Enhancing the Acquisition and Retention of the Navajo Language using Computer-based

Instruction and the Effects of Static Pedagogical Agents and Gamification Practice

by

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ABSTRACT

The purpose of this study was to investigate the effects of static pedagogical agents (included and excluded) and gamification practice (included and excluded) on vocabulary acquisition and perceptions of cognitive load by junior high students who studied Navajo language via computer-based instructional program. A total of 153 students attending a junior high school in the southwestern United States were the participants for this study. Prior to the beginning of the study, students were randomly assigned to one of four treatment groups who used a Navajo language computer-based program that contained a combination of static pedagogical agent (included and excluded) and gamification practice (included and excluded). There were two criterion measures in this study, a vocabulary acquisition posttest and a survey designed both to measure students' attitudes toward the program and to measure cognitive load. Anecdotal observations of students' interactions were also examined.

Results indicated that there were no significant differences in posttest scores among treatment conditions; students were, however, generally successful in learning the Navajo vocabulary terms. Participants also reported positive attitudes toward the Navajo language content and gamification practice and expressed a desire to see additional content and games during activities of this type. These findings provide evidence of the impact that computer-based training may have in teaching students an indigenous second language. Furthermore, students seem to enjoy this type of language learning program. Many also indicated that, while static agent was not mentioned, gamification practice may enhance students' attitudes in such instruction and is an area for future research. Language learning programs could include a variety of gamification practice activities to

assist student to learn new vocabulary. Further research is needed to study motivation and cognitive load in Navajo language computer-based training.

DEDICATION

To Lisa, who has been by my side through this entire endeavor: I could not have done this without you. To my children, Austin, Dion, Chenoa, and Ava, who served as my motivation to pursue my educational dreams: Thank you for the sacrifices you made so I could pursue this goal. To my parents, Diana and Gary, thank you for your love and support. To my sister, Ditter, and brother, Nathaniel, whose belief in me never faltered. Thank you for the rest of my family. Your love and support helped me get through this.

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CHAPTER 1

Introduction

Students today are growing up in a digital age dominated by mobile devices, computers, and 24/7 wireless access. In recent years, electronic games, home computers, and the Internet have assumed an important place in the life of children and adolescents (Zin & Zain, 2010). Technology plays a significant role in the development of schoolchildren globally. The use of technology as an educational tool has helped to revolutionize both teaching and learning. Incorporating technology into learning is now viewed as the norm in most schools worldwide. In return, the development of online education has skyrocketed. Technology infuses classrooms with digital learning tools, such as computers and handheld devices; expands course offerings, experiences, and learning materials; supports learning 24 hours a day, seven days a week; builds 21[st]century skills; increases student engagement and motivation; and accelerates learning (U.S. Department of Education, 2018). Roughly 5 million of the country's 54 million K-12 students have taken at least online or virtual class during the 2015-2016 school year (National Association for Gifted Children, 2017). The concept using the computer as a medium of language learning is no different. Nowadays, computers are recognized as a valuable instrument in teaching modern foreign languages in universities (Afshari, Ghavifekr, Siraj, & Jing, 2013). Lee (2004) stated that using computer in second language instruction can improve practices for students through experiential learning, motivate students to learn more, enhance student achievement, increase authentic materials for study, encourage greater interaction between teachers and students and students and peers, emphasize individual needs, escape from a single source of

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information and, enlarge global understanding. Research into the use of digital games in education is relatively novel but growing rapidly, and a lot of language teachers use digital games for teaching second language as it may be effective on every age group, particularly on children (Aghlara & Tamjid, 2011). The concept of learning a language via a computer seemed highly unlikely and impossible years ago. With the advancement of computer hardware, as well as e-learning development software, you can now proficiently learn a second language from a computer or mobile device quite effectively. Efficient and well-developed language software like *Rosetta Stone* has shown that one can learn a second language via the computer resourcefully. An advantage of learning via a computer is students are encouraged to communicate in the target language in a non-threatening environment and without the pressure of face-to-face conversation or in front of other classmates (McNeil, 2000).

When you think of language, what comes to mind? Is it oral communication? Written communication? Language can be viewed as cognitive, material, or social; it is, of course, all of these at the same time (Gee & Hayes, 2011). In many cultures, the language is the lifeline of people, the heartbeat that keeps the culture alive and strong. Native American tribes strongly believe that the language of their people is what keeps the culture and tradition thriving. Virtually every aspect of Native America life and the Native American worldview is influenced by culture and language (Allison & Begay Vining, 1999). The strongly held belief that the language is the heart of Native American society is especially prevalent in the Navajo culture. The Navajo Nation includes 27,425 square miles of land that extends into New Mexico, Arizona, and Utah, and borders Colorado, which makes Navajo the largest geographic land base American Indian

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reservation in the United States (Navajo Epidemiology Center, 2013). The Navajo language is the heart and soul of the Navajo culture and is an integral part of Navajo communities. It is pivotal because everything about a way of life such as cultural knowledge, prayer, song, ceremony, ritual, speech, and thought is based on how the people disseminate the information through the language (Lee, 2016). The Navajo language is the most widely used among all Native American tribes in the United States. During the 2010 United States Census, approximately 169,471 Navajo tribal members spoke the language, nearly nine times larger than the second and third most commonly spoken languages of Yupik and Dakota, with both languages having approximately 19,000 speakers (Siebens & Julian, 2011).

Unfortunately, today, in the 21st century, that is rapidly changing. Over the last couple of decades, the Navajo Nation has watched as other languages, like that of the Eyak, an Alaskan tribe, or the Lake Miwok, a tribe in California, became extinct or dormant (Denetclaw, 2017). The dramatic shift toward English due to public education and mass media is jeopardizing the survival of the Navajo language. The preservation of the Navajo culture and language has been a paramount challenge for the Dine' People for the past century, beginning with the dominance of the Anglo/Western society (Holm & Holm, 1995). In the state of Arizona, recent legislature to enforce English language use only in public schools has threatened several Navajo language programs at various schools within the Navajo Nation. English-only is another battle that Navajo educators must deal with when it comes to the survival of the Navajo language. The English-only policies advocated by the United States Government for the last four decades have adversely affected the speaking and survival of the Navajo language (Crawford, 1996).

On several levels, the language appears to remain strong and viable, but on others, the telltale signs of impending extinction are becoming apparent (Benally & Viri, 2005). A large percentage of Navajo K-12 students today cannot speak or communicate in the Navajo language. Navajo language teachers now change their entire approach to teaching the Navajo language from focusing on literacy to Navajo as a second language (Denetclaw, 2017). According to the Department of Diné Education's Program Manager for the Office of Standards, Curriculum, and Assessment Development, with each new generation, students speak less and less Navajo; in fact, kindergartners speak English only (Denetclaw, 2017). The disinterest in the Navajo language from the younger generations demonstrates the dire issue that the Navajo people currently face. It is vitally important that children are exposed to their language at a very young age to ensure that they learn their native tongue. No exposure means that once kids start school in pre-school or kindergarten, they have none or barely any knowledge of the Navajo language. Present-day parents have accustomed themselves to speaking English all the time in their workplace, in public, and at home, so the emphasis on speaking Navajo is not a priority. The threat of extinction is very high if the trend continues.

In return, the threat of extinction has triggered language preservation efforts to ensure the survival of the Navajo language. Members of minority language groups have been, or are becoming, increasingly aware that an important linguistic and cultural tradition is disappearing, and some have chosen to take measures to try to stem this incipient loss of their heritage language (Villa, 2002). Recent efforts among the Navajo people have demonstrated this resolve to ensure that the Navajo language endures the test of time by reemphasizing the learning of the language in schools, community centers and

at home. An example of recent efforts to fight the decline of learning the Navajo language is Tsé Hootsooí Diné Bi' Olta,' an elementary immersion school in the Window Rock Unified School District in Ft. Defiance, Arizona that teaches its curriculum in the Navajo language to 133 students. According to the school's principal, the Navajo language and culture are at the backbone of the public school, and that is what continues to make Diné Bi' Olta' unique (Notah, 2017). All teachers are trained and certified to teach the Navajo language. The principle asserts that instilling Navajo values, culture, and tradition within the students can help combat the looming threat on Navajo land: the loss of the Navajo language (Notah, 2017).

Many schools within the Navajo Nation now have programs that promote and encourage the development and endurance of the Navajo language. Classes are being taught exclusively in the Navajo language, allowing students to immerse themselves in the language. The Navajo Nation Chief Manuelito Scholarship requires high school graduates to complete a Navajo language course equal to at least one high-school credit hour or at least one college credit and a Navajo Government course equal to 0.5 high school-credits or one college credit (Office of Navajo Nation Scholarship and Assistance, 2018) to qualify for funding. Indeed, decades of evidence from around the globe indicates that successful language revitalization efforts are rooted in community initiative, investment, and commitment (Fishman, 2001). Influences like the Navajo Nation scholarship requirement help to inspire the continued learning of the Navajo language for current and future generations.

The survival of the Navajo language is at a crossroads, and that is where learning via computer may play a pivotal role. Technology can play a vital role in Navajo

language revitalization and preservation. Indigenous peoples can engage with digital tools to supplement language documentation, revitalization, promotion, and education efforts. Furthermore, as existing technologies are reinvented, and new technologies emerge, additional domains for language use surface (Galla, 2009). Navajo educators need to adapt to the digital age, utilizing the technology of today to innovate and inspire the youth. Villa (2002) has noted that the recent explosion in technology presents opportunities to aid in efforts at learning or re-acquiring a heritage language. Although still lacking, compared to the rest of the United States, technology in and around the Navajo Nation has improved dramatically during the last decade. With a $32 million grant from National Telecommunications and Information Administration's (NTIA) Broadband Technology Opportunities Program, the Navajo Tribal Utility Authority is bringing a modern wireless communications system to a region that has been all too frequently bypassed by amenities that most Americans take for granted (NTIA, 2014). The project will serve 30,000 households, 1,000 businesses and 1,100 institutions (Smith, 2012). Navajo youth and their families will now have access to technological resources never available before. Just a decade ago, Internet access on the Navajo Nation was virtually nonexistent. Today, a considerable number homes and schools now have the resources to gain access to a computer and Internet.

The challenge now is to harness the power of technology to motivate Navajo children to learn the language. In the field of education, motivation has been identified as a critical factor affecting learning (Lim, 2004). Motivation in academics refers to the reasons students want to attend, engage in, and put effort into learning and achieving in school (Beck, 2004). The motivated student has the inner strength to learn, to discover

and capitalize on capabilities, to improve academic performance and to adapt to the demands of the school context (Ferreira, Cardoso & Abrantes, 2011). Student motivation is a challenge many schools on the Navajo Nation face today. Motivational factors when teaching Navajo children, who are normally quite shy and subdued, is of the utmost importance. Social motivations represent a person's perception of how others view his/her actions and what the effects of his/her behavior are on others' welfare and utility; these motivations have value in technology-mediated environments (Venkatesh, Morris, Davis, & Davis, 2003). Motivation is enhanced as students gain a sense of self-satisfaction as they can complete the text and task (Valerio, 2012). Affective and motivational factors are considered to be especially important for those students who are traditionally underrepresented and disadvantaged (National Mathematics Advisory Panel, 2008).

Motivating Navajo students to learn their native language using a computer has increasingly become easier during the last 20 years due to increased exposure to both modern technology and a changing ideology to learn via a computer. Many second and foreign language learning researchers have emphasized that motivation is one of the main factors in target language learning success and it plays an important role in predicting the success of target language acquisition in general (Rueda & Chen, 2005). Learning strategies reflect an individual's ability to use cognitive strategies effectively and consist of a students' perception of self-efficacy to set goals, maintain motivation and sustain a positive attitude toward learning (ChanLin, 2012). A culture of engagement may help to build and sustain children's motivation to learn a new language (Oga-Baldwin & Nakata, 2017). Additionally, Aghlara and Tamjid (2011) found out in their study that children

learning vocabulary by playing digital games are more motivated than children who are taught vocabulary through traditional methods. If our educators do not adequately address motivation and student engagement today, the cultural decline in work ethic and student performance may become a larger problem for future generations (Barger & Byrd, 2011). Although indigenous language loss and revitalization are not new topics for scholarships, nor are they new topics in the field of community activism (e.g., Grenoble & Whaley, 2002; King, 2001), increased attention has been paid in recent years to the ways that new technology can support efforts to teach and renew endangered languages (Hermes & King, 2013). By presenting a computer-based instructional program that teaches the Navajo language, students' intrinsic motivation to learn the language can be positively affected by the subject matter.

Static Pedagogical Agents

Replacing a typical face-to-face course with computer learning can result in many challenges that may challenge the learner's desire to learn. Not having a so-called *authority figure* to tell the learner when, what, where, why and how to learn can be an uphill battle, especially for young children and teenagers. Most people are accustomed to having a teacher stand in front of the classroom, teaching them the specifics of a subject. When learning via an online course, learners lose the presence of a teacher. Pedagogical agents can play a crucial role aiding the motivation and comprehension of content via e-learning. The use of a learning agent to present content and simulate interaction with the learner has been demonstrated to increase recall and engagement in some contexts and with some audiences (Unrein, 2011). The agent metaphor provides a way to operationalize and simulate the *human* aspect of instruction in a more ecologically valid

way than other controlled computer-based methods (Baylor, 2002). The use of pedagogical agents represents the attempt to introduce more pedagogical support and motivational elements into multimedia learning (Clark & Choi, 2005). The mere presence of an agent in the form of a teacher can help motivate a learner to follow the content much more closely and actively.

Research suggests that pedagogical agents can play many roles in the multimedia learning environment, such as demonstrating, scaffolding, coaching, modeling, and testing (Clarebout, Elen, Johnson, & Shaw, 2002). The advancement of existing software that utilizes pedagogical agents in computer-based instruction offers a powerful motivational tool in aiding the acquisition and retention of the instructional content. While the addition of an anthropomorphic interface agent to a learning system has a little direct impact on learning, it potentially has a huge impact on learner motivation (Baylor, 2011). The use of a pedagogical agent within an e-learning course in a sense takes the place of the teacher.

The presence of an *agent* demonstrates to the user of the program that a person is there to guide and direct them to the program. Pedagogical agents – lifelike characters that guide users through multimedia learning environments – are intended to facilitate the learning process (Domagk, 2010). According to Chen & Chou (2015), agents provide a new metaphor for human-computer interaction through their image, appearance, message, voice, and interactivity. Today, agents appear as characters that exhibit life-like behaviors such as speech, emotions, gestures and eye, head, and body movements. By rendering the system more human-like, users can rely on standard interaction skills (e.g., interpreting

the partner's facial expressions or considering eye contact) which makes the interaction with the computer much smoother (Dehn & Van Mulken, 2000).

