Gamified Training to Engage Healthcare Employees

By

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A Directed Scholarly Project Submitted to the
Department of Nursing
in the Graduate School of
Brandley University in
partial fulfillment of
the requirements for the
Degree of Doctor of Nursing Practice

Peoria, Illinois

2018

Abstract

As innovation and technology in healthcare advances, it is important that education and training for healthcare providers also advance. Innovations in gaming, virtual and augmented reality, and real-time immersion offer exciting platforms for clinicians to engage in their continuing education. Gaming is often referenced as a new and innovative modality to train and educate, however, there is limited research available that identifies that healthcare providers actually enjoy this mode of education. In this study, a game was developed that allowed the participants to appropriately triage and communicate with patients in an urgent care facility. After completion, the gaming experience participants were asked to complete a short survey to determine the level of enjoyment, play engrossment and overall usability of the game. Results of the study were limited due to a small sample size of only 15 participants. Participants agreed that the game was fun, however, when asked if they wanted to play the game again, participants disagreed.

*Keywords*: Gamify, Gaming, Urgent Care, Training, Employees

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Gamified Training to Engage Healthcare Employees

As innovation and technology in healthcare advances, it is important that education and training for healthcare providers also advances. New innovations in gaming, virtual and augmented reality, and real-time immersion offer exciting platforms for clinicians to engage in their continuing education. An identified area of opportunity is to incorporate gaming into the education for healthcare providers.

**Background and Significance**

According to the Pew Research Center (2015), nearly half of Americans admit to playing some form of an electronic game. Even more inspiring is that although many Americans surveyed believed that men play more games than women, gaming is experienced almost equally between men and women. Gaming continues to sweep our nation with engaged Americans that simply enjoy playing games. According to the Pew Research Center (2015), approximately 17% of those individuals that admit to playing games will tell you that playing games is more engaging than watching television. With those numbers in mind, it was interesting to see that there is a complete lack of research supporting gaming being incorporated in the healthcare professional development curriculum. In my opinion, healthcare education methodologies continue to remain in a static methodology of didactic and PowerPoint presentations; methodologies of which both require passive learning and inhibit the natural desires of the average adult to engage in the adult learning theories. Simulation is an up-and-coming methodology for healthcare training and education. In my experience, although simulation is very active and engaging, simulation remains the most expensive form of healthcare education.

Improving access to care for the American population is an organizational goal for many including the American Medical Association (AMA) (Stack, n.d.). Stack (n.d.) went on to

explain that with the addition of the Affordable Care Act, 20 million Americans have achieved

healthcare coverage.  Christopher et al. (2016) correlated the link between improving healthcare

coverage and improved access to care.  They also explained that individuals whose healthcare

coverage was through Medicare increased their visits to healthcare providers and engaged in

more preventative strategies.  This information then lends itself towards the purpose of this

project.   As Americans continue to gain healthcare coverage, healthcare providers have to build

new clinics in rural areas or expand current healthcare centers to support the growth in demand.

Kaissi, Shay, and Roscoe (2016) explain, "Retail clinics (RC) and urgent care centers (UCCs) are

convenient care models that emerged on the healthcare scene in the past 10 to 15 years" (p.148).

Kaissi et al. goes on to explain that Healthcare has traditionally been centered around the

provider's preference rather than today's shift in the patient being a consumer of healthcare.

Traditional models show a lack of coordination with complex billing practices that not only

frustrate the patient but also lead to dissatisfaction and distance.  UCCs offer a convenient access

to care with a menu-style of offered clinical services (Kaissi et al., 2016).

Hoke and Hexem (2017) express, "With 20 million newly insured, an aging population

and pervasive health disparities, the need for meaningful access to high-quality cost-effective

primary and preventative care has never been greater (p. 34)."  Understanding the evidence that

supports this style of healthcare, I began to question how healthcare providers are being

introduced to and educated on these new UCCs.  Rogers (2003) describes innovation as "an idea,

practice, or project that is perceived as new by an individual or other unit of adoption" (p. 12).

UCCs could be considered an innovative approach to improving access to healthcare for the over

20 million Americans that demand health services.  When considering the introduction and

education associated with the UCCs for healthcare providers, I began to challenge the traditional modes of education and considered the use of more innovative pedagogies such as gaming.

**Problem Statement**

Dempsey and Reilly (2016) break down the concept of nurse engagement into two parts; commitment to their employer and commitment to their profession. This project is not specific to nursing, but instead applies the concept of engagement to all healthcare providers, which also includes nurse practitioners, certified nursing assistants and medical office assistants. "Fifteen of every 100 nurses are considered disengaged" (Dempsey & Reilly, 2016, p.1). The authors also reveal that a disengaged nurse could result in an organizational cost of over $22,200. Fredrickson (2004) theorizes that positive emotions felt by the individual will "broaden-and-build" into their psychosocial and physical actions. A common measurement of a successful game is the level of enjoyment one feels while playing the game. Salanova, Schaufeli, Zanthopoulou and Bakker (2010) theorizes that the individual that experiences positive emotions at work can then broaden and build those emotions to improve their own work engagement. The research opportunity is to use gaming as a method to train and educate healthcare providers on modernized urgent care clinics.

