Recent research indicates that users prefer downloadable native applications over mobile web applications. Therefore, many would say that creating a native application is the way to reach the largest number of users in the given mobile device market. The purpose of this study is to confirm that even though, for some information needs, a native application is the best option; information needs do exist to create necessity for mobile web applications. To show this, I have created, implemented and analyzed a survey to ask respondents about their mobile device usage. The study will serve to show that not only are native applications necessary in the future, but mobile web applications also play a vital role in the future of mobile device usage.

Headings:

- Mobile Device Applications
- Mobile Computing
- Mobile Device Application Development
- Mobile Device Software Development Environments
MOBILE DEVICE INTERFACES:
THE ALMIGHTY APP VS THE WEB BROWSER

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A Master’s paper submitted to the faculty of the School of Information and Library Science of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Information Science.

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Introduction

The mobile device market is arguably one of the largest information driven markets of this past decade. The advances in the mobile device industry over the past years have tied many consumers closer to their devices. Not only have the devices themselves improved immensely, but the software that powers them has as well. Today, users can check their bank account, read the news, play games, and utilize social media all on the same device. Users have the ability to do just about everything on a mobile device that they can on a full desktop or laptop computer. These rapid advances in mobile device technology have changed the way users will get information from their devices forever. Users can be very particular about how they get information on their mobile devices. Some would rather use a downloadable application, while others would prefer to use their devices mobile web browser to obtain information. In the past, the mobile device industry has dictated how users could utilize their devices for certain tasks. However, now the industry has found that users are dictating how developers should create mobile applications. Advances in information technology such as HTML 5 have split the market for software development up into two major groups: those who create mobile applications using HTML 5 compliant mobile web applications and those who create native downloadable applications. In short, most developers would rather create one mobile web application that costs less to create, is easier to make using HTML 5 standards, doesn’t need to be approved by mobile applications stores, and utilizes search
engine optimization instead of creating several iterations of the same native application for each different major mobile device platform. This may work for some mobile device applications; however there is no guarantee that consumers will utilize it. The problem lies in how users utilize a given mobile device application. Deciding on which to create mainly depends on the opinions of the users. Most users may trust downloadable native applications more for some tasks over mobile web applications. While for other tasks, users may want increased functionality that comes with mobile web applications. As an example, some users may trust the reliability of native downloadable applications for tasks such as banking and anything that may need to be done securely while users may use mobile web applications for searches and tasks where getting multiple different results is necessary. Research indicates that users prefer downloadable native applications over mobile web applications, however, both play a role in the future depending on the user’s specific information needs. This study shows how users utilize downloadable native applications and mobile web applications as well as when they prefer to use one over the other. But first, it may be advantageous to go over the strengths and weaknesses of both native downloadable applications and mobile web applications.
Literature Review

There is significant research available discussing the pros and cons of both native mobile applications and mobile web applications. Native applications are applications that are downloaded onto a user’s mobile device through an application store and are local only to the user’s device. They can only be made for each specific platform and do not have cross platform compatibility. (Budiu, 2013) Native mobile applications have some distinct advantages over mobile web applications. Some of these distinct advantages are that native apps can fully exploit the hardware and user interface of a user’s specific mobile device. Basically, native mobile applications can directly access nearly all device hardware such as cameras and sensors as well as directly access operating system software such as GPS. (Borg, 2013) Also, native applications are mostly localized applications that have access to local storage space. The ability of native applications to access local storage means that they have the potential to be faster because they don’t have to access the internet one hundred percent (100%) of the time and they can also move more data around within the local file system quicker. (Borg, 2013) Another factor includes the ability for native mobile applications to be used when there is no internet connection. Because native mobile apps are stored in the local file system they can be accessed by the user at any time. (Lionbridge) Ease of use is also one of the large advantages to native mobile applications. Because native mobile applications are downloaded and stored on the local file system, they are stored automatically on the
devices “application list screen” for daily visibility. (Lionbridge) Lastly, native applications have the ability to send notifications to the user about updates, news, or pertinent information about the application. These features give native mobile applications a leg up against mobile web applications. However, mobile web applications also have their own set of unique strengths.

Mobile web applications are applications that are formatted for smartphones and tablets and are accessed through the mobile devices web browser. (Lionbridge) The difference between native mobile applications and mobile web applications is that instead of using a programming language such as Java or Objective C, mobile web applications are created using HTML, CSS and usually JavaScript. (Lionbridge) The main advantage that mobile web applications have over mobile native applications is that they are cross-platform compatible. In other words, you can access the exact same mobile web application through many different mobile devices even when the devices run different operating systems. Companies would like for users to utilize mobile web applications because the company would only have to create one application for all platforms instead of multiple different iterations of the same application to run on different devices. This makes mobile web applications powerful yet also takes away key functionalities that native mobile applications use daily. Because only one application needs to be developed, development costs are lower. It boils down to the cost of creating several versions of the same application or only creating one version. Development costs are usually related to the amount of labor it takes to get a mobile application completely functional. More labor equals higher cost. Mobile web applications are easier to maintain as well. This relates back to the cross platform optimization of mobile web applications. Along with cross
platform optimization, mobile web applications can be easier to access than native mobile applications if you think about them in a different way. They do not require downloading, one just simply access the URL on their mobile browser to find the correct application. Mobile web applications can also utilize SEO or search engine optimization. Search engine optimization can be utilized to increase a mobile web applications visibility in the market. Because native apps are local environments, they cannot be seen by search engines and they will not impact the ranking of a search. (O’Dell, 2013) Mobile web applications do not have this problem because they are inherently on the internet and therefore can be searched through. In the past, business have been able to dictate the way users find and user their applications, however, because of market saturation, users dictate how businesses need to create mobile applications. Because of this, native mobile applications are winning the battle over mobile web applications.

