2020

Evaluation of User Interface in Drive Focus® Application

Bailey Kiser *Dominican University of California*

Paul S. Peritos *Dominican University of California*

Noreen Hasan *Dominican University of California*

Anjelica J. Collins *Dominican University of California*

https://doi.org/10.33015/dominican.edu/2020.OT.03

This thesis, written under the direction of the candidate's thesis advisor and approved by the program chair, has been presented to and accepted by the Department of Occupational Therapy in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy.

Bailey Kiser, Paul S. Peritos, Noreen Hasan, and Anjelica J. Collins
Candidate

Julia Wilbarger, PhD, OTR/L
Program Chair

Kitsum Li OTD, OTR/L, CSRS
First Reader

Evaluation of User Interface in Drive Focus® Application

By

Anjelica Collins, Bailey Kiser, Noreen Hasan, & Paul Peritos

A culminating capstone project, submitted to the faculty of Dominican University of California in partial fulfillment of the requirements for the degree of Master of Science of Occupational Therapy.

Dominican University of California

San Rafael, CA

May 2020

Abstract

Technology is used in healthcare settings to aid clinicians in accessing client information, researching data, and enhancing communication with the client and other healthcare team members. In order for an app to best support client engagement, the app needs to have a well-developed user interface design There are four main aspects of user interface design, context, fidelity, accessibility, and consistency. The Drive Focus® application (app) is designed to identify how an individual recognizes, prioritizes, and reacts to information during real-world driving simulations. The Drive Focus® app has efficacy and feasibility, however, the user interface design has never been assessed. Therefore, our research question is: Do clinicians find the Drive Focus® app to have a strong user interface design when using it for rehabilitation purposes? Through the use of a descriptive study, the student researchers investigated the user interface design of the Drive Focus® app using two different data collection methods; an anonymous survey and an hour-long focus group discussion. The source of the participant population was from Dr. Miriam Monahan, OTD, OTR/L, the developer of the Drive Focus® app who provided a list of clinicians using the app. The study determined there are three of the four components of user interface design. The app has fidelity, accessibility, and consistency, but lacks context.

Acknowledgements

We would like to give special thanks to Dr. Miriam Monahan, OTD, OTR/L, the developer of the Drive Focus® app, for her continued support of our study. Additionally, we would also like to thank Jocelyn Diaz for her work and contribution toward the completion of this study. We would also like to thank our families for their unconditional support throughout this process. Finally we would like to thank all the clinicians for their participation in our study.

Table of Contents

Abstract .....
Acknowledgements i
List of Tables iii
List of Figures iv
Introduction 1
Literature Review 2
Technology Today 2
User Interface Design 8
Statement of Purpose 13
Theoretical Framework 14
Ethical Considerations 17
Methodology 19
Design 19
Results 22
Survey 22
Discussion 29
Fidelity 29
Accessibility 29
Consistency 30
Context 30
Recommendations 31
Limitations 32
Conclusion 33
References 35
Appendix A: Survey Questions 38
APPENDIX B: Email Insturctions 44
APPENDIX C: Focus Group Sign up Form 48
Appendix D: Letter of Support 50

List of Tables

Table 1 Design of Survey Questions through M.O.H.O. Lens 39

Table 2 Design of Focus Group Questions through M.O.H.O. Lens..... 43

List of Figures

Figure 1 Professional specialty of participants using the Drive Focus® app. 22
Figure 2 Single user version vs. Educator version usage of Drive Focus® app by clinicians. 23
Figure 3 Please rank: “I recommended the Drive Focus® app for home use with ___ of my clients.” 24
Figure 4 Please rank: “Ever since the Drive Focus® app was first available to me, I found it to be a useful tool for the therapy process in my practice setting.” 24
Figure 5 Please rank: “Following use of the Drive Focus® app, it presents to you relevant information regarding your client’s performance. 25
Figure 6 Please rank: “The Drive Focus® app is relevant in my clinical practice.” 25
Figure 7 Please rank: “Among the tools that I have to address driving with my clients with cognitive and visual deficits, I find the Drive Focus® app the most useful. 26
Figure 8 Please rank: “I use the Drive Focus® app as a cognitive visual training tool for clients who do not have a goal to return to driving.” 26
Figure 9 Please rank: “The Drive Focus® app is easy to use in my current practice setting.” 27
Figure 10 Please rank: “I find the Drive Focus® app’s user interface easy to navigate.”..... 28

Introduction

Over the past few years, technology has made a drastic impact on the everyday lives of people. Technology provides a way for people to communicate, while also allowing people to enjoy music, multimedia, and games (Dogtiev, 2018). Technology is also used in healthcare settings to aid clinicians in accessing client information, researching data, and enhancing communication with the client and other healthcare team members (Rupp, 2018). Alvarez, Asantey, Classen, Feher, He, Knott, Medhizadah & Moulin (2018) found the Drive Focus® application (app) is designed to identify how an individual recognizes, prioritizes, and reacts to information during real-world driving simulations, which are context, fidelity, accessibility, and consistency (Argon Design, 2018; Kushniruk & Kuziemsky, 2014; Lal, 2013; Russ & Saleem, 2018). A strong user interface may support an app that allows clinicians to provide the best support for their client's needs and desires. Current evidence shows the Drive Focus® app has efficacy and feasibility, however, the user interface design has never been assessed (Alvarez et al., 2018). Therefore, this study determined if the Drive Focus® app had components of a strong user interface. Clinicians who used the Drive Focus® app had the opportunity to provide their professional opinions about the user interface design based on their experiences with the app. In turn, this will assist the producer of the Drive Focus® app in making the appropriate updates to better support client engagement in the Drive Focus® app in a clinical setting.

Literature Review

Technology Today

What is technology? Technology is a body of knowledge devoted to creating tools, processing actions and extracting materials (Ramey, 2018). There are many forms of technology. Some of these forms include communicative, constructive, assistive, and informative technology, among others (Ramey, 2018). Devices such as cellular phones, tablets, and laptops are examples of communicative, constructive, assistive, and informative technology. On a global scale, these devices influence a large part of the consumer's everyday lives. Gordon (2018) noted that globally in 2017, Apple™ sold 216.76 million iPhones, while a total of 97.8 million desktop personal computers (P.C.), and 161.6 million laptops were purchased. Furthermore, a total of 163.7 million tablets (Apple™ and Android) were sold in 2017 (Gordon, 2018). Out of a global population of 7.7 billion people, the number of smartphone and tablet users are 224.3 million (Gordon, 2018). Dogitev (2018) estimated that individuals over the age of 18 in the United States (U.S.) will spend an average of 34 percent of their time on a desktop, 50 percent on a smartphone app, seven percent on a smartphone web browser, seven percent on a tablet app, and two percent on a tablet web browser monthly. These data showcase that per month, an adult may spend up to half of one's time using smartphone apps for entertainment, communication, music, multimedia, and games (Dogtiev, 2018). In fact, collectively, this accounts for 58 percent of the total time an adult spends on his/her mobile device monthly (Dogtiev, 2018). Thus, there is a mass market for apps and smartphone technology.

Healthcare apps are being utilized by clinicians and clients as resources for medical information retrieval systems (Healthcare Information and Management Systems Society [H.I.M.S.S], 2017). H.I.M.S.S. (2017) reiterated that technology is being utilized in U.S.

hospitals to promote clinical interdisciplinary communication, provide client education, and improve data research and collection. Thus, developed countries, such as the U.S., utilize technology to facilitate the process of diagnosing ailments, providing treatment and therapy to medical conditions, accessing client information, and assisting in research (H.I.M.S.S., 2017).

Technology is also used in healthcare settings to help a client access his/her healthcare plan and medical history, as well as facilitate communication between the healthcare team, the clients, and their family members (Rupp, 2018). A recent survey showed that out of 200 healthcare provider employees, 90 percent of them used mobile devices to engage a client in his/her healthcare process (Rupp, 2018). For example, the device can be used to provide visual examples of clinical diagnosis, human anatomy, and statistics. Thus, given the broad use of technology in everyday life and in the medical industry, healthcare technology needs to be effective in communicating essential medical information to the clients as well as clinicians. However, in order for effective communication to take place, it is imperative to understand the components that are essential in technology to further engage clients and clinicians in their individualized medical process.

Components of technology in healthcare. Healthcare technology requires specific components of the user interface design to make an app usable, acceptable, and efficient for clients and clinicians (Crisan-Vida, Mada, Serban, & Stoicu-Tivadar, 2016). An app is defined as a software program developed for use on a mobile or tablet device (Merriam-Webster, 2019). User interface design is defined as everything a user sees and interacts with on a virtual screen (Lal, 2013). The engagement of the clients and the clinicians are based on an understanding of what individuals are seeking in the design of healthcare technology (Lal, 2013). Understanding

the needs of the clients and clinicians, as well as how technology is used in healthcare today, allows for a stronger user interface to be developed.

