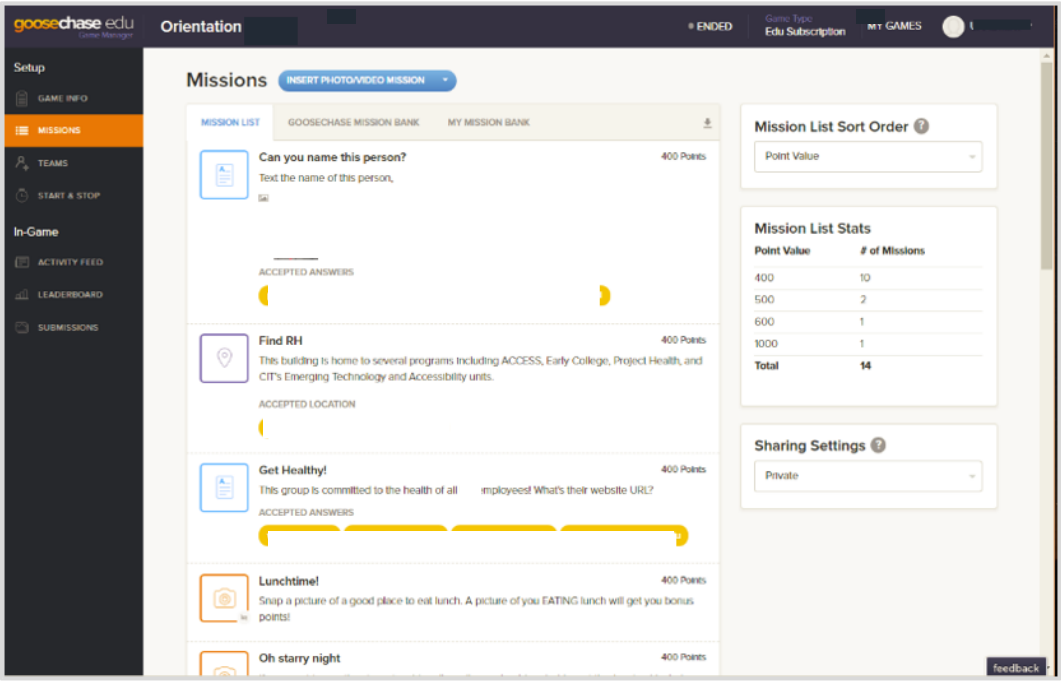

Figure 8. Administration panel, missions list.

The Teams tab (Figure 9) allows the game administrator to add participants individually or in teams. The game for this study will be played individually. Participants will sign up for the game on their own.

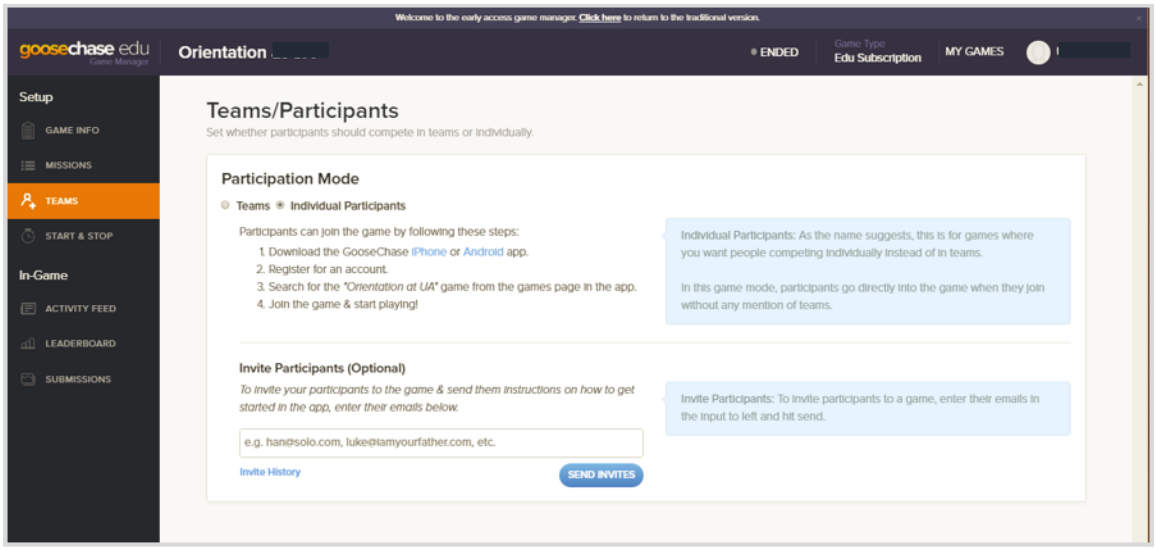

Figure 9. Administration panel, teams/participant screen.

Instructions for downloading, registering, and joining the game will be included with the initial email sent to the test group. The game will have a password. This protects the anonymity of the participants by allow them to create an account using any email and username they wish.

The Start & Stop tab (Figure 10) allows the game administrator to set the start and stop time for a game. Games can be scheduled in advance and participants can pre-register, however, the missions will not appear until the game begins.