Most of the research analysis in this field tends to suggest users prefer the use of native mobile applications. There has been a large amount of analysis done on whether people use native mobile applications or mobile web applications. Flurry, a major application analytics firm that tracks applications usage of roughly 300,000 apps over billion devices, has studied the usage between native mobile apps and the web apps on the browser. Flurry states that we spend, on average, 158 minutes each day using our mobile devices. Of that 158 minutes more than two hours is spent in native applications. This means that roughly thirty minutes is spent using our mobile devices browser. Most of the difference between usages of native apps versus mobile web apps relates to game usage. Games account for thirty two percent (32%) of the usage of native apps while Facebook accounts for eighteen percent (18%) while the all other apps only account for
six percent (6%) according to Furry. (Koetsier, 2013) Other studies conclude the same, with native mobile applications pushing ahead of mobile web applications. A study done by Yahoo and Ipsos in 2011 shows that consumers, to perform some functions, would rather use native mobile applications. Shopping, searching and entertaining were all best done using native apps while connecting, navigating and informing were best suited for the mobile web. But in this field 2011 is ancient history. (Cavazza, 2011) A more recent survey conducted by Compuware shows that nearly eighty five percent (85%) of consumers favor apps over mobile websites for several different reasons. (Marcheider, 2013) These reasons boil down to speed, ease of use and convenience. (Marcheider, 2013) Understanding these reasons is paramount for businesses trying to decide which applications to build. One cannot build an application meant to reach the largest number of users without knowing exactly what the users use and why. There is not enough research about “why” people decide native mobile applications over web applications and vice versa.
Methodology

Mobile users are very particular in how they use their mobile devices. With such a large saturation of content in the applications market, users are able to pick and choose what they use and how they use it. Because of this, businesses are finding that they need to cater more to the users of specific applications. It is no longer about trying to get users to come to you but instead it has become trying to find your users. Creating an application that best suits your user’s information needs is paramount in today’s ever growing industry for mobile device applications. Research indicates users prefer downloadable native applications over mobile web applications however, both play a role in the future depending on the users specific information needs.

While there has been some analysis on whether people use native mobile applications or mobile web applications, there has been little research done on why people use what they use. Businesses trying to decide on whether to create a native mobile application or a mobile web application don’t only need to know which one users utilize the most, but also need to know why people use what they do. Clarifying for businesses why people use what they do can help the businesses decide what to create and how to create it. The preference of the user should help determine how the business should create the application, whether it is a mobile web application or a native mobile application. Trying to decide between creating a mobile web application and a native
mobile application is not an easy task however. To make a decision for or against either can be very difficult. The users need to be studied as well as why the users use what they use. The best way to know exactly how users decide between using a mobile web application or a native mobile application is to interview and ask users. This study was designed to help better understand why people use what they do to find different forms of information.

**Mobile Device Study**

To find out more about how users find information on their mobile devices I decided to complete a study. The initial portion of the study consisted of a survey. This survey was created for the sole purpose of understanding user’s habits when using their mobile devices. For specific information needs, do users prefer to utilize mobile web applications or do they prefer native mobile applications and why? The survey was advertised by email and by randomly passed out paper copies. About 50% of the surveys that were returned were electronic mail surveys, the other 50% were paper copies. Copies of both the paper survey and electronic survey can be found in both Appendix B and Appendix C. Surveys were disseminated over email and participants were asked if they would send copies to friends and family to solicit them to participate. The email that was sent out can also be found in the Appendix A. The paper copies were randomly distributed to people in Charlotte NC, Raleigh NC and Chapel Hill NC. In all, around 120 people ended up turning the survey back in. The emails were anonymous and discarded once the surveys were saved with coded identifiers to protect the individual’s identities. To get information about different groups of people, the study had several types of questions.
Survey Questions

Three types of questions were used in the survey: preliminary questions, general usage questions and specific usage questions. The preliminary questions allowed the survey to get information about the respondents who use mobile devices. The first preliminary question was about the participant’s age. Age was binned into four separate categories. Breaking age into four intervals allowed for sufficient data in each interval to support statistical analysis, while maintaining sufficient granularity to answer the desired questions. The first interval was comprised of individuals ages 18-25, and they represented a younger group of usually very technically savvy individuals. This group is usually defined by their heavy use of mobile devices and their willingness to adopt new technology. The second group was individuals ages 25-35. This group represented the new working force. They use their mobile devices mainly for business purposes. They are special in that they are the first generation to own smart mobile devices before entering the workforce. This means that they helped define how people use applications for work related issues. The third group is comprised of individuals 35-45 years old. This group is special as well as they were in the work place before owning any smart mobile devices, and therefore mobile applications are used differently by them. In general, non-dependent on their work, they still use mobile devices differently than the younger generations. The last group represents our oldest age group. This group is comprised of individuals 45-60 year old. I increased the difference in ages by five years here because older individuals are less likely to use smart mobile devices and I needed to broaden the age group to get relevant results. This did not affect the study in any way. Breaking the study up into more variables will also help tell a story about why certain individuals use
mobile web application or native mobile applications. Being able to break the groups up by gender may also help explain users habits about how information is gathered from a mobile device and whether they use mobile web applications or mobile native applications. Once questions about gender and age are answered, the survey will ask about the user’s highest level of education. It is important to note that mobile use and technology adoption are not only affected by age, but also by the user’s education level. The question to ask here is, will a user’s education push them towards or away from using mobile devices technologies, whether it is a native mobile application or a mobile web application. The user’s ability to access the internet was also asked. Without the use of internet, depending on the mobile device a user may own, there may be more or less functionality. Being able to show that users with ample access to the internet were either more or less likely to use the mobile device, and therefore, utilize mobile web applications or mobile native applications was an important part of this survey. Even when most mobile devices have built-in internet, it is still pertinent to ask about access to the internet because it may be possible for people to use their devices differently depending on the way they have grown accustomed to using or not using the internet frequently. Users were also asked about their perceived proficiency with their mobile devices. A perceived proficiency is important to this study because this study wants to know how people rank themselves using their devices and what people of each perceived ranking use to acquire information from their mobile devices. I also asked a generalized question about whether the person being surveyed would rather use a mobile web based application or a native mobile application. This will help me to get a broad perspective for each individual that gets surveyed.
General usage questions allowed me to get a feel for respondents overall usage of their mobile devices. Half of the general usage questions asked respondents about how much time per day they spend using devices. These questions also included the amount of downloaded apps the respondents had on their mobile devices. The next questions were about more specific general usage including one question about the amount of time each respondent took each day using downloaded mobile native applications. The respondents were then asked about the amount of time each day they spend using mobile web applications. The next questions were based more on the different types of activities respondents do on their mobile devices. For each of these questions, respondents were given ten different types of activities that they may do on their mobile devices. These activities included: Shopping, Banking, Travel, Food, Searching, News, Entertainment, Games, Weather, and Other. The “Other” category gave the respondents the opportunity to write in different activities that weren’t offered. The questions that were asked about these activities were about the types of downloadable apps respondents have on their mobile device as well as the types of websites they browse to on their mobile devices browser. Also, usage questions were asked about the types of apps and websites people use in a typical week. These usage questions are important so we can further understand how respondents use their mobile devices for different activities and finding different information.