**Project Aims**

The project plan utilized gaming methodologies to engage healthcare providers. There were two goals identified for this project. The first project goal was to introduce a game to the healthcare providers to complete. The second project goal was to evaluate the healthcare provider's enjoyment, engrossment, and playability when completing the game.

**Clinical Question**

The project incorporated gaming technology into the urgent care education for identified healthcare providers. The research question was; how does gaming, incorporated into the urgent care center's education, affect the healthcare provider's experience?

**Congruence with Organizational Strategic Plan**

Individuals that may benefit from this project include healthcare leadership that support urgent care center healthcare providers. This project may attract leaders that are interested in improving workforce engagement through innovation and technology. The research setting has identified improving their workforce commitment as a strategic goal related to the success of this project. Investing in modern technologies and innovations for their employees represents their dedication to improving overall employee engagement and commitment. All of the urgent care clinical healthcare providers are required to complete education focused on the work streams and scope of practice. The gaming project offered an innovative approach to delivering the required standard education.

**Review of Literature**

Multiple databases were utilized to collect evidence including; case studies, research studies, literature and systematic reviews. Databases included CINAHL, Google Scholar, Health Source, ACM digital library, and Wiley online journals. Keywords provided into the search function included; nurse professional development, healthcare professional development, gaming professional development, healthcare gaming, nursing games, and nurse game professional development. The initial database search utilizing the mentioned keywords resulted in over 2,000 potential pieces of evidence. Database searches were then advanced to include only evidence from January of 2013 to September of 2017 and research articles. Criteria used to

identify relevant pieces of evidence included studies that utilized a modality of gaming linked to healthcare education. This filter resulted in 18 relevant pieces of evidence. Studies that were not written in English, studies that are focused in game development/coding, and studies that were focused on patient-facing gaming were excluded from the review, resulting in 11 articles for review. Five of the 11 articles are discussed in this synthesis of evidence.

Abdulmajed, Park and Tekian (2015) performed a systematic review of the trends and outcomes related to educational games for health professions. Their assessment identified that gaming does increase user cognition and games build a beneficial learning environment by enhancing and reinforcing student's knowledge retention. This study was beneficial because it provided support for the use of gaming as an effective educational modality.

According to Dempsey and Reilly (2016), "fifteen of every 100 nurses are considered disengaged" (para.6). Disengaged nurses result in a decrease in nurse retention, productivity and satisfaction. Schaufebuel (2013) estimated that each disengaged nurse results in a loss of $22,200 to the organization.

Tan et al. (2017) utilized serious gaming to educate nursing students about the safe blood administration practices. Results of this study demonstrated that students in the experimental group (utilizing the serious game) achieved higher levels of knowledge and increased confidence. Evaluation scores provided by the students were positive as they related to the gaming experience. The students liked the gaming enhancements and agreed that it improved their problem-solving capacity.

Friedrich et al. (2017) proposed a similar hypothesis with their study incorporating gaming into the physician chest tube insertion training. Friedrich et al.'s aim was to improve skill level as well as to provide an enhanced and standardized approach to training the chest tube

insertion skill, without adding resources such as faculty and supplies.  Their study goals provided an unforeseen benefit to the research question. Does gaming in professional development decrease resource demand?

Levac and Miller (2013) and Meredith (2016) took a unique perspective look at gaming by examining the facilitator experiences with gaming.  Levac and Miller's results were similar to Meredith's in that many of the facilitators had reservations about using gaming as a teaching or training modality.  Levac and Miller revealed that the therapists had to take time out of their day to train and become familiar with the gaming technology because onus belonged to them.  They realized that for their patients to succeed in the gaming therapies, they needed to be well trained and an advocate for the gaming technology.  Meredith's results were similar in that faculty needed to see the value of the game and be an advocate for the technology for it to be successful to the learner. This information is relevant to the research question because the game requires a facilitator/owner of the game and their perspectives need to be considered prior to implementation of the game.

A second review of literature was performed, focusing on healthcare urgent care clinics. Database searches included, CINAHL, Google Scholar and Health Source.  Keywords provided in the search include; urgent care, urgent clinics, modern healthcare, medical assistants and nurse practitioner clinics.  Database searchers were then advanced to include articles written between the dates of January 2013 to January of 2018.  The articles were filtered by their focus on modern healthcare and the use of nurse practitioner led clinics.  Four articles were identified and used to build the review of literature.

O'Malley, Gourevitch, Draper, Bond and Tirodkar (2014) explored the level of teamwork evident in the primary care setting.  The study focused on qualitative evidence showing that

primary care healthcare providers had overcome the previously identified challenges in

teamwork.  The researched settings implemented policy driven guidelines as well as "template-

guided information" to assist in delegating primary care tasks away from the physicians and

practitioners to the nurses and medical assistants (p. 187).  This type of referred delegation

allowed for physicians and practitioners to see more patients and asked the nurses and medical

assistants to work at the full scope of their license.  Qualitative results did show an improvement

in primary care teamwork.  Ironically, a second article was written by Hoke and Hexem (2017)

discussing the scope of practice for nurse practitioners.  The authors discuss the rising need for

primary care clinics and urgent care clinics to meet the need of the growing population.  "With

20 million newly insured, an aging population and pervasive health disparities, the need for

meaningful access to high-quality cost effective primary and preventative care has never been

greater" (p. 34). It is for this reason that nurse practitioners are driving state legislation to change

policy so that they may practice to the full scope of their license.  "A mechanism to expand

access to care is allowing allied healthcare providers to practice at the top of their license" (p.