Crisan-Vida, Mada, Serban, and Stoicu-Tivadar (2016) outlined how a strong user interface is needed for healthcare services. In their research, Crisan-Vida et al. (2016) created a web app with a specific technology that provided an optimal responsive interface required by the healthcare industry. The authors noted how display features could be distorted depending on which device (mobile, tablet, or desktop) was being used. In order for healthcare technology to be engaging and beneficial to the clients and clinicians, there cannot be distortions across devices. Therefore, a strong user interface must remain dynamic across multiple devices to achieve the client's or the clinician's desired outcomes, hence, the need for a "fluid design" when creating an interface. A fluid design is pivotal in ensuring the outcome of the technology to be achieved (Crisan-Vida et al., 2016).

Along with a fluid design, healthcare technology needs to have usability and user acceptability (Halvorsrud, Hoel, Holthe, Karterud, & Lund, 2018). Usability is defined as how clients and clinicians can engage with a piece of technology to achieve the goals of effectiveness, efficiency, and satisfaction (Halvorsrud et al., 2018). The other aspect, user acceptability, is defined as how willing clients are to utilize the piece of technology in their everyday activities (Halvorsrud et al., 2018). Acceptability is critical to healthcare technology because it keeps the clients engaged. For example, Halvorsrud, Hoel, Holthe, Karterud, and Lund (2018) looked at a variety of apps which aimed to provide information for community-dwelling older adults diagnosed with mild cognitive impairment or dementia. Halvorsrud et. al (2018) found occupational performance increased by using technology. Furthermore, through a systematic review of 29 research articles, Halvorsrud et. al (2018) identified four thematic commonalities in

community-dwelling adults using technology to support their independence in mobility and socializing. The findings reiterated the usability and acceptability from the community-dwelling older adults had a positive effect on the training and use of new technology (Halvorsrud et al., 2018). Chen, Huang, and Wang (2015) also looked into how acceptability played a role in the client's interaction. The focus of Chen et al.'s (2015) study was to produce a digital game that can increase upper extremity movement in rehabilitation therapy (Chen, Huang, & Wang, 2015). They designed a game with various difficulty levels to challenge the clients, a navigation function to prevent the clients from getting lost during operation of the game, a feedback mechanism to encourage and correct the clients' movements, and a component to record movement data so clients and clinicians can track progress in therapy (Chen et al., 2015). The clients found the game to be both feasible and acceptable, and 60 percent reported the user interfaces were easy to operate. Meanwhile, 90 percent of the clients reported satisfaction with the game (Chen et al., 2015). Therefore, when a client was satisfied with the game's purpose, outcome, and user interface, he/she would be more inclined to accept the game and continue using it in his/her rehabilitation process.

Along with being acceptable to the user, healthcare technology must be efficient. Alnanih and Ormandjieva (2016) defined user efficiency as to how a client completed a task in a specific context. In Alnanih and Ormandjieva's (2016) study, when a client anticipated what would take place, as well as what was about to take place, the technology was deemed to be more efficient. Throughout the app, the intended outcome must remain clear and consistent to the clients which will allow them to anticipate what was going to take place on the app (Alnanih & Ormandjieva, 2016). Therefore, the information presented by healthcare technology affected the way the clients understand the context and the intended outcome, thus promoting efficiency (Alnanih &

Ormandjieva, 2016). The more efficient the technology is, the more a client is able to engage with it (Alnanih & Ormandjieva, 2016). Therefore, efficiency is a critical component when developing a successful and useful piece of healthcare technology (Alnanih & Ormandjieva, 2016).

Many healthcare technologies take into account the design as well as the intended outcomes to benefit clients and keep them engaged during the rehabilitation process. Ways to accomplish this is to have a user interface that has a fluid design while being usable, acceptable, and efficient (Alnanih & Ormandjieva, 2016; Chen et al., 2015; Crisan-Vida et al., 2016; Dogtiev, 2018; Gordon, 2018; Halvorsrud et al., 2018; H.I.M.S.S, 2017; Lal, 2013; Ramey, 2018; Rupp, 2018). When healthcare technology has these aspects, both clients and clinicians will have their needs met.

Applications and occupational therapy. A quick app store search revealed many apps are being used to facilitate therapy on a global scale. Many apps incorporate aspects of occupational therapy, which focuses on improving and/or maintaining one's ability to complete his/her occupations. One of these apps is called the Drive Focus® app (Alvarez et al., 2018). The Drive Focus® app is a driving simulation app designed to identify how an individual recognizes, prioritizes, and reacts to roadway information appropriately (Alvarez et al., 2018). There are two versions of the app--the educator version and the single-user version (Alvarez et al., 2018). While research has been done on the end-result of populations using the single-user version in conjunction with the educator version of the Drive Focus® app, there is still no data specifically on the educator version and the clinicians' opinion on the user interface design (Alvarez et al., 2018).

In a study by Alvarez, Asantey, Classen, Feher, He, Knott, Medhizadah, and Moulin (2018), the researchers found the Drive Focus® app was a feasible intervention for improving young drivers' visual scanning and adjustment to stimuli (Alvarez et al., 2018). Young drivers were defined as individuals between 16 and 19 years of age who had a valid learner's permit (Alvarez et al., 2018). The researchers defined "visual scanning" as the ability to monitor and detect vital information for on-the-road driving (Alvarez et al., 2018). Meanwhile, "adjusting to stimuli" was defined as the ability to appropriately respond to vital information for on-the-road driving (Alvarez et al., 2018). The study found the number of mistakes made during the driving simulation decreased at a statistically significant rate across baseline, midpoint, and posttest for the young drivers after using the Drive Focus® app (Alvarez et al., 2018). Because the intervention demonstrated a statistically significant decrease, the researchers concluded that it is feasible to use the app in interventions with young drivers (Alvarez et al., 2018).

Along with being feasible, the Drive Focus® app also has high efficacy, as proven by Alvarez, Classen et al., (2018). Efficacy was defined as whether or not the Drive Focus® app is able to produce the results it states it will (Alvarez, Classen et al.,2018). In this case, the Drive Focus® app claims to be able to decrease the number of errors made by a client (Alvarez, Classen et al., 2018). Through a pilot study, Alvarez, Classen et al., (2018) determined a statistically significant decrease in the number of errors drivers made after using the Drive Focus® app. Not only was there a statistically significant decrease, but the findings were consistent over multiple trials (Alvarez, Classen et al., 2018). Since the significant decrease confirmed the Drive Focus® app has efficacy, the app is found to have accomplished its intended result consistently (Alvarez, Classen et al., 2018). While Alvarez, Classen et al., (2018) noted the

need for further research, they still found the app to be consistent with its goal of decreasing the number of errors made by clients (Alvarez, Classen et al., 2018).

The Drive Focus® app is a healthcare app that is both feasible and effective for therapy interventions (Alvarez et al., 2018; Alvarez, Classen et al., 2018). However, while these components have been evaluated, there is no research on whether clinicians find the Drive Focus® app to have a strong user interface design during the driver rehabilitation process.

User Interface Design

As previously mentioned, user interface design is described as everything a user sees and interacts with on a virtual screen (Lal, 2013). User interface design is the foundation that helps position a user to utilize an app to its full potential (Sridevi, 2014). Sridevi (2014) likened technological apps and user interface design to a house and its architectural design with the house being the technological app and the architectural design as the user interface. The user interface includes input and output mechanisms that provide interactions between the users and the technological device (Sridevi, 2014). These input and output mechanisms, as well as its design, are the key to building an app (Sridevi, 2014). Research also showed a weak user interface may cause technology to be less effective, thus having poor usability (Interaction Design Foundation, 2016). There are four prominent components, context, fidelity, accessibility, and consistency, all of which can strengthen user interface to promote the usability of technology (Argon Design, 2018; Kushniruk & Kuziemsky, 2014; Lal, 2013; Russ & Saleem, 2018).

Components of a strong user interface design. In user interface design, the usability of an app is key to successful interaction between the client or the clinician and the technology. Technology with a strong user interface should fulfill the wants and needs of the clients and the clinicians (Kushniruk & Kuziemsky, 2014). For example, an app with a lack of resolution may

have a strong user interface for a pre-admission room, but it would be problematic in an operating room due to the lack of clarity on the computer readings (Kushniruk & Kuziemsky, 2014).