Specific usage questions were also asked. These specific questions will help me with user preference between downloaded native applications and mobile web applications. This is particularly important because users may prefer something different than they actually use on a regular basis, which is what we asked in the general usage
questions. For the activities described in the general usage section, we asked people to choose whether they would prefer to use a downloaded native application or a mobile web application through the browser. Once the respondents chose, they were asked why they chose what they did. They were given different reasons why they chose what they did including: Security/Trust, Quick access, Ease of Information Searching, Ease of use, Increased Functionality, Content, and of course Other to give the respondents a chance to come up with their own reasoning. These questions were quite possibly the most important questions in the survey. This is because these personal preferences are based on each respondent’s assumed needs. These assumed needs may be different from the way they actually use their existing mobile device. This is where my belief stems from that businesses may create mobile device native applications and web applications differently than their user group wants them to be made. This mobile device survey has allowed me to do an analysis of how different user groups use their mobile device given the current climate around mobile native applications and mobile web applications. It will also allow me to analyze how different user groups would prefer to use their mobile devices via mobile web applications and mobile native applications. This analysis could be very important to the mobile device application and web industry by explaining how users would like to use their mobile devices. It is important to note that while I discuss the results and analysis, instead of using the term mobile web application, I will use the term mobile browser. This is purely because my survey asked questions about the mobile browser so that respondents would know what I was asking. If I asked about mobile web applications they may not know what I was talking about. Also, the mobile web browser is the only way to access mobile web applications; therefore, the browser is paramount in
this study. Before I get into the results and analysis however, I will go into some limitations of the survey and analysis.
Limitations

There were a few very important limitations to the study. For instance, I chose not to include users over the age of 60 years. Studies have shown that there are large barriers that exclude this age group from the mobile device network. Even if some businesses are trying to create mobile web applications or mobile native applications for that demographic, there are too few of them who use newer mobile devices to come up with accurate statistics. Quite simply put, the technology was not around when they were young enough to adopt it. Therefore, for my study, finding enough people over the age of 60 to take the survey and participate in the study would have been a real issue. As a generalization, most people over the age of sixty just don’t use smart mobile devices that allow for both web browsing and native mobile applications. The collection of data was the real issue here. While there is a fair amount of data on use of mobile devices by the elderly, that consideration is outside of the scope of my study.

Another limitation may be educational level. I was not able to get a very broad range of respondents with different educational levels. Because of this, my analysis on respondents of different educational levels may not be the most in depth. However, I will try to analyze the groupings as much as possible. There were also limitations based on respondents self-reporting estimations of usage as opposed to actually counting as well as their different perceptions in understanding differences between mobile native apps and their mobile browser.
**Results**

Once the data was collected it was statistically analyzed. Using Excel statistical software, I was able to calculate the raw data results from the survey to come up with figures about the respondents in the survey. In total, the survey was completed by 120 respondents. To begin, out of the 120 respondents, only 2.5% did not own a smart mobile device. The age distribution of the respondents was fairly even. The largest group of respondents was between the ages of eighteen and twenty-five consisting of 32.5% of the total respondents. To continue with age groupings; 25% of the respondents were 45-60, 21.6% were 35-45 and 20.8% were 25-35. This pool of ages is fairly even as most of the surveyed people were random or family and friends. With 56.6% of the respondents being male and 43.3% of the respondents being female, the pool of males’ vs females was also fairly even. When it comes to the educational level, however, my survey did not reach all of the groups evenly. For instance, the group of respondents who never graduated high school was only 1.6% large, while the group of respondents who graduated from a four year college was 47.5%. At nearly fifty seven total respondents in the four year degree category, this group represents nearly half of all the respondents. The rest of the groupings fields are represented by high school graduates with 25 %, graduate program graduates with 20%, and two year college graduates with 5.83% of the total respondents. These uneven groupings of respondents may create a limitation during the analysis of this survey due to large gaps in respondent’s educational levels. Internet
access and proficiency proved to be not much different than educational level when it came to the evenness of the respondent’s answers. However, in today’s information age, these may not be bad things in general. The number of people who say that they always have access to the internet was 112, meaning that 93.33% of respondents always have access to internet. On the opposite end of the spectrum, 5% and 1.6% respectively say that they have only internet at home or on their mobile device. To finish off the internet access category, no one said that they have no internet. As stated above, proficiency brings some of the same distributions as results, however with a slightly more even ratio as shown in Figure 1. With nearly half of the respondents stating that they are very proficient and

![User's Self Described Proficiency](image)

**Figure 1- Users Self Described Proficiency**

only 7% of them saying they are not very proficient there is still a fairly large gap between those who are very proficient and not very proficient. However, this gap is softened by the other three fields within this grouping. With 23%, 14% and 13% being
“Somewhat Proficient”, “Neutral”, and “Less Proficient” respectively, there is still a somewhat even distribution.

When asked about personal preferences about whether users would rather use their browser or a downloaded app, users would actually in general prefer to use their mobile devices browser. Out of the respondents surveyed, 54% said they would rather use their devices browser while only 46% say they would rather use a download application. To continue with general usage questions, when asked about the amount of time spent per day on their mobile device, the majority of respondents are represented by 1-2 hours and 3-4 hours. Combined, these two categories make up 62% of the entire group at 1-2 hours having 29.4% and 3-4 hours having 32.7%. Once these two have been seen, the other four fields are all fairly equal with <1 hour having only 6%, 5-6 hours having 7%, >6 having only 10% and 4-5 hours having 12%.