35).  In congruency with the previous studies, Christopher et al. (2016) also found that newly

insured Medicaid patients increased the use of outpatient medical care.  These patients reached-

out to their healthcare providers much more than those who were uninsured.

        Kaissi et al.  (2016) described the rising popularity of retail clinics and urgent care

clinics.  The authors performed an excellent comparative analysis of both retail clinics and urgent

care clinics to identify cultural trends as well as trends in popularity.  The researchers analyzed

over 117 clinics in six different states.  Overall, their analysis showed that "urgent care clinics

are more prevalent than retail clinics among hospital systems and that large and unexplained

state-by-state variation exists in the adoption of these strategies" (p.158).

**Conceptual Framework**

The conceptual framework begins with Fredrickson's (2004) broaden-and-build theory of positive emotions. Fredrickson states, "Positive emotions also produce optimal functioning, not just within the present, pleasant moment, but over the long-term as well" (p.1367). Fredrickson goes on to explain that the theory is named broaden-and-build because the immediate joy that people feel seems to broaden to the individual's psychosocial and physical action, then builds endurance and leaves a lasting impact on those actions. Fredrickson breaks out the positive emotions into groups such as joy, interest, contentment and love. Joy in particular is described as the emotion that creates an "urge to play" (p.1369). Fredrickson explains that the joy introduces the desire to play, which then triggers the desire to "push the limits and be creative" not only in behaviors but also in intelligence (p.1369). Salanova et al. (2010) builds on Fredrickson's theory by applying those positive emotions into the workforce. Salanova et al. hypothesizes that when individuals are presented positive emotions, these emotions then broaden and build into their daily work and potentially increase work engagement. Salanova et al. summarizes a literature review by stating, "Frequent experiences of positive emotions in the workplace may lead to a more persistent, positive affective state, and namely work engagement" (p.126). A validated measurement of gaming is "enjoyment." It is my belief that an individual that finds joy in playing a game at work will broaden and build that positive emotion into their work thus improving workforce engagement. Murphy (2014) links work engagement with nursing by stating, "the presence of high levels of employee engagement is also thought to enhance job performance, task performance, and customer satisfaction" (p. 194).

## Methodology

### Needs Assessment

Management at the project hospital identified an opportunity to introduce and educate healthcare providers to the new urgent care clinics that are being designed as part of the organization's strategy to improve access to care. They recognize that the workflows, staffing practices and aesthetics will all be drastically different than their current critical access centers. As discovered by Kaissi et al. (2016), "UCCs also operate on a walk-in, no appointment basis, are open for extended hours and are typically located in strip malls" (p. 149). The urgent care clinics will offer new concepts to this hospital organization such as; no wait times, nurse practitioner driven care and menu-styled costs for services. Both nurse practitioners, physician assistants and medical office assistants are being empowered to work at the full scope of their license and/or certification. The hospital's management recognizes that these patient care workflows are different to the current state and they value the need for engaging education to their healthcare providers.

### Project Design

The focus of this scholarly project is to incorporate the concept of gaming to the urgent care center staff. This study is a quantitative quasi-experimental study with the use of a post survey only. An interdisciplinary approach is applied to the creation of the gamified training. Two game developer students are dedicated to the game development. The hospital administration, as well as the urgent care center content experts identify content. This content is then delivered to the nurse researcher and the hospital's chief medical officer.

This nurse researcher constructs the study design, project implementation plan, project deployment and project evaluation. This study design includes a thorough literature review,

concept analysis and method design.  The role of the chief medical officer is to communicate

with the nurse researcher to align both the hospital's initiative and this project.

**Setting**

The gamified training was deployed to all healthcare providers employed in urgent care

clinics, medical offices and prompt cares within a large Midwestern hospital network.  An email

invitation to participate in the study was sent to the identified audience.  The email invitation

included a link to access the game as well as a short description of the study proposal.

Completing the game was voluntary and the healthcare provider was able to complete the game

at any time.

**Population**

The gamified training was deployed to all healthcare providers employed in the urgent

care clinics, prompt cares and medical offices within a large Midwestern hospital network.

Healthcare providers included nurse practitioners, physician assistants and medical office

assistants.  The email invitation was sent to 364 providers in total.

**Tools and Instruments**

This nurse researcher utilized the "Game User Experience Satisfaction Scale (GUESS) to

collect post-deployment evaluation data (see Appendix A).  The GUESS is licensed under a

Creative Commons and can be freely copied and redistributed when appropriate credit is given

(Creative Commons, 2018).  This scale is a validated instrument that focuses on the evaluation of

the game and playtesting.  A limitation to the tool is that it has 55 questions and that may take a

significant amount of time for the participant.  This nurse researcher gained approval from the

instrument's author to limit the survey to those questions related to enjoyment, engrossment and

usability/playability (see Appendix A and B).  The final survey contained 22 questions.