Several research studies on the use of pedagogical agents focus on the use of animated versus static agents. For this study, the use of an agent will remain static to eliminate the need for the additional time and funding needed to develop animated agents. Tools designed to create animated characters, complete with expressive hand and head gestures and lip-synching, are often marketed to elearning designers as easy ways to improve learner engagement and retention of content; however, they can carry hefty price tags and dramatically increase production times over using static images (Unrein, 2011). Unrein has also concluded that his results do not support the use of an animated agent when extra time, software, and technical skills are required to develop an animated agent. When utilizing an animated agent, extra consideration regarding the use of video and memory needed by an animated agent, as well as bandwidth needed to handle an animated agent via the learner's computer and the Internet. Therefore, in this study, a static, non-animated pedagogical agent was investigated.

Gamification Practice

Using gamification practice to help students learn instructional content is another viable option for enhancing learning and motivation. Interest in learning through digital games has intensified in recent years, and researchers and teachers have been keen to harness the pedagogical benefits in classroom contexts (Chik, 2014). Games and gaming have played influential cultural and social roles throughout the development of civilization (DiPietro, Ferdig, Boyer, & Black, 2007). Playing games has been a key social element for Native American tribes for centuries. Gaming has ancient indigenous

roots in the Americas; it is associated with rituals of play and storytelling that connect the peoples to their communal origins and destiny (Luna-Firebaught & Fox, 2010). Cultural games associated with storytelling help Native American people connect to their origins. Gaming helped to preserve culture and ceremonies that in return, helped teach traditional values to community members. Traditional games played by American Indians had cultural or religious significance, and gaming was often a sacred act connected to myth, legend, and ritual (Luna-Firebaught & Fox, 2010). The use of games as a teaching tool allows learners to share in the wealth of knowledge in fun, yet traditional ways.

The main issue is to harness the power of educational gaming that benefits the learner. Games can help motivate people in otherwise nongame scenarios and engage users in high interaction (Basten, 2017). It is easy to see that children today are quite comfortable with technology. This *global* collective experience provides a lens through which our young people will learn, work, and live in a way not experienced by previous generations (DeVary, 2008). In fact, individuals in 67% of American households play computer or video games (Leaman, 2014).

In today's digital culture, youth play all types of electronic games. Computer games (hereafter, called *games*) have become an integral part of our social and cultural environment (Oblinger, 2004). Platforms include computers, video game systems, and mobile devices (e.g., tablets and smartphones). According to the Entertainment Software Association (ESA), in 2015, 26% of children under the age of 18 are considered regular players of computer and console games (ESA, 2015). Most often the games are used to motivate and engage people, and they include features such as achievement badges, levels to clear and other rewards (Roberts, 2014). The key is to capture this power and

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transform the power and popularity of gaming into an educational tool. This concept of gamification practice is also known as *gamification*. Gamification can be defined as the use of gamification mechanics in non-game scenarios to increase influence and encourage engagement in an activity (Luminea, 2013). Gamification serves as one of the facilitators that may *lure* a person out of him/her comfort zone by providing his/her with a worthy challenge, which is relatively safe, engaging and effortless (since the burden of *effort* is partially withdrawn by fun and engagement provided by the gamification platform; Kalinauska, 2014). This innovative technique has the potential to maximize learning for youth already familiar with this media platform. Research shows that by playing games in the classroom, students develop unique skills, participate in new roles, build literacy skills, solve problems, promote civics education and social responsibility and understand the world better from a professional perspective (Chaudhary, 2010). Gamified learning is particularly strong in helping to improve the retention of learning through techniques such as repetition, association, elaboration, and stories (Leaman, 2014).

Learning a new or second language is always difficult. Teaching children to learn by incorporating educational gaming is an excellent avenue to promote language comprehension and motive in a fun and exciting environment. The research on computer game-based language learning focuses on two perspectives: computer games as a virtual environment that supports language learning on its own and computer games as a tool or medium to facilitate collaborative learning (Ang & Zaphiris, 2008). Games in language learning are associated with intrinsic motivation, meaningful exposure to the target language, as well as perceived associations between children's language play and

second/foreign language learning (Meyer, 2013). Crookall (2007) claimed that the use of simulations and games are widespread and encouraged in language learning as the integration of game and simulation activities in language learning material has almost become a 'guarantee' of learner inclusion and creativity. Mubaslat (2000) emphasized that games in second language learning are effective because they provide motivation, lower students' stress, and give them the opportunity for real communications. Therefore, in this study, gamification practice for language learning was investigated.

Purpose of the Study

This study was designed to investigate the effects of static pedagogical agents and gamification practice in a computer-based instructional program on Navajo language vocabulary acquisition and cognitive load using a large sample of participants at a southwestern junior high school.

The role of technology as a resource for the instruction of language learners in increasing as educators recognize its ability to create both independent and collaborative learning environments in which students can acquire and practice a new language (Ghasemi, Hashemi, & Bardine, 2011). One of the advantages of using computer technology for language learning in the contemporary world is that language learners can choose the learning materials they are interested in or that are useful to them available at standalone computers or accessible via the Internet at school or at home with or without teacher support (Lee, Yeung, & Ip, 2016). This study was conducted in a classroom containing laptops at a junior high school.

The independent variables in the study were a static pedagogical agent and gamification practice. The static pedagogical agent consisted of two levels: static

pedagogical agent included or excluded. The static pedagogical agent, when included, took the form of a female teacher character. The gamification practice also consisted of two-levels: included or excluded. Gamification practice, when included, was made up of two Flash-based games for the practice section. Participants in the combination treatment saw both a static pedagogical agent and gamification practice.

The dependent variables in the study were Navajo vocabulary acquisition and cognitive load as represented by learning these language skills this way. Students attitudes and anecdotal observations of participants were examined in the form of students' overall and specific attitudes toward this novel computer-based approach for learning Navajo.

Addressed in the study are the following questions:

1. How does the use of static pedagogical agents versus no static pedagogical agents affect Navajo language vocabulary acquisition?

2. How does the use of gamification practice versus non-gamification practice affect Navajo language vocabulary acquisition?

3. What is the effect of the use of static pedagogical agents and gamification practice on cognitive load?

A computer-based Navajo language lesson was presented to seventh and eighth-grade students during their scheduled literature class using two static pedagogical agent treatments and two gamification practice treatments. Students in one static pedagogical agent treatment and one gamification practice treatment participated with a version of the computer lesson that contained both variables. Students in the other static pedagogical agent treatment group participated with a version that contained regular practice (no

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gamification practice). Students in the other gamification practice treatment group participated with a version that contains no static pedagogical agent. Students in the final treatment group participated with a version of the computer lesson that contains neither the use of a static pedagogical agent or gamification practice.

A computer-based, twenty-item posttest was used to assess student achievement. At the completion of the Navajo language program, a thirteen-item questionnaire to measure student attitudes and the cognitive load was handed out. The survey contained three sections. The first section contained five questions to measure student attitudes. The second section contained six questions to measure cognitive load using a variation of the NASA Task Load Index. The last section contained two open-ended questions to allow students to express their opinions about the program.

CHAPTER 2

Method

Participants

Participants in this study consisted of 151 seventh and eighth graders from a junior high school in the southwestern United States. Note that the school is not located on the Navajo Nation. The junior high school is in a middle-class socioeconomic area of a large southwestern city. The ethnic background of students in this school is predominantly white with a few students representing other minority groups. The reason why a school located on the Navajo Nation was not selected to conduct the study was that Navajo students' prior knowledge and daily exposure to the Navajo language could potentially skew the results of the posttest. Although the program is ultimately designed and developed to benefit the children of the Navajo Nation, for research purposes, I conducted the study at a school where most, if not all, participants had no to very little prior knowledge of the Navajo language.

The students who participated in the study did so during their regularly scheduled literature class. All the students had the required minimum computer skills to participate in the experiment. The age of the participants was of particular importance in this study, as many studies have indicated that learning a second language is best at a young age. Famous linguist Eric Lanneberg's critical period hypothesis (1967) suggests that there is a biologically determined period of life when language can be acquired more easily (Karavasili, 2017). The critical period hypothesis holds that primary language must occur during a critical period which starts at about the age of two years and ends at puberty (around the age of 12 of 13) with the establishment of lateralization of the language

function (Murad, 2006). Because children are "indifferent to contradictions" and with maturity they seek to find a resolution for the "ambiguities about them," once they reach the age of 14-15, learning a second language seems overwhelming, raising their inhibitions (VanSickle & Ferris, 2013, p. 8). All students participating in the study were required to have parental permission before participation. Appendix A contains the parental letter of permission. Students whose parents did not sign the parental permission form participated in an alternate activity not related to the study.

Materials

Beginning Navajo Words and Phrases (Shurley, 2018) was designed and developed with Articulate Storyline 360 (Articulate 360, 2018), with the gamification practice and static pedagogical agent developed using a third-party vendor named eLearning Brothers (eLearning Brothers, 2018). The program consists of two lessons containing content to teach essential Navajo words and phrases and family relations, two vital concepts when teaching beginning Navajo language (Wheeler, 2013). *Beginning Navajo Words and Phrases* is available for use on both Windows and Macintosh operating formats, as well as mobile devices. The class contained laptops utilizing the Windows operating system. Each student was assigned a laptop that they retrieved at the beginning of class.

Beginning Navajo Words and Phrases follows a set path that *forces* them to review a lesson on essential Navajo words and phrases and a lesson on Navajo family relations. Each lesson contains interactive buttons that the learner clicks to hear the Navajo pronunciation of Navajo words and phrases and family relations. The screen containing the interactive buttons with audio pronunciation of Navajo words and phrases

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and family kinship has the Next button disabled until the learner clicks on each button, thus forcing the learner to review each Navajo word before he or she can continue to the next section of the lesson. The objectives of the course center on the participant being able to identify and select the correct Navajo term based on the audio translation they hear.

The following outline illustrates the framework of the Navajo language computer-based training:

1. Introduction Page

    a. Learner ID entry

    b. Introduction/Objectives

        i. Objective 1: Given the audio translation of the 10 essential words or phrases, you will be able to identify the correct term.

        ii. Objective 2: Given the audio translation of the 10 family kinship words, you will be able to identify the correct term.

2. Essential Navajo Words and Phrases (Objective 1)

    a. Ten interactive buttons (Hello, Eat, How much? etc.)

3. Essential Navajo Words and Phrases Practice/Gamification Practice

    a. A screen displays four essential Navajo words or phrases with voice-over narration pronouncing one of the words/phrases. The learner chooses the correct word/phrase heard, with

immediate correct feedback following a correct or incorrect choice.

4. Family Kinship

    a. Ten interactive buttons (e.g., Mother, Father, Older Sister, Maternal Grandfather)

5. Family Kinship Practice/Gamification Practice

    a. A screen displays four family relations with voice-over narration pronouncing one of the family kinships. The learner chooses the correct family kinship term heard, with immediate correct feedback following a correct or incorrect choice.

6. Conclusion

7. Quiz

    a. Twenty quiz questions

    b. A screen displays four Navajo words/phrase and family kinship with voice-over narration pronouncing the word/phrase. The learner chooses the correct word/phrase heard, with immediate correct feedback following a correct or incorrect choice.

    c. Results slide with a final score

8. Exit Course

The beginning of the Navajo language program presents introductory material regarding essential Navajo words and phrases and family kinship. All four versions of the Navajo Language program include: (a) an introduction to the Navajo language program that includes prompts for the user to enter their first and last name and the course

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objectives, (b) interactive instructional screens for both essential Navajo words and phrases and family kinship, (c) practice to ensure Navajo language comprehension and (d) a posttest.

The content in the *Beginning Navajo Words and Phrases* program focuses on a variation of ten critical words or phrases in any language and Navajo kinship. The ten critical words or phrases are unique because these are words that are universal in any language to communicate (Quora, 2011). The Navajo kinship words are culturally significant because kinship is at the heart of the Navajo beliefs. These are words that children learn at a young age to identify the family. *Beginning Navajo Words and Phrases* contains two types of treatments, static pedagogical agent (included or excluded) and gamification practice (included or excluded).

Figure 1. Navajo language program with first and last name prompt (No static agent treatment).

Figure 1 illustrates the *Your Information* screen that prompts users to input their first and last name. Figure 1 illustrates the no static agent treatment. The purpose of this screen is to personalize the experience. The user's first name appears in several instructional screens and the final quiz score screen. Appendix B contains the screenshots for the static pedagogical agent with gamification practice.

Figure 2. Course objectives slide with the first name displayed (No static agent treatment).

Figure 2 demonstrates the personalization of the Navajo greetings instructional screen by calling out the users by their first name on the Course Objectives slide. Figure 2 also illustrates the no static agent treatment.
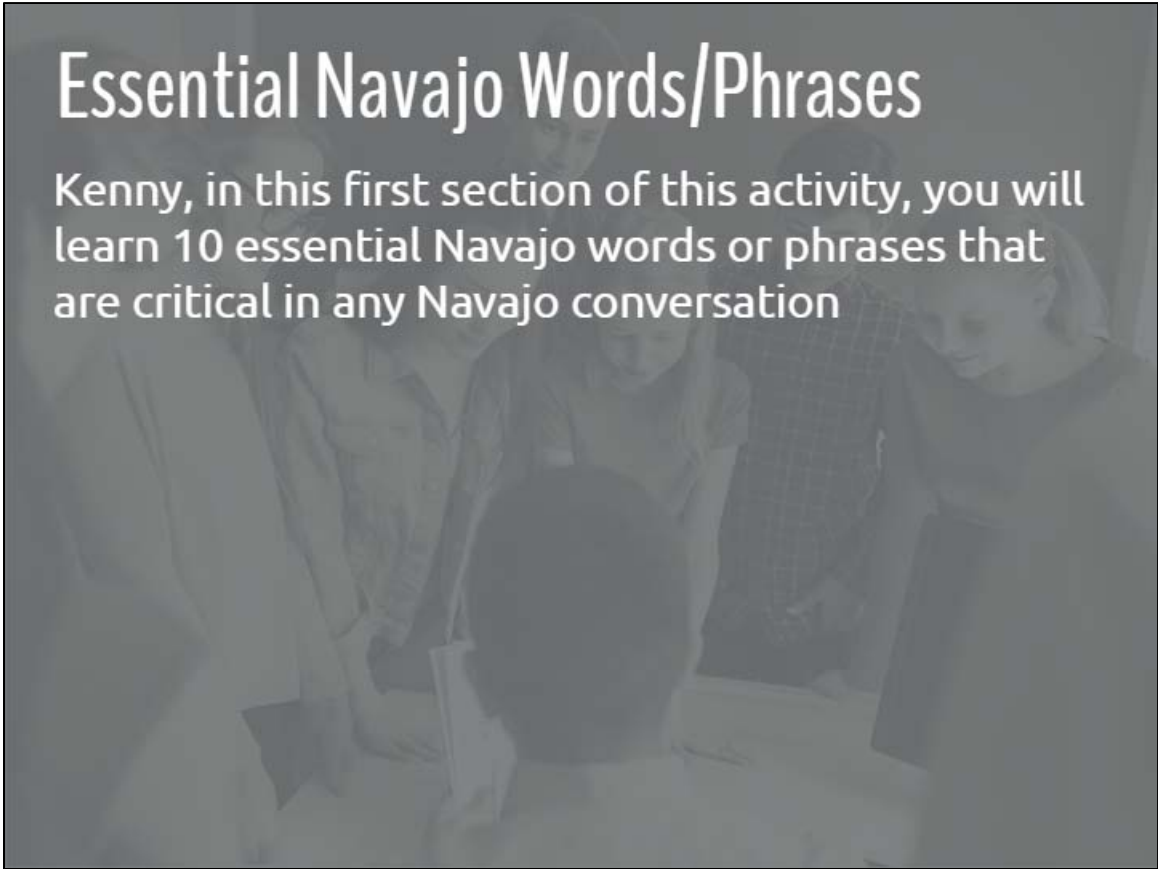
Figure 3. Essential Navajo words/phrases instructions slide with the first name displayed (No static agent treatment).

