

BOURELLE MARTIAL ARTS:
A CASE STUDY IN IMPROVING WEB USABILITY

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ABSTRACT

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In the modern climate of software development and user engagement with technology, where new applications are being regularly developed, there is a high degree of competition between those delivering similar functionality. This challenge creates a need for innovation outside of an application's primary purpose, where software is expected to perform above and beyond user expectations to create an "experience." The user experience requires the consideration of human interaction with the software during the design process; designers are expected to think about the effect the software is having on the user aside from the functional benefits. These considerations can manifest into nonfunctional requirements such as usability, security, performance metrics, and even more innocuous factors such as gamification. This capstone research covers a case study in which a service provider's website design is evaluated and edited to improve usability, specifically in information architecture. Improvements in business performance will be measured through user studies in which key tasks are performed and the experience is evaluated using quantitative metrics and qualitative feedback. The desired goal of the research experiment is to deliver design suggestions to the client that will improve business performance through increased traffic and engagement with the company website.

CHAPTER 1: INTRODUCTION

When a project is being developed, whether it is a new system, an innovation to an existing software, or even a venture into an existing industry, there are a number of requirements that need to be considered. Fundamentally, a project is a solution to a problem or unmet need that has been perceived for the target audience. These needs that need to be met or, more specifically, the actions that the solution will take to address those needs, can be referred to as the “functional requirements” of the project.

For new inventions or projects that seek to break into a new market, these functional requirements can be sufficient to deliver success in their completion. However, in an environment where technological growth is rapid and new innovations are being delivered daily, there is an increasing challenge to make projects profound. This is akin to the concept of a crowded industry, where supply massively exceeds demand, and competitors are required to adapt their products or services with extraneous features or diverse marketing schemes to stand out. Indeed, where a software system was once designed to perform a function, now the average user is attracted to products that create an “experience.” These new, “nonfunctional requirements” include factors like performance metrics, security, and reliability, which may be considered adjacent to the functionality. Also considered are how the application makes the user “feel,” which can be affected by how easy the system is to use, how quickly requirements can be completed, and even how the information is structured.

These considerations developed into the research concept of the “user experience” (UX), which is the primary focus on this capstone project. When applied to the use case of a service-provider’s website, this UX study will identify changes that can be made to increase traffic and improve the findability of desired information in the website’s

architecture. To support the business's goals, key tasks to be completed on the website have been identified by the owner, and research efforts are directed toward making design changes that will encourage users to follow through on these task flows. As the client's business is a martial arts studio, the primary goal is to encourage users to engage with the following website tasks: registering for a trial class, accessing information on the after-school program, registering for self-defense classes or private lessons, and accessing information on the owner's martial arts book.

To achieve this outcome, the primary changes that will be executed on the website will involve the restructuring of the information architecture, which is currently disorganized. The website serves as a "hub" for four locations of the Bourelle Martial Arts franchise: one in North Carolina, two in Nebraska, and a fourth in Wyoming that is no longer in operation. As each location has different information regarding contact information, instructors, schedules, and programs offered, the "Locations" tab on the website has become deeply nested and difficult to navigate. Once changes have been made to improve the structure and findability of important information on the website, A-B usability testing will be performed between the current and updated versions to identify changes in the speed of completing tasks. It is the hope of this research that the changes made to the design and information structure of the Bourelle Martial Arts website will spur an increase in traffic from the business's target market, as well as in completed registration forms.

1.1. Motivation

As a graduate student coming from an undergraduate curriculum in recreation and parks' management, the greatest degree of motivation for this capstone choice came from the variety of courses I took in this master's program. In my first semester at the

university, the courses that influenced this project most were “Intro to Computer Science” (CSC-500) and “Information Systems Analysis” (MIS-411). CSC-500 provided a much-needed refresher in programming languages, as I had only reviewed the fundamental of Java during the previous summer. This course also helped me recognize a passion for problem-solving and the innate “puzzle” aspect of developing software. MIS-411, despite being incredibly daunting in the first few days of class, became one of the most invaluable courses I took during my graduate studies. In this course, I was able to combine my limited business experience from my undergraduate minor with my interests in visual design and organization to learn many new subjects. In addition to discussing Agile and its associated methods, I was able to learn more about the software development lifecycle, domain and entity relationship diagram modeling, and even did some work in prototyping! While the domain models were some of my favorite class assignments, the chance to take a prospective software concept through the analysis and design stages was engaging. This interest in design extended to a fascination with usability as a factor of the greater user experience, which we discussed briefly in MIS-411. Though some of the underlying design considerations involved in UX and human-computer interaction were foreign to me, I was surprised at the degree to which these choices could affect the user. Prior to that time, my assumption had been that software design was primarily aesthetic-driven, and that metrics like “findability” would be more connection to functionality.

Another influencing factor in this capstone research was a desire to gain experience creating business value through the user experience. As my post-graduation plans involve entering the UI / UX design field, I would like to have the tools and knowledge necessary to bring the greatest benefit to the clients I would be working with.

Working with a business's website allows me to utilize skills in HTML and CSS that I learned in high school while experimenting with the newer concepts of usability and information architecture. The website will also be responsive, so experience can be gained in optimizing for desktop and mobile devices. The latter will be especially useful in our world where many people are reliant on smartphones and tablets as their "mini-computers." From my personal experience using mobile browsers and even working on the development for my own business website, I can attest that having an easy-to-use and visually pleasing mobile interface makes the world of difference. In fact, a research study in 2006 indicated that higher-quality websites have higher levels of business performance, on average, than websites that are less developed (Lee et al., 2006). With this in mind, the primary goal for this capstone is to improve the usability and quality of the Bourelle Martial Arts website to increase web traffic and business performance.

CHAPTER 2: REVIEW OF LITERATURE REVIEW AND ANALYSIS

When approaching the capstone project and the Bouelle Martial Arts case study, there was a great amount of deliberation in the early stages to determine the desired focus for the research. With a limited timeframe and a plethora of design factors to consider, it quickly became necessary to pinpoint a sector of software design and the user experience that would be complementary to both the business and the portfolio of a budding UI/UX designer. Reviewing Bouelle's website influenced the research hypothesis by possessing a clear need for restructuring to improve information findability, which led to the discussion of information architecture as a focus. Though familiar with the information architecture concept individually, there was a need to explore its connection to usability and UI/UX design. The following literature review was conducted to obtain a clearer understanding of the current climate of the design industry as it relates to software and the user experience.

2.1. User Experience (UX)

In a case study on usability and the user experience from 2017, author S. Raquel Ramos developed a new interface for informing patients at an HIV clinic of their privacy rights. Ramos implemented a user-centered design for this interface, which he defines as “an interactive and iterative process that incorporates end-user feedback to facilitate tailored, usable interfaces, products, or systems” (Ramos, 2017). Though the final design of the interface left some things to be desired, the focus on the user's ease of use and benefits from engaging with the system help create an experience that exceeds functionality alone. A study by Krueger et al. in 2020 reviews the importance of the user experience in the process of innovating software products in an already saturated environment. The primary focus of the piece, however, is an exploration of current

methods for conducting user research. The challenge in choosing a research method, they argue, is that there is not a single “best method” that can support the requirements of all projects (Krueger et al., 2020). Therefore, it becomes necessary to adapt the research process for each specific project, which can often entail a combination of aspects from different methods. The authors expand upon this concept by providing principles used to summarize the adaptations made to two existing methods: “Positive Experience Focus,” “Creative Visualization,” and “Systematic Guidance.” In explaining their adapted research methods, the principles are referenced by their impact in motivating choices in activity (Krueger et al., 2020).

This stood out as an excellent tactic for ensuring that research activities support the underlying goals of the project, while also keeping integrity and desired effects of the design in mind. The integrity and ethics of user-centered design is also explored in a study of engineering students from earlier this year (Vilaza & Bækgaard, 2022). Specifically, ethical concerns that can arise during UX design include “transparency, [illusion of] choice, well-being, inclusion, and reciprocity” (Vilaza & Bækgaard, 2022). This is important to remember, as a designer’s desire to create business value should not outweigh their responsibility to the well-being of the user. These ethical considerations can influence the range of emotions that occur within the user as they engage with the application, which a journal from August of 2022 refers to as “feelings of being” (Dirin et al., 2022). Emotions during the use of an application tend to arise when a user’s expectations for a system’s performance are reconciled with reality. In their work, Dirin et al. explore the various feelings that may arise during the stages of adoption, from “Anticipation,” “Orientation,” “Incorporation,” and finally “Identification” (Dirin et al., 2022). User experience designs will want to consider expectation management in their

designs, while also doing ample research to better understand the preconceived expectations users may have for their product.

2.2. Usability

During the graduate curriculum in the computer science program, a prerequisite Information Systems Analysis course introduced the concept of usability and human-computer interaction in conjunction with a list of design heuristics created by Jakob Nielsen. As this held the greatest familiarity for usability, these heuristics served as the starting point for usability research. Surprisingly, one research study on the implementation of these heuristics proved that they may not be sufficient in covering all design recommendations (Miller et al., 2018). In this journal, the authors conducted two experiments that evaluated the presence of Nielsen's design heuristics in UX-related literature and also mapped application design recommendations to a relevant heuristic. The resulting 20:42 ratio of recommendations mapped indicated that many design choices in the areas of "interface, information, and interaction" are beyond the scope of Nielsen's work. The literature study also indicated a sparse presence of the usability heuristics (Miller et al., 2018).

