ABSTRACT OF CAPSTONE

Sean D. Bailey

The Graduate School

Morehead State University

April 20, 2017

TRIVIAPREP®: THE DESIGN AND DEVELOPMENT OF A
COMPETITIVE ACADEMIC TRIVIA APPLICATION

———————————————————

Abstract of capstone

———————————————————

A capstone submitted in partial fulfillment of the
Requirements for the degree of Doctor of Education in the
College of Education
At Morehead State University

By

Sean D. Bailey

Owingsville, Kentucky

Committee Chair: Lenora J. Justice, Assistant Professor

Morehead, Kentucky

April 20, 2017

ProQuest Number: 10275435

ProQuest 10275435

ABSTRACT OF CAPSTONE

TRIVIAPREP®: THE DESIGN AND DEVELOPMENT OF A
COMPETITIVE ACADEMIC TRIVIA APPLICATION

An ever-growing trend in education is the integration of mobile devices in the school setting, especially considering the abundance of research available on BYOD (Bring Your Own Device). Not surprisingly, a common concern found is the lack of student interest in educational applications. This capstone reports a summary of the research, design, and development of a competition-driven educational trivia gaming application from idea to release.

TriviaPrep® is an app designed and developed to harness competitive and addictive qualities that many mobile trivia applications offer while replacing the random trivia questions with core curriculum concepts. The foundational objective of the questions presented in the app are targeted toward college-preparatory students looking to practice standardized assessment questions, like that found on the American College Testing (ACT) assessment.

KEYWORDS: Mobile gaming, trivia, competition, application design, development

_____
Candidate Signature

_____
Date

TRIVIAPREP®: THE DESIGN AND DEVELOPMENT OF A
COMPETITIVE ACADEMIC TRIVIA APPLICATION

By

Sean D. Bailey

Approved by

_____
Dr. Shane Shope
Committee Member   Date

_____
Dr. Donna Everett
Committee Member   Date

_____
Dr. Lenora J. Justice
Committee Chair   Date

_____
Dr. Timothy Simpson
Department Chair   Date

RULES FOR THE USE OF CAPSTONES

Unpublished capstones submitted for the Doctor's degree and deposited in the Morehead State University Library are as a rule open for inspection, but are to be used only with due regard to the rights of the authors. Bibliographical references may be noted, but quotations or summaries of parts may be published only with the permission of the author, and with the usual scholarly acknowledgements.

Extensive copying or publication of the capstone in whole or in part also requires the consent of the Dean of the Graduate School of Morehead State University.

A library that borrows this dissertation for use by its patrons is expected to secure the signature of each user.

Name   Date

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

CAPSTONE

Sean D. Bailey

The Graduate School

Morehead State University

April 20, 2017

TRIVIAPREP®: THE DESIGN AND DEVELOPMENT OF A
COMPETITIVE ACADEMIC TRIVIA APPLICATION

_____

Capstone

_____

A capstone submitted in partial fulfillment of the
Requirements for the degree of Doctor of Education in the
College of Education
At Morehead State University

By

Sean D. Bailey

Owingsville, Kentucky

Committee Chair: Dr. Lenora J. Justice, Assistant Professor

Morehead, Kentucky

April 20, 2017

DEDICATION

This capstone is dedicated to my selfless and compassionate wife. From day one this doctoral journey has been demanding and time-intensive, yet she has remained by my side and became the rock of our home. Since this three plus year journey began, we have grown from a one child family with Noah to having four children with the addition of Lincoln, Graham, and Claire. Raising newborns, infants, and toddlers is a massive task in itself, but she has done this while serving others as a physical therapist and having a husband that would often be found many early morning hours and late nights studying or working in his office.

On top of the demands of this educational journey, God found it timely to call me as a lead pastor. The demands of this ministry have pulled me away from home most weekends and too many evenings. Instead of struggling as a couple, however, we have been led through a fortunate journey of increasing love, discipleship, and companionship.

Candra, your love and support deserves far more than what I can write in a few paragraphs. Know that I love and admire you and have been blessed beyond measure to have you as a partner in this journey of parenthood, ministry, marriage, and friendship.

ACKNOWLEDGEMENTS

There are so many people who deserve acknowledgement for their role in making my doctoral goal a reality. First of all, my wife and children deserve a huge thank you. To my wife, thank you for your endless love and support. To my children, thank you for sharing your daddy. My time with you is not something I will ever undervalue. I will use this accomplishment as another resource to provide for you and forever make you proud to call me Daddy.

To my church family, there is no doubt that managing time studying for course work and pastoring our church was often a circus-worthy juggling act. Thank you for your love and support even when it frequently felt undeserved.

A huge thank you to my doctoral committee. Dr. Donna Everett and Dr. Shane Shope, your time and expertise offered has not gone unnoticed. To my doctoral chair, Dr. J. Justice, who has become a mentor, a coach, and a friend. Your never-ending encouragement and advice has made this challenging undertaking enjoyable. Your heart for others is a gift! Thank you!

To my Doctoral Cohort, "Say Anything." You guys are inspiring and one of the most fun groups I have had the pleasure of knowing. You evolved into a cheering section, a place to vent, a tutoring team, and lifelong friends. I cannot wait to see how you change the world!

Finally, more than ackowledgement, I give praise and glory to God for His providence of daily strength and assurance through this journey. My faith has grown tenfold as my mind has been pushed to its limits and my body often left exhausted. In the end I can assure you, though, it was definitely worth it.

God is good.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

What is the core of the capstone?

The core of this capstone project is the research-driven design and development of a school-based competitive academic-trivia application. So, Seow, & Looi (2009, p.369) suggest that the "gap between formal and informal learning can be bridged by utilizing the affordances of mobile technology." Thus, this application was created to harness the competitive and addictive qualities that peer-based trivia games can offer while interchanging the random trivia questions with core curriculum concepts that could be highly beneficial to the learner.

Figure 1. The final logo design for the application

TriviaPrep®, see Figure 1 for universal logo design, integrates the standardized assessment categories of the American College Testing (ACT) test, along with a "fun" category into a multiple-choice trivia format. The categories are randomly presented to the user per play. A correct answer results in points added to the user's score. Consecutive correct answers result in continually increasing points. The points are used to determine the student's ranking on a school-wide leaderboard. Incorrect answers result in zero points and corrective feedback.   Detailed student progress and data are readily available on the home screen. Essentially, students will

be working toward improving performance on standardized assessments while competing with classmates across the school.