Figure 3 demonstrates the personalization of the Navajo greetings instructional screen by calling out the user by their first name on the Navajo Greetings instructional slide. Figure 3 demonstrates the no static agent treatment.
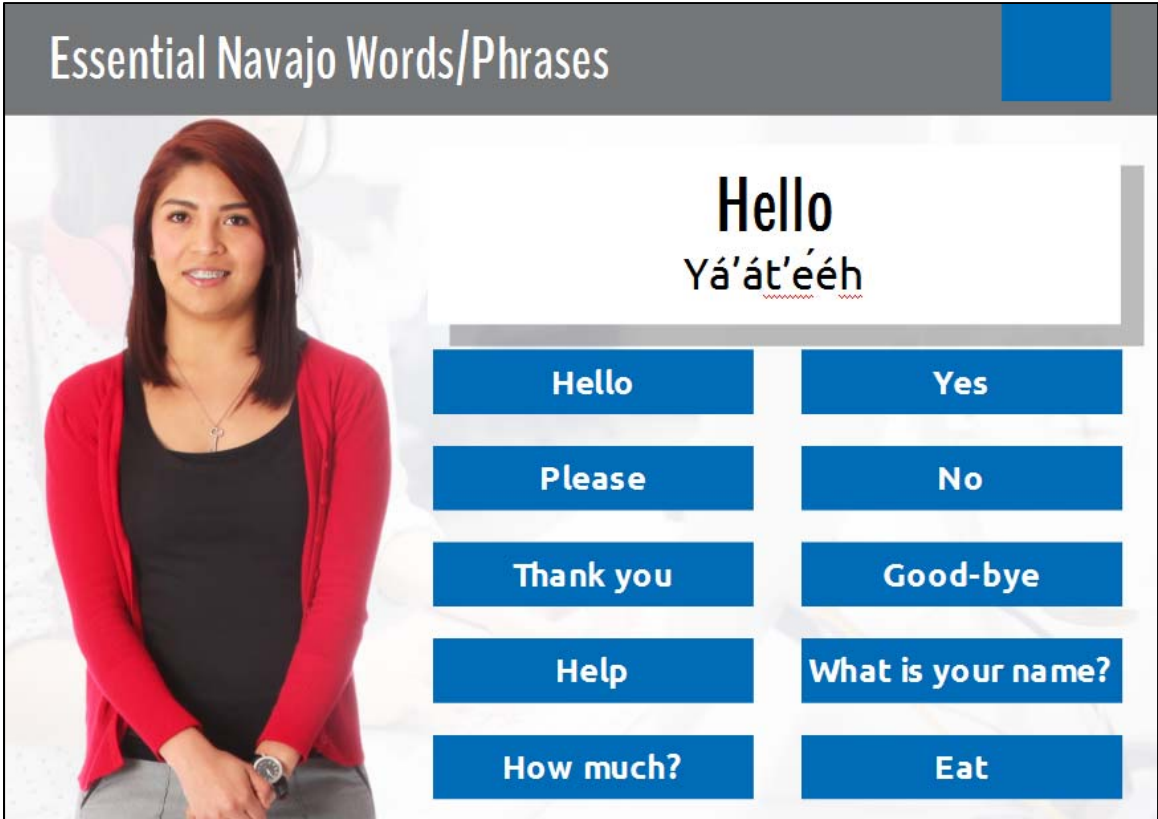
Figure 4. Navajo language program with a static pedagogical agent.

Figure 4 illustrates an instructional screen containing a static agent. This version of the computer-based training displays the Navajo content with a static agent to replicate the appearance of an *authority figure* teaching the course. The static agent used to represent a *teacher* figure is young and has the appearance of a Navajo woman, complementing the voice of the narrator.
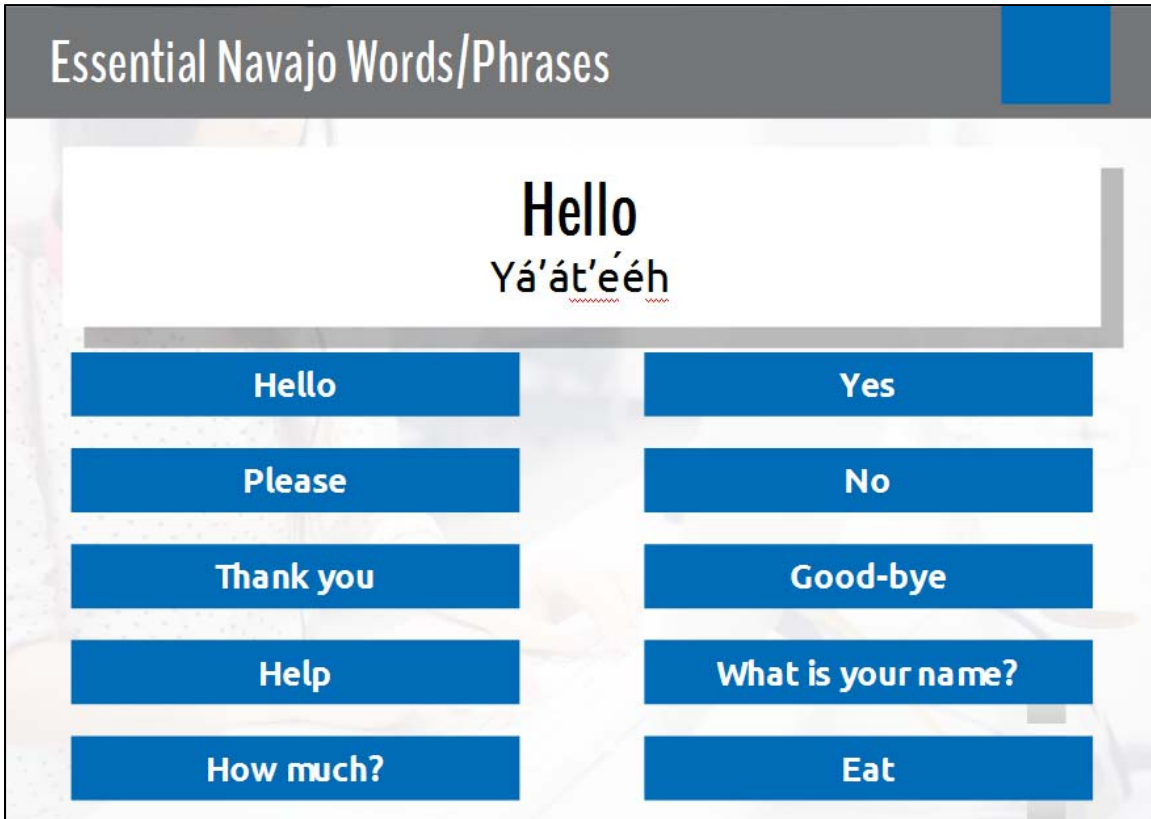
Figure 5. Navajo language program with no static pedagogical agent.

Figure 5 illustrates the same instructional screen, but with no static agent. This version of the computer-based training contains no static agent, with only the Navajo content displayed.

At the completion of the interactive Navajo language instructional screens, there is a practice section for each topic. Each practice section consists of ten questions. The practice sections also incorporate positive feedback for both correct and incorrect answers. If the learner did not select the correct answer, the correct answer is automatically displayed. Feedback on incorrect answers also includes the option to review the content so that the learner has the opportunity to review and reinforce incorrect answers.
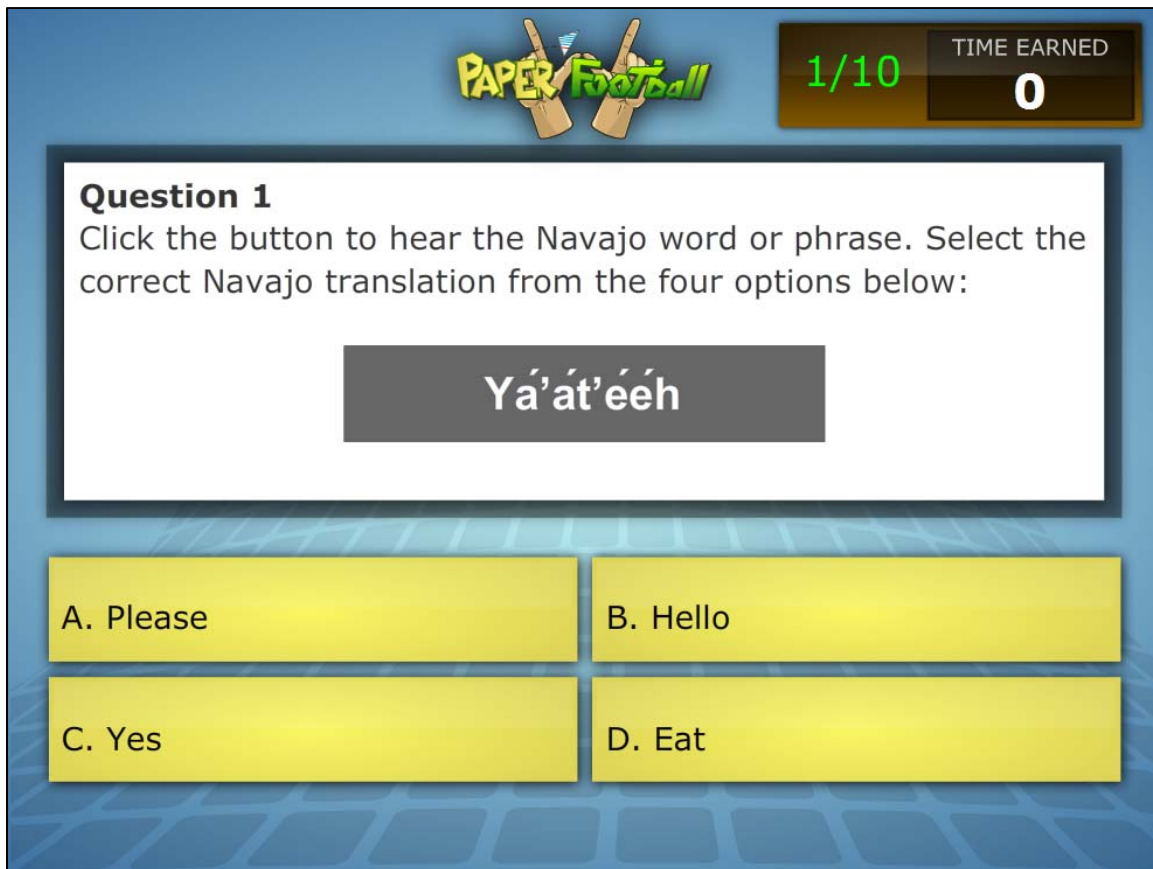
Figure 6. Navajo language program with gamification practice.

At the completion of each lesson, the learner then has the chance to practice the

Navajo language comprehension content in the form of a multiple-choice *quiz* or a game.

Figure 6 displays the gamification practice in multiple-choice format. The gamification

practice does not contain an agent. The gamification practice is an interactive game that

rewards students for questions answered correctly by awarding more time to play the

game at the end. For every question answered correctly, ten seconds add to the timer. For

every question answered incorrectly, five seconds is deducted from the total time. The

goal is to answer as many questions correctly to have more time, in the end, to play the

game and score as many points as possible. The gamification features include time and

points for motivation. At the end of each practice set, an object moving back and forth on the screen launches at a target. Participants must utilize skill and timing to ensure they score a point. Launching the object at the stationary target is accomplished by clicking the mouse at the precise moment. The interaction of the game allows students to become fully involved in the game by enforcing the use of timing skills. This version illustrates the use of gamification practice as a method for users to practice the Navajo content just learned.