Further research focused on the methods of gathering feedback to make improvements to usability, as well as tools that can be used to build prototypes. In a 2009 study on using the Google Analytics tool to measure usability of a website, the authors identified a need for both quantitative and human-based feedback to make improvements (Hasan et al., 2009). For example, the Google Analytics tool was able to provide useful metrics for the e-commerce website, including pageviews, session duration, bounce rate, and even the source of traffic. However, these statistics did not provide specific reasoning to inform and motivate design changes; for this, qualitative feedback from users must be

collected (Hasan et al., 2009). Other tools used for usability design and prototyping include Figma, Adobe XD, and Sketch, the three of which were compared in a journal published earlier last year (Wang et al., 2022). The tools, themselves, were evaluated on their usability through user studies in which users completed several design-related tasks within the interfaces. To collect data from the studies, a combination of an “objective evaluation” using eye-tracking software and “subjective evaluation” using an “evaluation scale,” “retrospective think-aloud interview,” and “user test” were implemented (Wang et al., 2022). Based on the results of the research, Figma was identified as the superior software in terms of usability, followed by Adobe and Sketch, respectively. This study was especially interesting as it can help inform decisions of software used by new UI/UX designers.

2.3. Information Architecture

While Nielsen’s design heuristics are well-known, they are not the only usability criteria that have been created. In a 2017 research study on the most effective design for smartphone questionnaires, the following five heuristics were defined for usability evaluation: “readability,” “ease of selection,” “visibility across the page,” “simplicity of design elements,” and “predictability across devices” (Antoun et al., 2017). These heuristics are important to ease of use for an application’s user, and many of them refer to the structure of information on a page, also known as “information architecture.” At a fundamental level, two primary descriptions of a page’s information structure exist: “deep,” or “wide.” In the smartphone case study, it is noted that mobile devices possess “small and narrow screens...[which] limit the amount of content that can be displayed” (Antoun et al., 2017). On mobile devices, the solution manifests in either creating a deep

architecture that encourages scrolling on a single page, or breaking up information into multiple pages using either a deep or wide structure.

As design decisions relating to information architecture often involve creating multiple, potentially nested pages, there is a need to discuss navigation in conjunction with this topic. A 1999 study on information systems on websites led to the development of navigational patterns which can be implemented in application design to increase efficiency (Rossi et al., 1999). The primary focus of this research was to organize the information contained on the website in a logical manner, creating an interface that makes navigating to complete common tasks simple. An interesting point in the article is that navigational patterns originated from “urban architecture,” and that a good strategy for structuring information is to approach it from the problems that the information can solve for the use (e.g., the desired tasks) (Rossi et al., 1999). It is important to note, as well, that a structure design that is understandable to the designer or a single user may not be logical for the majority. This idea presented itself in a study on user behavior for an eye hospital in Germany from 2020; in this study, an attempt to simplify the hierarchy of the hospital’s website, including shortening file names, ultimately had a detrimental effect performance (Lang et al., 2020). Specifically, a drop in users occurred around the time of the file names being shorted, which happened a month after the study’s primary changes to the website were implemented. The belief of the researchers is that the drop came from a reduced Google Page Rank, but this is only an assumption (Lang et al., 2020).

Other recommendations for structuring the information architecture of an application include implementing automation to reduce time and cost, though this can be challenging. To overcome this challenge, a research project from 2012 proposed a new

development tool called “InterArch” that would automate the process of creating UML classes, which help provide structure in a software engineering environment (Rojas & Macías, 2012). While not specifically related to webpage development and optimization, this research provided interesting details about the interactions between the “information architect” and software analysts when working on an application.

2.4. Related Works

During the literature review, two studies were identified as being similar to the case study being performed as a part of the capstone project. The first of these was a mixed-methods evaluation of a mental health portal in Canada (Jeong et al., 2019). The research used a combination of Google Analytics metrics and qualitative feedback from test users to learn about user satisfaction with the website. As Google Analytics measures the global traffic of the portal, data retrieved from this tool was comprehensive of all visitors, while the qualitative feedback came from willing participants in the study. While most users indicated satisfaction with the service, the major takeaway from this journal was the value that Google Analytics and similar tools can provide in terms of collecting demographic information, which saves time during qualitative interviews (Jeong et al., 2019).

The second related work was a study specifically identifying challenges during the web development process, which connected more specifically to the work within the capstone than the topic of usability of user experience (Chivinge et al., 2021). In this study from 2021, a literature review was conducted to recognize the most common challenges that web developers face; from this, the authors developed a framework for developers known as the “7Cs Website Development Scheme” (Chivinge et al., 2021). This framework is optimized for use in a Agile environment, and consists of seven

overarching concepts that are completed sequentially for the most success (Chivinge et al., 2021). While these concepts have subcategories that help guide their implementation, the authors' main points are organized as follows:

1. Agile planning and acceptance
2. Create website drafts for acceptance
3. Flexible website design
4. Agile website development
5. Website to website connections
6. Connect website to social media platforms
7. Website cybersecurity and protection

The 7Cs framework, as described, is reminiscent of the software development life cycle (SDLC) workflow that was introduced during the graduate curriculum. However, there are potential concerns in implementing a strict sequence for these steps, particularly if cybersecurity is the last consideration.

CHAPTER 3: METHODOLOGY / STUDY DESIGN

The following section will address the various factors contributing to the study design of the research project. A visual representation of the interworking pieces is provided in Figure 1, below:

Figure 1

Study Design



3.1. Current Website Design

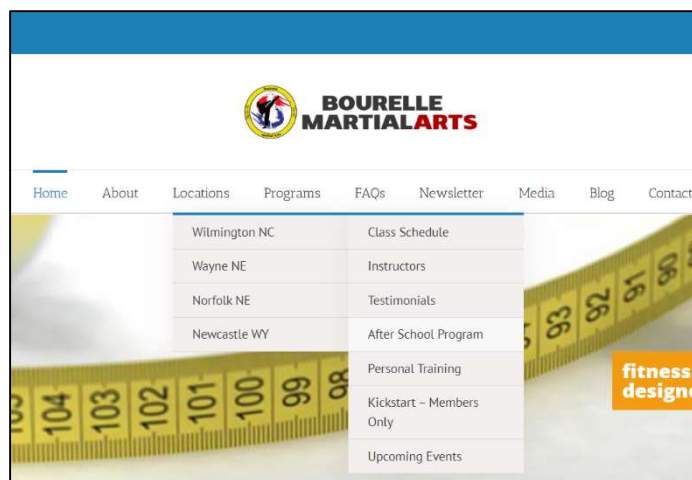
The Bourelle Martial Arts studio website is the primary source of information and contact for three locations based in Wilmington, North Carolina; Wayne, Nebraska; and Norfolk, Nebraska. Pages containing key information are accessed through the clickable tabs across the top of the page (on desktop): “Home,” “About,” “Locations,” “Programs,” “FAQs,” “Newsletter,” “Media,” “Blog,” and “Contact.” Many of these tabs are also “nested,” meaning that additional tabs appear below them in a drop-down format when the top-level tab is moused over (or tapped, on mobile).

While nested tabs are common in many websites and are appropriate to use for organization, they can become an issue when the depth exceeds one or two levels.

Nesting tabs can also be challenging to navigate without having a clear plan of how the information will be organized ahead of time. The difficulty for Bourelle’s website tabs lay in the organization of information that is specific to each of the company’s three locations. For example, the Wilmington location is the only location to offer an after-school program for children. To represent this, the current version of the website nests an “After School Program” page two levels deep from the top-level “Locations” tab, as is shown in Figure 2; to access it, the user must first access “Locations,” then “Wilmington NC” to find the page. This significantly decreases the findability of this program page, which should likely be placed under the primary “Programs” tab in its current configuration. To identify that the after-school program is offered only in Wilmington, another solution would be to specify this in text-form on the “Wilmington NC” or “After School Program” page, but ideally both.

Figure 2.

BMA Current Website: After School Program Example



Another weakness of the Bourelle website is a lack of consistency with certain features appearing on pages. The website contains two widgets that appear intermittently

throughout the site; one is a quick access to the site's blog, a very popular section based on the client's report, while the second is a call-to-action to sign up for the studio's newsletter. Most pages place both widgets aligned to the right side, with the blog on top and newsletter immediately beneath it; others include one, the other, or no widgets at all. While this can be perceived as a reasonable effort not to inundate the user with features they are not interested in, it also has an element of inconsistency that makes the website feel less planned. To remedy this, suggestions would include standardizing the use of the widgets on certain page styles (such as the location pages or information pages for martial arts forms) or limiting the presence of blog information and the newsletter sign-up to only their respective pages.

While there are some apparent weaknesses in the current design of the Bouelle Martial Arts website, the design itself is visually pleasant and performs well outside of the usability metric. Some strengths noted during the initial review stage that are planned to remain in the final draft include the elements of movement, particularly on the home page; the preference for deep information architecture on pages, which helps optimize for mobile devices; and the implementation of the blog widget on pages (Antoun et al., 2017). The aesthetic designs of the website, especially in terms of color scheme, are cohesive across all pages, suit the company branding well, and allow for easy readability; however, these factors are not the primary focus on this UX research.

3.2. Priority Website Tasks

One of the first steps in evaluating the Bouelle Martial Arts website was meeting the client, Dan Bouelle, who is the owner of the Wilmington studio and was the primary point of contact on the business side for the project. During the initial consultation, some of the strengths and weaknesses of the website's present state were discussed, and

information was gathered about its management. The website, hosted on the WordPress platform, was designed, and is currently managed by, a volunteer web designer who is a colleague of Bourelle's. Due to the volunteer's limited availability to make changes to the WordPress site, the prototype created for user testing would have to be created as a duplicate of the current website, and there will likely be only a single chance to complete the testing.

Another focus of the initial meeting with Bourelle was to identify the priority business objectives for the website in terms of tasks that the user can take. In discussing their current web traffic, Bourelle mentions that the primary use of the website is currently for the blog, which provides interesting takes on martial arts concepts and serves as an access point to the martial arts community. However, this has resulted in a greater percentage of traffic from users located outside of the target areas in North Carolina and Nebraska. As Bourelle's overarching goal is to increase physical presence in the studio through classes, as well as to promote his martial arts book, the following list of priority tasks was developed for research:

1. Register for trial classes.
2. Register for self-defense course / private lessons.
3. Access the After School Program website.
4. Access Dan Bourelle's book website.