TriviaPrep® is an application that was carefully designed and developed following in-depth research into the literature of software application design. The development of this tool was completed on the premise of cross-coding into multiple digital platforms with the core intent of reaching the majority of mobile devices. Therefore, most of the design and development strategies used were based on the use of mobile devices for student learning.

With 65 percent of American households playing video games regularly (Clark & Ernst, 2009), there is little doubt that gaming has appealing and motivating qualities. Students want to perfect their skill when they play video games. They want to feel as if they are making progress and ultimately master the challenges that are presented to them. This type of focus that students put into video games is the focus that instructors desire in the classroom (Adams, 2011).

Researchers, when discussing effective learning, consider motivation indispensable (Martens, Gulikers, & Bastiaens, 2004). Motivation is, according to Bergin, Ford, & Hess (1993, p.437), a complex psychological and physiological process that results in a particular behavior with "direction, vigor, and persistence." Significant learning is clearly associated with motivation (Eck, 2010). Therefore, in order to maximize potential, motivational aspects should be emphasized to the learner.

Furthermore, motivation often leads to players becoming easily engaged and often completely immersed in games for several hours, frequently resulting in little attentiveness to the world around them (Beck & Wade, 2013). Thus, the merging of video games and instruction, if done effectively, can be a major asset to students' overall learning experience.

This type of student learning without direction and course requirement is a common goal for many instructors. Clark and Ernst (2009, p. 24) state that "scientists consider gaming a way to captivate student interest so that they will spend time learning on their own." This realization is pivotal in today's education. How do we get students to learn on their own; to choose to go beyond the expectations of the classroom and improve content knowledge? The prospect of combining the anywhere access of mobile gaming, the motivational aspects of competition, and the practice of ACT-like questions on a trivia-gaming platform suggests this capstone project as authentic and intriguing practitioner-based research and development.

Who is the capstone meant to impact?

The design of TriviaPrep® is centered on the adolescent student. A study performed in 2014 showed that 83% of young adults own smartphones (Street, NW, Washington, & Inquiries, 2014). No longer are learners' gains confined to the traditional brick and mortar classroom or even at the isolation of a desktop computer. Mobile learning devices provide a platform for learning to transfer from the classroom to home and social environments. Vavoula (2005) suggests that the

potential for mobile learning is largely untapped. Thus, the learning that currently occurs while a person is in motion is nowhere near its potential. With this realization, we are underserving our learners if the innovation of mobile learning is not embraced.

Opportunities are clearly present for the design of more tools that can support learning during the time people are in motion. This application is mobile-ready and can be used across many platforms; therefore, learning through this trivia-application can occur anywhere at anytime.

The impact of this capstone can potentially reach school teachers, administrators, and parents. As 21st-century teachers and administrators are pressured to incorporate effective technology tools into the student's learning experience, TriviaPrep® can be a teacher-friendly tool. The use of the supplementary website, www.TriviaPrep®.com, is implemented as a hub for teacher and administrator forums and best-use strategies for the application. Administrators and teachers are encouraged to incorporate TriviaPrep® into the school culture for increased motivational effect.

A study by Speak Up, an educational non-profit organization, found that 74% of parents would like for access to classroom and curriculum materials be made readily available through mobile devices at home (Leveraging Technology for K-12 Learning, 2012). Because TriviaPrep® is accessible by users at home, parents can retrieve scores and data by reviewing the student account information. Parents, therefore, will also benefit from the use of TriviaPrep® at home.

How was the capstone project implemented?

The development platform of this application offered the ability to create stand-alone applications that can be submitted to cross-platform application stores. The application, therefore, is available for download using the following application stores: iOS App Store, Mac App Store, Google Play Store, and direct online application download through www.TriviaPrep®.com. Furthermore, to extend the availability and accessibility of this tool to all desired users, the download and use of the game is free for all users. Currently, the only direct promotion of this application is word of mouth. Students, teachers, parents, and administrators will also be encouraged within the application to share with potential users in order to expand the competition pool.

Upon completion of the application's core development, a one-day pilot implementation of the beta version of the application was administered to a small group of high school students in a college-bound technology classroom setting. This implementation was primarily for troubleshooting any unforeseen issues. Throughout this short-term implementation, the issues that were reported were noted and corrections were made. No student data was collected from the pilot, only troubleshooting issues that arose and suggestions of potential modifications. During the pilot implementation, the following issues and recommendations were evaluated and remedied:

- Question answers were too long and could not fit completely in the provided content area.

- The blue multiple choice color option did not contrast enough with the black background thus causing an inability to read the text.

- The lack of sound effects throughout the game caused a dull experience.

- The connection to the server location of the database was initially blocked by the school's proxy management system.

- The integration of communicating and sharing progress on social media is missing.

- The clarity of what each category symbol represented is confusing.

Why were this capstone and related strategies selected?

As a previous high school teacher, I often observed numerous high school students enamored by the prospect of competing with their peers in a mobile trivia game, thus an epiphany presented itself. Why are there no applications that have incorporated content-based questions instead of random trivia that offers little educational benefit? Research on numerous mobile application marketplaces yielded no viable results. Thus, the mobile application research and development process began.

An obvious and ever-growing trend in education is the integration of mobile devices in the school setting, especially considering the abundance of research on 1:1 initiatives and available Bring Your Own Device, "BYOD," (Frederick, 2015). Not surprisingly, a common concern found is the usefulness of the devices and the educational applications that are used (Redford, 2013). It is one thing to provide learners tools to use; it is another to effectively motivate them to use those tools on their own. This understanding places learner motivation at the forefront in this design. How can this application motivate students to want to learn and improve? This is where competition plays a dominant role.

Competition.

With trivia/quiz games like "Trivia Crack" and "Quiz Up" littering the charts of the top mobile applications in mobile application stores like iOS AppStore and Google Play, one cannot argue that competitive, trivia-gaming is 'all the buzz.' There is a clear entertainment factor that is present in competitive trivia-based gaming. It is easy to simply assume that competition breeds excellence, but how can this concept be integrated into a student's learning experience and will it ultimately make a positive difference?

Many studies have yielded data proving positive results of competition on student learning and, therefore, should be used with the intent of motivating students to learn and to encourage students to complete targets (Chou, 2013; Chen, 2014). When competition is integrated into a learner's environment, it fuels focus on his or

her individual success as comparisons are made to their peers. Naturally, when competition is present, students continually seek positive outcomes and avoid negative results (Lam, Yim, Law, & Cheung, 2001).