Figure 7 displays practice with no gamification practice in multiple-choice format. This version of the program also allows the user to practice the Navajo content just learned, but without the gamification practice.
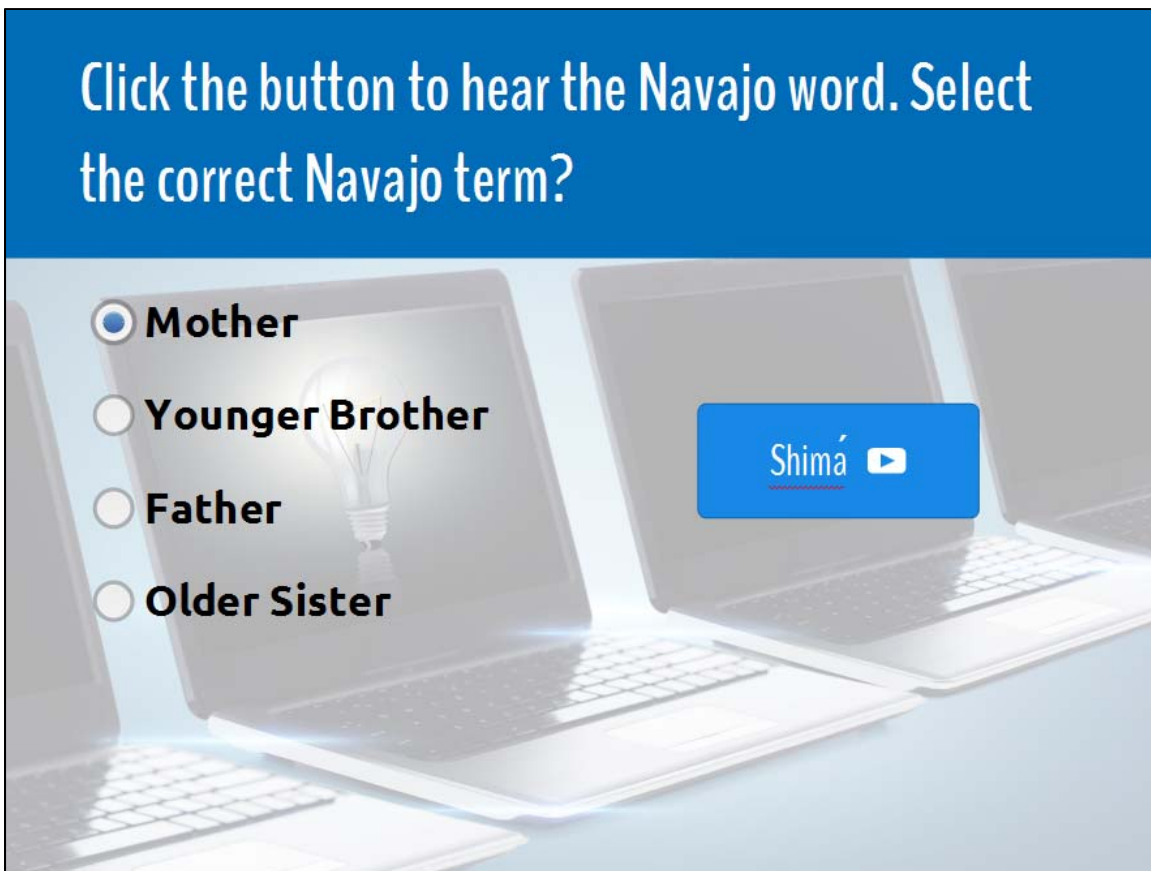
Figure 7. Navajo language program with no gamification practice.
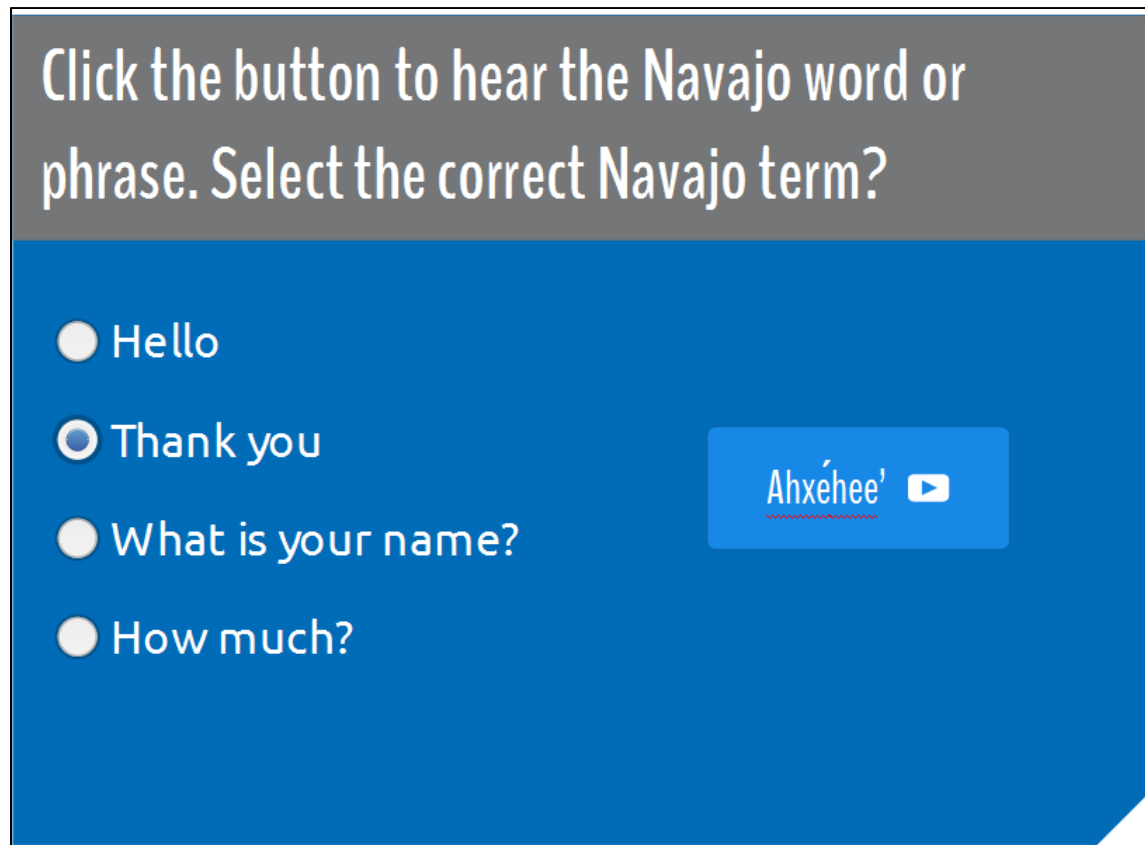
Figure 8. Navago language program posttest question (essential Navajo word/phrase).

Once the students complete the practice sections for both essential Navajo words and phrases and family kinship, students complete a twenty-question posttest to measure their overall vocabulary acquisition on both objectives. The posttest for all four treatment groups is identical. The students have one chance to get the answer correct. Figure 8 displays a posttest question on essential Navajo words/phrases containing a button allowing the learner to replay the Navajo pronunciation of the word.

Once the twenty-question quiz is complete; learners receive a results screen showing their score. The learner sends a screenshot of the posttest results to a printer in the classroom. Posttest data are then collected and securely stored in a folder for data analysis. The posttest data contain the overall score on a 100% scale.

Procedures

A parental slip asking for students' permission to participate in the Navajo language study was sent home with students several weeks before the study was conducted. Once all permission slips were received, a class roster was initially used to randomly assign learners to four treatment groups (static pedagogical agent with gamification practice, a static pedagogical agent with traditional multiple-choice questions, not a static pedagogical agent with gamification practice, and no static pedagogical agent with traditional multiple-choice questions). Students whose parents did not approve of their participation in the study completed an alternate assignment. Appendix C contains the child assent form.

The data collection all occurred within one day. The seventh and eighth-grade literature class at the school was utilized to run the study. The literature class contained school-issued laptop computers with earphones. There were approximately forty laptops in the classroom. Random assignment was initially used to assign students to the four treatment groups. Students accessed a centralized Google Classroom intranet site utilized for class announcements and assignments. The teacher determined that this method of access was the best method for students in the classroom to access the four different treatment groups. The computer-based program of the four different treatment groups made available to the literature course's website. Link 1 was named *Beginning Navajo Words and Phrases* (G-A), which represented the research variable group that contained both the gamification practice and static pedagogical agent. Link 2 was named *Beginning Navajo Words and Phrases* (G-NA), which represented the research variable group that contained the gamification practice and no static pedagogical agent. Link 3 was named

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Beginning Navajo Words and Phrases (NG-A), which represented the research variable group that contained no gamification practice and static pedagogical <u>agent</u>. Link 4 was named *Beginning Navajo Words and Phrases* (NG-NA), which represented the research variable group that contained no gamification practice and <u>no</u> static pedagogical <u>agent</u>.

As students arrived at the classroom, they took a laptop, sat at their desk and powered up the laptop. Once the bell rang to signify the period was starting, the teacher notified the students that they would be taking the Navajo language program. I was then introduced to the class and briefly explained the importance of the study and the cultural significance of the Navajo language. Navajo cultural introduction included a very brief introduction to the location of the Navajo Nation and the dangers of language extinction if steps are not taken to revive the Navajo language among the youth. The historical significance of the Navajo Code Talkers and the role the language played in World War II was stressed to the students.

Students were assigned to click on a link based on their assigned treatment group. An unusually higher number of participants selected link 1, *Beginning Navajo Words and Phrases* (G-A), which was the link located on the top of the list compared to the other treatment groups. The number of participants selecting link 1 resulted in unequal cells since a higher number of students completed the treatment with gamification practice and static pedagogical agent. The total number of participants who clicked Link 1 was 57. Link 2, *Beginning Navajo Words and Phrases* (G-NA), was selected by 28 participants. Link 3, *Beginning Navajo Words and Phrases* (NG-A), was selected by 25 participants. Link 4, *Beginning Navajo Words and Phrases* (NG-NA), was selected by 33 participants. Thus, the treatment with a static pedagogical agent and gamification practice was

completed by almost twice the number of participants as compared to the other treatment groups.

Earphone usage by each learner guaranteed no outside noise or distractions interfered with students completing the study. Completion time for the Navajo language program varied from twenty-forty minutes. Once the learners completed the program and submitted their scores, they raised their hands to confirm they completed the program visually. As students raised their hand, the teacher or I walked up to the student and handed the paper-based survey for the student to complete. Once they completed the survey, students raised their hands again, and the teacher or I collected the surveys. Unfortunately, the paper-based surveys included no information about each student's treatment group and were analyzed as one group.

Measures

The posttest measuring vocabulary acquisition contained ten questions measuring performance on Objective 1 essential Navajo words or phrases and ten questions for Objective 2, family kinship, for a total of twenty questions. The twenty posttest questions on essential Navajo words or phrases and family kinship contained four multiple-choice options for each question. The audio for the specific Navajo word or phrases or family kinship automatically played once the user advanced to each question. A replay button was available if the user wished to hear the audio again. Instructions on top of each screen instructed the user to select the correct answer based on the audio they heard. Figure 9 displays a posttest question on Navajo family kinship. Appendix D contains all twenty posttest questions.
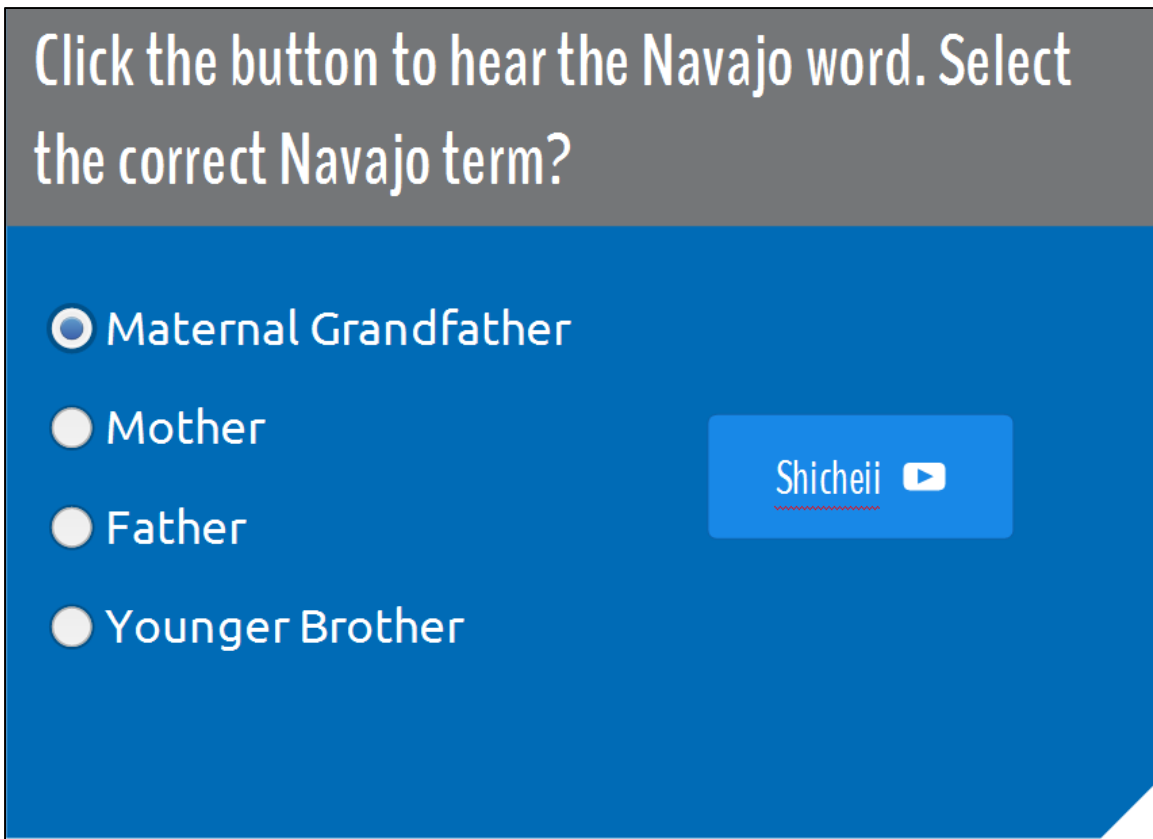
Figure 9. Navajo language program posttest question (Family relations).

Attitudinal data were collected at the end of the *Beginning Navajo Words and Phrases* computer-based program to assess the learners' perceptions about the program and its cognitive load. Learners were handed a paper-based survey to complete. The attitudinal survey consisted of 13 questions. 11 questions based on a 1-5 scale, (1 = *strongly disagree* to 5 = *strongly agree*), and two open-ended questions. Questions 1-5 assessed students' attitudes and questions 6-11 assessed cognitive load. Note that the attitudinal data collected were not separated by research variables. Survey data were collected to produce students' attitudes toward the Navajo-language computer program. Appendix E contains the *Beginning Navajo Words and Phrases* survey.

The attitudinal section of the survey (Questions 1-5) measured the student's opinion of the Navajo language program based on their impressions after completing the course. Figure 10 displays the five attitudinal survey questions from the *Beginning Navajo Words and Phrases* survey.

The computer program was fun:

1	2	3	4	5
Strongly Disagree				Strongly Agree

The computer program kept me interested:

1	2	3	4	5
Strongly Disagree				Strongly Agree

I learned a lot from this computer program:

1	2	3	4	5
Strongly Disagree				Strongly Agree

The computer program was easy to navigate:

1	2	3	4	5
Strongly Disagree				Strongly Agree

Overall, this is a good computer program:

1	2	3	4	5
Strongly Disagree				Strongly Agree

Figure 10. Student attitudinal survey questions (Questions 1-5).

Figure 11 displays the six NASA Task Load Index survey questions (Questions 6-11) from the *Beginning Navajo Words and Phrases* survey to measure cognitive load.

The computer program was challenging?

1	2	3	4	5
Strongly Disagree				Strongly Agree

The computer program was physically demanding?

1	2	3	4	5
Strongly Disagree				Strongly Agree

Doing this computer program felt rushed?

1	2	3	4	5
Strongly Disagree				Strongly Agree

I was successful in completing this program?

1	2	3	4	5
Strongly Disagree				Strongly Agree

I had to work hard to complete the program at a satisfactory level of performance?

1	2	3	4	5
Strongly Disagree				Strongly Agree

The computer program was stressful?

1	2	3	4	5
Strongly Disagree				Strongly Agree

Figure 11. Cognitive load survey questions (Questions 6-11).

Motivational factors can help to determine the degree to which the use of static pedagogical agents and gamification practice are a useful means to teach language concepts. Cognitive load was measured using a variation of the NASA Task Load Index survey. NASA-TLX is a multi-dimensional scale designed to obtain workload estimates from one or more operators while they are performing a task or immediately afterward (Hart, 2006). The NASA Load Index survey was adapted from a variation of Dr. Michael Cottom's survey to use a five-point scale. The five-point scale was utilized due to the age of the students and to simplify their understanding of the cognitive load questions. The NASA Task Load Index contains six subscales that represent the following variables: Mental, Physical, Temporal Demands, Effort, Performance, and Frustration. It has been cited in over 550 studies, and a recent search for "NASA-TLX" on Google Scholar revealed over 4,820 articles (Sharek, 2011).

The first question, on *Mental Demand*, asked students if they thought the Navajo language program was challenging. The second question, on *Physical Demand*, asked students if they thought the program was physically demanding. The next question, on *Temporal Demand*, asked the students if the computer program felt rushed.

The fourth question, on *Effort*, asked students if they felt successful in completing the program. The fifth question, on *Performance*, asked students if they had to work hard to complete the program at a satisfactory level of performance. The final question, *Frustration*, asked students the degree to which they thought the program was stressful.