The U.S. Department of Health & Human Services (2018) explain that "during a usability test, you will learn if participants are able to complete specified tasks successfully and identify how long it takes to complete specified tasks." The author continues explaining that usability testing is used to identify if the participant is satisfied with the game and analyze to see if the meets its objectives. The definition of engrossment found in the Merriam-Webster Dictionary (2018) is "the state of being absorbed or occupied." As it applies to playing the game, the researcher is measuring the level to which the participant feels absorbed and occupied while playing the game. Enjoyment is defined by Merriam-Webster (2018) as "something that gives keen satisfaction." Enjoyment as it applies to this study is measuring the participants level of enjoyment while playing the game.

This project required the use of "gaming" software, as well as development hardware. Hardware and software development were the responsibility of the interactive media specialist.

**Project Plan**

An e-mail inviting the identified population to participate in the study was deployed by the investigator and each recipient was blind carbon-copied to maintain anonymity. The e-mail included a description of the study and a link to the website that hosted the game. The study participant then had access to the game through the website, was asked to complete the game and a short survey. At the time of survey completion, the participant's activity in the study was complete. Outcomes are measured using the modified GUESS instrument. E-mails were sent out on May 7th of 2018; due to small response a reminder e-mail was sent on May 21st. The survey closed on June 7th of 2018.

**Data Analysis**

Data collection from the GUESS instrument survey was retrieved anonymously and did not reveal any user specific information.  This data is intended to measure the learner's perception of engrossment, enjoyment, and playability related to the game.  The GUESS tool is a 7-point Likert scale with 22 questions.  Data is separated into each individual section (i.e. enjoyment, engrossment, playability) and measured via percentage.  Data was calculated and analyzed in Excel.

**Institutional Review Board and/or Ethical Issues**

Approval for the project was received by the OSF Research Approval Committee and the University of Illinois College of Medicine at Peoria (UICOMP) Institutional Review Board (IRB).  Bradley University Committee on the use of Human Subjects in Research accepted the approval of the UICOMP IRB.  There was no identifiable employee information associated with this project.  Informed consent was indicated in the e-mail, that by accessing the game, the participant is providing their informed consent.  Employee survey results are anonymous and were collated utilizing an online survey software called Qualtrics.

**Organizational and Cost Effectiveness Assessment**

The organization was assessed for any anticipated barriers and facilitators to this project implementation.  Any risks or unintended consequences were identified and resolved prior to the implementation of the project.

**Cost Factors**

According to Dempsey and Reilly (2016), "fifteen of every 100 nurses are considered disengaged" (para.6).  Disengaged nurses result in a decrease in nurse retention, productivity and satisfaction. Schaufebuel (2013) estimates that each disengaged nurse results in a loss of $22,200

to the organization.  The cost related to the loss of a healthcare provider employed at the urgent

care clinic is not available at this time.

The cost of game development ranges based on the complexity of the game as well as the

requirements for data collection.  Upon review of two quotes that were delivered to the project

hospital's administration, the game design ranged from $60,000 to $150,000.  It is important to

consider that this is the cost of the game development and this does not include maintenance

costs or annual software costs.

For this specific research, the game developers are not being paid to develop the game as

game development is part of their internship at the local University.

## Results

Invitations to participate in the study were sent to the identified audience and the game

trial remained open for 31 days.  There were no changes to the game or the survey during those

31 days.  Due to low participation, a reminder e-mail was sent mid-way through the trial in an

attempt to recruit additional participants.  The decision was made to host the game on a PC rather

than on a mobile device such as an iPhone or android.

**Analysis of Project Outcome Data**

The game trial resulted in 15 survey completions.  One of the 15 surveys was incomplete

and discarded due to lack of data.  Data was assessed in each sub-set including

playability/usability, play engrossment, and enjoyment.

**Playability/usability.**

Results for this sub-set were varied and showed no significance.  Eighty-five percent of

the participants agreed that the game was easy to learn how to play and the controls were

straightforward.  Whereas only 57% of the participants agreed that the game provided them the

necessary information to accomplish a goal in the game.  Seventy-eight percent of the participants disagreed that the game informed them of their next goal as the game progressed. Overall, participants chose "somewhat agree" for playability and usability 26% of the time. Forty-seven percent of the participants responded positively regarding the usability/playability of the game.

### Play engrossment.

Although 50% of the participants agreed that they could block out most distractions while playing the game, 64% disagreed that when they stopped playing the game they wanted to play the game again.  Eighty-five percent of the participants also disagreed that the game caused them not to care about events that were happening in the real world.  Overall, participants chose either, "strongly disagree" or "disagree" for play engrossment 21% of the time.  Twenty-eight percent of the participants responded positively regarding engrossment while playing the game.

### Enjoyment.

Seventy-one percent of the participants agreed that the game was fun but only 28% of the participants agreed that they wanted to play the game again.  Only 50% of the participants disagreed when asked if they felt bored while playing the game.  Overall, participants chose "neither agree nor disagree" for enjoyment 21% of the time. Fifty percent of the participants responded positively regarding enjoyment in playing the game.