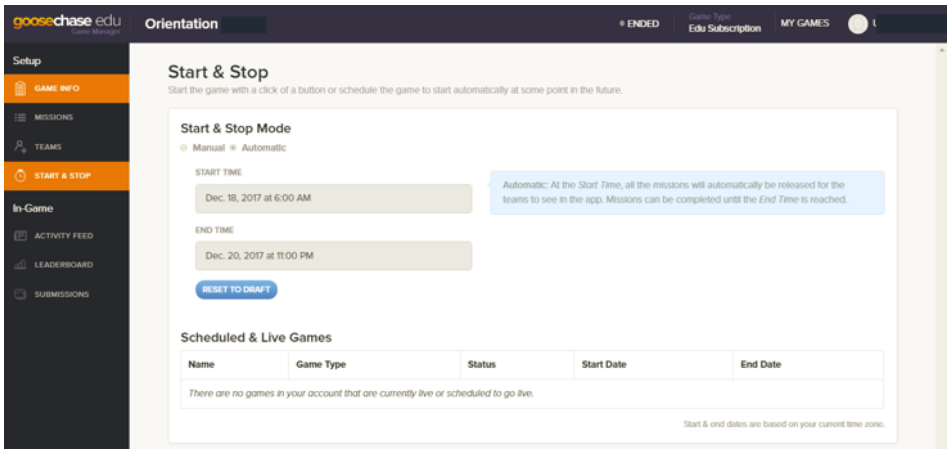

Figure 10. Administration start & stop screen.

The "In Game" section provides an activity feed, leaderboard, and submission tracking utilized by the administrator to monitor player's progress once a game begins.

The Activity Feed displays the activity (submissions and comments) of all players.

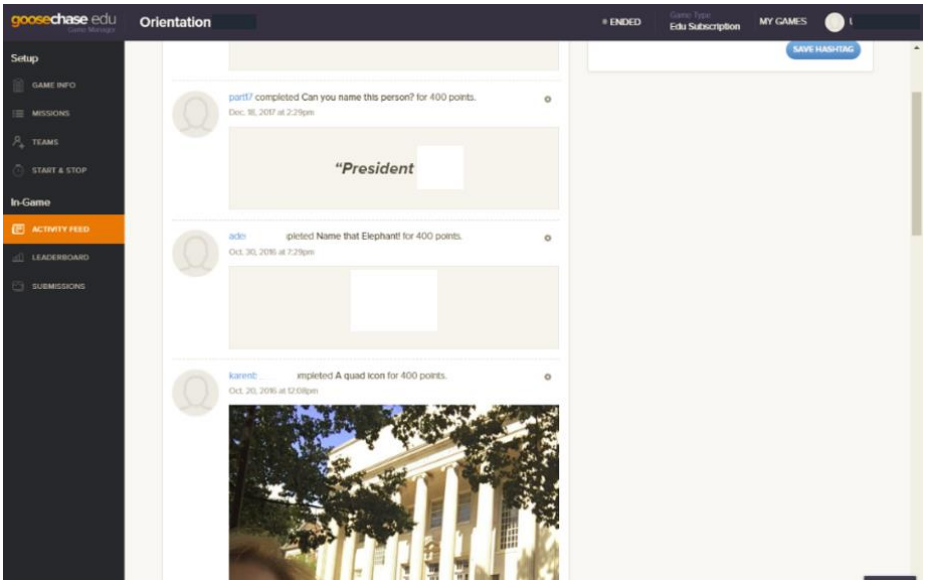

Figure 11. Administration activity feed screen.

The Leaderboard (Figure 12) displays all players sorted by highest score first. The game administrator may send messages, adjust scores, and remove individuals (aka teams), as well.

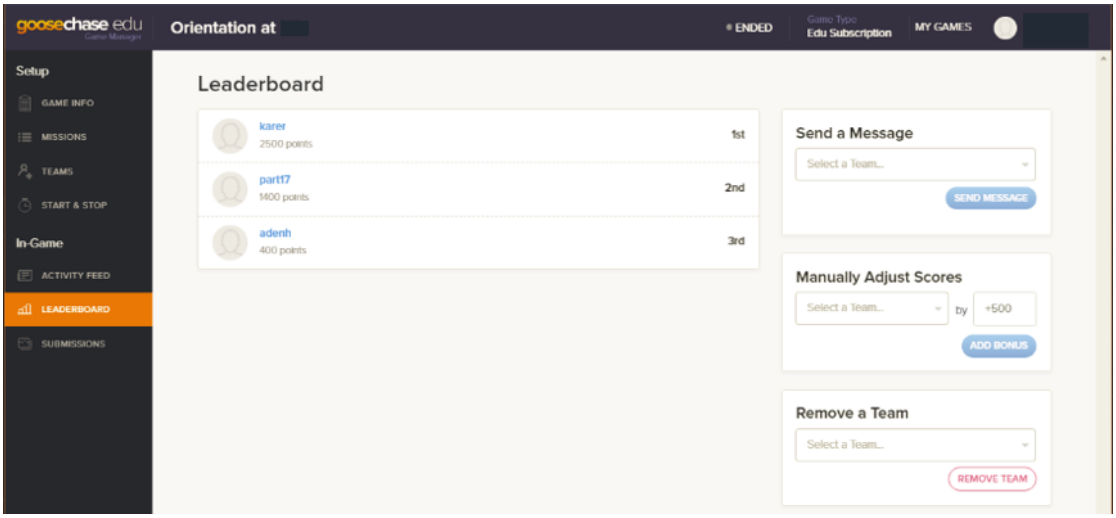

Figure 12. Leaderboard example.