The first two tasks, while appearing similar, will use different functionality to complete. For regular classes in any martial arts style, the user will be directed to complete a short form to get information about scheduling a free trial class. For the self-defense courses or private lessons, the user will be directed to reach out to Dan Bourelle directly using the website's contact form. The third task refers to an external website Bourelle has created

specifically for the After School Program; though an overview will be provided on the main website, those wishing to learn more will be directed to the external page. Similarly, Dan Bouelle has created a personal website containing his personal accreditations and certifications, as well as information about his book: *A Martial Artist's Guide to Failing Your Way to Success: The Dan-Do Method*.

These four key tasks will assist in supporting the rationale for changes made to the existing website in the updated prototype. They will also be instrumental in the creation of user personas and scenarios as the potential target audiences for the Bouelle Martial Arts website are being considered.

3.3. Updated Website Prototype

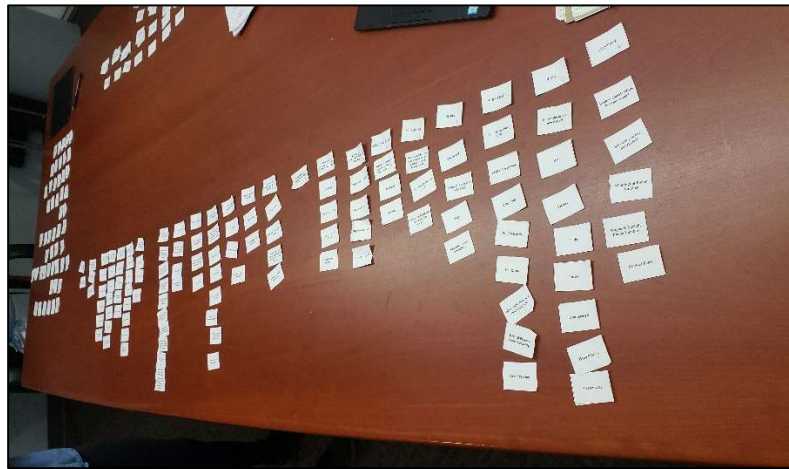
The prototype of the Bouelle Martial Arts website will be created on the Weebly platform, which is an online-based software that allows for free webhosting under a branded domain name. WordPress was planned to be the platform for the prototype initially, as this is medium used for the actual website. However, challenges arose when Bouelle's current website was unable to duplicated using WordPress's built-in "Duplicator" plugin, and attempts to download and recreate the website in a separate WordPress account exceeded the cost constraints of the project. As both student and mentor had previous experience working with Weebly in an educational setting, the WordPress incident appeared to be a blessing in disguise. In this way, changes made to the initial website in the Weebly prototype could simply be applied equivalently in WordPress should they prove beneficial to business performance.

To determine the specifics of the information architecture in terms of information to keep, information to abstract, and how best to organize it all, another meeting with Dan Bouelle was needed. In preparation for this, three sets of materials for a "card sorting"

activity were created, with small two-inch cards that each contained a piece of information included on the current website. Upon arriving for the meeting, each person present received a set of cards, and a primary set was placed on a large table in a hierarchical model of the current website. In its initial state, the model was too wide for the table and curved around the edge, as shown in Figure 3 below:

Figure 3.

Card sorting activity for information architecture



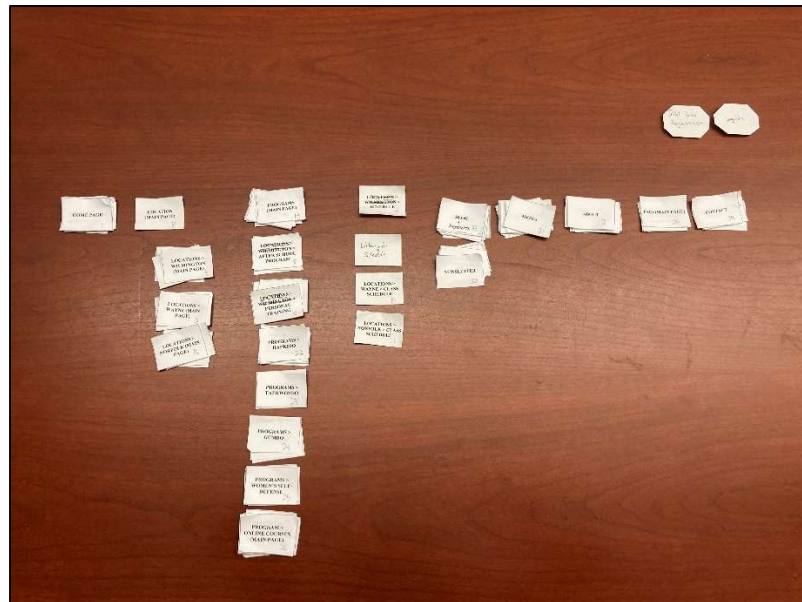
Once the current state was assembled, Dan Bouelle was asked to use his set of cards to create his understanding of what was needed for the website. Some difficulty occurred with this, as some cards contained repeated information to indicate the inconsistencies of the newsletter widget's presence. Both Dr. Ebrahimi and myself used our own set of cards to create our own version of what the website should look like, or what we believed would be easier to understand.

After about fifteen minutes of working independently, the activity was pivoted into logically processing potential solutions to problems; one example was combining information about instructors, contact information, and classes offered into one location page for each of the three studios, which could all be stored under the "Locations" tab.

This also allowed for clarification about information points that were not fully explained on the website, such as the “Tactix” program, conditioning classes, “Lil’ Dragons” classes, and the website’s inclusion of a fourth studio location in Newcastle, Wyoming that was closed. During this discussion, many information points and even full pages were abstracted or combined with other pages to result in a cleaner hierarchical model that would be easier to navigate. Ironically, the final result has more primary tabs than the initial version, but the decrease in nested tabs was significant, which also decreased the width of the architecture significantly, as can be seen in the finished product in Figure 4. Two “button” cards were created during the discussion and placed in the top right corner of the model to represent a login function for online courses and a “sign up” link to the trial registration form.

Figure 4.

Finished product of BMA card sorting activity



The card-sorting activity took about an hour in total, most of the time used in discussion of the information on the cards, themselves, in order to determine what

information was no longer needed. During the final defense of this capstone project, the question was raised as to why prospective or current users of the Bourelle website were not included in the card sorting activity. This is because, at the time of the activity, the current website had a great deal of outdated information on it that needed to be abstracted before official sorting could be done. Perhaps, had time allowed, further card sorting could have been done with the remaining cards from the figure above, so that users could provide their own perspective on what organization of information makes the most sense to them. Trends among these perspectives could then, potentially, be incorporated into the final information architecture of the website.

Following the card sorting meeting, the primary work on the website prototype was done independently on the Weebly platform. Though some attention was paid to design aesthetics due to the researcher's interest, the primary focus in the initial stage of work was creating a realization of the hierarchical model in a website. To do this, information points referred to on the cards were taken directly from the original website and placed on the prototype website's pages, based on the primary and secondary pages created in the model. The aesthetic design choices, color schemes, and deep information architecture on individual pages were maintained to visualize the changes being made to the WordPress website.

Challenges arose quickly during the development of the prototype due to some features from the WordPress website not being equally supported in Weebly. For example, an embedded calendar widget is used on the current website to display each studio's schedule and the classes being held during the week. When trying to recreate this in Weebly, the possibilities were limited by the lack of free plugins that could support the same functionality. In lieu of this, a screenshot image of the current schedule was used,

though it is difficult to say how this could affect the implementation of the comparative user tests. Similar issues occurred when creating the prototype's "Media" and "Blog & Newsletter" pages, as well as the "Log In" and "Register" buttons, which are currently unsupported.

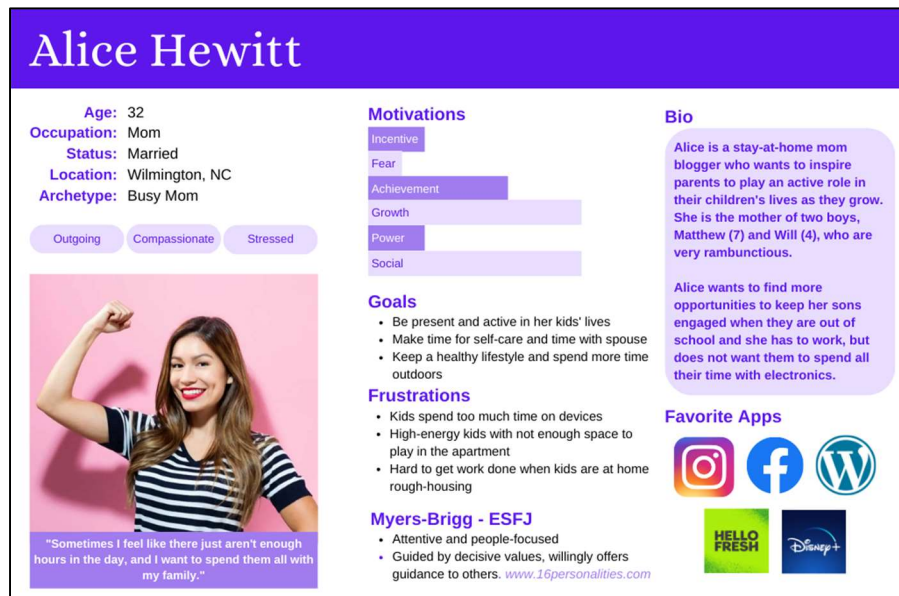
3.4. User Personas and Scenarios

In preparation for the user testing portion of the research experiment, which will be performed during the spring semester, user personas and relevant scenarios have been created for potential target audience members of Bourelle Martial Arts studio. Creating user personas for software design is beneficial because they serve as a reminder of "who" the user is, and the experiences they have that may influence their decision-making. When creating the user personas, an important consideration to keep in mind was to create "real" people, rather than the ideal client; any business wants a client that already knows about them, loves what they offer, and is ready to commit, but this is not a realistic expectation. As these personas and scenarios will be used for user testing, it is also crucial to be unbiased when crafting them, otherwise the results can be skewed in favor of the changes you would like to make. With those considerations in mind, the following four personas and scenarios were created: the "Busy Mom," the "Jogger," the "Reader," and the "Interested Party."