A driving factor behind the design of this application is the integration of school-based leaderboards. As students play this multiple-choice trivia game, they can compare their scores with that of other students in their grade level and across the school, if they choose. Recognition of "top students" in each class is essential and is highlighted throughout TriviaPrep®.

Yet, competition can potentially have a negative effect on student confidence. This likely is due to social-comparisons that occur. The research into the Social Comparison Theory presents many implications for the integration of a competition-driven tool in the learning environment. This theory suggests that individuals evaluate their own abilities by comparing themselves to others (Wood, 1989). It is important to note that students can be both positively and negatively affected through comparing themselves to their peers (Suls & Wheeler, 2012).

Many competitions are zero-sum activities (Dweck, 2000), due to the fact that there are winners and there are losers. That holds true with mobile gaming. Winners are rewarded while the losing party may suffer. The losing party likely experiences failure, which could result in potential feelings of lack of ability, helplessness, and frustration (Dweck, 2000; Weiner, 1985). These potential negative effects can be remedied, fortunately.

First, Zhi-Hong (2014) has proposed incorporating self-competition instead of peer-competition. This would diminish the impact of social pressure and alleviate concerns of experiencing social failure. To incorporate this into the design, a "self-competition mode" is available. In this mode, students are removed from the leaderboard, and the leaderboard is hidden. The student will then only see previous scores and work toward improving themselves without the comparison to their peers. Secondly, anonymity is an additional suggested mechanism that should be considered. A student competing anonymously with peers will likely minimize social pressure and still provide the competitive motivation that social competition can offer (Yu, Han, & Chan, 2008).

To further encourage the mechanism of anonymity, Yu & Liu (2009) have shown that it can improve communication and performance due to the lessening of inner restraints that it can offer. To incorporate this into the design, a "Go Anonymous" option is integrated into the application. When students use this method they are not identified by their name in the school leaderboard; instead, they are provided an "anonymous" moniker on the board. No other student will be able to identify the user unless the anonymous mode is turned off. The option of anonymity is fundamental for the effectiveness for all users.

Content.

The focus that students put into mobile gaming and the motivation games present is what instructors desire in the classroom (Adams, 2011). Where then do we

bridge gaming with content application? The content of the questions presented to users will provide the answer to that question.

Common annual high school effectiveness measurements heavily favor the results of annual standardized testing and undergraduate admissions tests (ACT, SAT, etc.). In the state of Kentucky, as a result of their 2012 Unbridled Learning initiative, twenty percent of a high school's accountability is determined solely on students' performance on a single standardized assessment, the ACT (Kentucky Department of Education, 2012). The questions presented to students in TriviaPrep® were collected and modified from released national standardized assessment practice questions and have been arranged into categories. Essentially, students will work toward improving assessment scores while competing with classmates across their school.
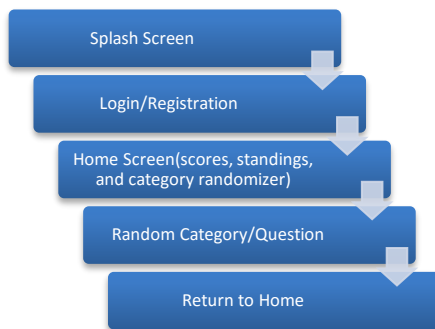
One of the approaches to further integrate entertainment into the application is to mask the application's appearance as "just another learning app". The inclusion of a random, non-academic trivia category into the game adds an entertainment piece to the experience. This category, labeled "School Spirit", is generated by user/school submitted questions covering random entertainment and sports facts. The questions will be governed by the administrators of the application and other users who are able to report an inaccurate or inappropriate question.

Design.

The concept and success of TriviaPrep® is hinged on the enjoyability of the user. This understanding emphasizes a focus on the application's design. Thus, the

following approaches were taken to ensure that the game design, both visual and navigational, is useful and appealing to the user:

The basic storyboard structure was created to be as simple and straightforward as possible. Tractinksy (2000) suggests that a designer's consideration of user experience is significant in order to promote learner's frequency of use in and out of the classroom setting. In considering this, the navigation of the application is displayed in Figure 2.

Splash Screen

Login/Registration

Home Screen(scores, standings, and category randomizer)

Random Category/Question

Return to Home

Figure 2. The navigational structure of the application

The effectiveness of a game is heavily determined by its motivating design (Schwabe & Goth, 2005). The entertainment nature of online gaming suggests greater demand for content design and points in the direction of mobile gaming (Huang & Hsieh, 2011). Before jumping headfirst into the designing of this application, an investigation into effective game design as it relates to engaging learners was completed. The two elements that needed to be considered were structural design and visual design.

Structural Design.

Structural design characteristics are integral to the success of the application and have been integrated as follows:

- *Rules.* A player must be presented with and acquire a basic understanding of the rules and navigational procedures within the game in order to play with minimal hindrances. Included within the understanding of rules and navigation, in order to maximize learner interactivity, is learner control. Learner control is an essential feature in a game environment that allows the user to have a sense of ownership within the game (Garrison & Anderson, 2003). Students are presented with a welcome tutorial upon completion of registration. This tutorial addresses likely navigational, scoring, ranking, and game modification questions.

- *Goals and objectives.* What does the learner hope to achieve? Ultimately, what is the purpose of playing the game and completing objectives within the game? Game designers may strengthen a learner's sense of control through an effective system of goals and achievements (Huang & Hsieh, 2011). This application has a clear goal of accruing points by correctly answering random content questions that are presented to students. The points determine student ranking on the school-based leaderboard and student success rating in categories. Additionally, because the questions are formatted similarly to ACT questions, students are provided experience in answering.

- *Outcome and feedback.* Mobile games have the ability to provide

    immediate and specific feedback (Clark & Ernst, 2009), thus enabling

    student self-correction and progress measurement. Following the correct

    or incorrect answering of a question, immediate feedback is presented to

    the student with the reasoning behind the correct answer. A point increase

    as an animated highlight appears as a result of selecting a correct answer.

- *Conflict, competition, challenge, and opposition.* At some degree, all

    games involve a form of competition, not excluding self-competition

    (Dempsey, 1996). Using competition as a motivational tool is the core

    engagement incentive of this application. For this reason, students'

    leaderboard rankings and scores are clearly seen on the home screen.

Visual Design.