According to Kushniruk and Kuziemsky (2014), context is defined as the setting and environment. Within the healthcare industry, context plays a heavy role in the design of a strong user interface (Kushniruk & Kuziemsky, 2014). In order to address the needs and desires of clients and clinicians, the context of the technology needs to be understood and taken into consideration (Kushniruk & Kuziemsky, 2014). Russ and Saleem (2018) stated a strong user interface must consider who the intended group of clients are. The target populations for the Drive Focus® app are the clients, caregivers, driver rehabilitation specialists, and healthcare professionals such as occupational therapists who use the app (Alvarez et al., 2018). The Drive Focus® apps' developer not only considered the role of the clients and clinicians in their context, but also the complexity of the various environments the app would be used in, such as in-patient, outpatient, and driving rehabilitation settings. The Drive Focus® app is currently used on an iPad, which is a compact platform that can be easily carried by a clinician in a plethora of environments. This portability increases the level of usability the app has. This compact platform promotes usability in a variety of contexts by fulfilling the wants and needs of the clinicians. On the other hand, if an app is not used in the appropriate contextual environment, the usability can have a negative effect due to an individual not feeling the urge to incorporate the app into one's occupations (Russ & Saleem 2018). For example, if the Drive Focus® app needed to be accessed on a P.C. then the clinician may not be as inclined to use the app in therapy due to the lack of usability that would be present. The usability of the Drive Focus® app on a P.C. would require the clinician to bring the client to the P.C. and ensure the client can ergonomically access all

aspects of the program. Hence, context plays an important role in determining whether an app is suitable for a particular environment and whether the client will continue to use the app in rehabilitation therapy.

Russ and Saleem (2018) identified fidelity as another concept of user interface design. Fidelity is defined as **t**he ability of virtual scenarios or tasks to represent the complexity of real-world situations (Russ & Saleem, 2018). For example, an app such as G.P.S. (Global Positioning System) has fidelity because the information it provides is able to be replicated and translated from an app or website to on-the-road driving. Argon Design (2018) stated components of fidelity are maintainability and flexibility which are accomplished through regular updates to adjust for changes in real-world situations. The Drive Focus® app simulates on-the-road driving of a client's experience while driving a vehicle (Alvarez et al., 2018). The driving simulations take place at different times of the day, within various cities, and have the option to change the levels of difficulty to include more or fewer hazards, such as pedestrians, red lights, stop signs, brake lights, etc. (Alvarez et al., 2018). These simulations provide the app fidelity by accurately representing real-world scenarios (Alvarez et al., 2018). Other real-world situations, such as changes in on-the-road driving laws, require regular app updates from the developer to update the app regularly and maintain its fidelity.

Another component that makes a strong user interface is accessibility (Lal, 2013). Lal (2013) defined accessibility as a user interface having simple designs which are easy to understand while still accomplishing the functionality of the main task. A simple design makes apps easy to use while providing a better experience for the clients and the clinicians (Lal, 2013). Argon Design (2018) reiterated a simple design for a user interface needs to be clear and ran without a manual to explain to the clients and clinicians on how to navigate all the features of the

user interface. Similarly, Sridevi's (2014) rule of simplicity required a simple interface design to reduce the amount of memory required by the clients and the clinicians. Therefore, technology with a simple user interface design is one that is easily understood, has a strong user interface which retains important information for the clients and the clinicians (Argon Design, 2018; Lal, 2013; Sridevi, 2014). Argon Design (2018), Lal (2013), & Sridevi (2014)'s research illustrated the importance of accessibility in an app's user interface to allow the clients and clinicians to best engage with the app.

Lal's (2013) research also included the concept of consistency, which refers to the use of similar navigation systems in different technology platforms such as tablets, computers, and cellular phones. Without consistency, an app would require a client to learn a new navigation system for every platform he/she interacts with (Lal, 2013). Keeping the navigation consistent with other popular platforms provides a strong user interface, as well as a smoother interaction between the client and the technology (Lal, 2013). Fluid design is required for a consistent app as well (Crisan-Vida et al., 2016). As mentioned before, fluid design is the ability for strong user interface design to remain dependable across various devices (mobile, tablet, or desktop) (Crisan-Vida et al., 2016). Therefore, the design needs to be consistent so a client and clinician can use the app repeatedly without having to learn new terminology and navigation across different platforms (Argon Design, 2018). Argon Design (2018), Crisan-Vida et al. (2016), Lal (2013), and Sridevi (2014) all support the importance of consistency in a strong user interface design.

Components of a strong healthcare application. Technology is becoming a useful addition to clinical practices. Technology supports apps to provide clinicians with systems to quickly diagnose ailments, access clients' information and provide visuals of information

(H.I.M.S.S., 2017). An app must possess a solid structure, a clear process, and consistent outcomes to be considered a strong app to be used in healthcare (Alvarez et al., 2018; Argon Design, 2018; Kushniruk & Kuziemsky, 2014; Lal, 2013; Russ & Saleem, 2018).

H.I.M.S.S. (2017) found strong healthcare apps handled errors and presented information in a usable manner. Solid structures, clear processes, specified outcomes, and simplified designs are all components of strong apps in healthcare (H.I.M.S.S., 2017). Apps can accomplish this by having the four principles of a strong user interface, which are context, fidelity, accessibility, and consistency (Alvarez et al., 2018; Argon Design, 2018; Kushniruk & Kuziemsky, 2014; Lal, 2013; Russ & Saleem, 2018). In addition, technology is best utilized in healthcare when the needs and desires of the clients and clinicians are being addressed (Rupp, 2018). This can be accomplished through a user interface design that makes an app usable, accessible, and efficient for clients and clinicians to engage with (Crisan-Vida et al., 2016). With a strong user interface, it accomplishes these components which allow technology to better support clients in their daily occupations. An example of this technology is the Drive Focus® app, which has been proven to be feasible and to have high efficacy. However, there is no study to verify if the Drive Focus® app has the components of a strong user interface in terms of context, fidelity, accessibility and consistency (Alvarez et al., 2018; Alvarez, Classen, et al., 2018). When these components are present, a strong healthcare app is produced that allows clinicians to best address their client's needs and desires.

Statement of Purpose

As of today, it is unknown whether the Drive Focus® app's user interface design is beneficial or usable to clinicians' needs and desires for their client during the therapy process. The aim of this project is to collect opinion on the Drive Focus® app's user interface design through the clinicians' point of view to determine whether the current user interface is strong, beneficial, and usable in the clinical setting. The Drive Focus® app is defined as a driver rehabilitation app which is designed to identify how an individual recognizes, prioritizes, and reacts to real-world roadway information (Alvarez et al., 2018). The user interface is defined as everything a user sees and interacts with on a virtual screen (Lal, 2013). The clinician population for this study is defined as any clinician who has purchased the Drive Focus® app, either the educator version of or the single user version. In this study, the clinicians will be providing their opinion on the user interface design of the Drive Focus® app regardless of the version they are using. The focus of this study is to determine if the Drive Focus® app has a strong user interface, which are the components of context, fidelity, accessibility, and consistency (Argon Design, 2018; Kushniruk & Kuziemsky, 2014; Lal, 2013; Russ & Saleem, 2018).

For this study, the researchers used a descriptive, mixed methods study design. The researchers identified how the clinicians react to the user interface design of the Drive Focus® app. This was found by identifying various factors of user interface design currently used in the Drive Focus® app. With the results found in this study, the developer of the app will be able to improve the overall clinician experience. This can be accomplished by increasing the usability of the app and determining which aspects of user interface design address clinicians' needs. Therefore, our research question is: Do clinicians find the Drive Focus® app to have a strong user interface design when using it for rehabilitation purposes?

Theoretical Framework

The Model of Human Occupation (M.O.H.O.) is the theoretical framework that guides this study on the Drive Focus® app. The M.O.H.O. framework focuses on the interaction of an individual during his/her occupational performance through three components: volition, habituation, and performance capacity (Kielhofner, 1985). These components, if integrated successfully, allow the client to adapt to his/her occupations based on his/her own capabilities (Kielhofner, 1985).

The first component of M.O.H.O. is volition, which is defined as the motivation an individual has to participate in occupations, including interacting with what is around him/her (Kielhofner, 1985). Therefore, volition considers whether an occupation fits into the values and interests of an individual (Kielhofner, 1985). Our study determined if the Drive Focus® app supports clinicians' in accomplishing their needs and desires during their clients' driving rehabilitation therapy. The study addressed this component by asking questions through a survey and focus group discussion about the context the Drive Focus® app is being used. For example, to address the clinician's needs and desires of enhancing the client's ability to participate in driving, the app would need to be usable in the clinicians' practice setting. Additionally, our project investigated factors that may hinder the clinician's motivation to use the Drive Focus® app. Such factors could be the app not being applicable in the clinician's context, having low fidelity with lack of updates, not being accessible with simple interface design, and not being consistent with a fluid design.

Habituation is the organization of an individual's occupations into his/her roles and routines as well as maintaining specific behaviors, thus causing the occupation to be a part of the individual's everyday habits (Kielhofner, 1985). The survey and focus group questions created

on habituation address the user interface design component of fidelity. Both habituation and fidelity look into the user interfaces' ability to replicate various behaviors performed through the Drive Focus® app in different situations. These situations are based on the routines and habits of the clinician. We asked questions to determine if the Drive Focus® app is being used with a diverse population and across the continuum of diagnoses and ages in the clinicians' routine during the rehabilitation process.