### Discussion

Overall, the findings of this study were unremarkable.  Unfortunately, due to the limited participant size there is not enough data to identify any significant findings.  Findings that may be considered for future studies related to gaming are that the participants did agree that the game was fun and that they did take the time to block out other distractions while playing the

game.  In the topic of game development, developers would be interested to know that the

participants did feel that the game was easy to play, and the controls were straightforward.  This

would be important to know when developing future games for this audience.

It was clear to the researcher that the game did not adequately communicate the goals and

objectives to the participant and improvement is needed in that area of development.  The

majority of participants agreed that they would not play the game again, so when considering

continual play or return on investment, the researcher and developers need to identify strategies

that would engage and entice the participant to play the game again.

In future trials, the researcher may consider offering some type of incentive for

participating in the trial to increase participation.  A second method to improve participation is to

transition the game to a mobile platform.  Healthcare providers may find it more convenient to

trial the game on their mobile device rather than a P.C.

**Implications for further research**

There is an opportunity to involve a more interdisciplinary approach to the collaboration

and development of the game.  Additional primary input from the nurse practitioners, physician

assistants and office assistants may have helped to better define the goals and objectives of the

game.

One potential future research topic may include; the determination of the effectiveness of

this modality of education on the identified population's practice – how does gaming produce

better practice outcomes compared to traditional educational modalities such as lecture and

PowerPoint?  A second research topic may further examine the types of games that engage and

entice this identified audience to play repeatedly and frequently.  While this study focused on

outpatient clinicians, there is an opportunity to apply these research questions to physicians and registered nurses, both inpatient and outpatient.

## Conclusion

As innovation and technology in healthcare advances, it is important that education and training for healthcare providers also advances.  New innovations in gaming, virtual and augmented reality, and real-time immersion offer exciting platforms for clinicians to engage in their continuing education.  An identified area of opportunity is to incorporate gaming into the education for healthcare providers.  However, one cannot assume that simply incorporating gaming into education will result in the desired outcome.  Game development and the user experience is a crucial component to the success of the game.  Ideally, the game should engross the learner in the experience and result in an enjoyable outcome; when this is not achieved, results may be detrimental to the desired outcome.  The purpose of this study was to identify if healthcare providers enjoyed playing a game and the desired level of playability/usability for this population.

### DNP Essential

This project addressed the DNP Essential III *Clinical Scholarship and Analytical Methods for Evidence-Based Practice* (American Association of Colleges of Nursing, 2006).  In this study, the researcher reviewed the current existing literature and determined the appropriate research question to better assess and define the use of gaming.  During this study the use of data collection and analysis were applied to best assess the study results.  Following this study, the researcher plans to disseminate the findings to the study location as well as within the DNP portfolio.

This project also addressed the DNP Essential IV: *Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care* (American Association of Colleges of Nursing, 2006).  This study focused on using gaming technology to engage healthcare providers in their clinical education.  This technology could be used as an engaging modality to educate not only healthcare providers but also educate patients during their care continuum.

**Attainment of Personal and Professional Goals**

This study has helped the researcher meet a personal goal to reorient herself to the research process and best practices.  A professional goal achieved through this study is the completion of a DNP scholarly project leading towards graduation.

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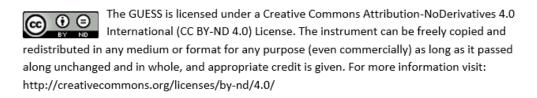Stack, S. (n.d.). Health care reform in the United States: Past, present and future challenges.

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Appendix A – Game User Experience Satisfaction Scale

**ABOUT THE GAME USER EXPERIENCE SATISFACTION SCALE (GUESS)**

The GUESS is a psychometrically validated and comprehensive gaming scale with nine subscales (e.g., Usability/Playability, Creative Freedom, and Social Connectivity) and 55 items in total. In general, the GUESS is intended for any playtesting and game evaluation purposes. It was developed and validated based on the assessments of over 450 unique video game titles across a number of popular genres. Thus, it can be applied across many types of video games in the industry both as a way to assess what aspects of a game contribute to user satisfaction and as a tool to aid in debriefing users on their gaming experience.

For further questions or inquiries, contact **Mikki Phan, Ph.D.** at mikkip@gmail.com.

**THE GAME USER EXPERIENCE SATISFACTION SCALE (GUESS)**

Instructions: Based on your experience playing this game, please rate the following statements on a scale from "Strongly Disagree" to "Strongly Agree". Select "N/A" if a statement does not applied to the game that you are rating.

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 1 | I think it is easy to learn how to play the game. | | | | | | | | |
| 2 | I cannot tell that I am getting tired while playing the game. | | | | | | | | |
| 3 | I am captivated by the game's story from the beginning. | | | | | | | | |
| 4 | I am in suspense about whether I will succeed in the game. | | | | | | | | |
| 5 | I feel the game allows me to be imaginative. | | | | | | | | |
| 6 | I think the game is fun. | | | | | | | | |
| 7 | I enjoy the sound effects in the game. | | | | | | | | |
| 8 | I find the controls of the game to be straightforward. | | | | | | | | |
| 9 | I think the characters in the game are well developed. | | | | | | | | |
| 10 | I find the game supports social interaction (e.g., chat) between players. | | | | | | | | |