The visual design of the application was incorporated using multiple

strategies. Tractinsky (2002) shared in his research,"What is Beautiful is Usable," the

relationship between perception of users on computerized system's aesthetics and

usability. Tractinksy's study found that the beauty of an application's design directly

affects a user's perception of his/her interaction with the application (Tractinsky,

Katz, & Ikar, 2000). If a user feels that an application is useful, its perceived

usability improves. An aesthetically pleasing design can inspire users to perform at a

higher level (Norman, 2002). Thus, in relation to the studies of Norman (2002) and

Tractinksy (2000), the designer's consideration of user experience is significant in order to promote a learner's frequency of use in and out of the classroom setting.

Understanding and incorporating visual appeal was a major focus in this application. Strong and consistent colors dominate the interface while a consistent sans-serif typeface of Myriad Pro was applied throughout the application. Brief animation loops are presented to the user to add energy and flow to the design. Large buttons and icons offer broad accessibility and further simplifies the navigation of the application.

Color schemes and icons were selected to incorporate an identity for each question category. The category splash screens were designed as follows:

- The English category features the Fleurs de Lys symbol animated over a red background (see Figure 3).

- The science category features an animated neutron over a green background (see Figure 4).

- The Math category features an animated lightning bolt symbol crashing onto a blue background (see Figure 5).

- The Reading category features a flashing lightbulb animated over a yellow background (see Figure 6).

- The Spirit category features an animated paw print scratching down a higher contrast version of the home screen background (see Figure 7).

- Finally, Figure 8 displays the design of the home screen where the animated

  icons and the PLAY button dominate the layout.

Figure 3. English category splash screen

Figure 4. Science category splash screen

Figure 5. Math category splash screen

Figure 6. Reading category splash screen

Figure 7. Spirit category splash screen

Figure 8. The home screen background is a combination of all category colors

Graphic design for TriviaPrep® was accomplished using the Adobe CC

software suite. Adobe Illustrator was used in the design of the following:

- TriviaPrep® Logo
- Category Icons: Math, Science, Reading, English, School Spirit
- Custom buttons and icons

Adobe Photoshop CC was used in the design of the following:

- Splash screen
- Animated category intro screens
- Home screen layout
- Mock layouts for all pages
- Background images

Coding.

There is much more to the creation of an application than the front-end visual

elements, however. Because a cross-platform tool was used, the coding of the

application was very time-demanding and challenging. TriviaPrep® was developed

using LiveCode 7 and the LiveCode programming language. The decision of

selecting this coding language was made based on the versatility of the tool.

LiveCode provides the cross-platform translation of program code that was desired,

thus providing the availability of creating native applications for iOS, Android,

MacOS, Windows, and LINUX.   Screenshots of the application's code within the

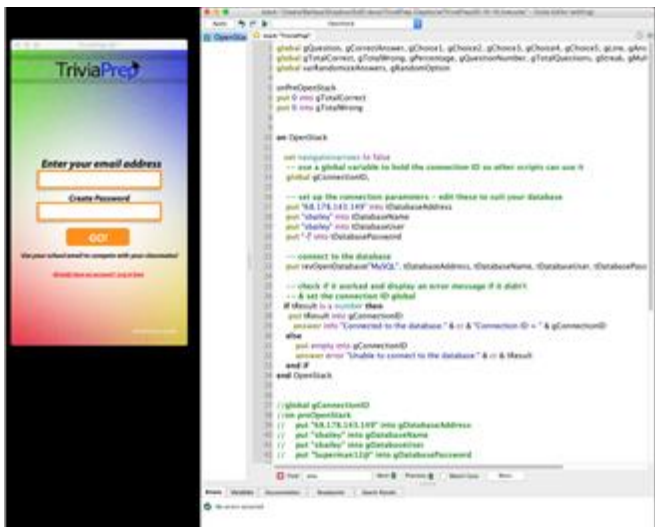LiveCode environment are below (see Figures 9, 10, and 11).

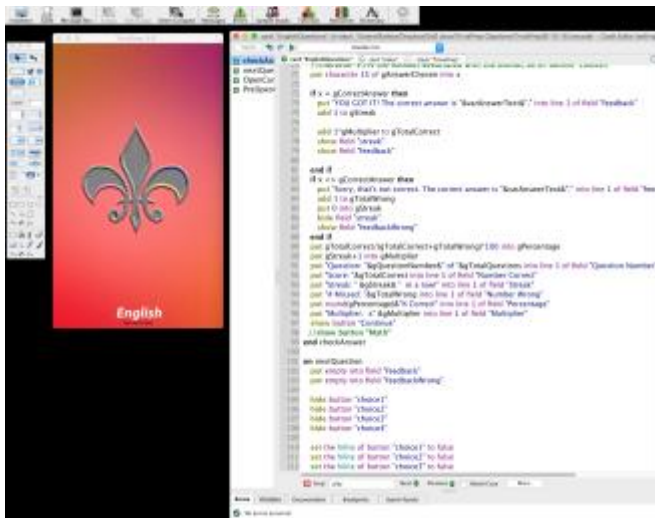*Figure 9. Login Screen design and coding in the LiveCode Environment*

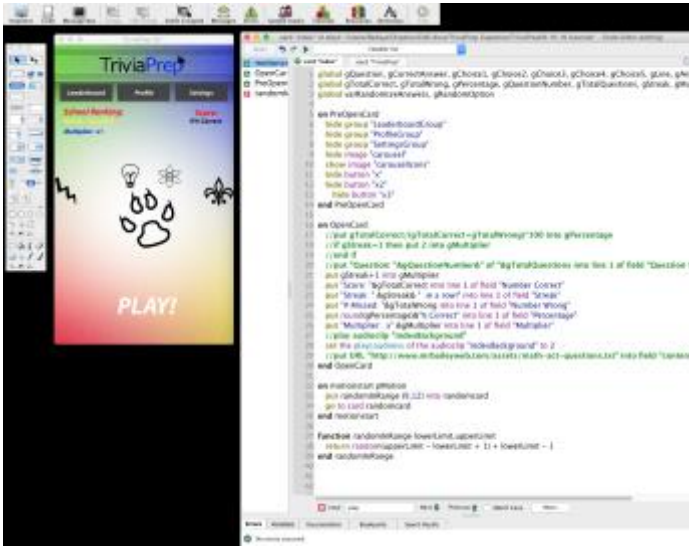*Figure 10. Category design and coding in the LiveCode Environment*

Figure 11. Home/Navigation Screen design and coding in the LiveCode Environment

When was the capstone implemented?