The "Busy Mom" persona, named "Alice Hewitt," is illustrated through the persona file in Figure 5 below:

Figure 5

User persona for Alice Hewitt, the “Busy Mom”



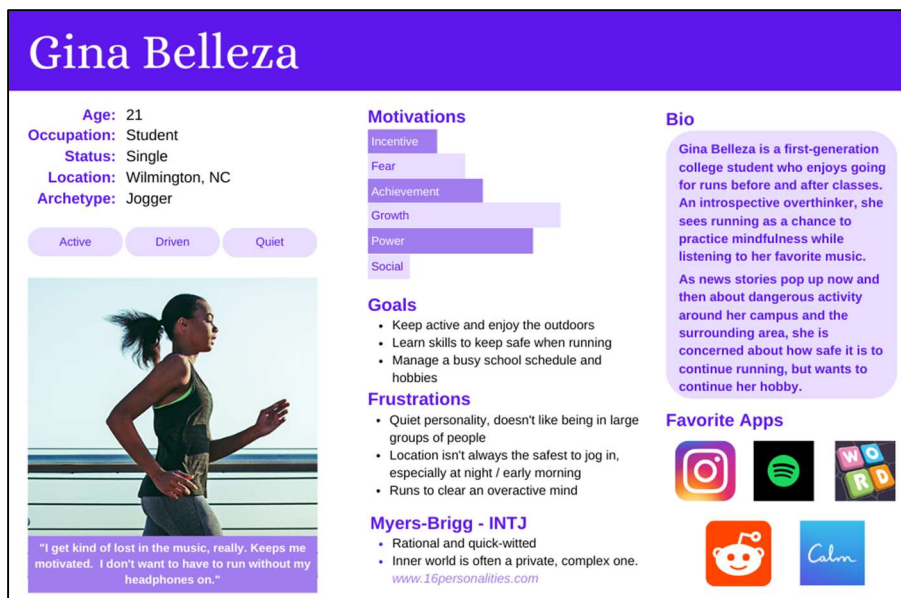
This persona is intended to include the market segmentation of parents with young children who may be interested in martial arts classes, or potentially the after-school program. The following scenario represents a situation in which the “Busy Mom” persona’s goals could lead to researching the after-school program on the Bourelle Martial Arts Website:

Alice Hewitt (32) is a stay-at-home mom and mom blogger living in Wilmington, North Carolina. Her spouse, Jonas Hewitt (34) is a marketing manager and frequently traveling. The couple have two sons: Matthew (7) and William (4), who are both in grade school. The boys have lots of energy and tend to rough-house, which makes things difficult when Alice is trying to get work done at home. The family lives in an apartment, as well, so there is not enough space for the boys to play outside unless Alice takes them to the nearby park. Alice wants to spend as much time as she can with her sons and be an active part of their childhood growth, but wishes she had more activities to keep them engaged. As she advises against it in her blog, Alice feels guilty when she considers giving the boys a tablet or phone to play with when she cannot otherwise occupy their time. Ideally, Alice would like to find an activity for her sons to participate in together that will help keep them active, allow them to get out excess energy in a safe space, and provide more time for Alice to participate in self-care.

The “Jogger” persona, named “Gina Belleza,” is illustrated through the persona file in Figure 6 below:

Figure 6

User persona for Gina Belleza, the “Jogger”



This persona is intended to include the market segmentation of women, especially those between the ages of 15-35, who may be interested in self-defense classes or martial arts as a form of self-defense. The following scenario represents a situation in which the “Jogger” persona’s goals could lead to contacting Dan Bouelle through the website about self-defense classes:

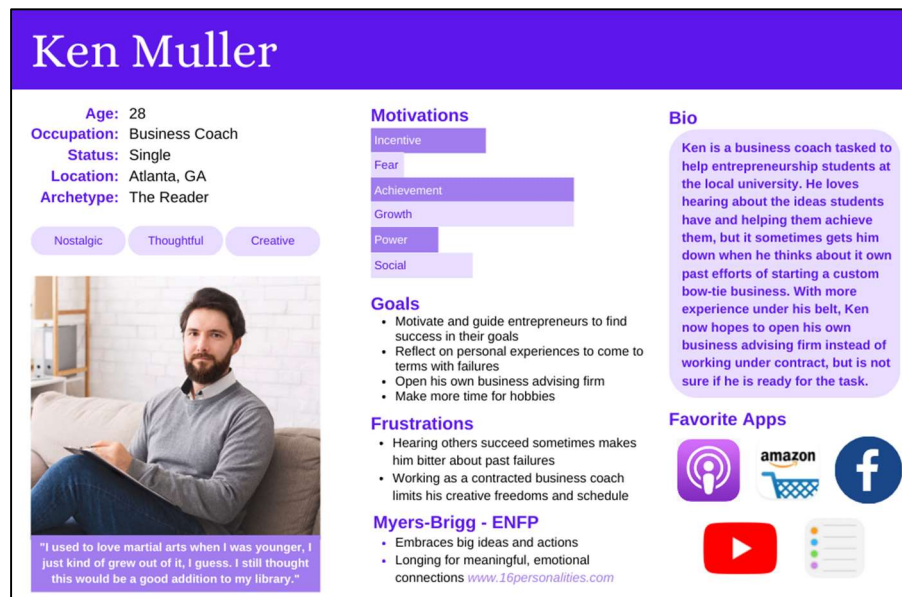
Gina Belleza (21) is a first-generation college student at UNC-Wilmington who is studying nursing. She enjoys running, and likes to go for a run before or after classes when she gets the chance, though her schedule is very busy. While she is on campus, she hears about local news stories that make her concerned about whether the surrounding areas are a safe place to run. While she knows she could run without listening to her music to be more alert, running allows her to clear her overactive mind, and the music helps with her mindfulness exercises. Another benefit came from the outdoor activity, meaning that relying on the student athletics center’s track or treadmills is less ideal. Gina would like to find a way to

feel comfortable running on campus while navigating safety concerns and her busy class schedule.

The “Reader” persona, named “Ken Muller,” is illustrated through the persona file in Figure 7 below:

Figure 7

User persona for Ken Muller, the “Reader”



This persona is intended to include the market segmentation of users who may be interested in martial arts and would like to learn more about them through a professional’s experience. This audience may also include users who are interested in learning about how to overcome failures and hardships from a unique perspective. The following scenario represents a situation in which the “Reader” persona’s goals could lead to researching Dan Bourelle’s book through the studio website:

Ken Muller (28) is a professional business coach who was contracted to provide guidance to entrepreneurship at his local university in Atlanta, GA. In this role, Ken enjoys supporting the students in their exciting ventures, and seeing them find success. However, sometimes Ken feels embittered by the success of clients, as he had previously failed in his attempt to start a business selling custom bow ties. While he believes that his failures have contributed to the lessons he has

learned and the experience he can share with the students, they have also given him trepidation in growing his career. Specifically, Ken hopes to expand out of his current contract role and start his own business advisement firm where he can have his own creative license on his work and have a regular schedule. Though he would love to have the space to try new things in his work and try new hobbies, Ken’s past failures makes him nervous to try again.

The “Interested Party” persona, named “Anton Winters,” is illustrated through the persona file in Figure 8 below:

Figure 8

User persona for Anton Winters, the “Interested Party”



This persona is intended to include the market segmentation of users who are already familiar with martial arts in some capacity but would like to learn more about it. These audience members may even wish to participate in their own classes. The following scenario represents a situation in which the “Interested Party” persona’s goals could lead to subscribing to the newsletter or signing up for a trial class:

Anton Winters (35) is an accountant and single father to eight-year-old Rose Winters (8), who currently takes taekwondo classes at a local martial arts studio. Anton is dedicated to being present and engaged in his daughter’s interests, and

stays during her classes so he can watch with other parents. However, Anton wishes he knew a bit more about what his daughter is learning in class so that they could talk about it. He has even considered taking an adult taekwondo class at the studio, but is unsure if he can participate with his knee issues. While Rose loves the classes and tries to explain things to her dad, Anton finds himself searching martial arts terminology during class breaks to try and stay up to date with what she is talking about.

3.5. Preparing Prototype for Research

After the midterm Capstone Proposal, recommendations were made by the board to abstract the number of personas / scenarios to two, which would allow for a more focused study that would be realistic for the timeframe available. Other suggestions were made to pursue a mobile-first design for the website, and obtain more participants for a smaller amount of target audiences. The scenarios also needed to be updated to have a clearer purpose and “call to action.” These recommendations were taken, in addition to intentions to update currently unsupported features in Weebly over the interim winter break.

The primary focus when editing the scenarios was making their goal clearer to the reader, in this case, the upcoming research participants. Each scenario needed to have a clear task that was the desired outcome of the fictional persona and would be supported by the objectives that had been created for evaluation. For the “Jogger” persona, this was signing up for the studio’s self-defense course; for the “Busy Parent” persona, it was enrolling children in the after-school program. The greatest challenge in making these changes was coming up with an organic way for the fictional user to learn about BMA without sounding too forced. The addition to the Jogger persona is shown below:

When talking to her parents about the issue, Gina received the suggestion to take martial arts classes at a local studio, but she was apprehensive about learning skills if she did not know how to use them in an emergency. However, she knew that there was local martial arts studio in Wilmington that offered self-defense

classes specifically. Gina would like to gain more information about this program, and sign up online, if possible.

