

Mindful Mustangs: A Mindful Meditation App for Cal Poly SLO

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ABSTRACT

This report discusses the creation and research behind a new mindfulness meditation application called Mindful Mustangs, which is created for the students of Cal Poly SLO. The goal of this mobile website is to use the various techniques used in mindful meditation to reduce the stress and anxiety that college students regularly face. With the onset of iOS and Android applications, similar health and behavioral applications are on the rise. The increase of these applications calls for a certain type of design and a robust analysis must be done to ensure the psychological health of the user. Mindfulness applications such as Stop, Breathe & Think and Calm have adopted different information architectures and aesthetics that are proven to achieve lower anxiety levels in the user. Understanding the features that contribute to the positive effects of these applications helped create Mindful Mustangs and can help develop more powerful psychological and behavioral applications in the future.

1 INTRODUCTION

Test anxiety is a mental condition that affects a large portion of the student population. During my Cal Poly career, I have received low grades and experienced the adverse effects of test anxiety. Recently, there has been a new type of therapy called Eye Movement Desensitization and Reprocessing (EMDR) and it is being used to treat PTSD patients. EMDR is based on the theory that eye movements allow the processing of traumatic memories, so patients are given negative stimulation and eye movement is used to desensitize them. They are then given positive stimuli and the result is an effective treatment for PTSD patients. While EMDR has been used for treating PTSD, a study published in the Journal of Science and Healing uses EMDR

for treating test anxiety, particularly in college students (Benor). The participants were Canadian university students with severe to moderate test anxiety. This study yielded a positive result; there were significant reductions in test anxiety and the participants reported high satisfaction with the treatment. While I hoped to investigate this type of anxiety-reducing therapy for this project, Annika Michetti, a local psychologist who administers EMDR therapy, brought the complicated and highly subjective aspects of EMDR therapy to my attention. With her advice, I decided to go in another direction with my research.

1.1 MINDFUL MEDITATION

While there are various approaches to lowering test anxiety or stress, a recent study in 2003 showed that mindfulness-based stress reduction lowers psychological distress in students (Rosenzweig, et al 2003). One example of this is mindful meditation.

Mindful meditation is a form of meditation designed to develop the skill of paying attention to our inner and outer experiences with acceptance, patience, and compassion. This form of therapy stems from Buddhism, where Gautama Buddha stated that the source of suffering is our attempt to escape from our direct experience. Contemplative psychology, a combination of humanistic psychology (the study of the whole person) and psychotherapy (the investigation of the stages of human development), combines with Buddhism to create the most common practice of mindful meditation, sitting meditation.

1.2 TYPES OF MINDFUL MEDITATION

Mindful meditation (specifically sitting meditation) focuses on three basic aspects to center the mind: the body, breath, and mind (Wegela 2010). For the body, it is important for the meditator to be practicing

mindfulness with their eyes open and in a quiet environment. Interestingly, the breath is not as important to mindful meditation as it is to other types of meditation; only 25% of the meditators attention should be focused on the breath. The most important aspect is the mind; it is important to notice every thought that is passing through the mind. If the mind wanders, that is when the body and breath help the meditator focus and balance it. It is important to remember that it is not about a stop in cognition or thinking, but a sustained observation of the current thought in one's mind.

Mindful meditation focuses on the fact that one should not feel different from whom they are, they simply need to be acutely aware of their moment-to-moment thoughts. It helps keeps one unconditionally present, no matter what the circumstance is. Instead of struggling to get away from difficult experiences, mindfulness meditation encourages the meditator to accept his/her feelings and be with them.

1.3 MENTAL HEALTH APPLICATIONS

In the recent technological age, more people have been using mobile applications and websites to practice meditation and lower anxiety levels. Introducing mindfulness into the mental health application niche brings a new dimension to the mental health application niche.