![Number of Apps for Total Respondents](image)

**Figure 2- Number of apps by grouping of survey set**

The amount of apps respondents had on their mobile devices differed greatly. The largest amount of the respondents had more than 30 apps on their mobile devices
with 22.6%. The other five groups were all within 7 respondents of each other as shown in Figure 2.

To continue with more general usage data, 36.9% of respondents used downloaded application less than one hour per day. The majority in the amount of time spend on apps per day is 1-2 hours with 46.2% of the respondents. From there the numbers drop to 14% for 3-4 hours per day, .8% for 4-5 hours per day, and 1.6% for more than 6 hours per day. On the opposite side, the browser got used less than one hour per day by 54.6% of respondents. This represents a slight difference between the amount of time people spend on native apps versus the web browser. Respectively, 37.8% of respondents used their web browser 1-2 hours per day, while those using their browser 3-4 hours, 4-5 hours, 5-6 hours, and more than 6 hours combined for only 8% of respondents.

Now to move on to the types of apps and websites that respondents use to find information as well as the types of apps and websites respondents use on a weekly basis. The types of apps that respondents have on their mobile device are shown in Figure 3. The graph depicts the percentage of respondents by the types of apps they have.

![Figure 3- Types of Downloaded Applications by Percentage of Respondents](image-url)
The types of websites that respondents browsed to on their mobile device are shown in Figure 4. The graph depicts the percentage of respondents who choose each of the different types of websites.

![Types of Websites Browsed to by Percentage of Respondents](chart1)

**Figure 4- Types of Websites Browsed to by Percentage of Respondents**

The types of downloaded apps used most often in a week are shown in Figure 5. The graph depicts the percentage of respondents who use each of the different types of downloaded applications.

![Types of Downloaded Applications Used Most Often by Percentage of Respondents](chart2)

**Figure 5- Types of Downloaded Applications Used Most Often by Percentage of Respondents**
The types of websites that respondents used most often in a week are shown in Figure 6. The graph depicts the percentage of respondents who browse to each of the different types of websites.

![Types of Websites Used Most Often by Percentage of Respondents](image)

To finish the results, I will present some of the user preferences that respondents gave for different types of information needs. The bulk of the results for this section, mainly the reasons for choosing between downloaded mobile applications and mobile web browsing, are in Appendix D. I will only skim the surface of this section for now and most of it will come back up later in the analysis.

The survey shows us that for shopping on mobile devices, apps were preferred by 42.2% of respondents, meaning that respondents picked using the devices mobile browser 57.7% of the time. The survey also shows that for banking, 73.3% of respondents prefer using mobile native applications over the use of their mobile devices browser which only got 26.6% of respondent’s votes. The next category, travel, received a fairly even distribution with 53.5% of respondents preferring mobile web applications as opposed to
the use of mobile native applications, which received a close 46.4% of the votes. Searching however, was a different story, with 81.7% of the respondents saying that they would rather user their devices mobile web browser to search than use a mobile native application. The next category is the respondent’s preference about how they access their news. Out of both mobile native applications and mobile web applications and browser, respondents preferred the use of mobile native applications 61.4% of the time as opposed to 38.5% for the mobile devices web browser. For the Entertainment category, 60% of respondents preferred to access their entertainment through a mobile native application whereas 40% of the respondents preferred the use of their mobile devices browser. Gaming was not such a close comparison however, with nearly 86% of respondents preferring to use a mobile native application for gaming rather than playing games on their devices mobile browser via a mobile web application. Lastly, for the weather category, 86% of respondents said that they would rather get their weather from a mobile native application than a mobile web application via the browser. Subsequently, the mobile browser only got 14% in this category.

Now that the results have been presented in a way that is readable, analysis of the survey is imperative. The analysis will serve to find and show comparisons and correlations in the data. These correlations may help businesses create whichever mobile applications they need to reach the correct amount of users in their target market.
Analysis

The main question I want to answer with this study is why users use a particular mobile application to reach their specific information need. To find this, first I have to figure out which groups use which applications to fulfill specific information needs. Analyzing the data will help me find correlations in the data as they pertain to what people use, how they use it, and why they use what they do, whether they use mobile web applications or native mobile applications. Some of the more independent variables are the person’s age, gender and education level. To sum this idea up, depending on a user’s age, gender or educational level, they may tend to use either native mobile applications or mobile web applications. Finding correlations between these variables and the rest of the data will help me truly get an understanding of whether or not a person’s age, sex or educational level play a role in how they fulfill a specific information need.

Age

Age is expected to be a key factor in how people use their mobile devices. Some of the older age groups may not utilize their devices the same way that some of the younger age groups would. This is an analysis to find out if there are any correlations between age and the way users act with their mobile devices as well as what they prefer to use. The 18-25 year old age group is the youngest group from my survey. However, because they are young and live in the information age, they are usually the first ones to adopt new technology, including the use of smart mobile devices. They tend to have the
greatest understanding of mobile devices. Of the thirty-nine 18-25 year olds surveyed, 64% of them believe that they are very proficient with the use of mobile devices. This group makes up nearly half of the total number of respondents that said that they are very proficient with their mobile devices. When asked whether they prefer to use their devices mobile browser or apps, 60% said that they would rather use their devices mobile web browser to access information. They do however fall in line with the number of hours per day that they use their mobile devices with the highest number of respondents saying that they use their devices 3-4 hours per day. They are also in line with other survey respondents in how many apps they own and how much time they use their apps. The first real difference that was seen between 18-25 year olds and the rest of the total survey respondents was the lack of travel apps. This is predominantly because younger people between the ages of 18-25 may tend to travel significantly less. Therefore, they do not need the native mobile applications to travel. Only 25.6% of respondents 18-25 even have travel apps, whereas, nearly 47% of the total respondents have travel apps. However, there was no discrepancy with the results of the 18-25 year old respondents who use their browser for travel. This may be because when a browser is used, traveling may just be in the preliminary stages, and a native mobile application may be used to finish finalizing the travel process.