The addition to the Busy Parent persona follows:

Ideally, Alice would like to find an activity for her sons to participate in together that will help keep them active, allow them to get out excess energy in a safe space, and provide more time for Alice to participate in self-care. Alice was speaking with a reader of her mom blog recently and heard about Bourelle Martial Arts studio as a potential outlet for her children to be active and engaged during their after-school hours. She would like to sign them up for the afterschool program, but is unsure of how to do so.

The other major hurdle in preparing the prototype for the research study was managing certain features of the original website that were impossible to replicate in the Weebly development environment due to a pay wall. Specifically, the calendars for class schedules at each of the BMA schools, as well as the studio blog, were currently being represented in the prototype by static screenshot images taken from the original WordPress site. This, naturally, is not ideal, as users would most likely expect to be able to interact with these features in what is otherwise a high-fidelity interface. Another challenge with this was the fact that many other features including media integrations and the frequently asked questions page were created using third-party plugins that Weebly supports. Though this is acceptable for a website hosted on Weebly, itself, it limits the ability to take source code that Weebly provides and transfer it seamlessly back to WordPress; changes may need to be made if third-party plugins are not supported.

All of these facts inspired a need to potentially explore other options for creating the final prototype for research. As we prepared the research study, we explored other software options for creating web application designs for the user to interact with; specially, these were Figma, Justinmind, and Adobe XD.

3.6. Software Study

The software exploration journey started with Figma because this option presented an opportunity to engage with a ubiquitous application in industry that I had no experience with. Unfortunately, this factor became the ultimate barrier for use on this project. Both Figma and Justinmind are “freemium” programs, meaning they are free to use up to a certain extent, but ideal features and functionality are restricted to paying users. However, despite accessing a free account on Figma, I still found myself facing a blank screen with a high degree of uncertainty of how to even begin. Given that I had prior experience with both Weebly and Justinmind, it was easier to jump right in and begin working, whereas Figma and Adobe XD each presented a higher learning curve I would have to navigate in order to recreate the existing Weebly interface to the same quality. After working through a few introductory tutorials and experimenting with different tools, I ultimately decided that my Figma experience would have to wait for a different project.

Justinmind is a prototyping tool that I had previous experience working with, as I created an interface for both a desktop and mobile application during one of my courses in the graduate program. I was eager to explore this software again, as it made things extremely easy in terms of building the application and creating interaction opportunities for the user. However, what I quickly discovered was that my classroom experience with Justinmind had been more exclusive than I had previously thought. For the sake of the class project, students had been given temporary access to a full license in Justinmind, bypassing freemium restrictions and allowing for unlimited creative freedom. With a limited number of pages and graphics I was able to access, it was clear that Justinmind would be even more difficult to use than Weebly had been, though it was not as laborious to work with as Figma due to my previous experience.

The final tool I explored before making final decisions on the prototype was Adobe XD, which is a UI design tool that is part of the Adobe Creative Suite. Thankfully, the pay wall was not an issue here, as being a UNCW student provided full access to the entire suite of programs (this author has been especially fond of working with Adobe Illustrator and Photoshop during this semester). However, the primary issue with Adobe XD was the same learning curve with the environment that I experienced with Figma. Once again, I was staring at a blank page that was reminiscent of a bitmap editor like Photoshop, but completely unsure how to begin building an interactive website using this program. By this time, the deadline to complete the prototype for research was coming closer, and it was evident after a few tutorials that “reinventing the wheel” using a program I had never used would not be feasible with the time I had.

This ultimately resulted in going back to square one: Weebly. The current interface I had was not perfect, and some features were unsupported, but it had more potential given the timeframe and compatibility to WordPress in terms of being a similar web-building platform. To address unsupported features, I included notes in bolder red text to inform users who accessed these pages that the static nature of the images were intentional, and were due to the development environment. To make the final prototype effective for both desktop and mobile users, I duplicated the original Weebly design and rearranged content with a focus on mobile-view and usability in mind. To my surprise, this resulted in a final product that was visually appealing in both desktop and mobile environments. More details on these changes will be discussed in the coming sections.

3.7. Planning the Research Study

During the final stages of preparing the prototype, the research study needed to be planned. The target audiences being addressed by the study were identified by the

personas: university students, and parents of young children. However, other details that needed to be confirmed were the desired number of participants, how these volunteers would be recruited, how to divide up the study, as well as how the studies should be conducted. Due to the mobile-first design of the final prototype, it was deemed appropriate to divide each target audience pool into two even groups; one group would evaluate the usability of the website using a desktop, the other would use mobile devices. To accommodate male and female participants, the original scenarios were edited to create alternate versions with male and female personas.

Once these major decisions were made, the next step was to write a script for conducting the experiment. Like any scientific experiment, there should be a controlled environment beside any variables that are being tested. Having a scripted process for introducing yourself to the research participant, explaining the task and rules, and obtaining feedback, allows the study to be conducted by anyone, but also helps prevent the person leading the study from influencing the outcome of the study. To create the script, a public web-usability study template from the General Services Administration was used and edited for our purposes (*Example usability test script* 2023). The final version of the script is included in Appendix A. Please note that the script allows for some flexibility of speech to not appear frigid or robotic but ensures that the participant feels comfortable in the research space.

3.8. Finding Participants

Finding participants for the research study, surprisingly, was one of the most difficult parts of the process. In fact, scheduling time with individuals was so challenging that the final usability interviews were conducted mere days before the first draft of this report was released! That said, any person can understand the struggle of trying to

schedule a meeting with someone, regardless of if it is for a formal meeting or simply catching up with an old acquaintance. The initial strategy for recruiting research participants was through the use of Signup Genius, a web-based program that allows users to sign up for time slots to participate in any number of meetings or activities. To make things as simple as possible in hope of encouraging participation, I collected the minimum amount of information needed, specifically email, name, and which persona groups they related to, if any. The latter of these fields, unfortunately, got lost along the way in Signup Genius's system, and I was unable to find that information for those who registered. By avoiding asking about availability upfront, I hoped to allow more flexibility for participants; they would have the option to find a time that worked best for them, and could complete the study either in-person or over Zoom.

The sign-up form was distributed over the UNCW email system to the entire computer science department, and we managed to obtain ten registrants using this method, though only five of them were ultimately scheduled due to communication difficulties. The other participants were gathered through a variety of other means, including direct emailing to classmates, Dr. Ebrahimi requesting student volunteers from her classes, and advertising the study in the messaging system Slack, which was used as the primary tool at my current internship; the latter two of these methods were the most successful.

Figure 9

Screenshot of the Signup Genius form (cropped to hide personal information)

The screenshot shows a Signup Genius form titled "Brenda Segda - UNCW MSCIS Program" and "Capstone Research Study". It includes a contact link for Brenda Segda, a thank-you message, and details about the study's duration and anonymity. At the bottom, there is a "Sign Up" button and a progress indicator showing "10 of 100 slots filled".

Brenda Segda - UNCW MSCIS Program

Capstone Research Study

BS Brenda Segda [Contact](#)

Thank you for your interest in participating in this research study! This is an important aspect of collecting feedback for my graduate capstone project.

We are currently looking for volunteers in the college student population, as well as volunteers who are parents of young children.

Participation in the study will take approximately 30-45 minutes, and your identity will be kept anonymous. We do not have specific time slots created, in the interest of being flexible with the availability of the participants.

[Share](#) [p](#) [f](#) [t](#)

Available Slot

Research Study Participant [Sign Up](#)

10 of 100 slots filled

The participants recruited for the research study were selected for their personal association with the persona groups being studied; that is, the “Busy Parent” study participants were, indeed, solely parents of young children. Similarly, all of the “Jogger” persona participants were university students, most of them attending UNCW. The choice to specify participants this way was made so that they would be able to find the personas and scenarios to be relatable and connect them to their own lives, rather than simply needing to “imagine” or “pretend” that they were in the situation being described. Forcing participants to act like someone they are not could result in ingenuine feedback, or comments that are influenced by misconceptions they may have about the persona. In retrospect, the persona may not have been as necessary to provide as the scenario, though it could be beneficial to users who would not otherwise be interested in engaging with martial arts activities.

CHAPTER 4: OUTLINE OF COMPLETED PROJECT

During the first semester of the capstone project, the early design plans and reorganization of the information architecture of the Bouelle Martial Arts website were completed. The following sections provide an outline of capstone activities conducted during the spring.

4.1. Conducting the Study

The experiment phase of the capstone consisted of a usability study that evaluated the efficiency with which users can perform certain tasks related to a given scenario. This research was completed in an A-B testing style, where research subjects from each personal group were separated into two smaller groups to individually review the updated prototype on either a desktop or a mobile device. The success of the prototype and needed changes were to be determined through a combination of quantitative and qualitative metrics from the users.

During each study, a user was given a persona and scenario to provide context and motivation for the tasks they need to complete on the website. Then, the user completed the tasks to the best of their ability and the time duration was measured using a digital stopwatch. Once all tasks were completed, the user was asked to provide qualitative feedback and suggestions about their experience. These may include how easy it was to navigate the system, how they felt while completing the task, and what aspects they preferred or disliked about the interface.

The first test-run of the research study has not been included in the final data, as the time metrics recorded were interrupted by technological difficulty as well as issues with finding a room to conduct the study in. However, this first study provided qualitative feedback that was useful in making last-minute changes to the prototype before the study

would officially begin. The participant, who we can refer to as “Desktop-Jogger 0” (DJ-0) provided feedback on the website design being a bit condensed and “crowded,” needing a bit more white space. Issues also arose with navigating through the website in this test, as some links were broken or leading to incorrect locations. Naturally, this was a bit humiliating of a first-impression but served as a learning experience and a reminder to review the prototype with a fine-toothed comb before making it public.