2 DELIVERABLE

In addition to this written research component of the senior project, Mindful Mustangs, the mobile website, will be live for students to use. I have partnered with PULSE (Cal Poly SLO's peer health education program) to understand the requirements for this website, which allowed me to conduct user interviews, design usability studies, and use meaningful design techniques. The goal of this project is to help students cope with text anxiety, stress,

and other factors that can lead to mental distress in college. In addition, this website acts as a channel through which students can reach out to PULSE if they need additional help.

2.2 RELATION TO LAES CONCENTRATIONS

In my career, I intend to get involved with user experience engineering and/or product management. This project allowed me to treat PULSE as a client that I would potentially work for and design a product based on their needs.

3 LITERATURE AND TECHNOLOGY REVIEW

3.1 MOBILE APPLICATIONS

With the technological boom that has occurred in the last decade, a new technological paradigms have surfaced as a result of the rapid and dynamic changes of the information landscape. One such paradigm, the "Internet of Things", or IoT, encapsulates the presence of technological tools that can interact with one another and cooperate with other tools and human to achieve a common goal. This has the potential to have an impact on the everyday life of its users (Plaza, et al. 2003). With the introduction of smart devices such as smartphones, there is more potential to reach users because they contain characteristics such as small size, portability, processing capability, network connection, and limited memory (Plaza, et al. 2003).

3.2 MENTAL HEALTH APP DESIGN

Early mental health applications that were developed on smartphones began to get scrutinized in the past ten years. The Journal of Contextual Behavioral Science did a study to test the effectiveness of the design and development of mobile applications for behavior change. After they analyzed different applications and companies that

produced these mental health applications, they produced three important findings: 1) there must be an establishment of a clear vision and a team, 2) there is a strong emphasis on the iterative nature of this process of discovery and 3) one should expect iterations when designing the elements of the application and its development. This reflected the strong and iterative nature of the approach to mental health application design (Roth, et. Al 2014).

Successful Mental Health App:	Mindful Mustangs:
Clear establishment of a team	Worked with the REAL team (part of PULSE)
Iterative nature of the process of discovery	Constantly did research from different sources to understand mindful meditation deeply
Iterative nature of app development	Continued to report back to the REAL team to make sure that the design decisions that were made were satisfactory

3.2 OIVA

Based on this knowledge, recent applications have been creating different ways to analyze the satisfaction of their users' mental health. Oiva, a mobile application based on ACT (acceptance and commitment therapy), measured the changes in wellness of their users by questionnaires on stress, satisfaction with life (SWLS), and psychological flexibility (AAQ-II) at the beginning and end of the study. In addition, they supplemented these measurements with user experience questionnaires after one week and one month's use, and user

experience interviews were conducted after one month's use (Ahtinen, et al. 2013).

The results of this study provided strong design findings about mental health applications. First, it was found that it is important to provide the user with exercises to improve their everyday lives. Secondly, finding a proper place and time for challenging content was necessary to ensure the wellness of the user. Thirdly, the applications focus must be centered on self-improvement and learning to ensure long-term success. Lastly, it became apparent that restricting choice (ie. not providing a "back" button) or providing a tool for self-reflection, may inhibit the user from trusting the application and its features (Ahtinen, et al. 2013). These studies were the precedent for the numerous amount of mental health and mindfulness applications seen on the market today.

Successful Mindful Meditation App:	Mindful Mustangs:
Provide exercises for everyday life	There is a feature that gives the user everyday meditation tips
Find a proper place and time for challenging content	The "walking meditation" feature is to be done when one is alone and has a small pocket of time between classes
Focus on self improvement and learning	The blog feature provides everyday tools and tips from the REAL team to help an individual grow and learn
Do not restrict choice	The various features and pages of the mobile

	site are clear for the user to see and navigate
Provide a tool for self-reflection	The “How Do You Feel?” feature (will be added in the future), will allow for users to write down their everyday feelings

3.4 MINDFULNESS AND THE BODY

With the popularity of mindful meditation in the past five years, studies have been done to test the effectiveness of mindful meditation. In a study published by *Psychosomatic Medicine*, the effect of mindfulness on the human brain and the immune system was tested by measuring electrical brain activity and antibody counts after injecting users with the influenza vaccine and asking them to practice mindfulness. Brain activity was measured initially and then after 4 months following an 8 week training program in mindfulness meditation.