Submissions (Figure 13) displays the game submissions grouped either by missions or individuals. This allows the game administrator to compare answers to the same question among players.

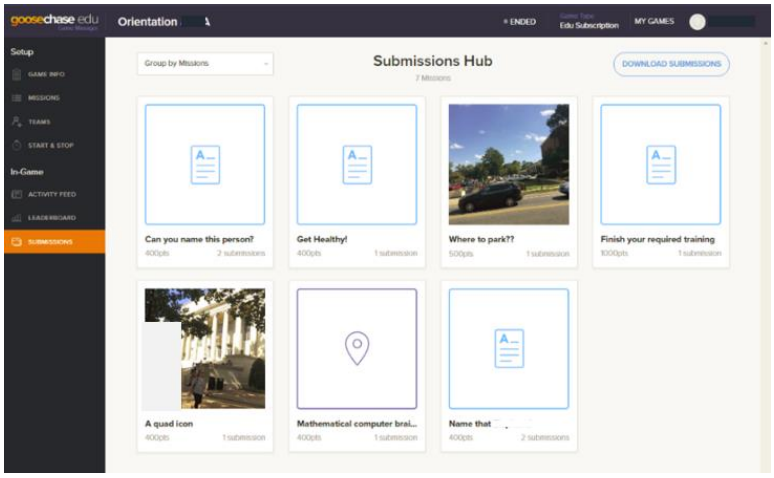

Figure 13. Example of the submissions hub.

The Game App

The game, as previously explained, is played on a mobile smart phone via the GooseChase app available from the iPhone or Android app stores. Once the game is downloaded (Figure 14), the player creates an account using their unique identifier as the Username and an email address of their choosing (Figure 15), searches for the game "Orientation" (Figure 16 and Figure 17), and joins the game (Figure 18).

Figure 14. Introduction screen to GooseChase app.

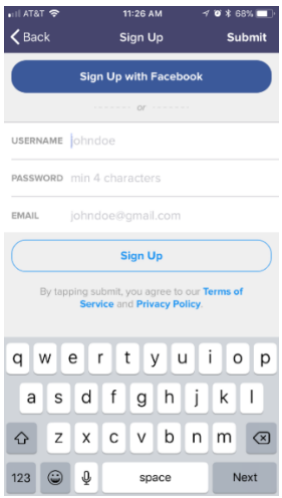

Figure 15. Sign up screen in GooseChase app.

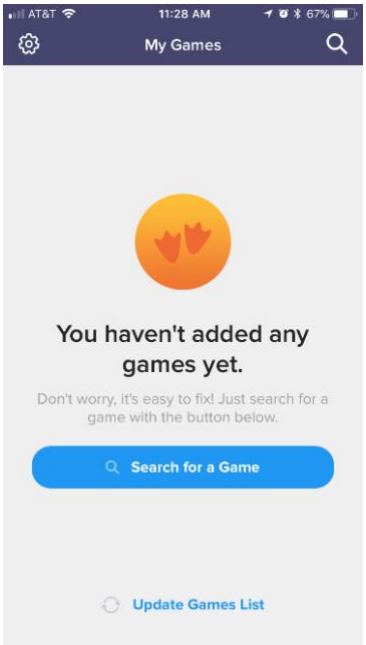

Figure 16. My Games screen.

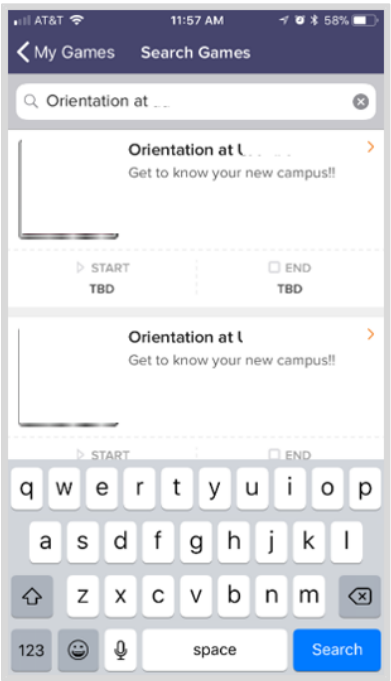

Figure 17. Search Games screen.

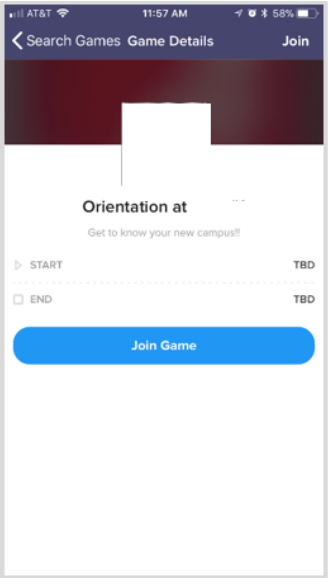

Figure 18. Initial screen of Orientation game.

Once a participant has joined the game, the mobile game utilizes five main screens: Missions, Feed, Rankings, Notifications, and My Activity. A representation of each screen is shown in the next section along with a brief description.

Missions

The Missions screen provides a list of all the missions to be completed. To complete a mission, select it and follow the instructions provided. Once a mission is completed and submitted, the mission moves to the “Completed” tab.