Research was conducted both in-person and remotely using the video conferencing software, Zoom. The remote option ultimately was the most ideal because of the convenience in location for participants, as well as the ability to record the meeting for future reference. To evaluate the prototype using mobile devices, 90% of users utilized the Google Inspect tool to simulate a mobile environment on a desktop computer. This was a function of the Google Chrome browser that I learned about recently and found to be an instrumental component in the research study. Using this tool, the webpage could be simulated on a variety of devices (iPad, iPhone, Android phone) including different generations of devices. In this environment, users simulate the touchscreen using a mouse, and can tap, drag, and do virtually any task that can be accomplished using a smartphone on the computer. One mobile participant used her smartphone for the study because of preference, but ultimately had similar results and behavioral patterns to those who used the simulated device.

4.2. Research Study Results

The following tables and charts illustrate the quantitative data collected from the research studies. For each study, the participants were asked to complete four sequential tasks on the website while discussing their thought processes aloud. The time spent on each task was recorded using a digital stopwatch, and is displayed below. Outliers exist in

some cases where participants either had significantly more difficulty with the task than others in their group, or spent a longer time talking about their thoughts while completing the tasks. In retrospect, this consideration is something that should be factored into the way the data is collected in future iterations.

Busy Parent Persona Tasks

1. Access the Bourelle Martial Arts Studio “Afterschool Program” website and learn how to sign up for the program.
2. Identify and learn about the instructor at the Wilmington location, Dan Bourelle.
3. Send a question to the Wilmington location (*do not sign up for classes*)
4. Sign up for the studio’s newsletter.

Table 1

Desktop Parent (DP) Research Results

Desktop Parent	Task 1	Task 2	Task 3	Task 4	Total Time
DP-1	00:11.66	03:04.84	01:10.65	00:28.35	04:55.52
DP-2	00:15.43	01:25.10	00:41.12	00:41.25	03:02.91
DP-3	00:27.02	00:48.76	02:08.52	00:38.16	04:02.48
DP-4	01:50.20	00:54.35	00:44.18	00:45.38	04:14.12
DP-5	01:29.47	00:37.33	00:26.46	00:13.90	02:47.17

Table 2

Mobile Parent (MP) Research Results

Mobile Parent	Task 1	Task 2	Task 3	Task 4	Total Time
MP-1	01:00.32	00:19.90	00:21.80	00:14.63	01:56.65
MP-2	02:23.09	00:49.96	00:27.25	00:17.68	03:57.99
MP-3	02:03.35	00:28.05	00:45.78	00:20.66	03:37.84
MP-4	03:13.40	01:03.15	01:00.98	00:27.00	05:44.53
MP-5	01:21.72	00:54.90	00:28.53	00:31.90	03:17.06

Jogger Persona Tasks

1. Access the “Self-Defense Training” program page on the website and book a trial meeting at the Wilmington location.
2. Identify and learn about the instructor at the Wilmington location, Dan Bourelle.
3. Request information about the personal training course (*do not sign up for classes*)
4. Identify the phone number for the Wilmington location

Table 3

Desktop Jogger (DJ) Research Results

Desktop Jogger	Task 1	Task 2	Task 3	Task 4	Total Time
DJ-1	02:15.85	01:21.72	02:00.97	00:07.66	05:46.40
DJ-2	01:17.33	01:00.36	00:25.53	00:07.25	02:51.07
DJ-3	01:39.67	00:53.71	02:16.94	00:38.03	05:28.36
DJ-4	01:21.90	00:24.26	00:39.71	00:11.03	02:36.92
DJ-5	00:51.11	00:20.03	01:00.88	00:02.45	02:14.97

Table 4

Mobile Jogger (MJ) Research Results

Mobile Jogger	Task 1	Task 2	Task 3	Task 4	Total Time
MJ-1	01:04.07	00:40.23	00:57.67	00:09.26	02:51.24
MJ-2	00:30.60	00:47.01	01:22.52	00:03.11	02:43.25
MJ-3	01:37.52	00:17.90	00:58.38	00:12.85	03:06.65
MJ-4	00:50.70	01:10.85	01:34.37	00:07.28	03:43.21
MJ-5	00:48.53	02:17.00	02:26.67	00:20.78	05:53.00

The final group of research participants consisted of ten “Jogger” personas, and ten “Busy Parent” personas, with the groups split between mobile and desktop users. The following table reviews the experience with martial arts and web design of each

participant, and qualitative feedback. Experience is summarized in a range from no experience, low experience (such as childhood participation), medium experience (such as recent short-term study), and high experience (significant participation). Qualitative feedback has been summarized in bullet points. Participants are referred to by the codes listed in the above tables to maintain anonymity.

Table 4

Qualitative Feedback Research Summary

Participant Code	Martial Arts Experience	Web Design Experience	Total Time	Qualitative Feedback
DP-1	None	High	04:55.52	<ul style="list-style-type: none"> - Make after-school website a new tab. - “Free trial class” is confusing on booking page. - First-person copy on “About Us” page. - Clearer wording on CTA buttons. - After-school website needs hours and pricing obvious (<i>unrelated to prototype</i>). - “Flickr” caption on homepage is distracting. - Fix copy errors (<i>grammar, unrelated to design</i>).
DP-2	Low	High	03:02.91	<ul style="list-style-type: none"> - Clean-looking site, bright and not overly crowded. - Clear what martial arts the studio provides. - Navigation bar provides desired information right away. - Easy to navigate, responsive in mobile.
DP-3	None	Medium	04:02.48	<ul style="list-style-type: none"> - “Contact Us” should be at the bottom, similar to the booking page CTA. - Very modern, lots of different types of information you might want to know. - Good visual organization, aesthetics. - Do not have to do a lot of reading to get the information. - Generally easy to find information.
DP-4	Medium	High	04:14.12	<ul style="list-style-type: none"> - The scenario is very relatable. - Information is what is expected for a small-business informational website;

				<p>the intention is to get people to get “in contact” as quickly as possible.</p> <ul style="list-style-type: none"> - CTAs on multiple points makes sense. - “Class Schedules” could be combined to find under “Locations” instead of being separate. - “More” is a good use of lumping less-expected topics into one place.
DP-5	None	Medium	02:47.17	<ul style="list-style-type: none"> - Having the after-school program as a separate website was a bit confusing, so knowing where to book is important. - Not having every page immediately visible on the banner was challenging, as she usually visits “About Us” pages and it was hidden under “More.”
MP-1	Low	None	01:56.65	<ul style="list-style-type: none"> - Well thought out, “anyone who’s been to a website before” goes to the navigation button. - “Everything’s in here” - Straightforward, easy to use.
MP-2	Low	None	03:57.99	<ul style="list-style-type: none"> - “Less is more,” and the website was not too overwhelming in the mobile interface. - Gets straight to the point with the CTA. - The navigation button is intuitive, but maybe not for those who are unfamiliar with the internet / mobile. - Possibly automate the booking form to automatically check interests based on the CTA clicked.
MP-3	None	None	03:37.84	<ul style="list-style-type: none"> - Everything makes sense, no “holes.” - As a parent, pricing is a big thing, should have information for the after-school program pricing clearly available. - Call out locations on the home page so that they are immediately obvious.
MP-4	Medium	High	05:44.53	<ul style="list-style-type: none"> - <i>Participant had some discussion time that created an outlier.</i> - Make different versions of the CTA in each section and populate that automatically into the interest form. - Make the main sections with the CTAs on the homepage to be visible “clickable.” - “It’s important to know we can sign up for the newsletter from the homepage, but that isn’t obvious.”

				<ul style="list-style-type: none"> - Possibly combine “Locations” and “Class Schedule” or link them together.
MP-5	None	Low/None	03:17.06	<ul style="list-style-type: none"> - Participant indicated that they were “surprised” that they were able to navigate the website so easily. - Good banner image; “I want to be out there doing it” - Having the after-school program website separate is a bit confusing. - Overall web design is straightforward, and information is easy to find.
DJ-1	High	Medium	05:46.40	<ul style="list-style-type: none"> - <i>Participant had some discussion time that created an outlier.</i> - Had some confusion with the first-person voice on the “About Us” page’s copy. - The text associated with the “Contact Us” CTA on the “Personal Training” page implies that you should click only if you play sports and want to book. - “Streamline copy” on the website. - <i>Participant had an outlying amount of martial arts experience that was significantly more than any other participant .</i>
DJ-2	Low	Low	02:51.07	<ul style="list-style-type: none"> - Sought the “Contact Us” page without looking at the Personal Training page. - Self-explanatory, information is easy to get to - “About Us” has useful information on it about the instructors. - “Contact Us” information is easy to obtain; some places make this hard to find. - Good to include class schedules for those who are interested in participating.
DJ-3	None	Medium	05:28.36	<ul style="list-style-type: none"> - <i>Participant had some discussion time that created an outlier.</i> - User-friendly; information is immediately available and intuitive. - Contact information task was a bit confusing, though that was more about the wording of the task sheet. - Grey banners on pages look like image placeholders that did not load. - Titles on pages should be larger.