The design and development of the beta version of TriviaPrep® was completed on February 14, 2017. This version was exported both as a MacOS and a Windows standalone application for review purposes. Once the standalone applications were generated, the application was tested on a MacOS system for basic diagnoses of potential issues. This beta test was completed with the target audience of high school students and yielded many beneficial recommendations as noted in the following "impact of the capstone" section of this summary.

Further deployment of the application will be additionally considered following the long-term implementation of the tool in multiple settings. A multi-year large-scale implementation plan is being considered to ensure positive user experiences in deployment due to the financial demands that will occur. Currently,

the application is live for public download but, due to likely server limitations, is intended for small-scale use at this time.

Impact of the Capstone

Because TriviaPrep® is currently in its introductory stages, the impact that the application has had on others is currently minimal. The overall impact can be better determined following public release and long-term integration of the application into pilot schools. The application is now live to the public for beta trial purposes. The initial impressions, however, were presented during a small high school beta testing session.

In gauging the impact that this capstone had on the beta testing session, the initial response was highly favorable. The leaderboard is, as expected, a key component as users immediately referenced rankings amongst peers instead of focusing on the technical aspects of the application. Thus, suggesting that the user's ranking should be more prevalent in the design. Thus, user ranking notification size and contrast was increased.

Users also applauded the navigability of the design but were left inquiring about the minimal range of difficulty of questions presented. As a result, questions of a broader range of difficulty were added to each question database. Potential modifications for future versions of the design include individualized question difficulty level presented to users based on current performance.

Furthermore, during this session, few technical issues arose that were quickly remedied. The connection to the database was initially blocked by a local firewall. To prevent this in the future, this needs to be considered in a local district's implementation plan and will be noted on the error message in the application. The display and resolution settings on some of the computers used made reading the text very difficult on some questions presented. This was corrected with a modification to the text settings and incorporating a lighter shade of blue in all question categories.

This small scale beta testing session proved very beneficial in considering the accessibility of the use of TriviaPrep® on many platforms and was encouraging to see the target audience engaged by the tool.

Limitations of the Study

Behind all of the bells and whistles, the core goal of this application is to give students practice in standardized assessment questions. Users are presented many questions that are purposed to help prepare for the ACT assessment and trust that the practice questions are accurate. Therefore, a major consideration is trust. Will students trust that the questions and feedback that are presented to them are accurate? To make strides in the accuracy of the questions that are in the database, users will have the option to report and suggest corrections to an inaccurate question or answer to the administrators of the application.

Also, as with most user-identifiable based software applications, there are ethical identity and privacy considerations that need be addressed. Initially, because this application is competition-driven, students will compare their scores to their peers on a school-based leaderboard. This leaderboard will identify students by their school-given identity or a selected pseudonym for privacy. It is clear that some students will thrive off of seeing their names on the leaderboard; for others, though, the idea of a revealed identity will serve as a deterrent from using the application. (Yu, Han, & Chan, 2008)

If the student chooses to use a pseudonym for anonymity, there are concerns with inappropriate names. Although this may be a freedom of speech concern, user experience is too important to allow for such ethical distraction. Therefore, in future versions, pseudonyms will be chosen from a drop-down list of names instead of being user created. A pivotal concern to the design, development, and ultimately the use of this application is privacy. The first privacy act to consider is the Children's Online Privacy Protection Act (COPPA) of 1998. COPPA was enacted to allow parents to oversee the information that would be collected about their children online. Online tools that ask children thirteen and under to provide personal information must have policies in place that will first obtain permission from parents before the collecting or sharing of the child's data (Scelsi, 2016).

Furthermore, detailed regulations of COPPA will require integration of the following into this capstone project if there is intention for children thirteen years of age or younger to use the application:

- Obtaining detailed parental consent prior to student use and the sharing of data

- The posting of an accessible privacy policy within the application

- Provide parents access to their child's data and login information

These COPPA regulations are the most applicable to the mobile application development; there are many more detailed regulations that are not as directly applicable at the current stage of this tool.

As innovation pushes educational technology to new heights with the availability of immediate feedback and learning personalization, there is growing concern to further protect student information and data (Molnar, 2014). While COPPA pertains primarily to users thirteen years of age and younger, the Family Educational Rights and Privacy Act (FERPA) is a far more inclusive legal concern in the design and development of this application.
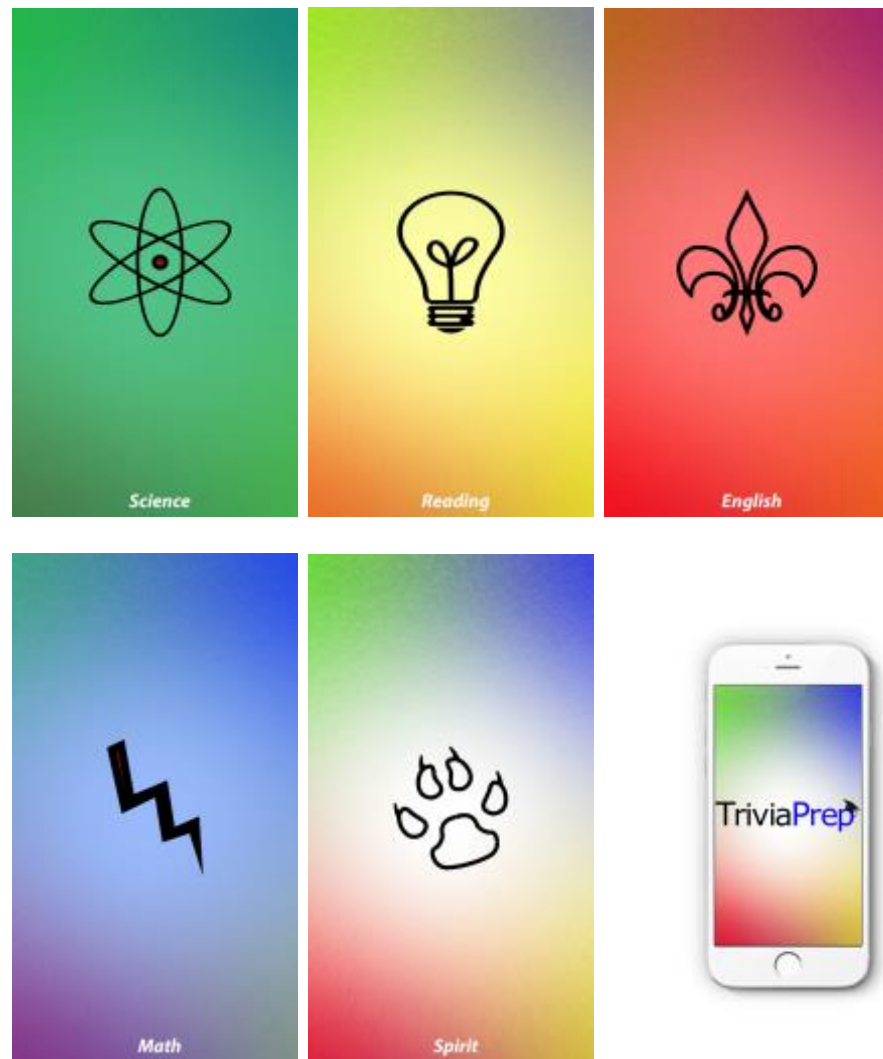
Enacted in 1974, FERPA applies to all students and is intended to protect the disclosure of the personally identifiable information of students (Molnar, 2014). Therefore, a strict and easily understandable privacy policy on the disclosure of student information has been developed and easily accessible within the application. This privacy policy is not an end-all remedy but is a strong starting point. School administrators, once TriviaPrep® is integrated, will have an important role in student privacy as well.