There are three mission types: Photo/video, text, or GPS. Figure 19 is an example of a photo mission. Following the missions instructions, the player takes a photo, submits the photo, and points are awarded automatically.

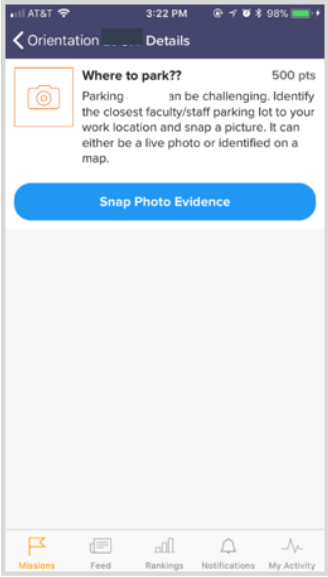

Figure 19. Example of a photo mission.

However, the game administrator may review the photo submission and either award additional points for extra creativity or reduce points for incorrect answers. For example, if the mission is to take a photo of the main library in the center of campus but the player takes a picture of different library instead, points should be deducted.

Text-based missions have the potential to be answered without physically moving to a specific location. In a text-based mission, the player reads the mission and enters the answer directly in the game app. If correct, the game awards the designated points. If incorrect, the player is informed and allowed to try again. Text questions can include photos and hyperlinks. Figure 20 illustrates a short answer mission.

Figure 20. Example of a short answer mission.

A GPS mission, as illustrated in Figure 21, demonstrates the ability to locate and check-in at a specific location via GPS coordinates. The player identifies and moves to the location, clicks the blue “Acquire GPS Location” button, and, if correct, the game accepts the coordinates and awards the designated points. If incorrect, the player is informed and allowed to try again.

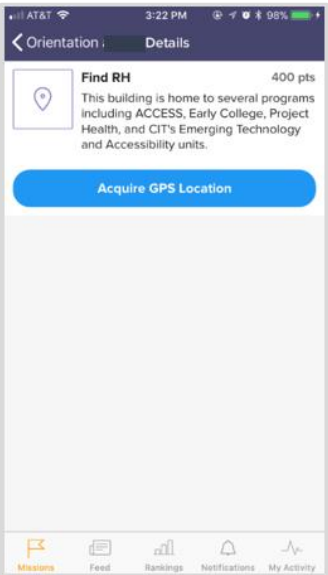

Figure 21. Example of a GPS mission.

Feed

The “Feed” tab (Figure 22) displays the missions completed by all players of the game.

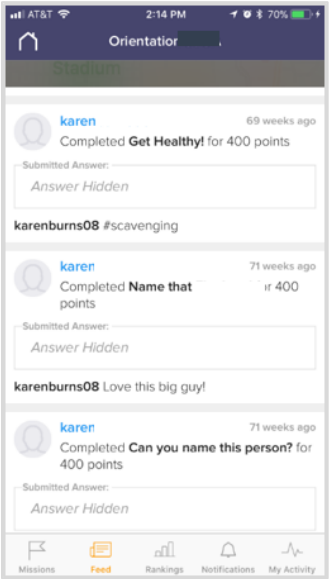

Figure 22. Example of the Feed screen.

Rankings

In the “Rankings” screen (Figure 23) players can view how they are doing compared to other players.

Figure 23. Example of the Rankings screen.

Notifications

The “Notifications” tab (Figure 24) displays announcements sent out by the game administrator.

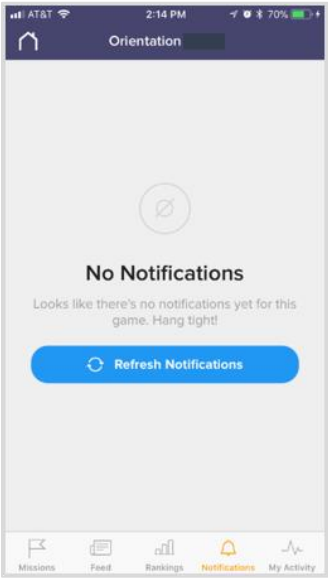

Figure 24. Example of the Notifications screen.

My Activity

The My Activity screen (Figure 25) displays all the missions a player has completed.

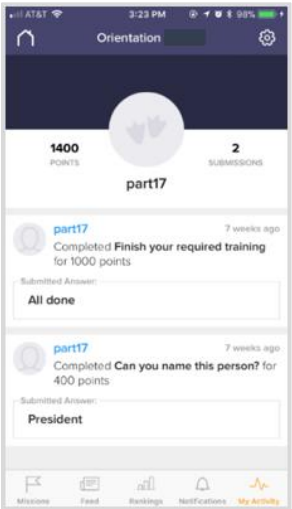

Figure 25. Example of the My Activity screen.

Game Settings within the App

From the Accounts Detail section of the Settings tab (Figure 26), players can upload a profile photo, change the username and email address. However, since players will be assigned a username/number, they will be asked not to change it during the game and asked NOT to upload a photo. From the Settings tab, players may also customize their notifications settings (Figure 27) and if photo and video submissions are saved and shared. By default, social media is not enabled when the game begins (Figure 28). Participants will be asked NOT to share submissions on social media platforms.