DJ-4	None	Medium	02:36.92	<ul style="list-style-type: none"> - Makes sense, things got a little confused with the first task because she “read it wrong.” - Navigation bar on top makes things very easy to access and find information quickly. - Good CTA on all of the pages.
DJ-5	Low	None	02:14.97	<ul style="list-style-type: none"> - Wording on the “Personal Training” page CTA was confusing. - Overall easy to read, you know what you’re getting into; “pretty solid.” - Good banner image on the homepage.
MJ-1	None	Low	02:51.24	<ul style="list-style-type: none"> - CTA sections on the homepage have different fonts / colors which is distracting. - “Flickr” caption beneath the placeholder image is distracting. - Looked clean and modern. - The “playing sports” comment on the “Personal Training” page felt out of place.
MJ-2	Medium	Medium	02:43.25	<ul style="list-style-type: none"> - Mobile set-up is pretty good; a lot of convenient “quality of life” things are easily accessible. - Automated location-orienting would be useful; recognizing where you are located to show you that location’s information first.
MJ-3	Low	None	03:06.65	<ul style="list-style-type: none"> - User does not primarily visit websites on their mobile device, but things were easier once they found the navigation bar. - “Programs” overview page made things easier to find with all the information “laid out.” - Pretty organized, confused at certain points about the wording of the task question.
MJ-4	Medium	Medium	03:43.21	<ul style="list-style-type: none"> - On mobile, the main sections should have a “visual indicator” so you know you can click on them. - Quote on the homepage is redundant, overlay the pullout quote over the image (“space could be used better”) - Task #3 was phrased confusingly. - “Contact Page” should have the address up front, which it does.

				- Possibly combine “FAQ” and “About Us”
MJ-5	None	Low	05:53.00	<ul style="list-style-type: none"> - <i>Participant had some discussion time that created an outlier.</i> - Did not seek information about the Personal Training program using the “Contact Us” page and used the “Personal Training” page instead. - “About Us” page should indicate who is speaking, as it is in first-person. - Well laid out, buttons are easy to click, links work, information is easy to find.

For the final presentation of these results, the most commonly-occurring feedback was included in the slide deck, along with the percentage of participants who mentioned this feedback specifically, or had comments associated with the same idea. The percentages were calculated by participants out of the total (for example, 15% indicates that three participants of the twenty made a similar remark). The process of coding the qualitative feedback was, admittedly, not an exact science and is highly subjective to my perception of the participants’ words. In future iterations of such an experiment, I would explicitly ask participants for positive and negative feedback separately, and possibly document a transcript of their words so direct quotes can be provided. The qualitative feedback and their frequency are displayed below:

- Information can be found quickly **(55%)**
- Easy to navigate, very accessible **(50%)**
- Desired information for most users can be found in navigation bar **(40%)**
- Clean, modern design **(40%)**
- Not over-crowded, no information overload **(40%)**
- Love the banner image **(10%)**

- Research scenarios were relatable **(10%)**
- Task #3 in the research study was confusing **(60%)**
- Confusing wording on some pages (“Personal Training,” especially) **(20%)**
- “About Us” page has first-person speaker in the copy **(15%)**
- Having a separate website for the After-School Program is confusing **(15%)**
- “Location” and “Schedule” pages could be connected or merged **(15%)**
- “FAQ” and “About Us” pages could be merged **(5%)**

4.3. Submission of Final Product

After completing the research studies and evaluating both the effectiveness of the site through quantitative metrics and potential pain points through the qualitative feedback, we have made final changes to the prototype and publish it for review. This final design will be shared with the client, Dan Bouelle, in hopes of using it as a reference for restructuring the official BMA website on WordPress. In addition to the screenshots of the website included in the figures below, an outline of the major changes to the original WordPress site is described as follows:

1. Restructured the information architecture of the original website, focusing on creating primary pages of Home, Locations, Programs, Class Schedules, Blog & Newsletter, Media, About Us, FAQ, and Contact Us. Each program page was delivered as sub-pages beneath the Programs header, and both the Locations and Class Schedules headers had three sub-pages, one for each location.

2. Calls to Action (CTAs) were implemented on every page to encourage users to access the newly-created Booking page, containing a booking form to sign up for a free trial class. CTAs were included at the bottom of every page, as well as in a “Book Now” button intended to sit at the top right corner of the screen.
3. Final design was created with a mobile-first development process, allowing for an aesthetically-pleasing and effective design on both mobile and desktop interfaces.
4. The blog and newsletter features were localized to a single page instead of being randomly implemented throughout the website.
5. The After-School Program links now directly connect to the separate program website, and links are stored under the Programs header instead of being nested deeply in Locations.
6. Obsolete information as determined by Dan Bourelle has been abstracted or removed completely from the original website design, allowing for the most up to date information available for users.
7. The final prototype design was created with the intention of maintaining the original “feel” and color scheme of the original BMA website and brand, in hopes to not make users feel lost when coming to the site.

Based on the data collected from the usability research studies, we believe that these changes, if implemented in the BMA WordPress website, will increase the effectiveness of the site, and encourage visitors to follow-through on booking their free trial class. As the client mentioned a concern about the purpose of the website being confused by

visitors to be informational instead of service-driven, we kept this focus in mind and believe that the final design will not be misunderstood. To illustrate some of the changes being made, please review the screenshot figures below:

Figure 10

Screenshot of the final design's Page Architecture

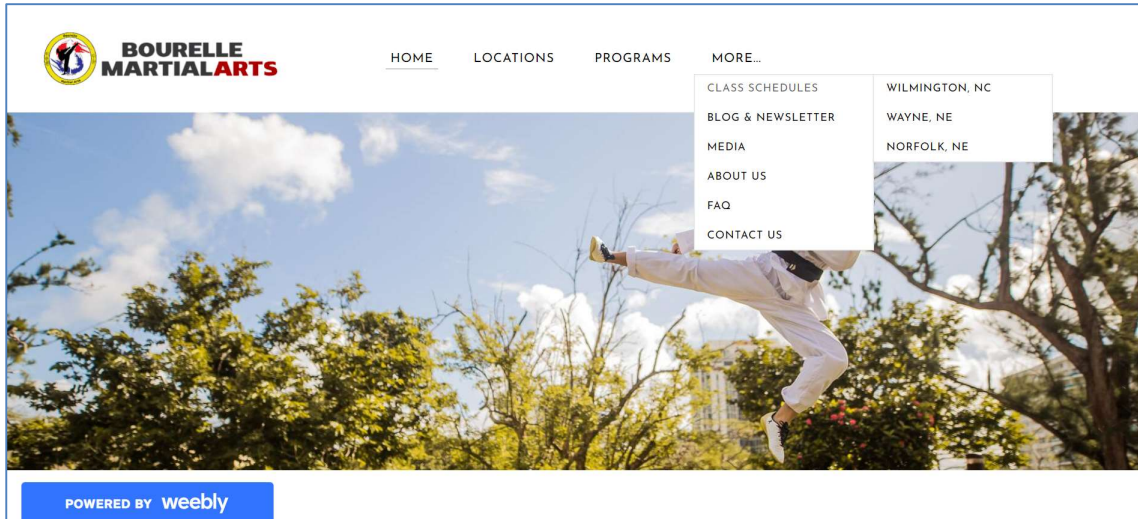


Figure 11

Screenshot of the final design's homepage CTAs

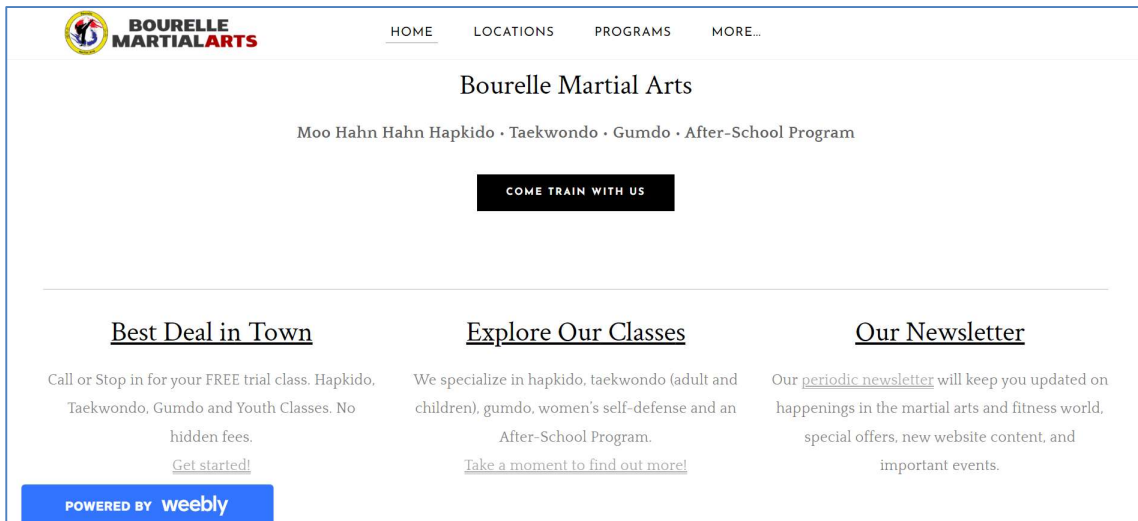


Figure 12

Screenshot of the final design's booking form in mobile

BOURELLE MARTIALARTS

Interested in coming for a free trial class?

Please fill in the form below.

LOCATION*
Wilmington, NC

NAME*
First Last

PHONE

EMAIL*

POWERED BY weebly

BOURELLE MARTIALARTS

WHAT CLASSES ARE YOU INTERESTED IN?

After-School Program
 Hapkido
 Taekwondo
 Gumdo
 Personal Training
 Self-Defense Training
 Other
 Unsure / Haven't Decided

ANYTHING ELSE WE SHOULD KNOW?

SUBMIT

POWERED BY weebly

Figure 13

Screenshot of the final design's programs page

BOURELLE MARTIALARTS

HOME LOCATIONS PROGRAMS MORE...

After-School Program

The Bourelle Martial Arts After School Program provides a safe and fun learning environment for your children after school. From supervised homework, snacks and fun games to the highest quality martial arts programs Wilmington has to offer, our after-school program is sure to please both parents and students!