The results showed that there was an increase in brain function and antibody counts, proving that mindfulness had positive medical effects on brain and immune function (Davidson, et.all).

3.5 MINDFULNESS APPS TODAY

This resulted in a surge of mindfulness meditation applications to be released on various app stores. Mobile applications such as the Mindfulness App help time users and give them the option of a guided meditation, while the Stop, Breathe, & Think App allows users to write down their feelings and learn more about mindfulness (Tlalka 2013).

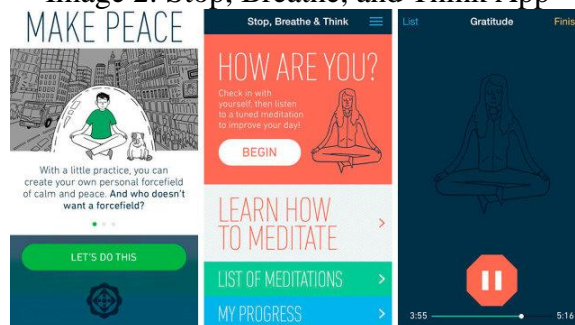
A study was done in 2013 to understand the design features and implications of different mindfulness applications that were on the

market. The results showed that most of these applications had features such as alarms, quotations, everyday tips, and photo upload options. Some special features included breath detection, holographic theming (ie. calm ocean background), and a review of the user’s feelings. The common features that were seen accurately depict how similar many of these applications are. The approach to mindful meditation seemed somewhat narrow, and while there were many applications on the market, the creativity and variety of mindful meditation techniques were limited.

Image 1: The Mindfulness App



Image 2: Stop, Breathe, and Think App



3.6 QUANTIFIED SELF

Quantified Self is the practice of recording one’s feelings or emotions to measure or quantify aspects of one’s daily life. Examples of this might be taking a picture of every meal, having a mobile app running in the background to measure actions (ie. fitbit), or writing up one’s own feelings. Four principles affect this lifestyle: the need for transparency, a wish to optimize life,

getting feedback of one's actions, and biohacking (Lagus 2014).

This type of continuous self-tracking somewhat resembles mindfulness practices. Paying attention to details of one's feelings and reactions in the context of everyday life helps make one more mindful of his/her habits. As a result, this causes a change in behavior for the individual.

A research paper was published by IEEE which researched the correlation between Quantified Self (QS) and mindfulness apps on the market. The data (apps with the tag "mindfulness") was collected from the Android app store in late Fall 2013. Out of the 305 apps found, 16 were analyzed. These apps approached mindfulness from a variety of techniques and promised different results (increased focus, decreased insomnia, decreased pain. etc.) (Lagus 2014).

There are two ways that the researcher (Lagus) looked at the measurements taken by the application users. One was the "control mindset" which included restrictions, tension, striving, judgement of self, and fear of failure, while the other was the "awareness and acceptance mindset" which included relaxation, non-judgment, acceptance, compassion to self, and forgiveness. Keeping these two mindsets as a blueprint allowed for Lagus to understand the types of emotions correlating with the QS (Lagus 2014).

The results of this study showed that using QS allowed the users to be more mindful of themselves. The applications that encouraged the user to track his/her emotions and daily habits focused the users' mind and caused them to be more alert of their moment-to-moment feelings and interactions. The most important aspect in these applications, the researcher concluded, was not simply being mindful but also being

accepting toward oneself (Lagus 2014). This research made it clear that there were many different types of ways that one could achieve mindfulness as long as the user was lead toward the principle of acceptance.