Design and Data Analysis

   A posttest only, experimental 2x2 (condition 1: static pedagogical agent excluded and included; condition 2: gamification practice excluded and included) factorial design was used in this study. Posttest and survey results were gathered and entered into SPSS for analysis. Due to unequal cells, Dr. Robert Atkinson (R. Atkinson, personal communication, February 6, 2017) indicated a concern with the homogeneity of variance, one of the assumptions underlying the parametric statistical analysis. Dr. Atkinson suggested the Levene's test for equality of variances. Based on the results, if the assumption were violated, I would have to use the more conservation F-value to establish significance.

CHAPTER 3

Results

Results for the vocabulary acquisition posttest and the attitude and cognitive load survey are presented below in the same order as the three research questions. The first and second research questions related to the effects of the use of static pedagogical agents and gamification practice on the acquisition of the Navajo language vocabulary.

Vocabulary Acquisition

Presented in Table 1 are the means and standard deviations for vocabulary acquisition by a static pedagogical agent (excluded and included) and gamification practice (excluded and included). The overall M score for all students was 72.75 ($SD =$ 15.87) out of a possible 100 points on the vocabulary acquisition posttest. The M score for students in the gamification practice excluded treatment was 71.74 ($SD = 16.30$), whereas the overall M score for students in the gamification practice included treatment was 73.51 ($SD = 15.50$). The overall M score for students in the static pedagogical agent excluded treatment was 73.33 ($SD = 15.33$), and the overall M score for students in the static pedagogical agent included treatment was 72.33 ($SD = 16.23$). Students receiving no treatment (both gamification practice and static pedagogical agent excluded) achieved an M score of 72.58 ($SD = 14.88$), whereas students in the static pedagogical agent only (gamification practice excluded) treatment scored an M of 70.91 ($SD = 17.56$). The M score for students in the gamification practice only treatment (static pedagogical agent excluded) was 74.17 ($SD = 15.76$) which is one point higher than the M score of 73.16 ($SD = 15.35$) for the combination treatment of gamification practice and static pedagogical agent.

Table 1

Means and Standard Deviations for the Vocabulary Acquisition Measure

Gamification practice	Static pedagogical agent excluded	Static pedagogical agent included	Total
Gamification practice excluded			
M (SD)	72.58 (14.88)	70.91 (17.56)	71.74 (16.30)
n	33	33	66
Gamification practice included			
M (SD)	74.17 (15.76)	73.16 (15.35)	73.51 (15.50)
n	30	57	87
Total			
M (SD)	73.33 (15.33)	72.33 (16.23)	72.75 (15.87)
n	63	90	153

Note. Total possible posttest score of 100.

A 2x2 Analysis of Variance (ANOVA) was conducted to examine the effects of
the static pedagogical agent treatment and the gamification practice treatment on
vocabulary acquisition posttest scores. Table 2 presents a summary of the ANOVA
scores. The ANOVA yielded no significant differences for any of the variables, nor were
there any interaction results.

Table 2

ANOVA Summary Table for Vocabulary Acquisition Posttest Scores by Gamification

Practice and Static Agent Conditions

Source	Df	F	p	Partial η_p^2
Gamification practice treatment	1	.51	.47	<.01
Static pedagogical agent treatment	1	.25	.62	<.01
Gamification practice X static pedagogical agent	1	.02	.90	<.01
Error	149	.16		

At the completion of the program, students answered an attitude survey containing a set of Likert-type questions used to measure student attitudes about the design of the program. The attitude survey was one survey consisting of three parts: a five-item section on student attitudes, a six-item section on cognitive load, and two open-ended questions. The paper-based surveys were analyzed as one group and not collected by treatment group. Because the surveys were collected, no ANOVA could be conducted on the attitude/cognitive load measures.

Table 3 presents the *M* scores and *SD*s on the five-item attitude questionnaire. Questions presented in the order in which they appeared to the students. A five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*) was used to record student responses. Thus, a higher number indicates stronger agreement with the given statement. *M* total scores ranged from 2.70 (*SD* = .07) to 4.59 (*SD* = .04).

Table 3

Descriptive Statistics for Student Attitude Survey Questions

Question	*M*	*SD*	*N*
The computer program was fun	3.86	.13	155
The computer program kept me interested	3.94	.06	155
I learned a lot from this computer program	2.70	.07	157
The computer program was easy to navigate	4.59	.04	156
Overall, this is a good computer program	4.47	.05	155

Note. Scores range 1-5: 1 = *strongly disagree* to 5 = *strongly agree*.

The first five questions captured students' attitudes toward *Learning Basic Navajo Words and Phrases* program. In response to Question 1 regarding students' perception of how fun the program was, students' responses yielded an *M* rating of 3.86 (*SD* = .13). Students with Question 2 rated how much the computer program kept them interested,

with an *M* rating of 3.94 (*SD* = .06). Question 3, "I learned a lot from the program,"

resulted in an *M* rating of 2.7 (*SD* = .07). On Question 4, students positively rated how

easy the program was to navigate with an *M* score of 4.59 (*SD* = .04). Finally, on

Question 5, students indicated they thought the program was good with an *M* score of

4.47 (*SD* = .05).

Cognitive Load

As did Cottam (2010), the Cognitive Load measure used was an adaption of the

NASA-TLX (Hart & Staveland, 1988) measure and consisted of six questions on the

attitude questionnaire designed to address various aspects of cognitive load. All questions

were scored on a five-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly*

agree). Five of six questions were worded in such a way that a lower score indicates a

more positive attitude. Question 4 is opposite of that. A higher score for Question 4 is

considered more positive. Each result is presented below. Table 4 presents the *M* scores

and *SD* of the six cognitive load questions.

Table 4			
Descriptive Statistics for Cognitive Load Survey Questions			
Question	*M*	*SD*	*N*
Mental demand: The computer program was challenging	2.99	.10	155
Physical demand: The computer program was physically demanding	1.74	.11	153
Temporal demand: Doing this computer program felt rushed	1.95	.12	151
Performance: I was successful in completing this program*	4.02	.06	147
Effort: I had to work hard to complete the program at a satisfactory level of performance	3.41	.08	151
Frustration: The computer program was stressful	1.71	.13	152
Note. Scores range 1-5: 1 = *strongly disagree* to 5 = *strongly agree*.			
*Question 4 was worded such that a higher mean score was more positive.			

Mental demand. The overall M for the question, "The computer game was challenging" was 2.99 ($SD = .97$).

Physical demand. The question, "The computer program was physically demanding" had a 1.74 ($SD = .11$) overall M rating for all students.

Temporal demand. The question, "Doing this computer program felt rushed" had an overall M rating of 1.95 ($SD = .12$).

Performance. Only this question, "I was successful in completing this program" was positively worded. The overall M rating for all students was 4.02 ($SD = .06$).

Effort. The question, "I had to work hard to complete the program at a satisfactory level of performance" had an overall M rating for all students of 3.41 ($SD = .08$).

Frustration. The overall M rating for the question, "The computer program was stressful" was 1.71 ($SD = .13$).

Open-ended Survey Question Responses

Students responded to two open-ended questions at the end of the attitude survey. Presented below in the order they appear on the survey are the results for each question, followed by examples of student responses for each question.

What students liked best about the Beginning Navajo Words and Phrases program. The first open-ended question was, "*What did you like best about the program*?" Appendix F displays the complete list of students' open-ended survey responses. A summary of participants' responses is found in Table 5.

Table 5

Student responses to Question 12 on the Beginning Navajo Words and Phrases Survey

Question: "What did you like best about the program?"	Frequency	Percentage
Human-computer interaction	62	35%
Excited to learn a new language	34	19%
Enjoyed gamification practice	33	19%
Easy, simple to use	16	9%
Computer program was fun	15	8%
Time as motivation (Game variable)	9	5%
Interesting	6	3%
Boring	3	2%
Total responses	178	100%

Note. Some students' answers yielded multiple responses; thus, the total number of responses was higher than the 151 students who responded. Percentages based on 178 total responses.

There were 178 responses to this question, made by 151 of the 153 participants in the study, indicating that several students made more than one response and that a few participants did not answer the question. The responses were analyzed by the frequency of occurrence based on various themes which emerged in their responses. Some participants provided more than one response to these two questions. The responses to the question list in rank order of occurrence based on several observed themes. The numbers provided specify the total number of responses of 178. The percentages are based on the total number of responses, 178, for each theme. Sixty-two responses of learners indicated they liked the human-computer interaction (35%) of the program because of the interaction and experience they had navigating through the program. An example of a learner response is, "I liked that you repeat the audio to be able to get a different way to remember the words. Also, I liked that it gave lots of information and direction to be able to know exactly what your doing." Thirty-four comments (19%) indicated that

participants were excited to learn a new language. Another learner response that demonstrated the excitement to learn a new language is, "I liked that I got to learn simple phrases and kinship words. This was especially interesting because I am a Navajo Native American. Although, I've only been exposed to a small portion of the language, it boosted my interest to learn the whole language." That statement is extremely powerful because it demonstrates that the Navajo language program has already made a tremendous impact on the life of one student by encouraging that student to learn more about their culture and language. Thirty-three (19%) responses were that students liked the gamification practice. An example of a learner response regarding gamification practice is, "I enjoyed the games. I was motivated to do well to play them." Sixteen (9%) responses indicated that they thought the program was simple and easy to use and fifteen (8%) that the computer program was fun. Nine (5%) responses mentioned time as motivation (game variable only) and six (3%) mentioned the program was interesting. Three (2%) mentioned that they thought the program was boring.

Program improvement. The final open-ended question was, "How could we make this program better?" Table 6 displays a summary of participant responses. Once again, we will describe the overall results and then discuss a few examples from each response.

Table 6

Student responses to Question 1 on the Attitudinal Survey

Question: "How could we make this program better?"	Frequency	Percentage
Instructional design	75	46%
Navajo language content	25	15%
Gamification practice	24	14%
Nothing	17	10%
Voice-over	11	7%
Human-computer interaction	6	4%
Time constraints	6	4%
Total responses	164	100%

Note. Some students' answers yielded multiple responses; thus, the total number of responses was higher than the 147 students who responded. Percentages based on 164 total responses.

There were 164 responses to this question, made by 147 of the 153 participants in the study. The responses to this question were examined by the frequency of occurrence centered on various themes determined based on the results received. Several participants provided more than one item that they liked or disliked in their response. The answers to the question listed in rank order of occurrence based on several observed themes. The numbers provided indicate the total response and the percentage based on the total number of responses for each theme. Seventy-five responses of learners suggested that portions of the instructional design (46%) could be enhanced to improve the overall experience of the user. An example of a learner response regarding the design of the program is "To improve this program; I would give the audience a little bit more practice. Specifically, in the kinship portion of the assessment." Twenty-five comments (15%) recommended that the Navajo language content could be improved. A learner response included, "make it more interesting like more colors." Another learner requested to "Add

more family members, like cousins and aunts and uncles." Twenty-four (14%) indicated that gamification practice was needed or had to be improved. Based on several learner responses, it was highly noticeable which participants were not in the gamification practice treatment, based on the request to incorporate games into the program. An example of a learner response requesting gamification practice is "adding a quick little game before the test…such as a matching game to review all the words." Seventeen (10%) thought the program was fine and no improvements were needed and eleven (7%) thought the narrator could be improved. Nine (4%) mentioned time, and an additional nine (4%) mentioned the human-computer interaction could be enhanced.

Anecdotal Observations

Anecdotal observations during and after implementation of the *Beginning Navajo Words and Phrases* program also revealed pleasing results. The school day consisted of six class periods. At the completion of every class period, several students would approach me to ask questions about the Navajo language and culture, as well as to offer praise about the program. Their interest in Navajo language and culture opened their eyes to the various cultural aspects of Arizona. Many students indicated that they have heard of the Navajo people, but did not know much about the culture, language, or where they resided. Several students indicated they were enlightened to learn a new language, albeit, it consisted of a few words and phrases. One student approached me to thank me and indicated she would now be able to return home that afternoon and refer to her mother in the Navajo language. Another student was able to say *goodbye* to me in Navajo as he was leaving for his next class period. The use of the Navajo words and phrases by the students

that day demonstrated that they increased their knowledge and picked up several new

words, thus demonstrating the effectiveness of the language program.

CHAPTER 4

Discussion

The purpose of this study was to investigate the effects of static pedagogical agents and gamification practice on Navajo language vocabulary acquisition and cognitive load. The current study was intended to extend the understanding of how multimedia annotations affect comprehension and vocabulary acquisition in this activity (Cottam, 2008). Also due to the large discrepancy in the number of research participants between the gamification practice with static agent group as compared to the three other groups, in this discussion, we will reference this inconsistency to explore the research findings in the current study.

Seventh and eighth-grade students at a junior high school in a large Southwestern city completed one of four randomly assigned Navajo listening activities with different types of gamification practice and static pedagogical agents. Participants then completed a vocabulary acquisition posttest and a survey that included questions to measure attitudes and perception of cognitive load. As discussed earlier, more students completed the gamification practice with a static pedagogical treatment. The assumption is that the higher discrepancy for this treatment group is the placement of the links on the classroom homepage. The gamification practice with a static pedagogical agent treatment was the first link in a list of four. Based on the placement of the link, it is likely that more students clicked the first link they saw, rather than clicking the link assigned. Placement of the link is the possible reason why this treatment group had twice as many participants when compared to the three other treatments. Although there was a large difference between the number of completions among the treatments, a Levene's test yielded no

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significant achievement differences found for either the gamification practice or static pedagogical agent variable on the posttest.

In this chapter we will discuss the results related to each of the three research questions, starting with the effect of static pedagogical agents versus no static pedagogical agent on Navajo vocabulary acquisition. Next, a discussion of the effects of gamification practice versus no gamification practice on Navajo vocabulary acquisition, followed by a discussion of the effects of static pedagogical agent and gamification practice on cognitive load. We will also include a discussion of student attitudes and will conclude with implications for design and recommendations for future research.

Overall Achievement

Results for achievement yielded similar effects on vocabulary acquisition on the posttest for all four treatment groups. The level of student achievement was good though not extremely high (73%), and there were no significant differences in scores among students in the four treatments; however, the results from this study provide critical results for improving learning in a computer-based instructional environment for learning an indigenous language.

There are several possible reasons why the treatments in this study did not influence overall achievement scores. One possible reason was that the Navajo language program was well-designed using the basic principles of developing instruction. The overall posttest scores among the four groups were very similar. Other researchers have indicated that well designed instructional materials often result in no significant achievement differences among treatments (Clark, 1994). The Navajo language was a language that was completely novel to almost all of the students who participated. The

unfamiliarity of the language contributed to good but not very high level of posttest scores.

Another reason for the lack of significance in this study may be due to the highly motivated students who participated in the study. This junior high school was named 1 of 39 Arizona public schools to receive the coveted A+ School of Excellence award in 2016 (Arizona Educational Foundation, 2016). Students who participated in the study were highly driven, competitive, and expected to do well. Although test scores ranged from 70-73% on the vocabulary posttest out of 100%, learning a new language is quite difficult, and the students in the study did quite well considering their unfamiliarity with the Navajo language.