POWERED BY weebly

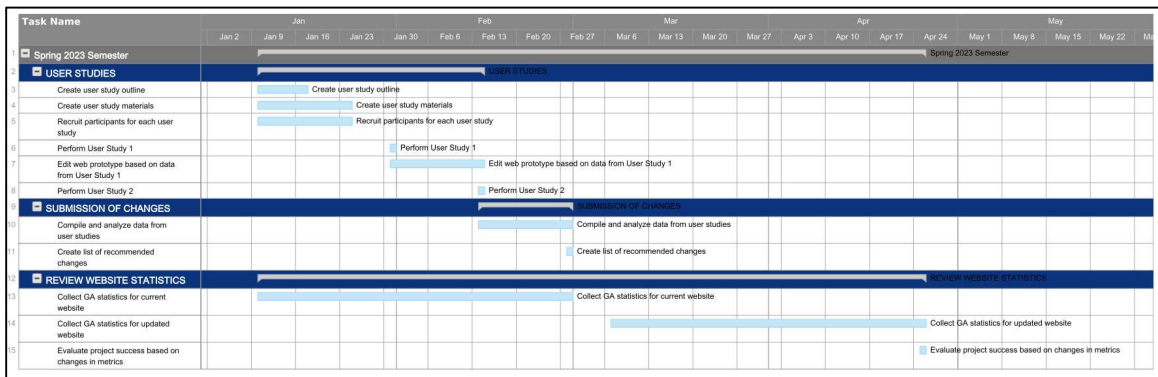
4.4 Timeline of Completed Project

The diagram presented in Figure 7 below is a Gantt chart, which provides an estimated schedule of activities to be completed during the spring semester. These estimations are adaptable and conducive to this hybrid-Agile environment, as

requirements like final deadlines and dependencies are rigid, while specific activity durations may vary as needed.

Figure 13

Spring capstone Gantt chart



For ease of reading, a table containing the schedule information is presented below:

Table 5

Spring capstone Gantt chart schedule

Milestone	Start Date	End Date
USER STUDIES		
Create user study outline	01/10/23	01/17/23
Create user study materials	01/10/23	01/24/23
Recruit participants for each user study	01/10/23	01/24/23
Perform User Study 1	01/31/23	01/31/23
Edit web prototype based on data from User Study 1	01/31/23	02/14/23
Perform User Study 2	02/14/23	02/14/23
SUBMISSION OF CHANGES		
Compile and analyze data from user studies	02/14/23	02/28/23
Create list of recommended changes	02/28/23	02/28/23

REVIEW WEBSITE STATISTICS		
Collect GA statistics for current website	01/10/23	02/28/23
Collect GA statistics for updated website	03/07/23	04/25/23
Evaluate project success based on changes in metrics	04/25/23	04/25/23

After receiving feedback that the above projections may be unrealistic, the scheduling was changed, and the scope of the project altered to be feasibly completed during the spring semester. While a second Gantt chart was not created due to the degree of uncertainty, the final schedule of activities is summarized in the table below:

Table 6
Final Spring Schedule

Milestone	Start Date	End Date
USER STUDIES		
Create user study outline	01/19/23	01/19/23
Create user study materials	01/19/23	02/2/23
Create registration signup	02/9/23	02/9/23
Recruit participants	02/9/23	04/10/23
Conduct user studies	03/16/23	04/12/23
Edit the prototype to final product based on research findings	04/13/23	04/20/23
SUBMISSION OF CHANGES		
Compile and analyze data from user studies	04/12/23	04/13/23
Create list of recommended changes	04/13/23	04/13/23
Submit final prototype and report to client (Bourelle)	05/03/23	05/03/23

CHAPTER 5: CONCLUSIONS AND FUTURE WORK

5.1. Conclusions and Final Thoughts

The Bourelle Martial Arts studio case study has provided an excellent addition to my portfolio as a future UI/UX designer, as well as a chance to help improve the online performance of a local business. Coming from a background where the concept of “creating an experience” was the definition of taking things to “the next level,” it is easy to see how user experience earned its name. There is a vast array of considerations that must be accounted for when designing any type of application, including a company website, and it is incredible the impact that simply rearranging information can have. This experience has shed light on the immense opportunities there are to learn, explore, and innovate software technology through design alone, and I am eager to see what more there is to discover.

When selecting this project for my final capstone, my goal was to gain more experience in designing applications and software to better prepare myself for entrance into the UI/UX design field. While I still completed some aspects of the user experience design process, specifically in terms of persona and scenario design and conducting usability research, the work on the BMA site was mostly interface-driven and was more about information architecture and navigation than how it makes the user feel. For future projects as I continue to develop my professional portfolio for employers, I hope to gain more experience focusing on emotionally-driven design for users. User-centered design and human-computer interaction are peak interests of mine, so any opportunity to learn and develop my skills would be excellent.

Another conclusion I reached for future work is that, were I to complete a project of this kind again, I would prefer to work from scratch as opposed to using a program that

does as much “hand-holding” as Weebly. I selected this tool to start with because I was familiar with it and the idea of hard-coding features like calendars and media carousels seemed very daunting. However, Weebly resulted in an array of other issues that could have been avoided had I used a different approach to prototyping.

Similarly, I would prefer to allot more time in the future to user research and low-fidelity prototyping before jumping into the high-fidelity designs. Prior to working on Weebly, the only guidance on requirements and pain points for the website came from the client and from our own experience using the WordPress site. Had we had the time to interview target audience members about the current state of the BMA website, we could have gained more context for what users are looking for, and how much difficulty they have in finding it. Creating lower-fidelity models in the early stages as well could create more opportunities for feedback on the design from both the client and end users.

5.2. Future Work

After graduating in the spring, I hope to pursue future work in the UI/UX design industry. While I have a passion for digital software design with a specialization in the visual aspects, I am interested in learning more about the user research that goes into making design choices for major applications. If possible, I would like to gain experience working on such user research projects that take larger sample sizes and collect more data than would otherwise be possible in this university project. There are, naturally, different methods of collecting feedback from users on applications, as well, so it would be interesting to learn how frequently research subjects are evaluated in person.

As I do not have internship experience specifically working with UI/UX projects, my design portfolio for potential employers is particularly scarce. Thus, one of my major focuses in terms of future work is to fill out my portfolio with a variety of different

projects, hopefully including some real-world experiences as well as personal projects. At present, I am exploring a redesign project for the desktop interface of a popular community app called “Amino.” My hope with this is to create an interface that is similar in design and effectiveness as the mobile application, which is significantly more user-friendly than the online version.

Further improvements to the Bourelle Martial Arts website may be possible by studying the impact that web design has on website performance. Search engine optimization (SEO) would be especially important to evaluate to see if popular ranking algorithms like Google Page Rank are built with preferences to certain design choices (e.g., deep architecture vs. wide, multi-page applications vs. single-page websites, etc.). As the literature review indicated, some time in research may potentially be saved by utilizing Google Analytics or similar tools to obtain demographic information about users; other useful metrics from this program could be evaluated to identify correlations between SEO and performance. In continuing the Bourelle study in relation to the user experience, one recommendation would be to research how machine learning (ML) technology could be integrated in UX design. A literature review of ML innovations from earlier this year identified the potential for this technology to be used to improve application design with a UX focus, such as by eliminating biases; however, many challenges have also been reported in implementing ML (Abbas et al., 2022).

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APPENDIX A

User Study Script

Introduction

Hello, my name's Brenda Segda, and I'm going to walk you through today's session. As I mentioned over email, I am currently working with Dr. Ebrahimi on a capstone project to redesign the website for Bourelle Martial Arts studio, in order to make it more effective and meet business goals.

I'd like to begin by thanking you for making time to speak with us. Your feedback is valuable, and will help us determine if our website design functions as intended. Just to confirm, we'd like keep this session to 30 minutes. Does that still work for you?

(WAIT)

Great. If you need a break or to stop at any time, please let me know. During this session, I'll start by asking you a few questions around your work and experiences. Later on, I'll ask you to accomplish a few tasks using the website we're evaluating.

Please be aware that there are **no wrong answers**. In fact, this is probably the one place today where you don't have to worry about making mistakes! As you go about using the website, I'll ask you to think aloud as much as possible: to describe what you're looking at and what you're trying to do. This will be a big help.

Also, please don't worry that you're going to hurt our feelings. We're doing this to improve the site, so we need to hear your honest reactions.

If you have any questions as we go along, just ask. I may not be able to answer them right away, since we're interested in how people do when they don't have someone sitting next to them to help. But if you still have any questions when we're done, I'll try to answer them then.

With your permission, I'd like to record this research session using my mobile device. The recording will only be used to help us figure out how to improve the site, and it won't be heard by anyone except myself and Dr. Ebrahimi. Recording this also helps me, because I don't have to take as many notes! Do I have your permission to record? Did you have any questions?

Warm up

Before we take a look at the site, I'd like to hear a little bit about you — what do you do for work?

What is your experience in relation to martial arts?

How about web design?

OK, great. We're done with the questions, and we can start looking at things. The first thing I'd like you to do is to visit the URL given to you on the page. To start, please look at this page and tell me what you make of it: What are your first impressions? What is this site for? You can scroll if you want to, but don't click on anything just yet.

Task completion (2-3 tasks)

Thanks. Now I'm going to ask you to respond to the following scenario. I'm going to read the scenario out loud, but you will also have a copy of the scenario with you.

(INSERT SCENARIO HERE)

Now, you should see a primary objective on the opposite side of the page, as well as some secondary objectives. While we record the screen, please use the webpage to complete the tasks described, in order. Please try to think aloud as much as possible so we can understand how you are processing the site. If the objective asks you to complete a form, please do so, but do not submit the form. Once you have completed an objective, please let me know, as I will be keeping track of your progress.

Follow up

Great, we're finished with the bulk of the study. You mentioned *[something they said out loud]* earlier and I didn't want to jump in at that time. Can you say more about that?

What are your thoughts about these concepts, generally?

Wrap up

Thank you so much for your time. Before we finish, what did we forget to ask about? Would you be open to speaking with us again in the future? Who else should we talk to?

Original Source: <https://methods.18f.gov/usability-test-script/>