2

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 11 | I tend to spend more time playing the game than I have planned. | | | | | | | | |
| 12 | I feel creative while playing the game. | | | | | | | | |
| 13 | I feel successful when I overcome the obstacles in the game. | | | | | | | | |
| 14 | I always know how to achieve my goals/objectives in the game. | | | | | | | | |
| 15 | I feel bored while playing the game. | | | | | | | | |
| 16 | I think the game's audio fits the mood or style of the game. | | | | | | | | |
| 17 | I find the game's interface to be easy to navigate. | | | | | | | | |
| 18 | I feel the game constantly motivates me to proceed further to the next stage or level. | | | | | | | | |
| 19 | Whenever I stopped playing the game I cannot wait to start playing it again. | | | | | | | | |
| 20 | I enjoy the game's graphics. | | | | | | | | |

3

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 31 | I feel the game allows me to express myself. | | | | | | | | |
| 32 | I can identify with the characters in the game. | | | | | | | | |
| 33 | I feel the game trains me well in all of the controls. | | | | | | | | |
| 34 | I am very focused on my own performance while playing the game. | | | | | | | | |
| 35 | I enjoy the social interaction within the game. | | | | | | | | |
| 36 | I do not care to check events that are happening in the real world during the game. | | | | | | | | |
| 37 | I always know my next goal when I finish an event in the game. | | | | | | | | |
| 38 | I am likely to recommend this game to others. | | | | | | | | |
| 39 | I think the game is visually appealing. | | | | | | | | |
| 40 | I feel my curiosity is stimulated as the result of playing the game. | | | | | | | | |

5

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 21 | I feel detached from the outside world while playing the game. | | | | | | | | |
| 22 | I enjoy the fantasy or story provided by the game. | | | | | | | | |
| 23 | I feel I can explore things in the game. | | | | | | | | |
| 24 | I find my skills gradually improve through the course of overcoming the challenges in the game. | | | | | | | | |
| 25 | I do not need to go through a lengthy tutorial or read a manual to play the game. | | | | | | | | |
| 26 | I can block out most other distractions when playing the game. | | | | | | | | |
| 27 | If given the chance, I want to play this game again. | | | | | | | | |
| 28 | I feel the game's audio (e.g., sound effects, music) enhances my gaming experience. | | | | | | | | |
| 29 | I find the game's menus to be user friendly. | | | | | | | | |
| 30 | I like to play this game with other players. | | | | | | | | |

4

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 31 | I feel the game allows me to express myself. | | | | | | | | |
| 32 | I can identify with the characters in the game. | | | | | | | | |
| 33 | I feel the game trains me well in all of the controls. | | | | | | | | |
| 34 | I am very focused on my own performance while playing the game. | | | | | | | | |
| 35 | I enjoy the social interaction within the game. | | | | | | | | |
| 36 | I do not care to check events that are happening in the real world during the game. | | | | | | | | |
| 37 | I always know my next goal when I finish an event in the game. | | | | | | | | |
| 38 | I am likely to recommend this game to others. | | | | | | | | |
| 39 | I think the game is visually appealing. | | | | | | | | |
| 40 | I feel my curiosity is stimulated as the result of playing the game. | | | | | | | | |

5

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 41 | I am able to play the game with other players if I choose. | | | | | | | | |
| 42 | I am emotionally moved by the events in the game. | | | | | | | | |
| 43 | Sometimes I lose track of time while playing the game. | | | | | | | | |
| 44 | I feel the game provides me the necessary information to accomplish a goal within the game. | | | | | | | | |
| 45 | I think the graphics of the game fit the mood or style of the game. | | | | | | | | |
| 46 | I think the game is unique or original. | | | | | | | | |
| 47 | I enjoy the music in the game. | | | | | | | | |
| 48 | I feel very confident while playing the game. | | | | | | | | |
| 49 | I can clearly understand the game's story. | | | | | | | | |
| 50 | I enjoy playing the game. | | | | | | | | |

6

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 51 | I temporarily forget about my everyday worries while playing the game. | | | | | | | | |
| 52 | I think the information provided in the game (e.g., onscreen messages, help) is clear. | | | | | | | | |
| 53 | I feel the game gives me enough freedom to act how I want. | | | | | | | | |
| 54 | I want to do as well as possible during the game. | | | | | | | | |
| 55 | I am very interested in seeing how the events in the game will progress. | | | | | | | | |

7

## THE GUESS SCORING GUIDELINES

The GUESS is based on a seven-point Likert scale with a response anchor at every rating point (e.g., 1 = Strongly Disagree, 5 = Somewhat Agree, and 7 = Strongly Agree). The GUESS has 55 statements/items and 9 subscales/dimensions called: Usability/Playability, Narratives, Play Engrossment, Enjoyment, Creative Freedom, Audio Aesthetics, Personal Gratification, Social Connectivity, and Visual Aesthetics.

The order of the statements can be presented as is or randomized per respondent. For online questionnaires, it is recommended that the statements on the scale be separated into a set of five statements per page to minimize scrolling.

The ratings of all the items within the same dimension should be averaged to obtain a subscale score for each respondent (see pp. 9-10). The composite score of video game satisfaction can be obtained by summing the average score of each subscale together. For the composite score, the minimum value is 9 and the maximum value is 63. Only one statement on the GUESS needs to be reverse coded (i.e., "I feel bored while playing the game" within the Enjoyment subscale).