Now we get to user preferences for 18-25 year olds. There were several different preferences by 18-25 year olds that were not shown in the results set as a whole. There was almost a 10% difference in how 18-25 year olds prefer to access games. Respondents who were 18-25 responded that they would rather use a native application to play games about 10% more than the rest of the age groups. This could be an age related
tie to the way young adults have grown up playing games on their mobile devices. Some of the main differences were in the categories of quick access, ease of use, and increased functionality. Those 18-25 year olds found that quick access, ease of use and increased functionality were all very important reasons behind why they would rather use a mobile native application over a mobile web application. Weather also presented a prominent difference. Out of 18-25 year olds, 78% of them would rather use a mobile native application than a mobile web application whereas the entire group would rather use a mobile native application 96% of the time.

The 25-35 year old age group is the second group I will discuss. The 25-35 year old age group represents one of the first groups to hit the working world having knowledge of how modern digital information technology works. However, their perceived proficiency is not much different than the entirety of the respondents. This group however, has a much different perspective on using their mobile web browser versus mobile native applications. This study finds that only 44% of respondents between the ages of 25-35 would rather use their device’s browser, while 54% of the total group would rather use their browser. There was also a difference in the number of apps that 25-35 year olds have on their mobile devices. More respondents in the 25-35 year old age category had on average 10 apps more than the total group. Also, adults between the ages of 25-35 spend more time in apps than they did using their devices mobile browser as shown in Figure 7.
The types of mobile applications used also differed dramatically between adults aged 25-35 and the rest of the survey respondents. There was a 6% increase in the number of shopping apps for 25-35 year olds as well as a 16% increase in the number of banking apps. You could conclude then that 25-35 year olds are more likely to do their shopping and banking on a mobile native app than the rest of the group.

The preferences between mobile native applications and mobile web applications are also different between the 25-35 year olds and the rest of the age groups. For shopping, this age group would rather use apps 8% more than the total of all the age groups, which tends to correlate with the increased number of shopping apps discussed previously. Additionally, 20% more of the respondents in this category prefer mobile native applications for a travel application than the rest of the respondents. This could mean that while the total group only searches for travel destinations, this group may utilize mobile applications to finalize flight reservations on mobile native applications.
There was also a difference in the way 25-35 year olds would like to access their entertainment. While about 60% of respondents of all age groups said they would like to access their entertainment via mobile native applications, 25-35 year olds access their entertainment through mobile native applications approximately 78% of the time.

The respondents ages 35-45 are the next age group that I studied. Their perceived proficiency was much different than 18-25 year olds and the 25-35 year olds. As a group, 23% of 35-45 year olds believe themselves to be right in the middle on proficiency. Whereas the total results show that only 14% of respondents chose a middle stance on proficiency. It was also interesting to note that this age group used their mobile devices browser on average one hour more per day than the balance of respondents.

![Websites Most Often Browsed To](image)

**Figure 8**- Websites most often browsed to between 35-45 year olds and the entire results set

The data shows that 35-45 year olds prefer to use their mobile device browser more than they use mobile native applications. There is also a notable difference in the types of websites they browsed to on their mobile devices as shown in Figure 8. The 45-60 year olds are the last age group to be analyzed. For this age group, the respondents
believed proficiency was right in line with the total results set. There was also very little difference between this age group and the rest of the respondents when it came to deciding about whether they preferred apps or their mobile browser. There was, however, a difference between how much this age group used their browser and native applications versus the balance of the respondents. In total, there were zero 45-60 year olds that use mobile native applications more than 4 hours per day as well as zero that use their browser more than 4 hours per day. One interesting differential distinguishing this age group is that 10% more respondents in this age group use apps for news than those in the other age groups. As for user preferences, 67% of the respondents in the 45-60 years old category prefer to use their mobile devices browser to shop; compared to 57% of the entire group. Once again, respondents between the ages of 45-60 would rather use an app to receive their news. About 70% of 45-60 year olds would rather use an app than their devices mobile web browser to get news. There was also a difference in gaming. While all user groups preferred native apps for gaming, those respondents ages 45-60 had less of a preference in comparison to the balance of the respondents. This is shown by the statistic that 26% of adults aged 45-60 years would rather use their browser to game as opposed to the only 14% of the entire group.

To conclude the analysis of the difference between certain age groups compared to the entire grouping, there are numerous correlations between a respondent’s age and the way they access information on their mobile device. In summary, eighteen to twenty-five year olds are more likely to be technically proficient with their mobile devices. Accordingly, they are more likely to prefer mobile native applications. However, they do not use mobile apps for traveling. This may be because they travel less than the other age
groups, as well as due to their income level. They also prefer the games they play to be in mobile native application form for reasons like ease of access, quick access and the increased functionality that come along with mobile native games. Generally, twenty-five to thirty-five year olds prefer mobile native applications on nearly all fronts, possibly because they like the ease of use and because of their increased ability to adapt to the ever changing technological world. The thirty-five to forty-five year old age group is where we start to see a correlation between respondents and their use of the mobile web browser. The mobile web browser is how they did it when they first got into the work place, and because of that it has carried over to the rest of their lives. They mainly use their mobile devices for searching mostly. The respondents in the forty-five to sixty year old category used both their mobile internet browser and their native apps less than respondents in the other age groups. They tended to prefer the mobile browser more than other age groups. In applications (other than news) where they preferred a native app, they preferred it less strongly than the other age groups. Essentially, the data shows what you would assume to be true: the younger age groups have more readily adopted the newer technologies. This provides a correlation between age and the preference between mobile web applications and mobile native applications.

Gender

There is always discussion about how educational level or even age may affect a person’s technical skills or even their technical willingness, however, a person’s gender is never brought into the equation. I will try to do this without bias. To start there is a very different distribution between men and women and their perceived proficiency with their mobile devices. Around 50% of men see themselves as very proficient whereas only
34% of females see themselves as very proficient. The majority of women seem to be closer to the neutral area when it comes to perceived proficiency. With 26% of females and only 5% of males saying that they are a three on a scale of one to five, this is definitely the case. There was also a fairly large difference between males and females when it came to their preference between native mobile applications and using their web browser. With 61% of females preferring the use of their web browser and only 49% of males preferring use of their devices web browser. The data also shows that women seemingly spend more time on their mobile device each day than men do. This is shown in the Figure 9 below as women having a higher percentage in the higher hours per day ranges.