In looking at the other end of the spectrum, to protect the work and time that was put into the design and development of this application, there are some legal implications that need to be considered, such as copyright, patent, and trademark. Those three legal considerations are familiar to intellectual property. Therefore, the following protective steps have been taken:

- An online copyright protection from has been filed with the United States Copyright Office. According to the United States Patent and Trademark Office, Copyright protects creative expression. "Creative expression may be captured in words, numbers, notes, sounds, pictures, or any other graphic or symbolic media" (Copyright Basics, 2016). This will protect all of the ongoing original work for the application, including the source code, graphics, and text.

- Filing for Trademark for the name of the application, "TriviaPrep®," and logos that were designed. Although trademark does not protect against the copying of the ideas or concepts of the application, it will be wise to protect the designs in Figure 12:

Figure 12. Splash screen designs

- Finally, the process of filing for a patent of the application will occur. Although this is a very costly approach, getting the application patented would be a formidable method of intellectual property protection. In order for the application to be patentable, it must be a new type of application and be deemed useful

(USPTO, 2014). Before filing for a patent, however, the application must be

complete and available on the market.

Finally, because of the demanding nature of application development, there

are many limitations that present themselves in this capstone. As the passionate

creator of this application, it would be tempting to craft false expectations of willful

integration of this tool by all instructors into classrooms. However, it is not

uncommon to find reluctance in digital game integration in the classroom. Some

stakeholders in education view this type of technology as distracting, ineffective use

of time, and even an influence toward immoral behavior (O'brien, 2011). This is a

major restriction to the integration of this school-based application.

Furthermore, the time restraints of the completion of this study allows only for

the development of minimal beta versions of the application. Corrections to the

application code, although possible, would be time-consuming and dependent upon

the growing capabilities of the LiveCode software used.

Reflections

As my doctoral capstone journey began, I tip-toed in with eyes wide-open. I

had a pessimistic approach toward doctoral work because of my lack of desire to

perform research. This capstone proved different, however. The opportunity to

incorporate my abilities and appreciation of visual design presented itself, and I was

sold. Thus, the merging of my passion for educating young people and aspirations of achieving a terminal degree made this capstone worthwhile in many aspects.

Michael Eisner, the former CEO of The Walt Disney Company, is credited with saying "there's no good idea that cannot be improved on," this holds true with my experience in designing and developing this application. In spending more than a year on this capstone from its inception, I can attest to the struggles and moments of uncertainty that were met along the way. With a software application development background of only an end-user, I often hit road blocks that resulted in frustrated hours of scouring online coding resources. The time invested, however, has resulted in self-directed growth in the realm of software application development that I would never have imagined.
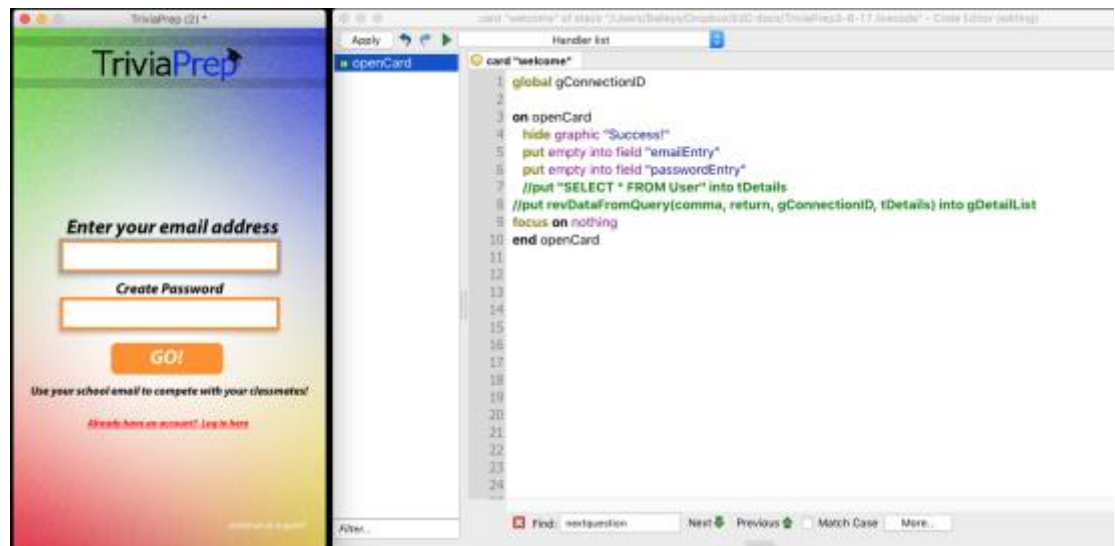
The creation of this application, to me, is similar to the handiwork of many proud artists. There is a strong desire for its appreciation and application of others and a bias that comes along with it. I am, therefore, confident that this tool can have a positive impact on the culture of a learning environment and increase users' familiarity with standardized multiple-choice questions. Therefore, considering the design and development of such an application as its purpose, TriviaPrep® is a sound capstone for the completion of my doctoral endeavors.