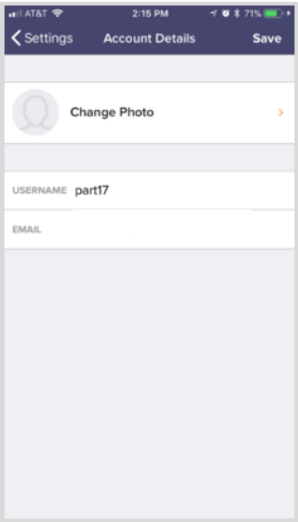

Figure 26. Example of the Account Details screen.

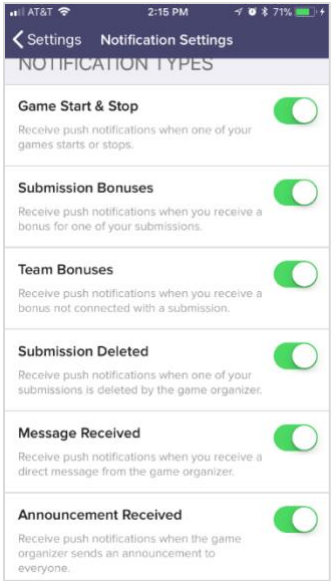

Figure 27. Example of the Notifications Settings screen.

Figure 28. Example of the Submission Settings screen.

APPENDIX G

DIGITAL SCAVENGER HUNT COMPARISON

Scavenger Hunt Comparisons

What's the difference in a Scavenger hunt and a Treasure hunt? A scavenger hunt is a hunt to find a list of items or do a list of activities. A treasure hunt is a list of clues that lead to a treasure.

Name	Website	OS	Location	Missions	Positives and Negatives	Cost
Actionbound	http://actionbound.com	iOS, Android, updated 4/2017	Berlin	Can be treasure hunt or scavenger hunt. QR barcodes, quiz, sort order, and photos.	Dealing with an out-of-country vendor may be difficult.	Approx $500 for a year license and up to 50 players at a time.
Reviews and more; https://statterm.io/@sk799/PW7LEJP6Ws						
Eventzee	http://eventzeeapp.com	iOS, Android, updated 1/2017	Texas	Photo and qr codes only. No quizzing.	Nothing is free. Players must create an account with the app.	$400 for a short-term event hunt. Free to players
GooseChase	http://goosechase.com	iOS, Android, updated 5/2017	Ontario	Quiz, leaderboard, text, photos, gps. Begin and end times. By invitation.	Each player must create an account before locating the game in the app.	Free and paid options. Free up to 5 teams (25 people), unlimited missions.
Reviews and more: http://www.adventuresinedtech.com/2014/09/17/goosechase-scavenger-hunt-review-and-thoughts/						
Huntzz	http://huntzz.com	iOS, Android, updated 10/2016	UK	Hunts contain 10-20 clues, chests have a cryptic clue, interesting scroll (guide entry) and a map with location title. No photo submissions, just find the treasure and move to the next clue. Good for an informative tour.	Dealing with an out of country vendor may be difficult.	Some paid, some free options
Klikaklu	http://klikaklu.com	iOS only, updated 3/2017	Washington	GPS dependent, then scan recognition, but this can be turned off. Hunts can be private or public. Can print poster with QR code to enter game. Can use qr codes, quizes, hints, maps, tasks, matching images, and more.	Negatives: No computer interface; mobile only. iOS only. Positives: Easy to setup and play. Does not require internet except at the beginning and end of game. EXCEPT if using GPS for clues	Free for up to 2 players. Other pricing varies but is inexpensive. $4.99 per hunt for 30 players and 50 clues.
More info and reviews: https://www.geekwire.com/2013/reinventing-scavenger-hunt-app-brings-hightech-twist-fun-family-game/ https://www.commonsense.org/education/app/klikaklu-player-scavenger-and-treasure-hunts-teacher-review/4124486. http://www.ipadeducators.com/review-klikaklu						
Scavify	http://scavify.com	iOS, Android, updated 3/2017	Washington,DC area	Leaderboard, analytics, qr codes, quiz, photos, gps		Paid only. Pricing not on website.
Learn More: http://www.quiltedaffair.com/blog/scavify-scavenger-hunt-app https://iq.intel.com/tech-based-scavenger-hunts-let-you-build-your-own-adventure/						
SeeknSpot	http://seeknspot.tromlabs.com	iOS, Android, updated 4/2017	Singapore	text, photos, QR, GPS, Voice, chat, quiz tool, match, order items, find beacon	Negatives: Has an ad at bottom of app and at end of game. Dealing with out-of-country vendor may be difficult. Positives: Provide online tutorials for creating a game.	Free to some
Social Scavenger	http://www.socialscavenger.com	iOS, Android, updated 11/2016	Virginia	stickers, photos, trivia, text, qr codes, gps.		$499 per campaign but education license may be negotiated. Nothing is free.
StrayBoots	http://strayboots.com	iOS, Android	New York	text, photos, leaderboard, chat, interactive map	The company builds the hunt for you. You cannot create your own.	Prices range from $650 (8-15 players) to $40 per person.
Learn more: https://www.yelp.com/biz/strayboots-new-york http://fortheloveofwanderlust.com/exploring-nashvilles-downtown-through-a-strayboots-competitive-scavenger-hunt/						

Klikaklu, Scavify, GooseChase, and StrayBoots review: https://iq.intel.com/tech-based-scavenger-hunts-let-you-build-your-own-adventure/

Other national scavenger hunts that reflect the current popularity: gishwhes.com is the largest, most epic scavenger hunt ever created. Teams work together, from home or in public, to create crazy art, commit acts of kindness, and attempt fun challenges. Thousands of people from over 100 countries play every year!