For further questions or inquiries, contact **Mikki Phan, Ph.D.** at mikkip@gmail.com.

**Scoring Guidelines per Dimension/Subscale**

**Usability/Playability** (11 items)

1. I think it is easy to learn how to play the game.

8. I find the controls of the game to be straightforward.

14. I always know how to achieve my goals/objectives in the game.

17. I find the game's interface to be easy to navigate.

25. I do not need to go through a lengthy tutorial or read a manual to play the game.

29. I find the game's menus to be user friendly.

33. I feel the game trains me well in all of the controls.

37. I always know my next goal when I finish an event in the game.

44. I feel the game provides me the necessary information to accomplish a goal within the game.

48. I feel very confident while playing the game.

52. I think the information provided in the game (e.g., onscreen messages, help) is clear.

**Narratives** (7 items)

3. I am captivated by the game's story from the beginning.

9. I think the characters in the game are well developed.

22. I enjoy the fantasy or story provided by the game.

32. I can identify with the characters in the game.

42. I am emotionally moved by the events in the game.

49. I can clearly understand the game's story.

55. I am very interested in seeing how the events in the game will progress.

**Play Engrossment** (8 items)

2. I cannot tell that I am getting tired while playing the game.

11. I tend to spend more time playing the game than I have planned.

19. Whenever I stopped playing the game I cannot wait to start playing it again.

21. I feel detached from the outside world while playing the game.

26. I can block out most other distractions when playing the game.

36. I do not care to check events that are happening in the real world during the game.

43. Sometimes I lose track of time while playing the game.

51. I temporarily forget about my everyday worries while playing the game.

**Enjoyment** (5 items)

6. I think the game is fun.

15. I feel bored while playing the game. (*REVERSE CODE*)

27. If given the chance, I want to play this game again.

38. I am likely to recommend this game to others.

50. I enjoy playing the game.

**Creative Freedom** (7 items)

5. I feel the game allows me to be imaginative.

12. I feel creative while playing the game.

23. I feel I can explore things in the game.

31. I feel the game allows me to express myself.

40. I feel my curiosity is stimulated as the result of playing the game.

46. I think the game is unique or original.

53. I feel the game gives me enough freedom to act how I want.

**Audio Aesthetics** (4 items)

7. I enjoy the sound effects in the game.

16. I think the game's audio fits the mood or style of the game.

28. I feel the game's audio (e.g., sound effects, music) enhances my gaming experience.

47. I enjoy the music in the game.

**Personal Gratification** (6 items)

4. I am in suspense about whether I will succeed in the game.

13. I feel successful when I overcome the obstacles in the game.

18. I feel the game constantly motivates me to proceed further to the next stage or level.

24. I find my skills gradually improve through the course of overcoming the challenges in the game.

34. I am very focused on my own performance while playing the game.

54. I want to do as well as possible during the game.

**Social Connectivity** (4 items)

10. I find the game supports social interaction (e.g., chat) between players.

41. I am able to play the game with other players if I choose.

30. I like to play this game with other players.

35. I enjoy the social interaction within the game.

**Visual Aesthetics** (3 items)

20. I enjoy the game's graphics.

39. I think the game is visually appealing.

45. I think the graphics of the game fit the mood or style of the game.

Appendix B – Approval to modify the GUESS tool

## [EXTERNAL] Re: GUESS use and modification request

**Mikki Phan** <mikkip@gmail.com>                                         ↩ Reply all | ⌄
Tue 2/20, 10:19 AM
Delinski, Nicole P. ⌄

> Label: OSF Inbox Retention (1 year) Expires: 2/20/2019 10:19 AM

Hi Nicole,

Thanks for reaching out about your plan to use the GUESS.

If your goal is to measure overall game satisfaction, then my recommendation is to use the entire scale since despite the number of items it is typically take people 5-10 minutes to complete.

However, if you're more interested in measuring specific gaming dimension (e.g., Engrossment) then it shouldn't be a problem that you separate them out from the entire scale to measure.

If length is an issue and you want to measure overall gaming satisfaction then please let me know. My colleagues and I recently developed a shorter version of the GUESS that is waiting to be published, and I can share that with you.

Mikki

## Appendix C – Modified GUESS Tool

| | Statement | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|---|---|---|
| 1 | I think it is easy to learn how to play the game. | | | | | | | | |
| 2 | I cannot tell that I am getting tired while playing the game. | | | | | | | | |
| 6 | I think the game is fun. | | | | | | | | |
| 8 | I find the controls of the game to be straightforward. | | | | | | | | |
| 11 | I tend to spend more time playing the game that I have planned. | | | | | | | | |
| 14 | I always know how to achieve my goals/objectives in the game. | | | | | | | | |
| 15 | I feel bored while playing the game. | | | | | | | | |
| 17 | I find the game's interface to be easy to navigate. | | | | | | | | |
| 19 | Whenever I stopped playing the game I cannot wait to start playing it again. | | | | | | | | |
| 21 | I feel detached from the outside world while playing the game. | | | | | | | | |
| 25 | I do not need to go through a lengthy tutorial or read a manual to play the game. | | | | | | | | |
| 26 | I can block out most other distractions when playing the game. | | | | | | | | |
| 27 | If given the chance, I want to play this game again. | | | | | | | | |
| 29 | I find the game's menus to be user friendly. | | | | | | | | |
| 33 | I feel the game trains me well in all of the controls. | | | | | | | | |
| 36 | I do not care to check events that are happening in the real world during the game. | | | | | | | | |
| 37 | I always know my next goal when I finsih an event in the game. | | | | | | | | |
| 43 | Sometimes I lose track of time while playing the game. | | | | | | | | |
| 44 | I feel the game provides me the necessary information to accomplish a goal within the game. | | | | | | | | |
| 48 | I feel very confident while playing the game. | | | | | | | | |
| 51 | I temporarily forget about my everyday worries while playing the game. | | | | | | | | |
| 52 | I think the information provided in the game (e.g., onscreen messages, help) is clear. | | | | | | | | |