Anecdotal observations showed students to be disappointed when they appeared to have answered a question incorrectly and elated when they answered correctly. Students also asked after each class who got the highest score, thus, demonstrating a desire to do well on the computer-based training.

Vocabulary Acquisition

Research Question 1 ("*How does the use of static pedagogical agents versus no static pedagogical agents affect Navajo language vocabulary acquisition*?") relates to how well students recalled vocabulary items under different static pedagogical agent conditions. The results of the data analysis indicated that there was no significant difference between students' vocabulary posttest scores in either static pedagogical agent treatment. According to Heidig and Clarebout (2011), presenting a pedagogical agent on the screen yielded no additional learning effect. Lusk and Atkinson (2007) reported no differences in retention between the agent and no-agent treatment groups in their study.

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Research Question 2 ("*How does the use of gamification practice versus non-gamification practice affect Navajo language acquisition*?") relates to how well students recalled vocabulary items under a gamification practice versus no gamification practice conditions. Again, the results of the data analysis indicated that there was no significant difference between students' vocabulary posttest scores in both gamification practice treatments. A study by Kebritchi, Hirumi & Bai (2008), presenting math computer games to study achievement and motivation, yielded no significant differences between math achievement and motivation scores of learners in the experimental group, who received a pre-Algebra or Algebra 1 instructional games, versus the math achievement and motivation scores of learners in the control group, who did not receive the games. In another study by Trooster et al. (2016) conducted a correlational analysis between the game group and control group regarding the game characteristics and the outcome measures, and the game characteristics and learner characteristics. The analysis found no significant correlations between game characteristics and outcome measures between both groups. A study by Benoit (2017) to explore vocabulary acquisition assessments, as measured by Measure of Academic Vocabulary, determined results were not significant, indicating there was no significant difference between the scores of students who participated in traditional methods of learning academic vocabulary and the scores of students who participated in game-based learning activities for the same academic vocabulary.

Although games can be effective, this does not mean that games are effective for all instruction, with different types of games and learners. Annetta, Minogue, Holmes, and Cheng (2009) reported results from their study indicated no differences in student

learning and found the participants' level of engagement while interfacing with the game was noteworthy. Although learning achievement in this study did not see a gain with game-implementation, engagement and interest in the game piqued the interest of many students. A study by Ke (2008) indicated students developed more positive attitudes toward math learning through math gaming, but there was no significant effect of computer gaming on students' performance or development. Although no significant differences were found in this study, increased levels of engagement and positive attitudes toward the content were detected in the open-ended questions of the survey.

Student Attitudes

Students indicated very positive attitudes toward the *Beginning Navajo Words and Phrases* program. Scores on four of the five questions were higher than three on a five-point scale, signifying the design of the program was appealing and effective. Zhang (2011) stated that students' attitudes toward computer-assisted language learning (CALL) could be considered as a key predictor regarding successful application of the computer to language learning. According to Teo (2006), students attitudes toward technology plays a crucial role in the adoption of instructional technology and learning in the classroom. Attitude is also considered to be one of the effective variables in the success of implementing technology in the second or foreign language learning process (Afshari, Ghavifekr, Siraj, & Jing, 2013). Students' attitudes are crucial to the development and implementation of the *Beginning Navajo Words and Phrases* program. The successful integration of computers in education is largely affected by students' attitudes and their willingness to embrace the technology (Pektas & Krkip, 2006). Attitude results indicated that students felt the computer program was fun, kept them interested, and they learned a

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lot. Students also indicated that navigation within the computer-based training was straightforward.

Cognitive Load

The third research question, "What is the effect of the use of static pedagogical agents and gamification practice on cognitive load?" related to students' perceptions of how hard they had to work to understand the Navajo language and vocabulary in the listening activity. To understand the amount of mental work perceived by learners, researchers have developed and tested methods for assessing cognitive load across a variety of tasks and situations (Wendall & Weibe, 2007). The current study included six cognitive load questions representing the six subscales of variables based on the NASA task-load index developed more than 20 years ago to measure cognitive load (Hart, 2006, Hart & Staveland, 1988). The wording of the cognitive load survey questions was simplified based on the target audience to help students understand the questions. The cognitive load questions were rated on a 5-point scale rather than the original NASA-TLX 21-point scale. Each question will be discussed in the order they appeared to students.

Mental demand. Mental demand determines how complex the learning task was for the student. Was it easy? Demanding? Or simple? Mental demand also relates to the intrinsic measurement of cognitive load. Analysis revealed students' opinions were neutral on this item, indicating their perceptions that the mental demand required by the program was neither demanding nor easy.

Physical demand. This cognitive load question asked students to rate how hard they had to work while using the *Basic Navajo Words and Phrases* program. It appears

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that students' perceptions of the physical demand required to be successful while engaging with the language program were minimal.

Temporal demand. This cognitive load question related to how much time pressure the students felt due to the pace in which program tasks occurred. Is the pace slow or fast? Data trends revealed that students did not feel rushed to complete the program.

Performance. The performance task question related to how successful students felt they were in performing the task. The data revealed that students were very confident that they performed strongly on performance.

Effort. This cognitive load question related to students' perceptions of the effort, mentally and physically, used to accomplish a level of performance. Analysis revealed students felt they had to put forth a generous effort to achieve a posttest score of their liking.

Frustration. The frustration question related to how stressed the students felt they were while utilizing the program. Data indicated that students' stress level was minimal.

Open-ended Attitude Question Results

Open-ended survey results revealed highly positive attitudes toward the Navajo language-based computer program. Kalaja, Alanen, & Dufva (2001) indicated open-ended questions are recommended when experimenting with new methods or new kinds of phenomena. Most participants conveyed a strong liking for the program and indicated that they enjoyed learning new words and phrases in the Navajo language. A study by Önsoy (2004) focused on the attitudes of students and teachers toward the use of CALL, and both students' and teachers' attitudes were found to be positive. The survey findings

in a study by Başöz and Çubukçu (2014) indicated that English as a Foreign Language (EFL) learners have positive attitudes toward CALL. According to Oz, Demirezen, and Pourfeiz (2015), motivation and attitudes toward learning a second or foreign language are the most crucial factor for success in language study.

It was very beneficial and constructive in evaluating the effectiveness of the current program to measure students' attitudes because computer-based Navajo language learning is still a relatively new concept. The feedback received offered key suggestions on how to improve the design and how to fix the flaws to ensure better flow of the program. Feedback included suggestions to add additional topics like colors and extended family members, a different gamification practice that appeals to diverse learner-types, and the addition of pronunciation practice that allows students to record words and phrases on the computer to ensure proper pronunciation.

Results of Demonstrating Beginning Navajo Words and Phrases at DevLearn 2017

Furthermore, I presented the *Beginning Navajo Words and Phrases* computer program during DemoFest at DevLearn 2017 in Las Vegas, Nevada. DevLearn Conference & Expo is North America's leading event focused on learning technologies (DevLearn, 2017). DemoFest is part of DevLearn and is a collective showcase of eLearning examples from conference participants. Presenting at DemoFest allowed me the opportunity to network with fellow eLearning peers, gain industry recognition and receive valuable feedback on my program.

The *Beginning Navajo Words and Phrases* computer program had never been viewed by adults, other than the teaching professionals at the research school site. The overall response to the program was overwhelmingly positive. People from various

professional backgrounds were able to view and interact with the program. The feedback was very encouraging and made me contemplate higher aspirations for the program, including the expansion into another language, both Native American, and non-Native American. The utilization of games was a high point among the feedback, with observers commenting that they loved the gamification practice.

Implications for Instructional Design

Results of the study suggest some implications for the design of vocabulary acquisition activities in a computer-based language course, particularly one teaching an indigenous language. The current research confirms that students appreciated the human-computer interaction of the Navajo language program, thus demonstrating openness toward learning a language via a computer program. Over the past few decades, CALL has become an important element of language learning which supports the idea that computers should be used as a medium to facilitate language learning (Mahmoudi, Samad, Razak, 2012). Using computers for language learning has proved not only interesting but also positive and stimulating for many language teachers and learners (Ghasemi, Hashemi, & Bardine, 2011). Computer-based learning is vitally important because learning the Navajo language through a computer may be a viable alternative to classroom-based learning. Navajo language computer-based training will help to expand the knowledge base among the youth through computer and Internet access, thus reaching a large audience that may otherwise not have access to Navajo language learning and resources. The use of computers to learn the language may prove to be motivational for students and may help to decrease their awareness of cognitive load.

The findings from this study also suggest that the use of gamification practice is viewed as very positive by participants even though gamification practice does not produce significantly higher vocabulary acquisition scores as compared to similar practice with no game. Overall, students' perception of the gamification practice increased motivation by making the program fun, interesting, and competitive. Increasing student motivation can be difficult; however, there is evidence that games and competition may be able to pique students' interest and motivation (Afari, Aldridge, & Fraser, 2012). The gamification practice may have allowed students to be much more aware of the practice and overall content of the program.

Future Research

Results of the current study suggest several possibilities for additional research that may help students enhance and retain vocabulary acquisition of the Navajo language. Feedback received from the attitudinal survey suggests future enhancements to the instructional content, as well as the design, of the program. This information may be important in helping to determine the success of the Navajo language computer-based program. The feedback demonstrated that the students' enjoyed the program the overall look and feel of the program. This study is unique among vocabulary acquisition studies in that there is little previous and current research on indigenous language learning using computer-based training. With the growth of online training, the need for indigenous language conservation and revitalization is crucial. When Native-based educational practices encounter Western technology, the production and sharing of wisdom beneficial to Natives and non-Natives alike become possible (Simonelli, 1993). McHenry (2002) indicated that "being able to see the Native language on a computer screen may be just

the 21st-century touch that makes learning the 'old' languages interesting and maybe even fun for contemporary learners." Finding alternative ways to reach the indigenous youth is vital. Navajo language educators need to adapt and harness the new technology of today to ensure the survival of the Navajo language. Because schools played such a powerful role in the decline on Native languages, it is reasonable to expect they can play a powerful role in restoring languages (Peacock & Day, 1999). Although no significant results were found in training, the feedback from the current study supports the need for additional research. Further research into language learning on a computer and online would help clarify the unknown of how effective this mode of teaching is.

Another area of research suggested by students' responses to the open-ended survey questions. Students requested the opportunity to practice pronouncing the Navajo words and phrases they just learned. The importance of beginning to train a child's pronunciation skills in a second language at an early age has long been known to researchers and educators (Neri, Mich, Gerosa, & Giuliani, 2008). Instead of just the hearing the word and phrases and memorizing the sound, incorporating a recording feature that allows students to record the word and phrase and playback the recording would help vocabulary acquisition. Teaching and learning new vocabulary has traditionally focused primarily on the definitions and parts of speech, but pronunciation is an important factor in learning new words (Ahmad, 2016). According to Wong (1987), even when the non-native speakers' vocabulary and grammar are excellent, if their pronunciation falls below a certain threshold level, they are unable to communicate efficiently and effectively. Further research to incorporate pronunciation exercises is needed to investigate the effects of vocabulary acquisition. Potentially adding

pronunciation exercises may increase posttest scores and the retention of Navajo vocabulary acquisition.

One more area of research prompted by students' open-ended survey responses is the use of gamification practice to enhance vocabulary acquisition. Gee (2007) recognized that there are language learning benefits for students who engage in playing the interactive game simultaneously. Although no significant results were found in this study when comparing the gamification compared with no gamification treatments, motivation was crucial. While it does require more effort in the design, gamification is a technique that, if used correctly, can improve the motivation of all learners who experience gamified eLearning (Guyan, 2013). Shaffer (2007) noted that researchers have shown that well-designed computer/video games can teach players innovative and creative ways of thinking, deep understanding of complex academic content, and valuable forms of real-world skills, given their ability to provide rich, complex, and compelling virtual worlds. Learners may be hesitant to participate in language classes due to not wanting to make a mistake in front of their peers but may be more willing to interact with a game to gain valuable linguistic feedback and practice with the language before applying their knowledge in the *real world* (Turgut & Irgin, 2009). Further research is needed to investigate to effects on motivation and cognitive load while using gamification practice to learn a new language such as the one used in the current study.

The addition of a leaderboard at the conclusion of the gamified practice would add the competitive element to the program, motivating students who want the highest score to best forth their best effort. The development of a leaderboard to display the top scores was eliminated due to time constraints. With additional time, a custom built

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leaderboard would greatly enhance the treatment groups with the gamification practice included.

Collection of demographic data could also help to distinguish differences among learning scores, attitudes, and cognitive load scores. The use of demographic data is ancillary; researchers collect and report data about their sample so that readers might be able to account for similarities and differences (Kostoulas, 2014). Demographic data would differentiate between sub-groups and offer insights that would be missed only looking at the aggregate data (Dobronte, 2013). Potential demographic data that could help to explain differences could include grade point average (GPA), age, ethnicity, any prior experience with Navajo language and culture, and gender.

Another area of research that I could expand is the use of a simulated practice in place of the game currently utilized. The current game format is simple to understand. Ten multiple-choice questions to earn points to play a game at the conclusion of the questions. The development of the current gamification practice was based on time constraints to conduct my study. The design and development of a custom simulation game, while labor intensive, for future use, could engage students even further. The instructional advantages to using simulations in an education setting allow the learner to experience life-like situations in a realistic environment that is conducive to the active involvement of all students (Sottile Jr. & Brozik, 2004). The design and development of a simulation would require more time and resources to build an effective practice game. Based on my current level of knowledge of eLearning software and with more time to development, creating a simulation could be attainable to replace the current version of the gamification practice.

Limitations of the Study

One limitation of this study was the unequal number of participants in each treatment. Each student was initially randomly assigned to a treatment group. Because access to the four different treatments was online through the classroom homepage, many students did not click their assigned treatment group; they clicked the first treatment group link in the list, which included both the static pedagogical agent and gamification practice. The first treatment group link increased the number of participants ($N = 57$) in that treatment group (static pedagogical agent and gamification practice both included) to almost twice the number of participants in the other three treatment groups. Although a Levene's ANOVA was conducted, which confirmed the unequal cell sizes was not a major threat, this is still a limitation of this study.

Another limitation involved the data from the *Beginning Navajo Words and Phrases* survey by treatment group. Because data from the survey was collected as a whole, and not by the four treatment groups, potentially valuable data regarding treatment differences on attitudes and cognitive load were lost. The inability to view treatment differences in student attitudes and the cognitive load was a lost opportunity to enhance the study.

Student incentive was another limitation. The study was conducted at a junior high in a large city in the southwestern United States. The eventual target audience for this Navajo language program is the Navajo people. Most of the participants in the study were of non-Native American origin. If the study were conducted at a school within the Navajo Nation, the incentive to do well because of the connection to the language would likely have motivated students to put for extra effort to do well. Participation in the study

also did not affect students' grades, so motivation to do well on the Navajo language program may have been inadequate for some students; however, attitudinal data indicated that many students did enjoy the program and tried to do well.

Differences for the gamification treatment group could potentially be related to the different visual layout of the gamified practice. The gamified practice slides contained a different layout for the slides that were unlike the rest of the program. Because the gamification slides are from a pre-existing template from a third-party vendor, the slide layouts varied from rest of the program. The visual differences potentially could have a negative effect on the users of the gamification treatment groups.