On Twitter - search for Scavenger Hunt and look at all the ways hunts are being used around the country. You'll find more people who love them than who hate them.

#exploreHB - used instagram/Twitter to conduct the hunt. No other app was needed.

APPENDIX H

EXPERT REVIEW PANEL

The following expert panel reviewed the game (the names have been changed):

Dr. Don Adams, Assistant Professor, Educational Leadership, Policy, and Technology Studies at a university. Expertise in game-based learning, game design, and instructional design.

Dr. Mike Rogers, Instructional Technology Specialist. Expertise in game-based learning, game design and instructional design.

Dr. Maggie Vicks, Director of Teaching for Learning Center and co-author of a game-based learning book). Expertise in game-design and instructional design.

Nancy Luke, eLearning and LMS Administrator. Expertise in HR Learning and Development, New Employee Orientation.

APPENDIX I

DIGITAL SCAVENGER HUNT GAME DETAILS

Onboarding Digital Scavenger Hunt - Orientation at UA

HR Categories	Pre- Post-Test question coorelation	Mission Name	Image or link shown on screen	Description	Points	Answer	Question Type	Type of search	Control Group Info
Campus Community	12	A quad icon	[redacted] Library	Take a picture of yourself in front of this iconic building! It doesn't have to be your face. A hand or big toe will do.	500	[redacted] Library	Photo	physical hunt	[redacted] Interactive Campus Map [redacted]
Employee Engagement	11	Can you help me with...?	[redacted]	The Office of Health Promotion & Wellness works to create and maintain a culture of health and wellbeing for [redacted] faculty and staff. On their website [redacted], is a long list of tip sheets. Click on one that you find interesting and take a screenshot.	500	any tipsheet from [redacted]	Photo	websearch - [redacted]	http:/[redacted]/facultystaff
Campus Community	none	Circle the [redacted]		Take a picture of something you find interesting at [redacted]. Make sure we can tell you are physically AT [redacted].	500	[redacted]	Photo	physical hunt	[redacted] Interactive Campus Map http[redacted]
Employee Engagement	none	Climb, walk, run, lift, swim, or dance		Up for some exercise? [redacted] has got you covered with at least three major facilities available to all faculty, staff, and students. Visit one of the locations and snap a photo of your activity of choice. Bonus points if you are performing the activity in the photo!	500	Rec center, presential center, aquatics center	Photo	physical hunt	http:/[redacted]/facultystaff
[redacted] Tradition	18	Did you know....?		[redacted] is the largest employer in [redacted]. According to the 2017 factbook, what was [redacted] total number of employees (hint: Employment Summary by Job Group)	400	6,944; 6944	Text	websearch - [redacted] FactBook	http:/[redacted]
Campus Community	none	Find the fountain		Take a picture of yourself in front of the fountain in the Engineering [redacted]	600	[redacted] quad fountain	Photo	physical hunt	[redacted] Interactive Campus Map http[redacted]
Onboarding Next Steps	20	Finish your required training		All employees are required to complete training for Child Protection Policy, Harassment Prevention, and Hazardous Communication. When you have finished all three, text ALL DONE.	400	'all done'	Text	n/a	http:/[redacted]/facultystaff
Employee Engagement	11	Get Healthy!		This group is committed to the health and wellbeing of all [redacted] employees! Be on the watch for frequent program offerings. Their website will keep you in the know. What's their website URL?	400	(leave open to review answers individually)	Text	websearch	http:/[redacted]/facultystaff
Campus Community	6	Getting hungry?	http:/[redacted]/locations	A [redacted] Dining location is just a hop, skip, and a jump near you! Snap a photo (including the name) of a location close to you.	500	Any of the [redacted] dining areas	Photo	physical hunt	[redacted] Interactive Campus Map http[redacted]
[redacted] Tradition	1	Growth spurts		On [redacted] 2, [redacted] had 52 students enrolled. What year did the Medical College move from [redacted] to [redacted] increasing enrollment to over 2,000? (hint: search the [redacted] web for "timeline")	400	1920 or 1921	Text	websearch - [redacted] / history timeline	http[redacted]/facultystaff
[redacted] Tradition	none	History 101		Locate a historical monument on campus. Take a photo or video re-enacting a moment in history with this monument. Extra points if you recruit other people to join in.	500	Open	Photo	physical hunt	[redacted] Interactive Campus Map http[redacted]map
Employee Engagement	none	Iron and Steel		In [redacted], a very large, heavy, and "tired" sculpture of metal made [redacted] it's home. Can you find it?	600	[redacted]	GPS	physical hunt	[redacted] Interactive Campus Map http:/[redacted]/map
Employee Success	11	It's all about balance		[redacted] wants to help you balance work and family life. Enter the website URL that provides information about the programs and resources offered.	400	http://h[redacted]work-life-[redacted]	Text	websearch	http:/[redacted]/facultystaff
Campus Community	18	Just the facts		[redacted] is a big place. The Office of Institutional Research and Assessment keeps up with a lot of numbers to help our leaders make decisions. What's the name of the "book" that contains all standard information about the institution?	400	Factbook	Text	websearch - [redacted] FactBook	http:/[redacted]u/
Employee Success	9	Learning is for everyone!	Link to http://hrspar[redacted]	You visited Human Resources Learning & Development office for training, but not all professional development training occurs in a classroom. Name one other website (full URL) sponsored by HR that provides online training.	400	(leave open to review answers individually)	Text	websearch	http:/[redacted]/facultystaff