Performance capacity refers to a clinician's ability to perform and adapt to his/her various occupations (Kielhofner, 1985). Our study looked at the clinicians' occupation of work to support a diverse population of clients. The performance capacity is determined by how well the clinicians can adapt to using the Drive Focus® app to their context for a range of client diagnoses, ages, backgrounds. The survey and focus group questions on performance capacity explored the Drive Focus® apps' accessibility and consistency. In our study, the accessibility of the Drive Focus® app is defined as how the app is viewed on different platforms, while consistency determines if the font, clarity, and details are adequate on the user interface. These aspects of accessibility and consistency affect how a client will be able to interact and engage with the Drive Focus® app, therefore, affecting the app's performance capacity. The performance capacity of the user interface design affects the clinicians' ability to utilize the app to its maximum potential for a variety of clients in the therapy process. For example, if a client using the Drive Focus® app has poor eyesight and if the app does not have a clear and large font to compensate for the client's abilities, the clinician may not choose to use the app with his/her client despite evidence that the app can benefit the client's rehabilitation therapy.

This study on clinicians' opinions of the Drive Focus® app assessed the app through the lenses of volition, habituation, and performance capacity to analyze the user interface design

principles of context, fidelity, consistency, and accessibility. Volition, habituation, and performance capacity are the three lenses that are incorporated within M.O.H.O. and support the clinicians' ability to adapt to their occupations based on abilities (Kielhofner, 1985). Hence, the three lenses of M.O.H.O. were used to create the survey and focus group questions to assess clinicians' opinions on the Drive Focus® app (Appendix A Tables 1 and 2).

Ethical Considerations

The ethical considerations in this study ensure the integrity of our study through considerations framed by the 2015 *Occupational Therapy Code of Ethics,* written by the American Occupational Therapy Association (A.O.T.A.). The qualities referred to in the code of ethics which are the most relevant to our study are beneficence, autonomy, and fidelity.

A.O.T.A. (2015) defined beneficence as maintaining the safety and well-being of the participants. The participants in this study were clinicians who volunteered, they were notified of their rights to withdraw from the anonymous survey or the focus group at any point without consequences. During the focus group, the student researchers monitored the participants for signs of distress. To promote the participants' emotional well-being, the student researchers reminded the participants at the beginning of the discussion of their right to take a break at any time and return once they feel comfortable again. The student researchers also reminded the participants of their right to withdraw from the focus group at any time.

The second consideration of our study is the principle of autonomy. Autonomy is defined as obtaining consent and disclosing all benefits, risks, and outcomes to the participant (A.O.T.A., 2015). The participants received an email where they were given a survey link which led them to a Google Form where they confirmed their consent to participate in the survey (Appendix A). The consent outlined the benefits, risks, and outcomes of participation to the participants. Providing the participants with this information allowed the participants to decide for themselves if they would like to proceed with the study. A separate link in the email led the participants to an additional Google Form to confirm their consent to participate in the focus group discussion (Appendix B). Additionally, all identifying information was only accessible by the researchers in a password-protected Google Sheet. The identifying information is the participant's name, area

of work, and specific field of practice. The participants' privacy was also being protected from the developer of the app, Dr. Miriam Monahan, only received the thematic commonalities derived from the study. Finally, autonomy was achieved by keeping the focus group transcript on a secure Universal Serial Bus (U.S.B.) which was only accessible by the four student researchers.

The final consideration in our study is fidelity, which the *Occupational Therapy Code of Ethics* emphasized as the need to treat participants with respect, discretion, and integrity (A.O.T.A., 2015). The student researchers accomplished fidelity by following the process established by the Dominican University of California's Institutional Review Board (I.R.B.) and outlined by A.O.T.A.'s *Occupational Therapy Code of Ethics.* The Dominican University of California I.R.B. thoroughly evaluated their student researchers' proposed study to ensure the safety and rights of the participants. The Dominican University of California I.R.B. process involved a thorough evaluation of ethical principles such as respect, discretion, and integrity within studies and projects. The I.R.B. ensures no participant would be harmed and holds the student researchers accountable for any violation of fidelity in their study. The I.R.B. asked the researchers to identify all risk factors, potential harms, and to maintain confidentiality. By considering the components of beneficence, autonomy, justice, and fidelity, the student researchers were able to ethically continue with this study. The study received I.R.B. approval #10775 on January 23, 2019.

Methodology

Design

Through the use of a descriptive study, the student researchers investigated the user interface design of the Drive Focus® app using two different data collection methods. The first data collection method consisted of participants who volunteered in a 10-minute anonymous survey about the Drive Focus® app. The second data collection method consisted of participants who volunteered to be a part of an hour-long focus group discussion about the user interface design principles of the Drive Focus® app. The questions the participants answered in both data collections were designed using the Model of Human Occupation (M.O.H.O.) therapy framework, while also addressing the principles of a strong user interface design (Table 2).

Drive Focus® App. The Drive Focus® app is available to the educator, and/or the participants, for a flat fee of $99.99 U.S. dollars, through the Apple App Store™. The educator version of the app provides driving simulation with varying levels of difficulty that participants can access, in any order, during clinical rehabilitation to improve and/or maintain clients' driving skills. The educator version of the app allows the educator/clinician to view the scoring system after a driving simulation. After a driving simulation, data analysis includes the identification of hazardous items that the client selected, which items were missed, and the amount of time it took the client to identify each item (Apple App Store™, 2019). The educator version of the app allows the educator and the client to compare their score from one driving session to their previous driving session scores (Apple App Store™, 2019). In addition, this app is also available to individual clients as a single user version for $9.99 from the Apple App Store™. The single-user version of the app allows a user to progress through real-world driving simulations sequentially to improve his/her ability to identify critical items on the roadway. The educator and

single-user version of the Drive Focus® app are used by participants in a variety of settings, including in-patient, outpatient, driver rehabilitation, and driver education (Alvarez et al., 2018). As the Drive Focus® app is expected to fit into each of these settings to support the needs of different participants, this study is to determine if the Drive Focus® app's user interface is fulfilling these expectations.

Subjects. The source of the participant population was from Dr. Miriam Monahan, OTD, OTR/L, the developer of the Drive Focus® app. Dr. Monahan compiled a list of clinicians who were using the Drive Focus® app. The student research team contacted Dr. Monahan, via email, who responded with support to reach out to participants on behalf of the student researchers (Appendix A). Per agreement, Dr. Monahan sent an invitation email (Appendix B) containing a Google Form link to the survey about the Drive Focus® app to the clinicians. In the original invitation email from Dr. Monahan, there was a second Google Form link for participants to voluntarily consent to participate in the focus group (Appendix C). In the focus group agreement, the clinician provided identifying information, including the clinician's name, email address, state he/she was practicing in, professional credentials, and area of practice. This identifying information allowed the student researchers to contact the clinicians about participating in the one-hour Skype focus group interview. The student researchers requested Dr. Monahan to send two follow-up reminder emails to the participants during the three and a half-week period the survey link was open. Following the focus group, all participants in the focus group received a token of appreciation with a $15 Starbuck/Peet's Coffee gift card for their time and participation.

Data Collection Procedures. Once the initial email was sent, the survey link remained active for three and a half weeks and took approximately 10 minutes for the participants to

complete. The data acquired through the survey were anonymous. Once the link was deactivated, the student researchers proceeded to analyze the data.

The focus group participants were acquired from the same population of participants who received the invitation email from Dr. Monahan. The Google Form link in the invitation email included the voluntary submission of consent information, which informed the participants that the focus group would be recorded and transcribed (Appendix C). Once this contact information was acquired, the student researchers emailed the clinicians a Doodle link and scheduled a time for the focus group meeting virtually. The focus group discussion was recorded using the free Skype Call Recorder. Input during the focus group interview was not completely anonymous due to the participant and the student researchers being able to see each other. However, during the transcription and analysis of the focus groups, the anonymity of the participants was maintained through pseudonyms created by the student research team.

Data Analysis Plan. The survey was created using a Likert Scale which ranged from strongly disagree to strongly agree. The Likert scale provided the participants who participated in the study the ability to rank how much they agreed or disagreed with a statement based on their clinical experience. The survey data set was analyzed using descriptive statistics, the mode, because it provided information on which statements were most agreed upon by the participants, therefore the most likely to be true.

The interview was transcribed by the student researchers. The transcribed document was then transferred to a secure U.S.B. drive which was kept locked in a file cabinet in a locked room at Dominican University of California. Once transcribed, the interview was used to support the survey results. All recorded data will be destroyed after a period of one year after the completion of this study.