3.7 AEON

Recently, a study was published in the International Journal of Human-Computer Studies regarding a new mindfulness mobile application called AEON. This application used thought distancing, a technique that requires one to be aware of his/her thoughts and observe them as they go away. The developers of this application decided to create this effect by mimicking writing words (or thoughts) on a piece of parchment and placing it underwater. The user then can touch the screen which makes the ink slowly dissolve on the piece of paper and "go away". After comparing the effects of AEON to other mindfulness applications, it was found that AEON users had a more positive experience with combating their anxiety and maintaining good mental health (Chittaro et al. 2014).

Image 3: AEON Mindfulness App

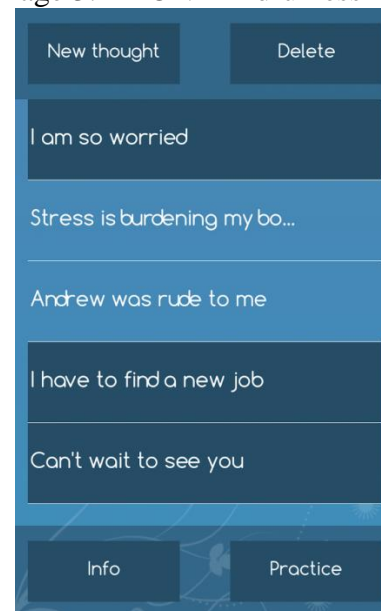


Image 4: AEON Mindfulness App

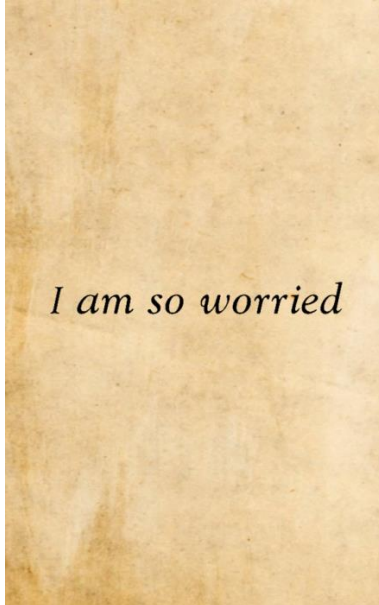
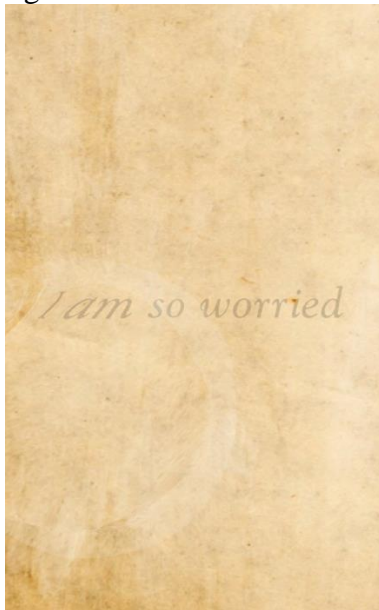


Image 5: AEON Mindfulness App



website from scratch, I found out that my client (PULSE's REAL team, who is specifically in charge of mental health) was made up of students who were mostly in the sciences or liberal arts field of studies. Since no one on the team who would take over the site had any computer science experience, I chose to develop the site on a platform that would be very simple for the members of the REAL team to use.

Initially, I was choosing between Wordpress and WiX for my website builder, because I knew that I wanted something that would be simple for the REAL team to edit. After comparing both, I realized that WiX has better flexibility (their tools are fully integrated with the website, making it less "buggy"), usability (WiX is designed specifically for non-developers to use), support (WiX has a focused support team to help their users with troubleshooting with phone support as well), maintainability (all of the WiX updates are carried out by their technical team and is automatically deployed to the website), and affordability (WiX offers a free option, while Wordpress does not). These five components of the WiX website builder which were more advantageous than what Wordpress had to offer lead me to develop Mindful Mustangs on their platform.

5 DESIGN

The initial design of the project revolved around a single screen design with an iterative approach to different anxiety reducing therapies. I had also designed a tile-style landing page which was more freeing navigation wise and allowed the user to view many aspects of the site.