![Figure 9: Time spent per day on mobile devices.](image)

Males also had a very different number of apps than females. While nearly 47% of males had greater than 24 mobile native applications, women had the nearly the same
amount, at 45%, in under 12 mobile native applications. Not only were there key differences in the amount of time spent on mobile native applications but there were also key difference in the types of websites between males and females. A fair comparison for this is that only 30.8% of males responded to going to shopping sites and nearly 56% of females responded the same way. On the other hand, 66% of men responded as using their web browser for news while only 44% of women did.

When asked about preferences and shopping however, the answers tended to level out. For instance, 61% of females preferred using a web browser to access information while 55% of men preferred the same. While these numbers do even out a bit, the reasons for accessing the information they did were very different. Approximately 51% of women decided to use their browser to access shopping because of quick access. While 51% of men decided to use their browser to shop because of ease of use.

Preferences about entertainment access also differed greatly. Nearly 68% of women responded by saying that they would rather use mobile native applications 69% of the time leaving the browsing statistic at only 31%. However, men said that they would rather access their entertainment via mobile native applications 53% of the time. This means that there is a 16% difference in the way males and females would like to access their entertainment through their mobile devices.

Gaming also saw a fairly dramatic difference of 10% in the way males and females access their information. Females responded that they would like to access their mobile device’s games via mobile native applications a whopping 91.4% of the time. Males said that only 81% of the time they would like to access their games via mobile native applications.
Men and women access very different kinds of information through their mobile device. Men access their devices less, but they still have many more mobile native applications than women do. While men do not tend to use their mobile devices for shopping, they do access it for more utilitarian needs in some cases. These findings have shown that not only men and women access very different kinds of information, but they also access information in very different ways. There is definitely a correlation in the different ways that men and women access their information.

**Education**

To begin, I did not get a very even distribution of the different educational levels; therefore it will be very hard to describe the differences among them. Because only 1% of respondents had less than a high school diploma and only 5% of respondents had a 2 year degree, leaving the other 94% to the other three categories, for this analysis I will discard respondents who had both two year degrees and less than a high school diploma.

As far as proficiency is concerned, there was an actual correlation between the respondent’s educational level and their perceived proficiency with their mobile devices. For instance, in the somewhat proficient category, high school graduates answered that they were somewhat proficient about 17% of the time, while respondents with a four year degree responded with somewhat proficient about 21% of the time. Climbing up this ladder, respondents with graduate level degrees responded by saying they were somewhat proficient about 33% of the time. This is a correlation between different educational levels and how proficient they perceive themselves.

There was also a fairly unexpected difference in the general amount of time respondents of different educational levels spent on their mobile devices, using mobile
native applications or their mobile web browser. The amount of time spent started out in the middle for high school graduates in the less than one hour category; at 40% then dropped 5% for four year graduates. Then a 10% uptick was recorded for Graduate students in the less than one hour category. This is only one example, however. The results set shows that this fluctuation is apparent in all six answer choices of time spent.

There were other very obvious differences between the types of apps that were used most often by all three educational levels that I analyzed. For instance, gaming was accessed much less often by the graduate study educational level, by a total differential of 25%. While the graduate level identified only 25% for gaming, the respondents with a four year degree answered 34% for gaming and the high school level responded with 37% for gaming. This could simply be because the higher the educational level, the less time respondents utilize games. However, this went the opposite way for apps used for shopping in that about 25% of grad students use apps for shopping most often and four year students and high school students only use apps for shopping 19% and 10% respectively. There were also declines in the websites used most often in the food category and the news category as we moved from high school to four year degrees and then to graduate level educations. This more than likely means that graduate level graduates do not have the time to visit the same types of websites that the other educational levels are able to. It also probably indicates the different interests between respondents at the different educational categories.

Preferences between mobile native applications and mobile web applications also differed between the three educational levels. The use of the mobile browser went down as we went from high school to four year degrees and then from four year degrees to
graduate level degrees all the way from 60% for high school degree respondents to 47% of graduate level respondents. Banking however did not change at all even though I thought it would have changed dramatically. I would have expected a person’s educational level define how they manage their money. Travel did however note a difference. High school graduates don’t use apps for travel as much, whereas four year degree graduates and graduate degrees both use native applications to travel around 50% of the time. There was a noticeable difference in Searching as well; graduate level respondents use their browser to search about 20% more than the other educational categories.

There are definitely correlations between respondent’s educational level and the way they use their mobile devices. Generally, the higher the level of the education of the respondent, the more proficient on their mobile device they considered themselves. Also, the higher the level of education the more a person generally preferred apps over the internet browser. More specifically, graduate students games less but shopped more. But they also search using their mobile device more often. Most of these results one might expect due to educational level, but the data verified the results.

Preferences

It is my belief that not only do age, sex and education all play a role in defining how users get information from their mobile device, but also that the reasons for using mobile web applications and mobile native application drive the user to use one or the other. Each user has a different mindset about how they want to get their information and why they do it that certain way. This section will analyze the reasons that respondents
used either their devices web browser or a mobile native application to access their information.

Shopping is first in the user preferences section; therefore I will analyze it first. To begin this section, the reasons respondents used either mobile native applications or their mobile browsers were all very different. Twelve percent of respondents felt using an app was more secure than using a browser. The ability to access information quickly was also a key note. Of those who accessed shopping through their browser, only 38.8% responded that using their devices browser was quicker than using a mobile native application. This represents a 26% difference from the 65% of respondents who found that using a mobile native application was quicker. Also ease of information searching was different in that respondents claimed that 49% of the time, using an app was easier to search for information than a mobile browser when shopping. Ease of use also posed a large problem for the mobile web browser while shopping. Where mobile native applications got nearly 70%, the mobile browser got only 22%. This represents a difference of 48%. Increased functionality also prevailed for the mobile native applications with 41% over the mobile browsers 19%. The only two reasons where the browser surpassed the native app were the content of the information being accessed and the category for other. In other words, when looking for different types of content, users preferred to use their devices web browser to shop, this is probably because of increase the ability to query anything on the web instead of anything just within a given mobile native application. The difference is depicted in Figure 10.
Figure 10 – The difference in respondents who chose Apps and those who chose the Browser.