## Appendix D – E-mail Invitation

| | | |
|---|---|---|
| Send | From ▾ | Nicole.P.Delinski@osfhealthcare.org |
| | To... | |
| | Cc... | |
| | Bcc... | |
| | Subject | Research Study Invitation |

Good Afternoon, My name is Nicole Delinski and I am Doctorate of Nursing Practice student at Bradley University.

You are being invited to participate in a research study titled "Gamified Training to Engage Outpatient Employees."

Your participation is completely voluntary and completely anonymous. If you are interested in participating in this study, please click on the hyperlink below that will navigate you to the trial game. The game will take approximately 4-8 minutes to complete with a short survey at the end.

"Research" designates an activity designed to test a hypothesis, permit conclusions to be drawn and thereby to develop or contribute to generalizable knowledge, whereas "practice of medicine" refers to interventions designed solely to enhance the well-being of an individual patient. Research subjects may or may not benefit from research procedures.

Thank you for your consideration,
Nikki

Nicole (Nikki) Delinski, MSN, RN, CCRN, DNP(c)
Bradley University Student, 309-657-7787(C)

Appendix E – Data Collection

| | I cannot tell that I am getting tired while playing the | I tend to spend more time playing the game than I had | Whenever I stopped playing the game I cannot wait to | I feel detached from the outside world while playing the | I can block out most other distractions when playing the | I do not care to check events that are happening in the | Sometimes I lose track of time while playing the | I temporarily forget about my everyday worries while | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strongly Disagre | 15% | 14% | 14% | 29% | 0% | 50% | 21% | 21% | | | |
| Somewhat Disa | 0% | 14% | 14% | 14% | 7% | 14% | 21% | 21% | | | |
| Disagree % | 0% | 21% | 36% | 36% | 14% | 21% | 29% | 14% | | | |
| Neither Agree ne | 23% | 29% | 21% | 14% | 29% | 0% | 7% | 7% | | | |
| Agree % | 23% | 7% | 0% | 0% | 7% | 0% | 0% | 7% | | | |
| Somewhat Agree | 15% | 0% | 7% | 7% | 36% | 14% | 14% | 21% | | | |
| Strongly Agree % | 23% | 14% | 7% | 0% | 7% | 0% | 7% | 7% | | | |
| | I think it is easy to learn how to play the game. | I find the controls of the game to be straightforward. | I always know how to achieve my goals/objectives in the game. | I find the game's interface to be easy to navigate. | I do not need to go through a lengthy tutorial or read a manual to play the | I find the game's menus to be user friendly. | I feel the game trains me well in all of the controls. | I always know my next goal when I finish an event in the game. | I feel the game provides me the necessary information to accomplish a | I feel very confident while playing the game. | I think the information provided in the game (e.g. onscreen |
| Strongly Disagre | 7% | 7% | 14% | 7% | 14% | 7% | 7% | 14% | 14% | 7% | 0% |
| Somewhat Disa | 0% | 7% | 43% | 7% | 21% | 29% | 43% | 50% | 14% | 21% | 36% |
| Disagree % | 7% | 7% | 14% | 21% | 14% | 0% | 0% | 14% | 7% | 7% | 21% |
| Neither Agree ne | 0% | 7% | 7% | 21% | 14% | 7% | 7% | 0% | 7% | 21% | 0% |
| Agree % | 7% | 21% | 0% | 21% | 7% | 21% | 7% | 7% | 21% | 14% | 29% |
| Somewhat Agree | 57% | 50% | 14% | 14% | 29% | 29% | 21% | 7% | 36% | 21% | 7% |
| Strongly Agree % | 21% | 0% | 7% | 7% | 0% | 7% | 14% | 7% | 0% | 7% | 7% |
| | I think the game is fun. | I feel bored while playing the | If given the chance, I want to | | | | | | | | |
| Strongly Disagre | 14% | 7% | 14% | | | | | | | | |
| Somewhat Disa | 7% | 29% | 21% | | | | | | | | |
| Disagree % | 0% | 14% | 7% | | | | | | | | |
| Neither Agree ne | 7% | 29% | 29% | | | | | | | | |
| Agree % | 21% | 7% | 14% | | | | | | | | |
| Somewhat Agree | 36% | 14% | 7% | | | | | | | | |
| Strongly Agree % | 14% | 0% | 7% | | | | | | | | |