Conclusion

Interest in teaching new indigenous languages through computer-based training and online environments is likely to continue to grow as technology and resources in the classroom expand. It is important to determine how technology can be infused with language learning effectively in enhancing student learning. There are numerous activities and resources available to engage students as they acquire new language skills. It is likely to be beneficial that researchers consider the results from this study to determine how to utilize methods effective for enhancing student learning of language by means of a computer.

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APPENDIX A

BEGINNING NAVAJO WORDS AND PHRASES PARENTAL LETTER OF

PERMISSION

The Effect of Static Pedagogical Agents and Gamification Practice on the Acquisition and Retention of the Navajo language using Computer-based Instruction

PARENTAL LETTER OF PERMISSION

Dear Parent:

I am a graduate student under the direction of Professor Wilhelmina Savenye in the Mary Lou Fulton Teachers College at Arizona State University. I am conducting a research study about learning basic Navajo greetings and family relations using the Navajo language.

I am inviting your child's participation, which will take approximately 30 minutes to complete the computer-based instruction and a survey. Your child's participation in this study is voluntary. If you choose not to have your child participate or to withdraw your child from the study at any time, there will be no penalty (it will not affect your child's grade, treatment/care, etc.). Likewise, if your child chooses not to participate or to withdraw from the study at any time, there will be no penalty. The results of the research study may be published, but your child's name will not be used.

Although there may be no direct benefit to your child, the possible benefit of your child's participation is a brief introduction to the Navajo language. Students will be introduced to the language of the largest Indian reservation in Arizona and one of the largest in the United States. Arizona history and culture is a topic many students enjoy. There are no foreseeable risks or discomforts to your child's participation.

Responses will remain confidential. The results of this study may be used in reports, presentations, or publications but your child's name will not be used.

If you have any questions concerning the research study or your child's participation in this study, please call me at (480) 299-4180 or Dr. Savenye at (480)-965-4963.

Sincerely,

Kenneth Shurley
Graduate Student
Arizona State University

By signing below, you are giving consent for your child _____ (Child's name) to participate in the above study.

_____   _____   _____
Signature   Printed Name   Date

If you have any questions about you or your child's rights as a subject/participant in this research, or if you feel you or your child have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the Office of Research Integrity and Assurance, at (480) 965-6788.

APPENDIX B

COMPUTER SCREENSHOTS FOR FULLER VERSION

73

Beginning Navajo Words and Phrases (Game-Agent)

Navajo Words/Phrases Practice

The following practice exercise will test your knowledge of essential Navajo words and phrases that are critical in any Navajo conversation.

PAPER FOOTBALL

Continue

10 Essentials Navajo Words/Phrases
Instructions
In this practice, click the audio button for each question to hear the Navajo word or phrase. Select the correct answer based on the Navajo word or phrase you hear.

Start

PAPER FOOTBALL

1/10 — TIME EARNED 0

Question 1
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Yáʼátʼééh

A. Please | B. Hello
C. Yes | D. Eat

2/10 — TIME EARNED 10

Question 2
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Tʼááshdoodí

A. Thank you | B. What is your name?
C. No | D. Please

3/10 — TIME EARNED 5

Question 3
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Ahxéhee'

A. Thank you | B. Hello
C. How much? | D. Good-bye

4/10 — TIME EARNED 15

Question 4
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Shíkáʼanilyeed

A. Eat | B. Help
C. Yes | D. Thank you

5/10 — TIME EARNED 25

Question 5
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Díkwíí

A. How much? | B. Hello
C. What is your name? | D. No

6/10 — TIME EARNED 35

Question 6
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Aoo'

A. Yes | B. Good-bye
C. Please | D. How much?

7/10 — TIME EARNED 45

Question 7
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Nidaga'

A. Please | B. Help
C. Hello | D. No

8/10 — TIME EARNED 40

Question 8
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Hágoónee'

A. Good-bye | B. Yes
C. Eat | D. Thank you

9/10 — TIME EARNED 50

Question 9
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

Haash yinílyé

A. No | B. Good-bye
C. What is your name? | D. Help

10/10 — TIME EARNED 60

Question 10
Click the button to hear the Navajo word or phrase. Select the correct Navajo translation from the four options below:

íiya

A. How much? | B. Eat
C. What is your name? | D. Hello

TIME EARNED 55

Game Time
Now it's time to kick some field goals...

Instructions:
After you click Continue below, you will play the game. Try to score as many field goals as you can before your time runs out. Click the mouse to kick the ball...

Continue

---

0 — TIMER 43

Skip

QUIZ RESULTS 70%

Great Job!
Click the **Next** button to continue.

Navajo Kinship

In this last section of this lesson, you will learn 10 Navajo kinship words that are crucial when identifying family members.

Kenneth, click the "**Next**" button to begin.

Navajo Kinship

Click on each button to hear the Navajo pronunciation.

- Mother
- Father
- Maternal Grandmother
- Maternal Grandfather
- Paternal Grandmother
- Paternal Grandfather
- Older Sister
- Younger Sister
- Older Brother
- Younger Brother

Navajo Kinship

Mother
Shimá

Navajo Kinship

Paternal Grandfather
Shinálí Hastiin

Navajo Kinship

Father
Shizhé'é

Navajo Kinship

Older Sister
Shádí

Navajo Kinship

Maternal Grandmother
Shimásání

Navajo Kinship

Younger Sister
Shideezhí

Navajo Kinship

Maternal Grandfather
Shicheii

Navajo Kinship

Older Brother
Shínaaí

Navajo Kinship

Paternal Grandmother
Shinálí Asdzáá

Navajo Kinship

Younger Brother
Shitsilí

Navajo Kinship Practice

The following practice exercise will test your knowledge of Navajo kinship words that are crucial when identifying family members.

Paper Shot

Continue

75

10 Navajo Kinships Words
Instructions
Click the audio button for each question to hear the Navajo kinship word. Select the correct answer based on the Navajo word you hear. The more questions you answer correct, the more time you have at the end of the game to shoot some hoops.

Start

Paper Shot

1/10 | TIME EARNED 0

Question 1
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shizhe'é

A. Paternal Grandfather | B. Father
C. Younger Brother | D. Older Sister

2/10 | TIME EARNED 0

Question 2
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shinálí Hastiin

A. Older Brother | B. Mother
C. Maternal Grandmother | D. Paternal Grandfather

3/10 | TIME EARNED 10

Question 3
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shádí

A. Older Sister | B. Paternal Grandmother
C. Father | D. Maternal Grandmother

4/10 | TIME EARNED 20

Question 4
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shicheii

A. Younger Sister | B. Maternal Grandfather
C. Younger Brother | D. Mother

5/10 | TIME EARNED 30

Question 5
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shimá

A. Mother | B. Maternal Grandfather
C. Paternal Grandmother | D. Older Sister

6/10 | TIME EARNED 40

Question 6
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shideezhí

A. Younger Sister | B. Older Brother
C. Paternal Grandfather | D. Father

7/10 | TIME EARNED 50

Question 7
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shimásání

A. Younger Brother | B. Older Sister
C. Paternal Grandfather | D. Maternal Grandmother

8/10 | TIME EARNED 60

Question 8
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shínaaí

A. Older Brother | B. Younger Sister
C. Mother | D. Maternal Grandmother

9/10 | TIME EARNED 70

Question 9
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shinálí Asdzáá

A. Maternal Grandfather | B. Older Brother
C. Paternal Grandmother | D. Father

10/10 | TIME EARNED 65

Question 10
Click the button to hear the Navajo word. Select the correct Navajo translation from the four options below:

Shitsilí

A. Father | B. Younger Brother
C. Younger Sister | D. Maternal Grandfather

TIME EARNED 75

Game Time
Now it's time to shoot some hoops...

Instructions:
After you click **Continue** below, you will play the game. Try to score as many baskets as you can before your time runs out. Click the mouse to shoot the ball.

Play Game

TIMER 0 | 65

Skip

---

45 | QUIZ RESULTS 90

Great job!
Click the **Next** button to continue.

Conclusion

Kenneth, you now have the knowledge to:
- Identify and select the correct Navajo essential word or phrase, given the audio translation.
- Identify and select the correct Navajo kinship word, given the audio translation

Click **Next** to begin the quiz.

NEXT ▶

APPENDIX C

BEGINNING NAVAJO WORDS AND PHRASES CHILD ASSENT FORM

The Effect of Static Pedagogical Agents and Gamification Practice on the Acquisition and Retention of the Navajo language using Computer-based Instruction

I have been informed that my parent(s) have given permission for me to participate in a study concerning gamification practice and static pedagogical agents for Navajo language learning.

I will be asked to complete a computer program and survey that will take approximately 30 minutes.

My participation in this project is voluntary, and I have been told that I may stop my participation in this study at any time. If I choose not to participate, it will not affect my grade in any way.

_____
Signature   Printed Name

_____
Date

APPENDIX D

BEGINNING NAVAJO WORDS AND PHRASES POSTTEST

Beginning Navajo Words & Phrases Quiz

The quiz contains 20 questions. Click the audio button for each question to hear the Navajo word or phrase. Select the correct answer based on the word or phrase you hear.

NEXT ▶

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- What is your name?
- Hello
- No
- Help

Nídaga' ▶

SUBMIT

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- Help
- Good-bye
- No
- Please

Shíká'anilyeed ▶

SUBMIT

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- How much?
- Help
- No
- Yes

Aoo' ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Older Brother
- Younger Sister
- Father
- Older Sister

Shideezhí ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Younger Brother
- Older Sister
- Maternal Grandmother
- Mother

Shitsilí ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Maternal Grandfather
- Paternal Grandmother
- Older Sister
- Older Brother

Shádí ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Older Sister
- Paternal Grandfather
- Older Brother
- Mother

Shinaai ▶

SUBMIT

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- How much?
- Hello
- What is your name?
- Thank you

Ahxéhee' ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Please
- Hello
- Help
- Yes

Yá'át'ééh ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Father
- Paternal Grandmother
- Younger Sister
- Older Sister

Shinálí Asdzáá ▶

SUBMIT

Click the button to hear the Navajo word. Select the correct Navajo term?

- Father
- Maternal Grandfather
- Younger Brother
- Mother

Shicheii ▶

SUBMIT

Slide 1

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- Yes
- Eat
- Good-bye
- Help

íyą ▶

SUBMIT

Slide 2

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- Good-bye
- How much?
- Yes
- Please

T'áá'shdigidi ▶

SUBMIT

Slide 3

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- Help
- Good-bye
- No
- Eat

Hágóonee' ▶

SUBMIT

Slide 4

Click the button to hear the Navajo word. Select the correct Navajo term?

- Father
- Older Sister
- Mother
- Younger Brother

Shimá ▶

SUBMIT

Slide 5

Click the button to hear the Navajo word. Select the correct Navajo term?

- Mother
- Younger Sister
- Younger Brother
- Paternal Grandfather

Shináli Hastiin ▶

SUBMIT

Slide 6

Click the button to hear the Navajo word. Select the correct Navajo term?

- Maternal Grandmother
- Mother
- Older Brother
- Father

Shizhé'é ▶

SUBMIT

Slide 7

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- Yes
- What is your name?
- Eat
- Hello

Haash yinilyé ▶

SUBMIT

Slide 8

Click the button to hear the Navajo word. Select the correct Navajo term?

- Maternal Grandmother
- Paternal Grandmother
- Father
- Younger Brother

Shimásáni ▶

SUBMIT

Slide 9

Click the button to hear the Navajo word or phrase. Select the correct Navajo term?

- How much?
- Thank you
- No
- Please

Díkwíí ▶

SUBMIT

Slide 10

Results for

Your Score: 75%

Submit Results

81

APPENDIX E

BEGINNING NAVAJO WORDS AND PHRASES SURVEY

Navajo Language - Survey

Please circle your answers below using the following code:
5 = strongly agree
4 = agree
3 = neither agree nor disagree
2 = disagree
1 = strongly disagree

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The computer program was fun	1	2	3	4	5
The computer program kept me interested	1	2	3	4	5
I learned a lot from this computer program	1	2	3	4	5
The computer program was easy to navigate	1	2	3	4	5
Overall, this is a good computer program	1	2	3	4	5
The computer program was challenging	1	2	3	4	5
The computer program was physically demanding	1	2	3	4	5
Doing this computer program felt rushed	1	2	3	4	5
I was successful in completing this program	1	2	3	4	5
I had to work hard to complete the program at a satisfactory level of performance	1	2	3	4	5
The computer program was stressful	1	2	3	4	5

What did you like best about the program?

How could we make this program better?

APPENDIX F

BEGINNING NAVAJO WORDS AND PHRASES OPEN-ENDED SURVEY

RESPONSES

What did you like best about the program?

1. They say the word clearly for me to understand.
2. What I liked best about the program was that just thinking of learning a part of a new language feels like a…
3. What I liked best about the program was I learned and was able to main the simple words so I can say them later.
4. Soothing voice.
5. How there were games at the end of the practices.
6. I love to learn about cultures. So this computer program was very informative and fun! I liked the matching part.
7. It showed clear instructions.
8. What I liked best about the program was that it had games.
9. When I got to learn about my tribe.
10. What I liked best was being able to hear the language being spoken multiple times & it is easy to use.
11. It was fun.
12. That I learned words
13. I liked that during the test you could still click to hear the word.
14. You could click the audio button to hear the word.
15. What I liked best about the program was it let you practice before taking the quiz.
16. That I got to learn another language. In 30 minutes or less.
17. It was really easy to learn from and didn't create a sense of urgency like I could take my time and it would be fine.
18. I liked the quizzes.
19. I liked how organized & simple it was.
20. Learning new things.
21. How fast and easy it was.
22. I liked that you could repeat the audio to be able to get a different way to remember the words. Also I liked that it gave lots information and direction to be able to know exactly know what your doing.
23. I liked how the program provided clear audio and how the word or phrase is spelled.
24. I liked how informative it was. Also I liked the fact that long strings of text were read aloud and simple to understand.
25. The program was rewarding by letting me learn. While also playing a sort of game.
26. I really liked the pacing of the program. It didn't have any distracting music or timer so it didn't feel rushed. It really felt welcoming and let me think.
27. I like how you could help children learn as well as including the mini games to make it seem more fun which it is.
28. It was interesting and made me focus.