HR Categories	Pre- Post-Test question coorelation	Mission Name	Image or link shown on screen	Description	Points	Answer	Question Type	Type of search	Control Group Info
Campus Community	6	Lunchtime!	[redacted]	[redacted] has over 16 restaurants on campus, not counting the food trucks. Snap a picture of a good place to eat lunch. A picture of you EATING lunch will get you bonus points!	500	anywhere	Photo	physical hunt	[redacted] Interactive Campus Map http:/[redacted]map
[redacted] Tradition	none	Name that [redacted]!	Photo of [redacted]	If you are a [redacted] fan, then you recognize our beloved mascot. Can you name him?	400	[redacted]	Text	n/a	http://[redacted]
Campus Community	none	Network collection		Collect at least 5 unique business cards. Submit a photo of them laid out creatively. The MOST creative submissions gets 20 bonus points.	500	Any 5 cards	Photo	physical hunt	Encouraged to network with colleagues in initial email
Campus Community	none	Oh starry night	http://astron [redacted] edu/ public-events	If you want to see the stars at night really well, you should probably visit this location! Public viewing nights are offered once a month. Snap a photo of the location and include the building name in the caption.	500	[redacted]	Photo	physical hunt	[redacted] Interactive Campus Map http:/[redacted]/map
Campus Community	12	Oldest Book		Books have been how humanity has recorded its existence. Find and submit a picture of a book from before 1900. Bonus points if the photo also contains the name of the library or museum where you found it!	500	Could be multiple place - library, museum, etc.	Photo	physical hunt	http://li[redacted]
Employee Engagement	2	Ride a bus	[redacted] bus	Buses are everywhere on campus! Hop on a bus and snap a picture of the driver. Ask permission first, of course! Bonus points if you are in the photo, too.	500	Bus	Photo	physical hunt	http:/[redacted]
Employee Success	9	Room for Growth		On the main page of their website, this group states that they "positively influence the campus Community by motivating, encouraging, and enabling others to grow". What is the name of the group?	400	HR Learning and Development', 'Learning and Development'	Text	websearch	http:/[redacted]acultystaff
Onboarding Next Steps	none	Safe and secure on the go		If you want to access [redacted] from a mobile device, you gotta get DUO! Visit the webpage where you can learn more about DUO and watch the video on the main page. Who is the star actor in the video?	400	[redacted]	Text	websearch - [redacted] ervice/duo	http[redacted]facultystaff
Onboarding Next Steps	3	Smile for the camera!		Did you know your smiling face can open doors and get you cash discounts? Better hurry and pick up your [redacted] card! You'll find the [redacted] card office under a bunch of cars.	600	[redacted] Drive Parking Deck	GPS	physical hunt	http[redacted]/facultystaff
Employee Engagement	8	Something blue	Blue emergency phone	Snap a picture of a blue emergency phone near you!	500	Blue emergency phone	Photo	physical hunt	http://ready[redacted] http://polic[redacted]
Campus Community	none	Ta-Daaaa!		[redacted] has an abundance of talented faculty and students. Locate the largest theatre on campus.	600	[redacted]	GPS	physical hunt	[redacted] Interactive Campus Map http:/[redacted]map
Onboarding Next Steps	none	Think like a mathematical computer brain		Home to Office of Information Technology (OIT), Math, and Psychology, the nice staff at the HelpDesk can get your set up with wifi and DUO.	600	[redacted]	GPS	physical hunt	http:/[redacted]facultystaff
[redacted] Tradition	16	Through the looking glass	https://www [redacted] /abo ut/history	This old structure, also known as the [redacted], only allows visitors to peer through the windows. Locate it and text the official name.	400	[redacted]	Text	websearch - [redacted] history timeline	http:/[redacted]/facultystaff
Employee Engagement	none	Tick-Tock		This tower represents a time of critical change at [redacted] Visit and walk in the footsteps of courageous students of the past.	600	[redacted]	GPS	physical hunt	[redacted] Interactive Campus Map http://[redacted]/map
Onboarding Next Steps	5	Where to park??		Parking at [redacted] can be challenging. Identify the closest faculty/staff parking lot to your work location and snap a picture. It can either be a live photo or up can circle a the spot on a map.	500	Faculty/Staff parking sign	Photo	physical hunt	http:/[redacted]facultystaff

APPENDIX J

RESEARCH PROJECT ANNOUNCEMENT

Invitation to Participate in a Research Project:
The Integration of a Mobile Pervasive Game in the New Employee Onboarding Process

Would you like to help a graduate student & learn more about the university at the same time?
I am looking for 50 people to participate in my research study. Participants will have the opportunity to

- explore the university through a mobile game activity (scavenger hunt) OR
- explore the university through websites designated for new employees.

Full details of the study will be provided *before* you commit to participation, but here are just the facts in a nutshell!

How long will it take?
The research activities will take no more than four to five hours spread out over a three to four week period.