Capstone Project

As evidence of the creation and use of TriviaPrep®, a video walkthrough of the application is available at http://www.triviaprep.com/tutorial.html. Furthermore,

an image-based walkthrough of the application's core pages is below. Each image is

a screen shot of the application within the LiveCode environment and is accompanied

by the relevant scripted behaviors.
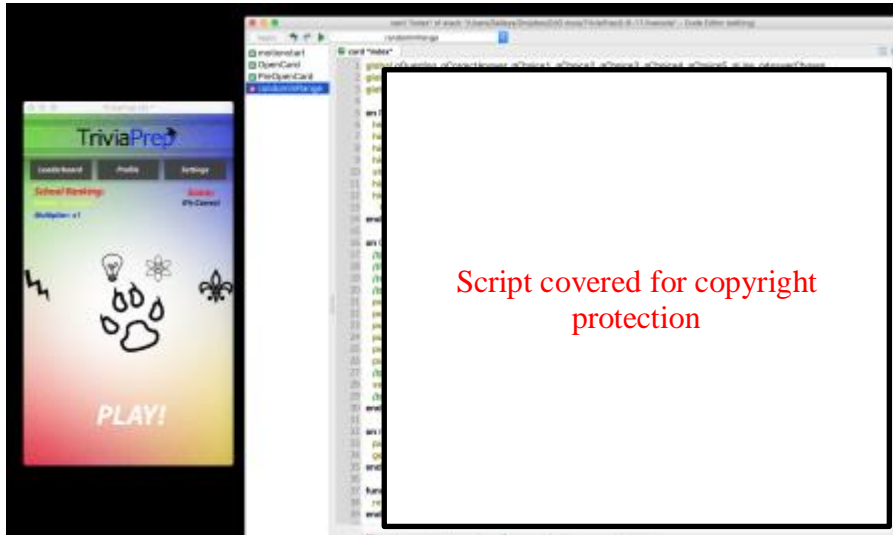
- Application Welcome/Login:

-The "GO!" button is scripted to check for and submit the user email address

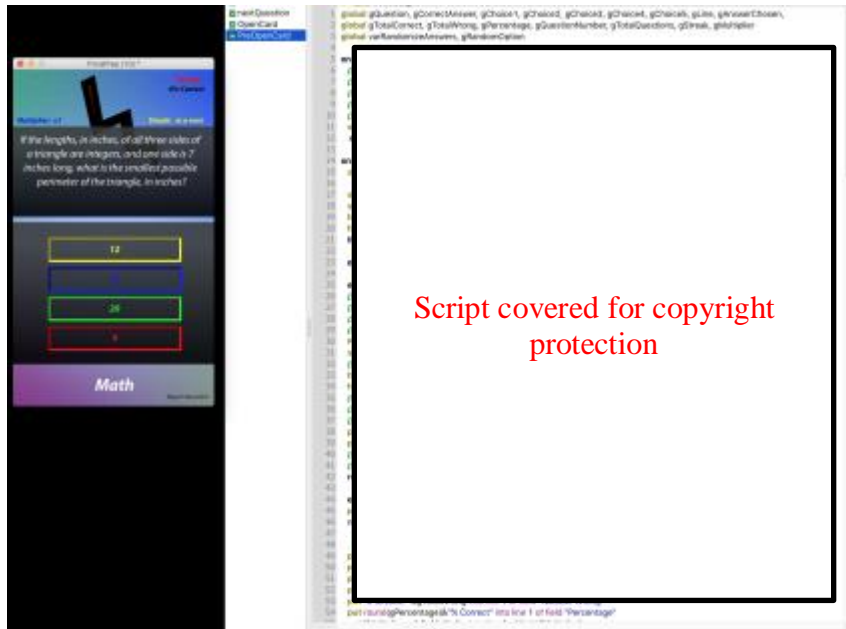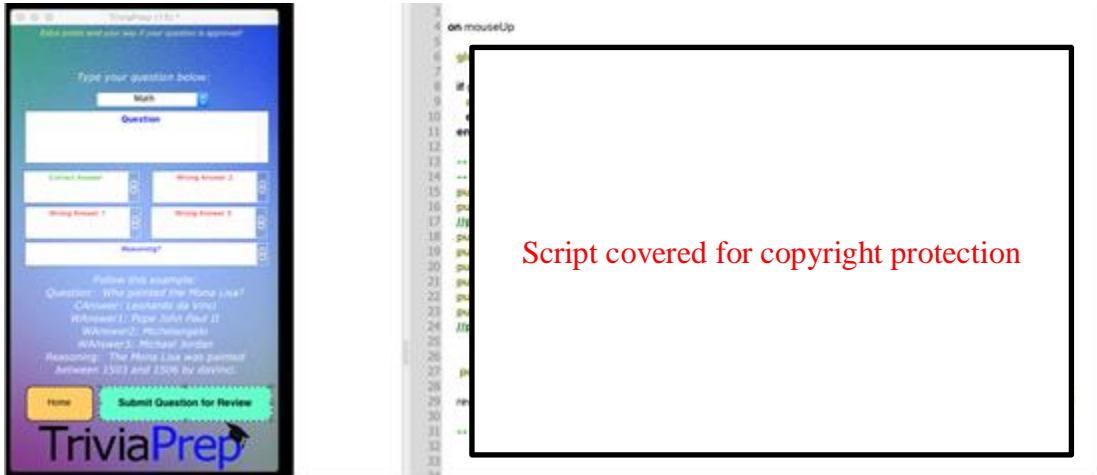and password to the database. The assigned script is as follows:

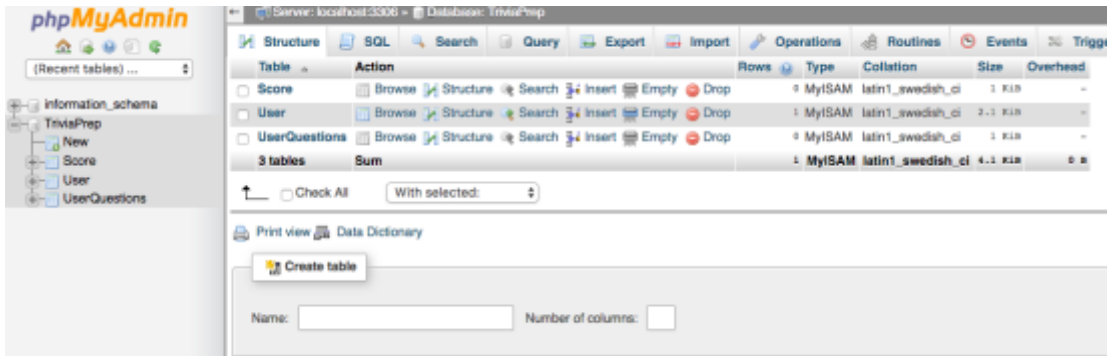- Application Home/Main Screen:

- Sample Question Category:

- User-Submitted Questions:

Script covered for copyright protection

Database:

The MySQL database for TriviaPrep® is managed through phpMyAdmin and has a basic structure that appears as follows:

Reference List

Adams, C. (2011). Play to Learn: Great Projects to Try, Websites to Bookmark, and a

World of Learning to Share with Students. *Instructor*, *120*(5), 64–66.