29. I learned quite a few things, it was interesting.
30. I like how it let us review before the test. We could also listen to the words instead of just looking at them.
31. The games were entertaining.
32. I liked how it let you interact and listen to the word as many times as need and make sure you at least heard all of the words before going on. I also liked how it kind of "rewarded" you with time to play a mini-game if you got a question correct, which could determine people to try harder at getting it right.
33. I liked how it kept you interested, and correct answers got you game time, motivating you to do better.
34. The actual struggle in learning the new information.
35. It was very simple to use.
36. It rewarded you with a game.
37. That it allowed you to hear the words more than once so you were able to fully comprehend what the lady was saying.
38. I liked the practice games.
39. I liked that it let you click the buttons multiple times.
40. It gave how the word is spelled and how it sounds
41. The clicking on buttons.
42. The best thing about this program is the audio of the person saying the Navajo word.
43. The game in the middle of the test.
44. I liked how east it was to navigate the game. Easy navigation made it easier to understand what was being taught.
45. I enjoyed seeing and learning the word and how it was pronounced.
46. I was able to move at my own pace and hear the words as much as I needed them.
47. I like the paper football game. It made me work for a goal. (more time)
48. What I liked best about this program is that it was educational but instead of boring it was fun.
49. I liked all of the functions of the computer program.
50. I liked the games.
51. The best part of this program was being able to go over a word more than once.
52. There was lots of info that was learned easily and quickly. Also the games were fun at the end.
53. I liked the fact that it showed you the right answer if you get it wrong.
54. The way you could click the buttons and it tell you the word in the Navajo language.
55. I liked how the words were clearly pronounced.
56. I enjoyed the games. I was motivated to do well to play them.
57. I liked best that it way easy to work with + taught me something.

58. It was quick and fast and not to mention simple.
59. It allows you to replay the audio.
60. I liked that I was shown correct answer before moving to next question.
61. I got to learn a new language.
62. I liked the amount of knowledge and the way it was presented.
63. I liked the practice part because it was fun learning the new words.
64. I liked the part when I was able to hear the audio for the Navajo words as many times as I needed to.
65. The fact that you could hear the word spoken.
66. I liked how even doing the quiz you can hear the pronunciation and had mini games.
67. It was easy to use and navigate.
68. The fun game at the end.
69. The best part of the program was I had to get the right words correct to get time to score a field goal or basket.
70. It was very clear with instructions.
71. I liked that I could click on the words over again to hear the pronunciation.
72. I like how the computer allows me to study all the words until I'm comfortable enough to take the quiz.
73. It was east to use.
74. I liked that it had audio and you could listen to the word when you were answering the questions.
75. I learned.
76. The games part and also when I learned 20 words of Navajo because it's always good to learn a new language.
77. What I liked best that there were games added to make the program more fun and interesting.
78. It was easy.
79. I liked how we had enough time to hear the words and not be rushed.
80. Learning the language.
81. Learning and hearing the pronunciation of Navajo words.
82. Taught basic words
83. Understanding/learning how each word was pronounced.
84. How you allowed to repeat the words.
85. I liked how interactive it was. Especially with the fun games.
86. I like how you can actually listen to the pronunciation.
87. What I liked about the program is that it helps students learn how to speak in Navajo.
88. I liked that you took tests to review the words phrases. I also liked that the website was simple.

89. I enjoyed the part where you could listen the pronunciation because it helps me remember what the word is.
90. What I liked best about the program is that it was mentally challenging and you had to really remember and study the words.
91. What I liked best was how it pronounced the words.
92. Learning new words in a different and complex language.
93. It was fun and it helped me learn a bit. I was able to find patterns or things in the words to help me remember like paternal grandparents have 2 names, maternal has 1. I would definitely do it again.
94. I liked that it was fun yet education.
95. I enjoyed the new learning fundamental that teaches a different language. The overall concept was interesting and really made me want to learn more!
96. That it taught students a language in a way they could understand and enjoy.
97. The got to learn Navajo language (some)
98. The mini games after the mini quizzes. Learning the new words. It was kind of easy due to the fact that I could connect some words to the English words.
99. I liked the audio pronunciation.
100. That I got to learn a new language, well some it , but it was really fun!
101. What I liked best is that the computer program pronounced the words to us, which made them easier to remember.
102. How if you got the question right, you get more time on the mini game.
103. It was a fun way to learn a different language.
104. It taught me words of the Navajo language. I didn't know, I like learning other native languages because some of my family is Navajo, so now I know some words of their home language.
105. The program had games to keep me interested in the program instead of studying for an hour with a book or something similar to learn which is longer and more time consuming way but the program taught me a few words in a shorted amount of time which is good.
106. One thing that I like best about the program was learning the Navajo language with the audio and games.
107. The audio of the words, to me it helps learn the words.
108. It was fun and easy to play.
109. How it scored points on the quiz, you earned time for games.
110. I liked how there was both a visual and auditory representation of the given directions.
111. The paper football game when every question you got right you got extra time to get points.
112. That you were able to keep repeating the words to help you remember them better.
113. I liked how every component was clear and easy.

114. It tells you how to pronounce and spell the Navajo word!
115. I like how you would get to listen to the words over and over again.
116. It gave us time to practice the words before taking the quiz.
117. Learning words from a different language
118. Easy to navigate
119. It has new way to learn a language.
120. The games after the questions
121. It spells the word and gives an example on how the word is said.
122. Learning the language
123. Hear the person way the words and the practice.
124. The little games at the end of the review.
125. I liked that I got to learn simple phrases and kinship words. This was especially interesting because I am a Navajo Native American. Although, I've only been exposed to a small portion of the language, it boosted my interest to learn the whole language.
126. I guess it was kind of easy and how it had the person saying the words.
127. I liked how on the quizzes you would earn points of game time in a mine game at the end of the quizzes. I found the games quite enjoyable to play. I learning quite a bit from the program.
128. I liked learning how to say a lot of new words.
129. I liked that you could repeat the words over and over. It was very helpful in remembering the words.
130. It was very organized and well prepared. The test was quite simple too.
131. How the words sounded.
132. If you repetitively practice this program, you could learn a bit of Navajo.
133. Learning crucial words in another language.
134. I was able to listen to the new words many times and not just once.
135. What I liked best was we could hear the audible multiple times.
136. I like that I was able to learn many things about the Navajo language and there was really not boring stages.
137. The audio. This helped because instead of trying to make out the word I was able to hear it clearly.
138. I liked fest that in the programs I could hear the Navajo words as many times as I liked as I could memorize them.
139. It let you hear what the words/phrases really sound like.
140. I liked how it actually spoke the words to me so I could try to speak then myself.
141. I like it gave me a little bit of knowledge on the Navajo language.
142. I got to learn a new language!
143. I enjoy the difficulty of the program as it increases learning of the Navajo language.
144. The quiz and the user interface (UI) of the program.

145. It was fun and it pronounced the words
146. The mini games
147. I liked how it gave a voice/visual example. It was easy to use.
148. The games kept me interested.
149. I liked the easy knowledge and the fun games.
150. I liked the games we got to play with the time we built up.
151. It taught me the basics of the Navajo language.

How could we make this program better?

1. Have questions in which you speak through the computer to better understand the words.
2. Not much but make it clear that you get to play longer the more answered right.
3. You could add more challenging games and add more Navajo words.
4. A different word category and different games.
5. The voices sound a bit odd, but it is not really a big problem
6. By making it more colorful and animated (also the mini-games could be better)
7. Give a lot more time of studying.
8. Just remove the timeline, because it felt like I was being rushed.
9. To feel more challenged I would rather not have the ability to take the lessons as many times as I want.
10. Try explaining ways to remember some of the words that are hard to remember.
11. I don't think you have to adding anything. It's perfectly fine.
12. It did not really give more practice to learn the words. I think it should have at least 1 more practice test.
13. Make it a bit longer, and maybe add like a match game or a crossword that uses the Navajo words/phrases involved on the site.
14. The program seemed to be fine.
15. Probably a little more training instead of listening to the word and taking the quiz.
16. Maybe a little bit more finesse such as unique colors, adding in little break times where the speaker tells something interesting about the culture.
17. To make this program better there should be games to have more practice.
18. One thing I would say is too keep it the way it is only when press the button to play the word it sometimes won't work it's not all too bad though worked wonderfully.
19. Not as challenging.
20. Teach students words one-by-one instead of cramming newly-practiced words to them in one test.
21. Make it more interesting like more colors.
22. There were typos to get rid of and that's it.

23. I do think that this program could be more interactive. I think doing practice, an activity, and then the quiz would be helpful in making the program more fun as well as easier to remember.
24. I think it is perfect.
25. It would make the program better by maybe letting the user play a variety of different games perhaps 5, so that the player could feel as if they won the choice to pick a mini game. That would be a fun idea for the user. Also, I thought that the program was pretty good and was very entertaining.
26. Could make an additional match game; helps practice and will also make it more fun.
27. To improve this program, I would give the audience a little bit more practice. Specifically in the kinship portion of the assessment.
28. Number the questions on the test just to know where we are.
29. Have the person give hints on how to remember what Navajo words mean.
30. The voice sounded bland and boring maybe you should make them sound happier or happy. The games in between weren't that fun either.
31. Give people other ways to translate the word.
32. Don't include the questions in the order that we got them.
33. It felt kind of boring and could use some interesting and FUN ways to learn a new language.
34. Make it more interesting
35. More emphasis in the voice, which really doesn't matter, so nothing really
36. Maybe to make it more fun include challenging games having to do with Navajo words.
37. Possibly making more things to interact with.
38. Make it more interactive where the people doing this pronounce the word.
39. Evolve it and add more words and phrases
40. By having different of practicing the words not go straight into the quiz.
41. More games
42. This program could be modified to be made a bit better by making the navigation buttons (previous, back) larger. Otherwise, this program was excellent!
43. Maybe teach the words one by one, or state a way to remember it. It was kind of just showing and saying, little harder to remember.
44. By having a say how you can remember the words and its meaning.
45. More practice
46. The program could be better is there was more review games for learning the Navajo terms.
47. Even though the program is good to study it could use more games and activities to get the person more engaged and more interested in the program and it does have the potential to do it.

48. Maybe add a few words like cousin, aunt, uncle. Other than that, I think the program is great.
49. Adding a quick little game before the test…such as a matching game to review all the words.
50. Better study technique.
51. You could make this program better, by possibly letting students have practice pronounce the words, too. Overall, it was a great program.
52. The person's voice was to "robot-like"; Acted like it was some test that would be in the grade book – it acted like its purpose was not to be fun. (ps. There are the problems I though the program had-if they are fixed it would be super cool)
53. Add pictures; Allow more learning instead of just trying to memorize the words and what they mean.
54. Make more questions for more understanding of words and mini games. Please!
55. Keep doing what your doing start with the basics.
56. You can make it a little more interesting/fun.
57. Maybe add some neat cultural background research.
58. To make it better maybe make it easier to throw the things in the hoop.
59. There was a few typos in the practice section. I believe maternal was spelled "materanl". Also, I got a few practice answer wrong because I accidently clicked an answer. I liked how in the real quiz you got to click "submit" just in case you accidently clicked the wrong answer.
60. Make the girl sound real.
61. Overall, I think the part I selected was really good. I honestly don't think there should've been something added.
62. Make the games more accurate.
63. Maybe using words in sentences so you can understand how to use them.
64. I don't think that the program is already good.
65. This program could be better if it also used simple words like the, are, and and.
66. Have a more energized speaker so it won't sound so boring.
67. Less harder words.
68. For the talker to talk faster a bit.
69. When doing practice quiz it should let us try again.
70. Personally I think the program was well constructed and easy to follow. Can be used for all ages.
71. Nothing, it was quite good!
72. Harder words.
73. Make better ways to teach.
74. How they could make the program better is by adding more practice.
75. It's a good program.
76. Make it interesting.

77. By making more practice before the quiz.
78. Having more practice programs.
79. By making it more fun.
80. Making more time to study the words to understand.
81. Less phrases because most the time the equated to harder words to remember.3
82. You could make the program better by making the program a little more interactive with the person who is taking it.
83. Nothing, it was good already.
84. You could put something on how to pronounce other than just saying it.
85. Making it a little more challenging.
86. This program seems really good to me except for one spelling mistake in the family kinship section.
87. You could add more practice before the test.
88. There were one or two types that I found but other than that, it's a good education program.
89. More fun more learning game, slower paced.
90. Fix the bugs and change the person that read
91. Have a speaking test.
92. To make the program better it should have a time limit when you learn the words so you can actually learn better. (Like there is no next button when you study)
93. To make this program better you could teach the questions that were answered incorrectly.
94. After taking the test, I don't remember many of the words. More practice may help. (Like identifying the word in a sentence)
95. You could put in more practice things for words you missed.
96. If the speaker had more pronunciation, than it would make the user more interested in what she way saying. Other than that, it was great.
97. I think you could make it so that on the practice it would keep the time you have for the game, but after the game, go back the incorrect practice questions and have them try again.
98. Add more family members, like cousins and aunts and uncles.
99. One way to make it better was to have the lade talk at a slower pace.
100. I felt like there should have been a review before the test.
101. This program could be made better by maybe adding something to help you remember the words better.
102. The program could be made better if there wasn't as much talking to explain on what the program was going to teach.
103. Try adding little reminders in the games for the words. I forgot some of them really quick. Other than that, wonderful computer program.

104. The program could be improved by perhaps showing a spelled out version of the word, sounded out.
105. The game could have a few difference instead of being essentially the same thing.
106. Adding less time at the end of the game. I think it would be better. Maybe 5 seconds instead of 10?
107. The second game was harder then the first.
108. At least have another try to pick the answer.
109. How you could improve this program better is to give a heads-up to kids that there is a test after the quizzes so they can focus more on the first sets.
110. Make/show a resemblance in words that help with understanding.
111. You can make more practices to understand the words better.
112. Nothing, besides adding animals or what not. Besides that I think it's amazing!!
113. Make a different power point.
114. Adding more games.
115. Change the game type because both of the games fun just the same.
116. What could make this program better is allowing the person to try to redo the question, if they got it wrong, once before giving out the answer.
117. Its already good.
118. If the person speaking was more joyful.
119. I don't think it can get better it's fine the way it is.
120. The ways of practicing the words. Make a game to make it more fun.
121. You can make the program better by making the practice a little more helpful other than just giving the phrase. (Ex. Put the word in a sentence)
122. You could make it a little more interesting.
123. Give us ways to remember the words.
124. When clicking to hear again, it could repeat it a little faster.
125. A little more practice.
126. More work so that the words could be remembered.
127. The program can't be bettered because it is really good.
128. The words and phrases should be required to be repeated more than once to assure memorization.
129. There could be improvement within formatting the site with an easier way to go from slide to slide.
130. I believe there is no room for improvement.
131. Maybe make the program a bit more visually interesting.
132. I wouldn't say it's perfect but the style and transitions were very good and I hope this program will be very successful.
133. Add more questions.
134. It's not really a lesson so I feel I won't know this later on.
135. I am not sure. I think it is great.

136. It's fine how it is.
137. I think for listening to the words it should have an option to slow it down or break it into parts so that it is easier for the user to understand how to pronounce a word, especially for long words because I know that I had a little trouble pronouncing some words while trying to pronounce them in my head.
138. The narrator could say the word in English, then in Navajo.
139. Add more people and make the basketball hoop game a little more fair than it is.
140. Nothing.
141. I think the program is fine, there isn't anything I can think of to make it better.
142. I believe that the program is fine just the way it is. It takes thing at a slow pace so the student can got at his or her own pace.
143. Have different difficulty levels to continue learning the language.
144. If you could let us go back and review words that would be great.
145. More designs and happy things to make it sound and look more interesting.
146. Everyone plays games.
147. I think there's not really much to make it better that is already is.