Results

58 clinicians received the invitation from Dr. Monahan to complete the survey. Out of those 58 clinicians, 16 participated in the survey, producing a response rate of 27.6 percent. The focus group yielded three participants, however, out of those participants, two responded to the follow-up email and from there, only one participant showed up on the day of the Skype interview. Presented below are the results of the survey categorized into the components of M.O.H.O with quotes from the interview supporting the survey findings.

Survey

For the purpose of this study, the mode of the data set was used as the measure of central tendency to analyze the results. Of those 16 participants, seven identified as driver rehabilitation specialists (DRS), four as occupational therapists (OT), and five as DRS and OTs (Figure 1). Seven of the participants used the single user version of the app at their clinic while the remaining nine used the educator version (Figure 2).

Figure 1 Professional specialty of participants using the Drive Focus® app.

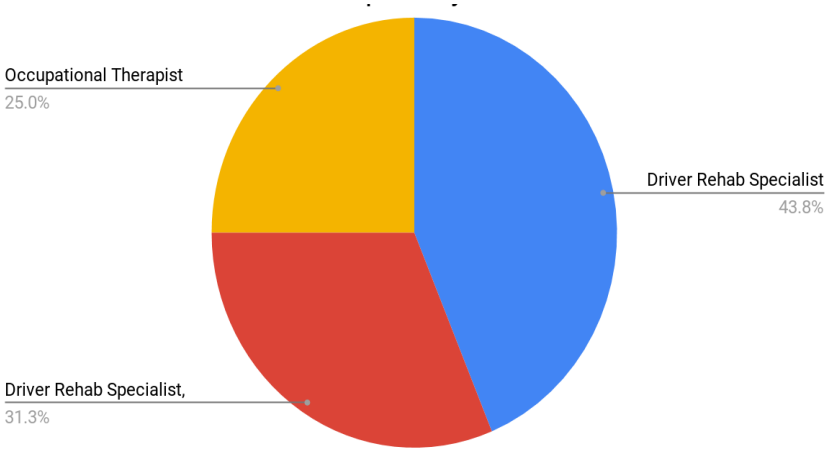
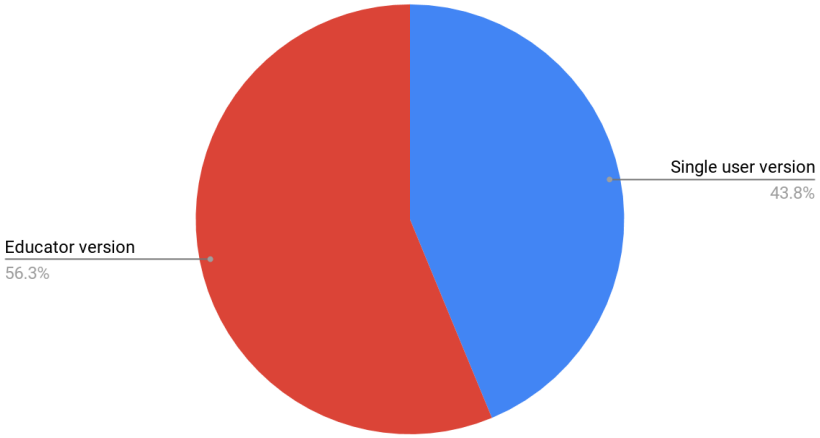


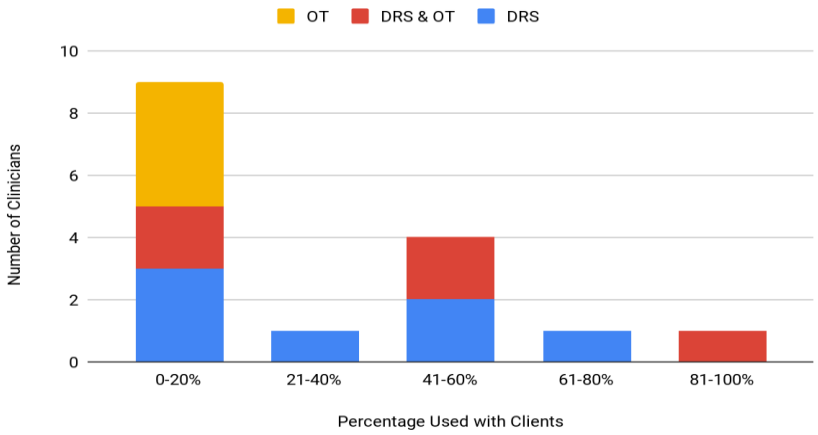
Figure 2 Single user version vs. Educator version usage of Drive Focus® app by clinicians.



Out of the 10 participants who used the app in a driver rehabilitation (rehab) setting, four participants used the app in an outpatient setting and two in an inpatient setting. Fifteen of the participants believed this app would be useful both in a driver rehabilitation setting as well as in an outpatient setting. Half of the 16 participants believed the app could be useful in an inpatient setting. The participants used this app with a variety of age groups. Eight participants used it with clients in the 16-18 age range. Twelve of the participants used the app with clients in the 18-25 age range. Seven participants used it with the 25-45 age range, while eight participants also used it with a population in the 45-75 age range, and five participants used it with the 75+ age range. This identified that the Drive Focus® app is used in a variety of settings and with a wide spread of age range from 18 to 75+.

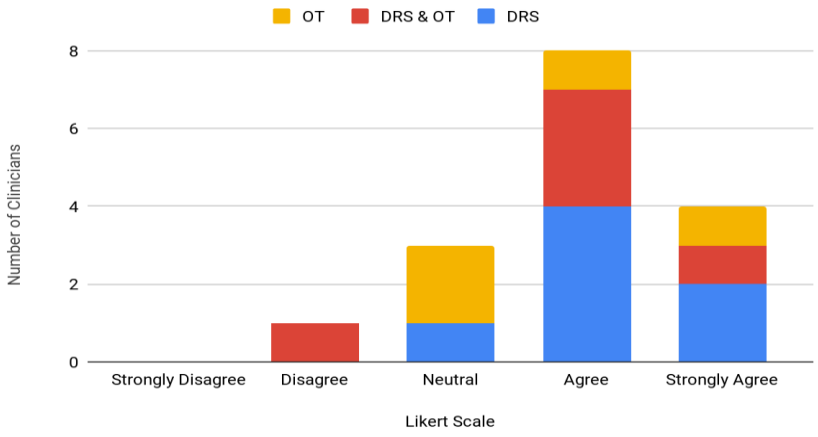
Volition. Out of the 16 participants, nine reported using the Drive Focus® app with only 0-20 percent of their clients. However, two out of 16 participants reported using the Drive Focus® app with 41-60 percent and 61 -80 percent of their clients, respectively. The results of the survey also showed a low recommendation percentage of the Drive Focus® app for home use, where nine participants reported recommending the app for home use with only 0-20 percent of their clients (Figure 3).

Figure 3 Please rank: "I recommended the Drive Focus® app for home use with ___ of my clients."



However, despite the low usage rates, it is worth noting the results of the survey provided positive results regarding the desired use of the app in therapy. For example, eight participants stated the Drive Focus® app is not only a useful tool in their practice setting but also had the ability to facilitate a client's ability to return to driving, through the skills acquired in the Drive Focus® app (Figure 4).

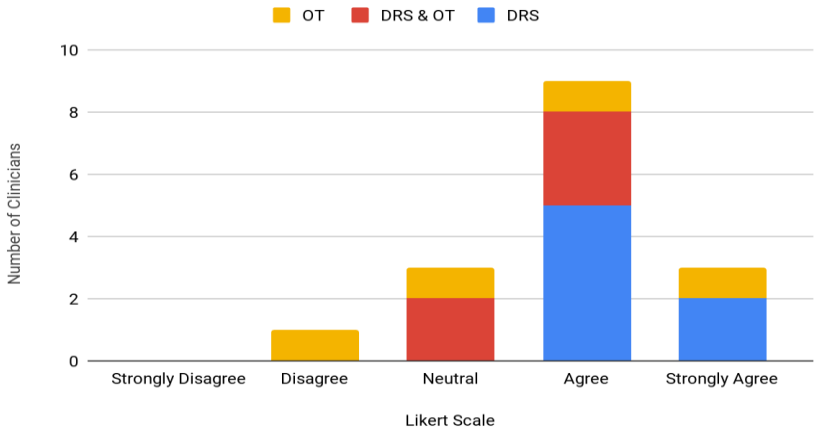
Figure 4 Please rank: "Ever since the Drive Focus® app was first available to me, I found it to be a useful tool for the therapy process in my practice setting."