Adams, E. (2010). *Fundamentals of game design* (2nd ed). Berkeley, CA: New Riders.

Arnett, A. A. (2012). There's an App for That. *Diverse: Issues in Higher Education*,

29(14), 14–15.

Baek, Y. (2010). *Gaming for Classroom-based Learning : Digital Role Playing As a

Motivator of Study*. Hershey PA: Information Science Reference. Retrieved from

http://wwws.moreheadstate.edu:2048/login?url=http://search.ebscohost.com/login.asp

x?direct=true&db=nlebk&AN=310451&site=ehost-live

Beck, J. C., & Wade, M. (2013). *The kids are alright: How the gamer generation is

changing the workplace*. Harvard Business Press.

Bergin, D.A., Ford, M.E., and Hess, R.D. (1993). Patterns of Motivation and Social

Behavior Associated with Microcomputer Use of Young Children. *Journal of

Educational Psychology*. 85(3), 437-445.

 Chapell, M. S., Blanding, Z. B., Takahashi, M., Silverstein, M. E., Newman, B., Gubi, A.,

& McCann, N. (2005). Test Anxiety and Academic Performance in Undergraduate

and Graduate Students. *Journal of Educational Psychology*, *97*(2), 268–274.

Chou, C.-Y. (2013). Evenly matched competitive strategies: dynamic difficulty adaptation

in a game-based learning system. *Research and Practice in Technology Enhanced

Learning*, *8*(2), 225–243.

Clark, A. C., & Ernst, J. V. (2009). Gaming in technology education: the study of gaming technology in Education. *The Technology Teacher*, *68*(5), 21-27.

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development*. Psychology Press.

Eck, R. V. (2010). *Interdisciplinary Models and Tools for Serious Games : Emerging Concepts and Future Directions*. Hershey, PA: Information Science Reference.

Kentucky Department of Education. (2012, June 26). Unbridled Learning Accountability Model. Retrieved from http://education.ky.gov/comm/UL/Documents/WHITE%20PAPER%20062612%20final.pdf

Kim, B., Park, H., & Baek, Y. (2009). Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning. *Computers & Education*, *52*(4), 800–810.

Kim, S., Kim, H., & Han, S. (2013). A Development of Learning Widget on M-Learning and E-Learning Environments. *Behaviour & Information Technology*, *32*(2), 190–202.

Lam, S., Yim, P., Law, J. S. F., & Cheung, R. W. Y. (2001). *The Effects of Classroom Competition on Achievement Motivation.* Retrieved from Eric.

Lan-Ying Huang, & Ying-Jiun Hsieh. (2011). Predicting online game loyalty based on need gratification and experiential motives. *Internet Research*, *21*(5), 581–598.

Molnar, M. (2014). Safeguard Use of Student Data, White House Report Urges. *Education Week*, *33*(31), 26–26.

Obrien, D. (2011). *Gaming and Simulations : Concepts, Methodologies, Tools and Applications*. Hershey, PA: Information Science Reference. Retrieved from http://wwws.moreheadstate.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=329231&site=ehost-live

So, H.-J., Seow, P., & Looi, C. K. (2009). Location Matters: Leveraging Knowledge Building with Mobile Devices and Web 2.0 Technology. *Interactive Learning Environments*, *17*(4), 367–382.

Learning Object Model Meets Educational Gaming. *Educational Technology & Society*, *12*(4), 359–371.

Suls, J., & Wheeler, L. (2012). Social comparison theory. *Handbook of Theories of Social Psychology*, *1*, 460–482.

Tractinsky, N., Katz, A. S., & Ikar, D. (2000). What is beautiful is usable. *Interacting with Computers*, *13*(2), 127–145.

USPTO – Patents and Trademarks. (n.d.). Retrieved June 29, 2016, from http://www.uspto.gov/learning-and-resources/ip-policy/copyright/copyright-basics

Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological bulletin*, *106*(2), 231.

Yu, F.-Y., Han, C., & Chan, T.-W. (2008). Experimental comparisons of face-to-face and anonymous real-time team competition in a networked gaming learning environment. *CyberPsychology & Behavior*, *11*(4), 511–514.

Yu, F., & Liu, Y. (2009). Creating a psychologically safe online space for a student-generated questions learning activity via different identity revelation modes. *British Journal of Educational Technology*, *40*(6), 1109–1123.

Zhi-Hong, Chen. (2014). Learning Preferences and Motivation of Different Ability Students for Social-Competition or Self-Competition. *Journal of Educational Technology & Society*, *17*(1), 283–293.

VITA

SEAN D. BAILEY

EDUCATION

May, 2008   Bachelor of Business Administration
                      Morehead State University
                      Morehead, Kentucky

May, 2012   Master of Arts
                      Morehead State University
                      Morehead, Kentucky

Pending   Doctor of Education
                      Morehead State University
                      Morehead, Kentucky

PROFESSIONAL EXPERIENCES

August, 2008   Business and Technology Teacher
- May 2016   Bath County Schools
                      Owingsville, Kentucky

May, 2016   Assistant Principal
- Present   Bath County Schools
                      Owingsville, Kentucky

HONORS

July, 2012   2012 Chamber of Commerce Service to Youth Award
                      Bath County Chamber of Commerce
                      Owingsville, Kentucky

May, 2015   Graduation Commencement Speaker
                      Bath County High School
                      Owingsville, Kentucky

PUBLICATIONS

Bailey, S (2015). TriviaPrep: Inside the research, design, development, and implementation
of an educational app. AECT Annual Conference Proceedings.