4 TECHNOLOGY OVERVIEW

This website was designed on WiX, a free website builder, with the clients' needs in mind. While the original intention was to build the entire frontend and backend of the

Image 6: Iterative Design

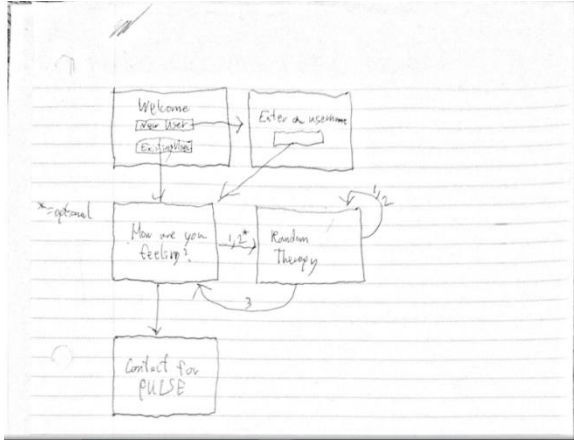
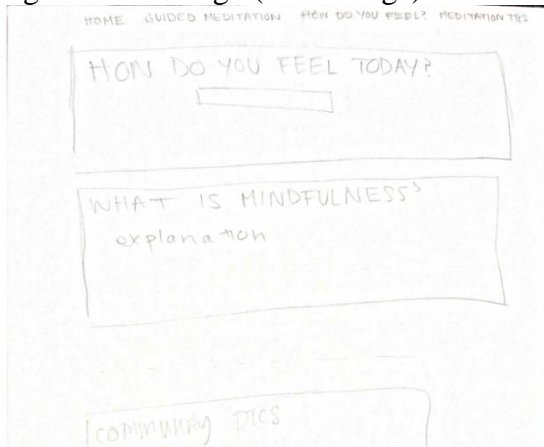
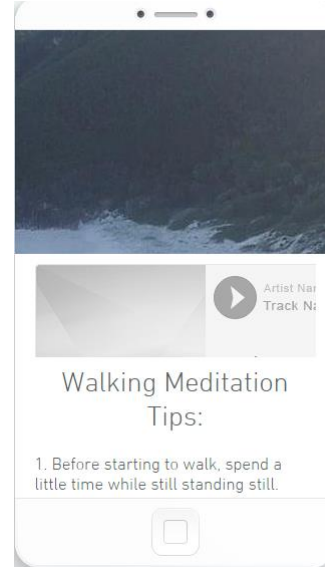


Image 7: Tile Design (Home Page)



After conducting initial user interviews with the REAL team, I became aware that the top three features that the users wanted was guided walking meditation, mindfulness tips, and writing down emotions/interactive feelings wheel. The guided walking meditation feature was added to the site with the help of SoundCloud. With a simple, calm, background, all the user needs to do is to play the walking meditation song on the REAL teams Sound Cloud and follow the tips on the lower part of the page to complete their mindfulness exercise.

Image 8: Walking Meditation Page



The mindfulness tips were added on a separate page and a blog page was also added so that the client can continually add more tips and updates to inform users of the various mindfulness techniques that one could use. There is also an interactive Instagram feed on the home page that can link to the REAL teams' Instagram and allow them to post information for their users.