Following the use of the Drive Focus® app, nine participants agreed that relevant information is presented to them, seven participants were neutral in their ability to use the

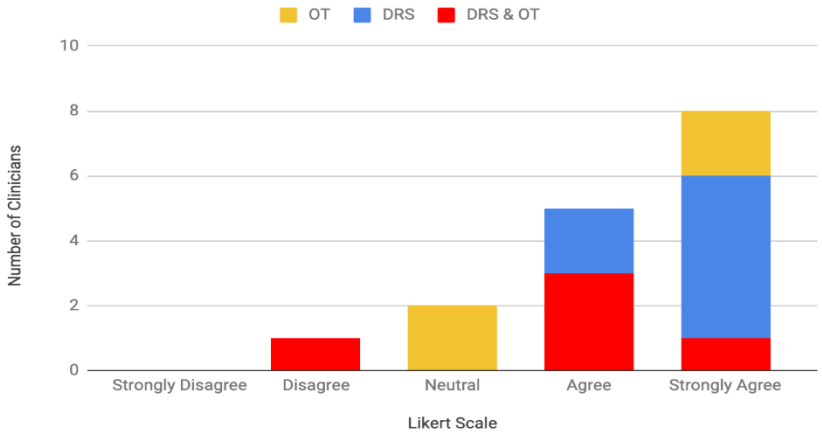
information from the Drive Focus® app in documentation, and nine participants agreed that they are able to use information from the Drive Focus® app in their therapy planning (Figure 5).

Figure 5 Please rank: "Following use of the Drive Focus® app, it presents to you relevant information regarding your client's performance.



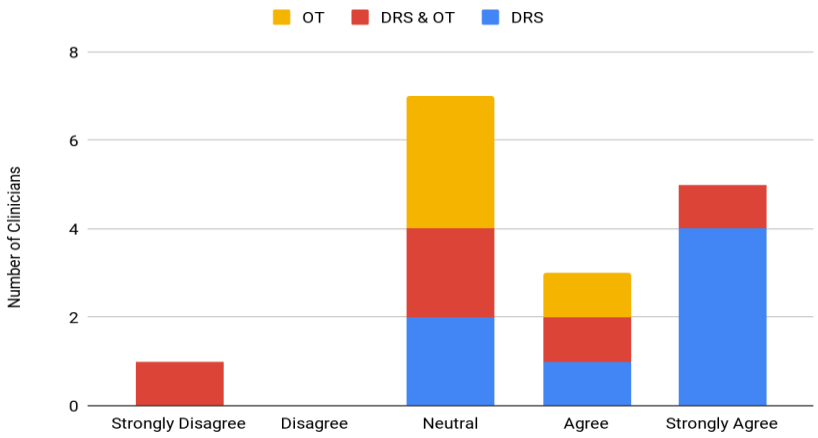
Habituation. Thirteen participants agreed or strongly agreed that the Drive Focus® app was relevant to their clinical practice. Only one clinician found the app irrelevant for his/her clinical use (Figure 6).

Figure 6 Please rank: "The Drive Focus® app is relevant in my clinical practice."



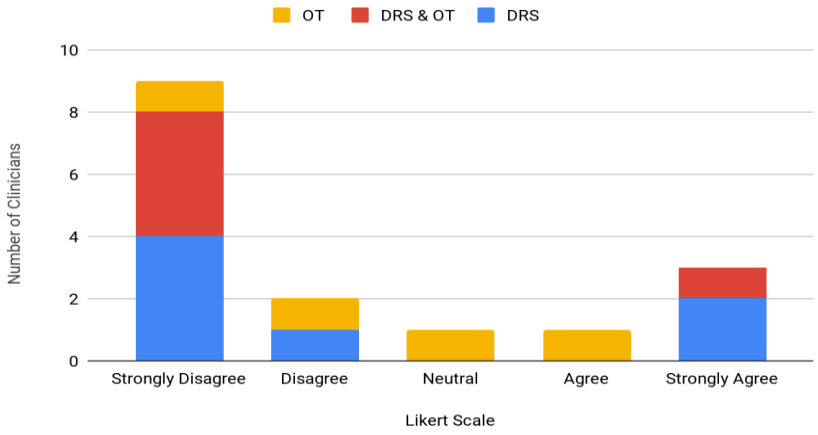
Half of the clinicians mentioned that they specifically used the app for driving rehabilitation. Seven of the 16 participants were neutral when asked if the Drive Focus® app was the most useful tool for addressing driving of clients with cognitive and visual deficits (Figure 7).

Figure 7 Please rank: "Among the tools that I have to address driving with my clients with cognitive and visual deficits, I find the Drive Focus® app the most useful.



Meanwhile, eight participants agreed to some extent that the app was a beneficial tool while one strongly disagreed to the statement. On the other hand, the majority of the participants, nine, strongly disagreed with the statement of using the Drive Focus® app as a cognitive visual training tool for clients without a goal to return to driving (Figure 8).

Figure 8 Please rank: "I use the Drive Focus® app as a cognitive visual training tool for clients who do not have a goal to return to driving."

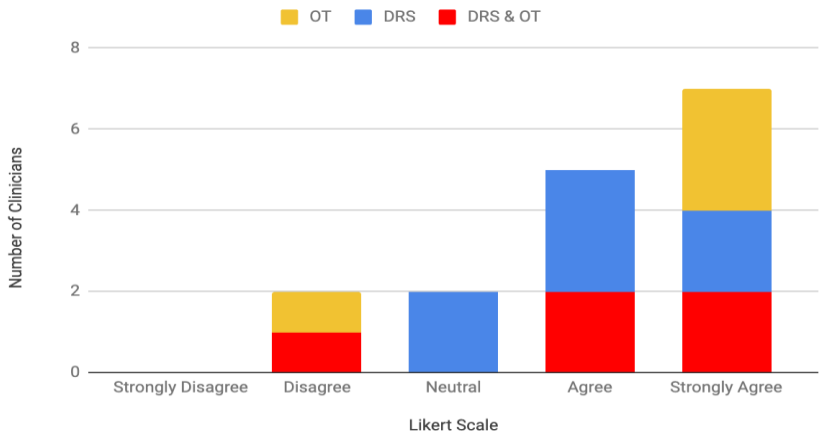


Six of the 16 participants agreed the Drive Focus® app is an effective app for improving visual scanning skills and nine agreed the app is effective for increasing visual processing speeds. Seven of the participants were neutral when asked if the Drive Focus® app is effective

for improving sequencing skills. The remaining nine either agreed or strongly agreed with the previous statement.

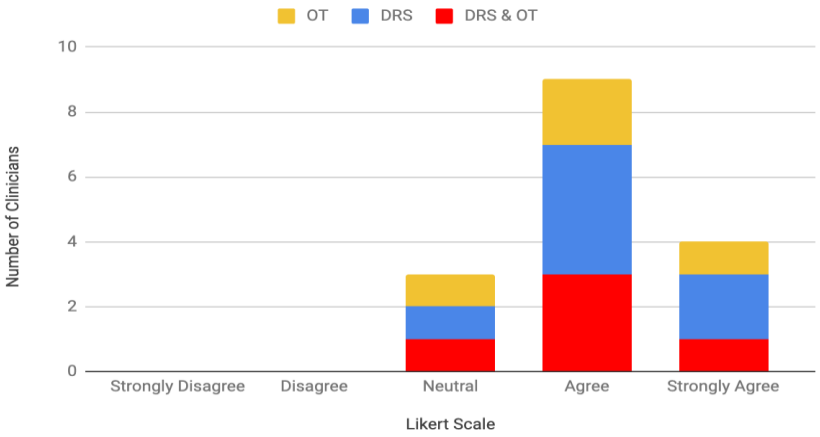
Performance Capacity. When the performance capacity of the app was examined, it showed that the majority of clinicians found the Drive Focus® app to be easy to use in his/her current practice setting (Figure 9).

Figure 9 Please rank: "The Drive Focus® app is easy to use in my current practice setting."



12 of the 16 participants agreed that the app would benefit from additional and more regular updates to the tour section or directions for use. Seven of the participants strongly agreed with the Drive Focus® app being easy to use statement. The remaining four participants were either neutral or disagreed.

Figure 10 Please rank: "I find the Drive Focus® app's user interface easy to navigate."



Thirteen participants agreed to some extent that the user interface design of the Drive Focus® app was easy to navigate (Figure 10). While the remaining three were neutral on the app's user interface being easy to navigate.

Discussion

This study determined that the Drive Focus® app has three of four components of user interface design: fidelity, accessibility, and consistency, but lacks context.

Fidelity

Overall, most of the participants, regardless of their distinction as a DRS or OT, agreed to some extent that the Drive Focus® app has fidelity. Most participants agreed that relevant information is presented to them through the app. Most of them also felt they were able to use the information presented by the app in therapy planning specifically regarding client factors such as visual scanning, visual processing speeds, and sequencing skills. The focus group participant mentioned that:

> "*A lot of our patients sometimes don't see why certain activities can actually relate to driving... And I'll try to explain it but then I can really show them with this app... and be like okay it's actually a little bit harder than you think to pick out the details or its somebody who, or some people now that need um, that they need to work on those things and they really enjoy it because it's working on what they want to work on"*

This reiterates the app's ability to represent and target the specific client factors that are present in the client's real-world situations which means that the app has fidelity.