This figure shows that for business creating either a mobile native application or a web application, if the business’s sole care is the variability of content, then they should create a mobile web application because it may get to the customer easier. This is probably why most shopping businesses have applications that only supplement their websites, because if users cannot find the correct content by searching, they may not buy from a business.

Banking is next on the list. To start, I will state once again that banking with mobile native applications had 73% of the respondent’s votes while only 27% of the votes were cast to the use of the mobile browser. Because of this, the reasons behind why respondents chose the way they did, varied greatly. For instance, 71% of respondents chose mobile native applications for banking for security or trust reasons, whereas only 65% of respondents chose their devices browser for banking for the same reason. There is a 6% difference in security and trust based on the different ways users accessed their
banking. A very large difference was in the quick access field. Of the respondents, 65% said that they would rather use an app to bank because of quicker access while only 20% said they would rather use their devices mobile browser. Ease of information searching also had a 14% advantage for the percentage of respondents who would rather use a mobile native application. One of the main benefit respondents said was that ease of use increased for banking with a mobile native application. This was a dramatic difference shown in the statistics. A significant 60% of respondents said that ease of use was a prime quality when accessing their banking via mobile native applications. On the opposite end, only 6.8% of respondents said that ease of use was a valuable reason for using their devices browser. This represents a 53% difference in the reasoning behind respondents wanting to use a mobile native application over their devices web browser. Figure 11 shows the similarities and difference of respondents who chose mobile native applications and their devices mobile browser.

Figure 11 - The difference in respondents who chose Apps and those who chose the Browser.
All in all, the only place the browser was preferred was in the “Other” category. However, this was mainly because some of the respondent’s banks did not have a mobile native application for banking. For banks trying to decide whether to create a mobile native application or a mobile web application, the former is preferred.

Next comes travel, in total, the browser was preferred in this category with 53.5% of respondents saying that they would rather use a browser for travel purposes. However, the reasons for choosing one over the other were fairly even, with respondents feeling more strongly about the reasons for using mobile native applications for travel. Only 6% of respondents claimed that they would rather use a mobile web application to access travel information because of security and trust reasons compared to 16% for mobile native applications. Of the respondents, 54% of the time quick access was picked for mobile native applications over the use of a browser. One of the main categories where the browser was preferred in travel was for the ease of information searching, which ended up being around 44% of users who prefer mobile web browsers. Mobile native applications were also picked by respondents because of ease of use nearly 64% of the time. The rest of the categories, such as increased functionality, content and other were all less than 5% apart from each other. Figure 12 shows the differences in reasoning between those who picked mobile native applications and those who picked the devices web browser.
Figure 12 - The difference in respondents who chose Apps and those who chose the Browser.

Searching is the next category. In total, respondents decided by a landslide that they prefer to use their mobile devices browser to search the internet on their mobile devices. However, it seems as if they don’t know why they chose what they did. This is mainly because the statistical reasons that respondents voted for are very skewed towards mobile native apps. Even when users said that they prefer mobile browsers, they did not check nearly as many boxes as did those who voted for mobile native applications. This just goes to show once again that those who pick mobile native applications are much more adamant at what they want out of their mobile device. Security was not an issue with searching. However, quick access was an issue. Those who chose apps stated that they preferred apps 61% of the time because of quick access, where as quick access on the browser side only got around 40%. The one very large difference was that ease of information searching heavily won in the browser column with nearly a 22% difference in the number of people who chose their devices browser over a mobile native
application. The mobile browser has shown that it can hold its own when ease of information searching is a factor, which is probably obvious. Ease of use showed a perceived benefit for the native app. Of the respondents, 42% preferred the browser, while 52% chose the mobile native applications. The other categories had little to no effect on the difference between the mobile native applications and mobile web browsers. Figure 13 shows the differences between respondents who would prefer either mobile web browsers and mobile native applications.

![Respondents Differences Searching](image)

**Figure 13-** The difference in respondents who chose Apps and those who chose the Browser.

This has shown us that even if the browser is preferred for searching, those who would like to search with a mobile native application are still more adamant about how they want to use them.

Next we come to the news category, which provided very different results then the rest of the types of information needs. Security and trust were no more than 2%
different between mobile native applications and mobile web browsers when it came to news. However, users were very adamant about which they prefer for quick access. Mobile native applications were chosen in this category 68% of the time whereas respondents chose quick access only 38% of the time for quick access with their mobile web browser. Ease of information searching however saw a different result. With nearly an 11% difference between the two, ease of information searching with the browser preferred over mobile native applications. Ease of use, however, saw once again the opposite result with mobile native applications taking 64% of the respondent’s votes as opposed to only 25% on the mobile web browser side. Increased functionality got a 31% for news on the mobile browser side, beating out the mobile native application which only got 19%. The last two categories, content and other, both did not hold much variance. Figure 14 shows the difference between mobile native applications and the mobile web browser, as they both pertain to the reasons people use them for news.

![Figure 14- The difference in respondents who chose Apps and those who chose the Browser.](image-url)
This shows me that if users want their news quickly and only want to skim through stories easily, that they want to use a mobile native application, however, if they care about the functionality and ability to search through large amounts of data to find a story that they are looking for, they will utilize their mobile devices web browser.

Entertainment shows a very similar picture to news. The only real difference between them was that ease of information searching won for the browser with 39%. However, another landslide victory for quick access on the mobile native application side with 63% shows us that there is starting to be a very strong correlation between why people use mobile native applications and the fact that they can be accessed quickly, usually at the touch of a single button. This is also shown in the ease of use category by the 35% difference between mobile native applications and mobile browser statistics. Content of the information being collected also played a role in how people choose between mobile native applications and their devices mobile web browser. The rest of the categories all produced little variance. Figure 15 shows the difference between the reasoning behind respondent’s answers of either mobile web browsers or mobile native applications.
Figure 15- The difference in respondents who chose Apps and those who chose the Browser.