Image 9: Mindfulness Tips

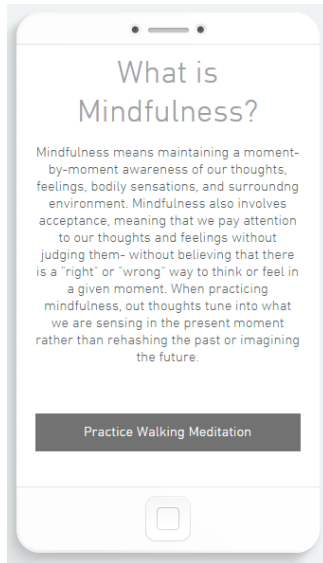
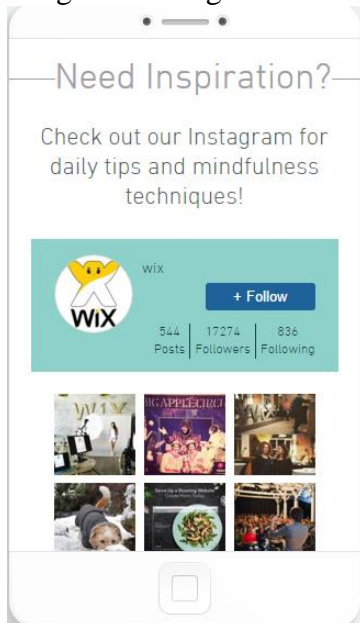


Image 10: Instagram Feed



5.1 MINDFUL MUSTANGS

Based on the results of all of this research, I was able to make sure that Mindful Mustangs would be effective as possible for the students at Cal Poly. It has a very clean and simple layout which allows the user to go back and navigate the website with ease. In addition, there are ways for the user to track how he/she feels and there is extensive

information on what mindfulness is. Lastly, there is a guided walking meditation feature on the website which allows the user to practice mindfulness on-the-go with tips and instructions to assist them, thus making the practice of mindful meditation less daunting for the user.

6 ANALYSIS AND VERIFICATION OF PROJECT SUCCESS

As a part of this project, there were many factors being assessed. In the mobile website, Mindful Mustangs, the top three factors that were to be assessed was the navigability, intuitiveness, and effectiveness.

After adding these features, a usability study was conducted where the users were asked to navigate the website based on a pre-defined task list. After completing the task list, the users were then asked to answer a post-usability study survey to gauge the intuitiveness and navigability of the website.

Based on the results of the usability study, the client was pleased with the aesthetic and the features on the website. There were little to no pain points, with the only criticism being the integration of the "How Do You Feel?" feature. Regardless, the initial criteria set by the REAL team was a design aesthetic for the site and two complete features, both of which I delivered to them.

In addition to this deliverable, I wrote an in depth analysis of mindfulness and mental health applications for Professor Kurfess' graduate level Human-Computer Interaction class (CSC 570). This aspect of the project was important because his grading of the research that I did for his class (which I used in this project as well) validated my research and proved that it was at an acceptable level of research and understanding. The type of research and findings that I gathered from

writing this paper helped me understand the foundation of a strong and robust mental health application. Professor Kurfess graded my final research paper with a 92/100 (a link to the full research paper can be found in the bibliography).

		claims. 2 points	claims unsupported, or too few references 3 points	unsupported 4 points	appropriate support for all major claims 5 points
Organization	No discernible structure 0 points	Little structure evident, difficult for readers to follow 2 points	Acceptable structure with some deficiencies, but readers should be able to follow 3 points	Good structure, possibly minor flaws 4 points	Excellent structure, very easy to follow 5 points
Appearance	No effort at formatting or proofreading evident 0 points	Serious flaws that affect readability 2 points	Multiple language or formatting issues 3 points	Minor language or formatting issue 4 points	Publication quality, no language or formatting issues 5 points
Length	More than 75% outside the specified boundaries 0 points	More than 50% outside the specified boundaries 2 points	More than 25% outside the specified boundaries 3 points	Somewhat too short or too long 4 points	Exactly within specified boundaries 5 points

92.00 / 100.00

Sunday, December 13, 2015, 12:54 PM



Franz Kurfess

Image 11: Professor Kurfess' Grading Rubric and Final Grade

This is the scheme I'm using to grade the 570 research papers.