Accessibility

Most participants found the app to have accessibility with an aesthetically pleasing layout and found it easy to use in his or her practice setting. The app has an interface that is easy to understand despite any cognitive deficits or perceptual deficits for the client. Those client factors do not affect the functionality of the main task which allows the app to be accessible.

The focus group participant stated that:

> "*Some of my patients are not processing as fast or their memory is poor or their perception is not great... people get frustrated … they're like 'I don't understand why I missed this'... when we go back ...it's like oh okay*."

Consistency

The participants also found the user interface design to have consistency. Because the app is currently available on one platform, the survey asked if the app would benefit from being available on multiple platforms to which most participants strongly agreed. However, the participants also agreed that the app would benefit from more regular updates to the user interface design. According to the DRS and OTs, the app is consistent in its presentation along with its accessibility of functions on the one platform, IOS, it is available. Therefore, the app has a consistent user interface design.

Context

The one user interface design component that the app did not have is context. Although DRSs and OTs find the Drive Focus® app to be most useful in the driver rehabilitation setting, the app was not considering the context the app would be used in. For example, the clinicians stated that they would not recommend the app for home use. Per the results of the survey, the Drive Focus® app is currently a better contextual fit for a clinical setting when the client's goal is to get back to driving.

Recommendations

Based on our findings, we recommend further research on the Drive Focus® app to determine methods to increase clinical application in therapy. The main recommendation the student researchers have is regarding the lack of context in user interface design. Because the app is currently not being recommended for home use by the majority of our participants, the developer should consider two options: either make the user interface design specifically for clinic use or make the app a better fit for a broader context such as home use. Additionally, the survey and focus group data all indicate that the app would benefit from more regular updates to the user interface design.

Limitations

A limitation of this study was the small sample size. Of the 58 participants who were sent the invitation email, only 16 participants responded to the survey for a response rate of 27.6 percent. Meanwhile, only one participant participated in the focus group discussion. The student researchers attempted to address this limitation by reaching out to Dr. Monahan and requesting her to send the invitation email three times over a period of three-and-a-half weeks. This study was also limited in the aspect that the participants may have been concerned that Dr. Monahan, the developer of the Drive Focus® app, would discover their identity, and therefore, may not be answering the survey and focus group questions truthfully. The final limitation of this study was that the researchers were able to see and hear the participant's responses during the focus group interview. Due to the focus group participant not being able to conceal her responses within the interview, her anonymity was compromised. This could have prevented the focus group participant from speaking with complete openness and either not sharing or changing her opinion, based on what was previously said or perceived to be correct during the interview. The student researchers addressed this limitation by ensuring that the participant was aware that they did not have to answer every question, that this was a professional discussion to acquire data, and that all opinions were welcome and her identity would be masked after transcription.

Conclusion

Technology has inserted itself into the global population's daily occupations (Dogtiev, 2018). Technology is able to do this by continuing to address the needs and desires of its users. In the healthcare context, the users are both clients and clinicians (Lal, 2013). To successfully address the needs and desires of this population, the user interface design of the technology must be usable, accessible, and efficient, for healthcare professionals (Alnanih & Ormandjieva, 2016; Chen et al., 2015; Crisan-Vida et al., 2016; Gordon, 2018; Dogtiev, 2018; Halvorsrud et al., 2018; H.I.M.S.S, 2017; Lal, 2013; Ramey, 2018; Rupp, 2018). For healthcare technology, context helps facilitate usability to better promote the components of the application (Kushniruk & Kuziemsky, 2014). Therefore, when technology is used in the appropriate context, the user interface design would be improved, influencing the needs and desires and allowing healthcare technology to promote the completion of the rehabilitation process. An example of a healthcare technology is the Drive Focus® app. This study determined if the Drive Focus® app has the components of a strong user interface design. The components that were analyzed are context, fidelity, accessibility, and consistency. A useful app with a strong user interface design should have all these four components that allows clinicians to support and address their client's needs and desires (Alvarez et al., 2018; Argon Design, 2018; Kushniruk & Kuziemsky, 2014; Lal, 2013; Russ & Saleem, 2018).

This study found that the Drive Focus® app has three out of the four components of a strong user interface design. The Drive Focus® app was found to have components of fidelity, consistency, and accessibility. However, the app lacks context. Currently, the surveyed clinicians are not recommending the app for home use. Clinicians are also mainly using the app specifically for clients who have a goal to return to driving. Therefore, the Drive Focus® app would benefit

from an update to the user interface design to either narrow the context specifically for clinical use or broadening it so it is able to be used in more contexts with a variety of goals. However, because the app contained three out of four components of the user interface design, it can still be said that it has a strong, overall user interface design. This study is relevant to the field of occupational therapy research because it bridges the gap between the use of technology and successful client engagement in occupations. This study opens the door for future studies between occupational therapy and technology.

References

Alnanih, R., & Ormandjieva, O. (2016). Mapping HCI Principles to Design Quality of Mobile User Interfaces in Healthcare Applications. *Procedia Computer Science, 94*, 75-82. https://doi.org/10.1016/j.procs.2016.08.014

Alvarez, L., Asantey, K., Classen, S., Feher, A., Knott, M., He, W., Medhizadah, S., Moulin, M. S. (2018). Feasibility of Drive Focus® and driving simulation interventions in young drivers. *OTJR: Occupation, Participation and Health, 38(4), 245-253.* https://doi.org/10.1177/1539449218787495

Alvarez, L., Classen, S., He, W., Knott, M., & Medhizadah, S. (2018). Pilot Efficacy of a Drive Focus® Intervention on the Driving Performance of Young Drivers. *Frontiers in Public Health, 6.* https://

American Occupational Therapy Association (AOTA). (2015). Occupational therapy code of ethics (2015). *American Journal of Occupational Therapy, 69*, p1-8. https://

American Occupational Therapy Association. (2014). Occupational therapy practice framework: Domain and process (3rd ed.). *American Journal of Occupational Therapy*, 68(Suppl. 1), S1-S48. http://dx.doi.org/10.5014/ajot.2014.682006

App. (2019, May 5). Retrieved May 9, 2019, from https://www.merriam-webster.com/dictionary/app

Argon Design. (2018). 5 aspects of a good user interface. *News: 5 Aspects of a Good User Interface.* Retrieved from http://www.argondesign.com/news/2014/feb/5/5-aspects-good-user-interface/

Chen, M., Huang, L.-L., & Wang, C.-H. (2015). Developing a Digital Game for Stroke Patients' Upper Extremity Rehabilitation – Design, Usability and Effectiveness Assessment. *Procedia Manufacturing*, *3*, 6-12. https://doi.org/10.1016/j.promfg.2015.07.101

Crisan-Vida, M., Mada, L., Serban, A., & Stoicu-Tivadar, L. (2016). User interface design in medical distributed web applications. *Studies in Health Technology and Informatics, 223*, 223-229. https://

Dogtiev, A. (2018, October 8). *App Download and Usage Statistics (2018)*. Retrieved from http://www.businessofapps.com/data/app-statistics/

Gordon, K. (2018). *Smartphone industry: Statistics & Facts.* Retrieved from https://www.statista.com/topics/840/smartphones/

Halvorsrud, L., Hoel, K., Holthe, T., Karterud, D., & Lund, A. (2018). Usability and acceptability of technology for community-dwelling older adults with mild cognitive impairment and dementia: A systematic literature review. *Clinical Interventions in Aging, Volume 13*, 863-886. https:

Healthcare Information and Management Systems Society (H.I.M.S.S). (2017). *2017: Essentials Brief: Mobile.* Retrieved from https://www.himssanalytics.org/sites/himssanalytics/files/2017_Essentials%20Brief_Mobile_SNAPSHOT%20REPORT.pdf

Hoogewerf, J., Rastall, P., Thimbleby, H., Williams, J., Wooldridge, D., & Wyatt, J. C. (2015). What makes a good clinical app? Introducing the RCP Health Informatics Unit checklist. *Clinical Medicine*, 15(6), pp. 519-521.

Interaction Design Foundation. (2016). *What is Usability?* Retrieved from https://www.interaction-design.org/literature/topics/usability

Kushniruk, A., & Kuziemsky, C. E. (2014). Context mediated usability testing. *Studies in Health Technology and Informatics, 205*(905). Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25160319

Lal, R. (2013). *Digital Design Essentials: 100 Ways to Design Better Desktop, Web, and Mobile Interfaces.* Beverly, MA: Rockport Publishers. Retrieved from https://dominican.idm.oclc.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=601915&site=eds-live

Ramey, K. (2018). *What Is Technology- Meaning of Technology and Its Use.* Retrieved from https://www.useoftechnology.com/what-is-technology/

Rupp, S. (2018). *HIMSS Mobile technology survey: Mobile technology upgrades continue to impact healthcare engagement*. Retrieved from https://electronichealthreporter.com/himss-mobile-technology-survey-mobile-technology-upgrades-continue-to-impact-healthcare-engagement/

Russ, A., & Saleem, J. (2018). Ten factors for consideration when looking at usability of health information technology. *Journal Biomedical Inform, 78,* (123), pp. 133. https://doi:10.1016/j.jbi.2018.01.001

Sridevi, S. (2014). User interface design. *Research Publish Journals, 2(2), pp. 415-426*. Retrieved from http://www.researchpublish.com/download.php?file=USER INTERFACE DESIGN-332.pdf&act=book.