Do I get any benefit from participating?
As an incentive to complete all components of the research project, participants who do so will have the opportunity to be entered into a drawing for a **$100 Amazon gift card**.

If I don't receive the $100 Amazon gift card, how else can I benefit?
I cannot guarantee results for all participants, but the goals of this study are to:

- reinforce information provided to you during the face-to-face orientation sessions,
- introduce new information,
- encourage new personal connections, and
- reduce stress

Furthermore, your participation will benefit future employees of The University. The findings may be useful to the Human Resources department for making improvements and modifications to the current new employee onboarding process.

Will my responses remain anonymous and be protected?
YES. Your email address will be used for tracking completion of the research components only. The identification of participants will be removed once all components are completed and will NOT be revealed or discussed in the final reports. The data will be password protected by me, the researcher, and made only available to my academic advisors as needed. The identification of participants will not be shared with anyone.

If you would like to be considered for participation in this study, please check all applicable statements on the next page and provide your name and email address. I will be in contact with you to provide further details. Questions about this study can be directed to me or you may contact my advisors.

Thank you, in advance, for your time and participation!!

Karen A. Burns, PhD Candidate, Instructional Leadership and Technology, College of Education,

Request to Participate in the Research Study -

The Integration of a Mobile Pervasive Game in the New Employee Onboarding Process

You *do not* have to check all statements to be eligible. Please leave this sheet with Training and Development personnel.

- ☐ I am a new, full-time employee (not a former employee).
- ☐ I have access (or will have access) to a computer with internet service and am willing to use it for this research project.
- ☐ I am willing to complete between three and five online questionnaires relating to the university and my orientation process (no more than 22 questions per questionnaire).
- ☐ I own or have access to an iPhone or Android smart phone with a data package (although the university's Wi-Fi may be sufficient) and am willing to use it during game-play.
- ☐ I am willing and able to physically explore the campus.
- ☐ Should my supervisor not allow me time to participate in the study during work hours, I am willing to participate in the study outside of work hours.

_____ _____

Name (Print please) Email address (work email preferred)

APPENDIX K

INSTRUMENT COMPLETION TRACKING SHEET

Below is a partial example of a method for tracking the participants' progress and completion of the various components of the study. The researcher maintained a record of all instruments to be completed, the date of completion, and any email correspondence to each participant in an Excel file, securely kept in a password protected folder online through the research site's licensed Box cloud storage service.

Participant Data Tracking Sheet

			Phase I		Phase II		Phase III		END
Part. Email	Part ID	Group	Demographics & pre-test sent	Demographic & Pre-test recvd	Official game or non-game start	Participant actual date of game start	Post-test/work/game survey sent	post-test/work/game survey recvd	Entered drawing

APPENDIX L

EMAIL TO TEST GROUP

Dear Participant,

Thank you for the time and effort in completing Phase I of this research project. Now the fun begins! In this second phase of the project, you are being asked to interact with a digital game activity. The purpose of this activity is to reinforce the information covered in the HR Orientation sessions and introduce additional information pertinent to new employees through "missions" that encourage campus exploration. The researcher hopes you will find the game to be a fun and exciting way to learn and that you will perhaps meet some new colleagues in the process.

The game is designed for individual play, however, you are welcome to grab a colleague to join you on any or all of the missions.

Get started by following these steps:

1. **Download the game app** from iOS or Android
2. **Create an account.** You may use an email of your choice (personal or professional). For the purpose of this study and to protect your anonymity, please use your unique identifier as your username. As a reminder, your unique identifier was created by using the last two digits of your [illegible] and the two digits of your birthday month (01-12) and your middle initial (if you have one) - _ _-_ _-_.
3. **Search for and open the game titled "Orientation at The University"**. Enter the password "hunt" when prompted.

If you wish to maintain anonymity, use the following guidelines in the Settings section of the app:

- Under the Account Details section, **DO NOT upload a photo.**
- Under the Submission Settings, the ability to share your game on Facebook and Twitter is turned off by default. **Leave these settings OFF.**

Your hunt will begin on [INSERT BEGIN DATE] and end on [INSERT END DATE]. That is a total of 12 days to interact with and complete the game. Once the game has ended, you will receive a link to the third and final phase of the research project. If you have any questions or need assistance, please contact the researcher by email.

Thank you,

APPENDIX M

EMAIL TO CONTROL GROUP

Dear Participant,

Thank you for the time and effort in completing Phase I of this research project. In this second phase of the project, you are being asked to continue discovering and learning your new work environment in a manner that works best for you; talk with colleagues, take a walk across campus, or dig into the online resources provided here. It's up to you. Your supervisor may provide additional information specific to your department and role.

- Onboarding Guide for New Employees - http:// -resources/new-employee/onboarding-guide-for-new-employees -
  This webpage is designed specifically for new employees.

- The Faculty & Staff page - https:// acultystaff -
  This is a large website containing information regarding services, governance, professional development, news and events, and web help. While you may not need to know everything here right away, but it's definitely a source you want to bookmark for future use.

- Additional items of interest include:
  - Bus access and routes – http://
  - Libraries – http:/ edu
  - com – http://
  - Office of Institutional Research – http://oira

On [Enter Phase III start date], you will receive a link to the third and final phase of the research project. I know your time is very valuable and I greatly appreciate your willingness to participate! If you have any questions or need assistance, please contact the researcher by email.