Topic Knowledge	Author does not seem to have any knowledge of the topic 0 points	Basic understanding of the topic, but some serious errors or omissions, or difficulties describing simple concepts 20 points	Good knowledge, with some errors and difficulties describing concepts 30 points	Very good knowledge, only minor errors or problems with the discussion of advanced issues 36 points	Excellent topic knowledge, no errors, interesting and relevant details, excellent handling of advanced issues and technical details 40 points
Relevance	Completely unrelated to the course topic 0 points	Somewhat unclear how this is related to the course topic 8 points	Topic is related to the course, but it is a somewhat remote connection, or the connection is not clarified 12 points	Clearly related to the course topic; connection not clarified, or not a core area of the course 16 points	Core area of the course and an excellent match 20 points
Topic Difficulty	Trivial, requires no technical background to understand and prepare a presentation 0 points	Moderate level of technical background knowledge required 8 points	Solid background in Computer Science or related fields required; little extra research necessary 12 points	Complex topic that requires a solid background and some research 16 points	Very complex topic, with novel and unfamiliar aspects; requires advanced background and significant research 20 points
Supporting Evidence	None 0 points	Minimal support for even major claims 2 points	Satisfactory evidence, some minor claims 4 points	Good evidence, minor claims 6 points	Excellent evidence, with significant details 8 points

7 SOCIETAL IMPACTS

Regardless of the approaches, it is clear that mindfulness is a positive approach to mental and immune health. In a fast-paced, high-stress world that both younger and older generations have to adapt to, mindfulness provides a way to handle the new everyday pressures of the technological world. About ¼ of Americans have some sort of mental illness in the United States today but they are not getting adequate treatment. Mobile applications can be the channel that can reach this demographic.

While this is the ideal, it would take much more cooperation between the medical and the technological aspects of this venture to provide a type of service that can completely substitute a therapist. Perhaps with new medical techniques being introduced in mindfulness applications, the idea of a surrogate therapist can be entertained.

8 NEXT STEPS

After this iteration of the project, completing the "How Do You Feel?" feature would be the next priority. In addition to continuing development, it is important for the REAL team to begin posting on the websites' blog and syncing their various media channels to the site (SoundCloud and Instagram). After that iteration, another usability study must

be conducted to not only test the functionality of the various plugins but also the overall effectiveness of the site. This would involve a more rigorous usability study so that users who typically have high test anxiety or stress levels would be the main demographic for the study. It would also be more time consuming for the test subject because it would not only be a list of tasks for them to complete, it would be a month (or more) long study of how they feel after using Mindful Mustangs. A marketing campaign on social media would also help attract users and beta-testers to the website.

9 CONCLUSION

Mental health is an area of psychology that is rapidly entering the technological field. There is an entire niche for people who interested in “online therapy”, “online counseling”, or “online meditation”. Since the mobile phone is constantly in use by each generation, it is the most suitable platform for a person to attain daily help.

The main aspect of mindfulness is that one should feel attentive to his/her thoughts and feelings. A mobile application, if designed correctly and has the appropriate features (ie. daily exercises, self-improvement and learning, self-reflection, etc.), has the power to influence an individual on a very direct and personal level. This makes a mobile application a very effective platform for various mental health therapies and practices.

While it is a great accomplishment that an area as subjective as mental health and meditation is growing, the format and approach for mindfulness stays mostly the same. After the AEON Mindfulness App used thought distancing, it was clear that there are other approaches to mindfulness that may be more effective than what we see in app stores today. Perhaps in the future, we

will see different approaches to mindfulness appear in mobile applications that are more effective than the applications seen today on the market. The amount of research an co

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Analysis on Mindful Meditation Applications (Graded by Prof. Kurfess):
<https://drive.google.com/file/d/0B-8LXKB5gOhQUdhJTmJxZ2toM0k/view>

Task List:
https://docs.google.com/document/d/1b5UNqTcPAECy6rLHTOfAKqbZQEhPwOauGM3FVp_e13s/edit?usp=sharing

Post-usability test survey:
https://docs.google.com/forms/d/1VqCb0GbD3eF0Q2ERUGWhxkQ7Sr2-HKvO6_uPFoSuKH0/viewform?usp=send_form

Mindful Mustangs Website (Beta version):
<http://nehaj93.wix.com/mindful-mustangs>