Appendix A: Survey Questions

Table 1 Design of Survey Questions through M.O.H.O. Lens

Questions	MOHO	Components	User interface criteria	Questions will address
1. As a user of the Drive Focus® app, what is your professional specialty 2. What version of the Drive Focus® app do you use at the clinic? 3. What setting are you using this application (app) in? 5. What age range are the clients you are using this app with? Check all that apply. 7. Please rank: *"I used the Drive Focus® app with ___% of my clients."* 8. Please rank: "I recommended the Drive Focus® app for home use with _____% of my clients." 9. Please rank: *"Ever since the Drive Focus® app was first available to me, I found it to be a useful tool for the therapy process in my practice setting."* 17. Please rank: *"The skills acquired in the Drive Focus® app can facilitate clients return to on-the-road driving."* 24. Please rank: *"Following use of the Drive Focus® app, it presents to you relevant information regarding your client's performance."*	Volition	Need, desire	Context	Need; performance capacity; Habit & routine

25. Please rank: *"Following use of the Drive Focus® app, I can use the information provided by the Drive Focus® app in my documentation."* 26. Please rank: *"Following use of the app, I can use the information provided by the Drive Focus® in the therapy planning."*				
4. What setting do you think this application (app) would be useful? Check all that apply. 6. What are the common conditions that you use the Drive Focus® app with? *Check all that apply.* 10. Please rank: *"The Drive Focus® app is relevant in my clinical practice."* 11. Please rank: *"I use the Drive Focus® app specifically for driving rehabilitation."* 12. Please rank: *"Among the tools that I have to address driving with my clients with cognitive and visual deficits, I find the Drive Focus® app the most useful."* 13. Please rank: "I use the Drive Focus® app as a cognitive visual training tool for clients who do not have a goal to return to driving." 14. Please rank: *"The Drive Focus® app is an effective app for improving visual scanning skills during the therapy process."* 15. Please rank: *"The Drive Focus® app is an effective app for*	Habituation	Habit, routine	Fidelity	Real world; Situation

increasing visual processing speeds in the therapy process." 16. Please rank: *"The Drive Focus® app is an effective app for improving sequencing skills in the rehabilitative process."*				
18. Please rank: *"The Drive Focus® app would benefit from additional and more regular updates to the Tour section (Interactive drives)."* 19. Please rank: *"The Drive Focus® app would benefit from updates to the Training section."* 20. Please rank: *"The Drive Focus® app would benefit from updates to the Scoring data."* 21. Please rank: *"I find the Drive Focus® app's user interface easy to navigate."* 22. Please rank: *"I find the Drive Focus® app's layout to be aesthetically pleasing."* 23. Please rank: *"The Drive Focus® app is easy to use in my current practice setting."* 27. Please rank: *"It would be beneficial to have graphs from the Drive Focus® app that track client's progress to include in client records."* *28.* Please rank: *"It would be beneficial to have graphs from the Drive Focus® app that track a client's progress to motivate clients."*	Performance Capacity	Ability to use for maximum potential	Accessibility Consistency	Laptop, iPad, Easy to use Ease, font, contrast, clarity, details

29. Please rank: *"It would be beneficial to use the Drive Focus® app on a platform other than Apple devices."* *Ex: Android, Windows, Google, or Samsung devices/tablets*				

Table 2 Design of Focus Group Questions through M.O.H.O. Lens

MOHO	Components	User Interface Criteria	Questions will address
Volition	Need, Desire	Context	Need, performance capacity, habits, and routines
Habituation	Habit, Routine	Fidelity	Real-world situation
Performance Capacity	Ability to use to maximum potential	Accessibility Consistency	Laptop, iPad Ease, font, contrast, clarity, details.

Appendix B: Email Instructions

DOMINICAN UNIVERSITY OF CALIFORNIA
EMAIL INSTRUCTIONS FOR DR. MONAHAN TO SEND TO CLINICIANS

Dear fellow clinicians,

We, Anjelica Collins, Jocelyn Diaz, Bailey Kiser, Paul Peritos, and Noreen Hasan, are students at Dominican University of California working on our master capstone project. Our project is based on the driving rehabilitation application (app) that Dr. Miriam Monahan developed, the Drive Focus® app. The purpose of our study is to determine whether clinicians find Drive Focus® app to be a strong user-interface, from a clinician's standpoint, during their clinical practice. The result of this study aims to provide feedback for future development of the Drive Focus® app to improve the experience of the clinicians and therefore, benefits clients in various clinical settings. We are interested in hearing your opinion on the Drive Focus® app's user interface design. Please support us in our capstone by voluntarily completing the survey below to voice your experience with the Drive Focus® app.

As users of the Drive Focus® app, you are being asked to participate in this study. Provided below is a link that will direct you to an anonymous survey which will take approximately 10 minutes to fill out. By opening the link and answering the survey questions, you are consenting to participate in this study. Please note that **participation in the survey is voluntary** and you are free to leave the survey at any time without submitting your answers. The only individuals with access to the survey results are the student researchers and their capstone faculty, Dr. Kitsum Li. Meanwhile, Dr. Miriam Monahan, the developer of the Drive Focus® app will only receive aggregate data and thematic information.

[INSERT SURVEY LINK]

In addition, the research team would like to invite you to participate in a separate focus group via Skype. The focus group will take approximately 60 minutes to discuss how the user interface design of the Drive Focus® app may be facilitators or barriers for clinicians in the intervention process at their respective practice setting. The purpose of the focus group is to go more in-depth on the Drive Focus® app components and allow for further discussion based on the clinicians' input from the survey. **Participation in the focus group is voluntary** and the participants are free to leave the focus group at any time or not answer any questions they are not comfortable with.

The focus group discussion will be videotaped. To maintain the anonymity of the participants, the research team will assign pseudonyms to the participants during the transcription and thematic analysis. Again, the developer of the Drive Focus® app, Dr. Miriam Monahan, will not have access to the taped video but only to the aggregate data and thematic information. As a small token, you will be entered in a drawing to win a $15 Starbuck/Peet's Coffee gift card upon completion of the focus group. If you are interested in participating in the focus group, please provide us with your email address using this link [Survey Link].

Thank you for your participation. If you have questions about the study you may contact Anjelica Collins at anjelicacollins@yahoo.com or the faculty advisor Dr. Kitsum Li at kitsum.li@dominican.edu. If you have further questions or comments about participation in this study, you may contact the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHP Office by calling (415)257-0168 and leaving a voicemail message, by FAX at (415)257-0615 or by writing to the IRBPHP, Office of

the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

Appendix C: Focus Group Sign up Form

DOMINICAN UNIVERSITY OF CALIFORNIA
Focus Group Google Form Sign-Up

Please check that you understand that your participation in this study is voluntary and that you withdraw participation at any time.	☐ I agree to volunteer to participate in this survey.
Please check that you understand participation in this study will involve taking part in a discussion that will be recorded using Skype video calling of approximately one hour. During this call, other clinicians will be able to see and hear me. However, all personal references and identifying information will be eliminated once the recording is transcribed, and all participants will be identified by pseudonym only. The developer will only be receiving the thematic information gathered from the clinicians' responses. One year after the completion of the research, all written and recorded materials will be destroyed.	☐ I understand
Please check that you understand that your participation involves no physical risk, but may involve some psychological discomfort.	☐ I understand

Name:	Email Address:	State:
Professional Credential:		Area of Practice:

Appendix D: Letter of Support

DOMINICAN UNIVERSITY OF CALIFORNIA
MIRIAM MONAHAN, OTD, OTR/L-- Letter from Miriam Monahan

December 11, 2019

Kitsum Li OTD, OTR/L
Occupational Therapy Department
Dominican University of California
50 Acacia Ave
San Rafael, CA 94901

RE: Capstone project

Dear Dr. Li and OT students,
This letter is to acknowledge my support of the OT student's project titled: *Evaluation of User Interface in the Drive Focus Application*. I would be happy to distribute the survey link that the students create to clinicians that are using the Drive Focus app.

I look forward to collaborating with you and the students on their capstone project.

Sincerely,

[redacted]

Miriam Monahan, OTD, MS OTR/L, CDRS, CDI
Chief Science Officer