This shows us simply that there is a correlation between how respondents would like to access their entertainment information and increased functionality.

Next, we will look at gaming. Mobile native applications were preferred by nearly 86% of the total respondents. Security and trust only got 6% of responder’s votes in the mobile native application domain; however this was enough to beat out the 0% of votes by responders in the browser domain. In fact, there is really nothing to analyze in this category, the native app was preferred over the browser pretty heavily when it came to gaming. Only once was the difference less than a 6% difference between the two and the highest difference was around 50%. The one occurrence where the mobile native application got beaten by the browser was in the “Other” category. After going back to look at this data in the surveys, this was only because two respondents put down that they
had never played games in their mobile devices web browser. This was more of a statement than an answer. The results of this analysis are posted in Figure 16 below.

![Respondents Differences Gaming](image)

**Figure 16- The difference in respondents who chose Apps and those who chose the Browser.**

This tells us that, at lease on mobile devices, all respondents’ categories preferred games to be played via mobile native applications. This is very obvious at the large amount of variance between respondent’s answers for or against mobile native applications and mobile browser applications.

Weather also showed a large preference for the mobile native applications. Of the respondents, 86% said that they would rather use a mobile native application than their mobile devices browser, which was only favored by 14%. The reasoning behind this may just be likely the same as gaming. However, the numbers fluctuate greatly from just either mobile native applications or mobile browsers taking a larger chunk of the votes. Of the respondents, only 7.1% said that they would rather access their weather through a
mobile native application because of security or trust. Those respondents who decided to vote for using their mobile devices web browser decided that almost 13% of the time it was because of security and trust in the weather services accuracy. To fluctuate, quick access was once again taken by mobile native applications by almost 46%. However, ease of information searching was taken by 15% by mobile web browsers. This fluctuation is caused by the need for quick weather, but also the need for being able to search different weather scenarios. Another fluctuation is shown by the difference in ease of use reasoning. Of the respondents, only 43% of them chose that ease of access was important when using a browser for weather, while nearly 63% felt that it was important while using a mobile native application. Increased functionality also saw a major difference. Those who used the browser responded that increased functionality was why they picked the browser over the mobile native application about 31% of the time while those who used mobile native applications only voted for increased functionality about 15% of the time. Content produced very little variation however, while the category of other produced a variance of about 11%. The differences between mobile browser and mobile native application reasoning can be seen in figure 17 below.
These fluctuations show us that there can be very different ways that respondents may like to access their weather. Those who like quick access and ease of use may choose to access their weather through a mobile native application while those who prefer easy information searching and increased functionality may access their weather through their devices mobile browser.
Conclusions

To conclude, this study has surveyed the many ways that users use their mobile devices. To show this I broke the respondents up into groups based on their gender, education and age. Within these respective groups, there are many different correlations between the data I received and the way that users utilize their mobile devices for different information needs. Each of the groupings has both very different information need as well as very different way of accessing their information on their mobile devices. The data from my survey results tends to indicate that while these may be decent groupings for most studies and businesses trying to penetrate the mobile device market, grouping individuals by their preferences is a much better way to understand how they will utilize your specific product or information. It is my belief that not only are the choices respondents make about their mobile device usage dependent on their age, gender and education, but even more dependent on their specific reasoning for using either mobile native applications or their web browser. In other words, the specific application of each type of mobile native application or mobile web application is what drives the users to use them. The prior research that downloadable native applications are utilized more than mobile web applications, therefore only mobile native applications should be created, does not agree with the results of my study. The raw survey results indicate that people prefer the mobile browser. But a more in depth analysis shows that the specific information need is what mostly drives preference
between a native app and the mobile browser. Based on my research, both the mobile
browser and native apps play a role in the future of mobile device usage.
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Appendix A: Survey Email

Dear Sir/Madam,

Hello! You are being asked to take part in a research study about your mobile device usage (smart phone/ tablet) and how you use either your web browser or downloaded apps. This research is being conducted by a Masters student at UNC in the School of Information and Library Sciences. Your participation would be greatly appreciated.

Please download the attachment that is with this email to take the survey.

You may also download it from this link… <The Link has been discontinued >

Once you have completed the survey, you may either send it to my email directly at gelawson@live.unc.edu or print it out and send it to my home address at

Greg Lawson
601 Jones Ferry Rd APT D9
Carrboro, NC 27510

Participation in this research study is completely voluntary and all of your responses will remain confidential.

Thank you for your consideration and participation

Sincerely,
Greg Lawson

Masters student
School of Information and Library Sciences
gelawson@live.unc.edu
Appendix B: Paper Survey

Mobile Device Survey

This survey is intended for use in a study about mobile device usage. The information gathered is entirely anonymous. The information that is collected from this survey will help in distinguishing how people use their mobile devices and why they use apps over mobile web browsers and vice versa. Please answer all of the questions to the best of your ability. In submitting this survey to the surveyor you consent to let him use your answers in his master’s paper and research study.

<table>
<thead>
<tr>
<th>Preliminary Questions</th>
<th>18-25</th>
<th>25-35</th>
<th>35-45</th>
<th>45-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your age range?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is your sex?</td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is your highest level of education?</td>
<td>Less than high school diploma</td>
<td>High school diploma</td>
<td>2 year degree</td>
<td>4 year degree</td>
</tr>
<tr>
<td>Internet Access</td>
<td>I always have access to the internet</td>
<td>I have access to the internet at home</td>
<td>I only have access to the internet on my mobile device (mobile data plan only)</td>
<td>I do not have access to the internet</td>
</tr>
<tr>
<td>Do you own a mobile device? (i.e. Smart phone or tablet)</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If No, please complete with forecasted usage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On a scale from 1 to 5 how proficient would you say you are with your mobile device?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Very</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Very Proficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In general, if both had the exact same functionality, would you choose to use your mobile devices browser or download an app?
- ☐ I would rather use my devices web browser
- ☐ I would rather download an app

**General Usage Questions**

These questions will help us gauge your particular usage of mobile devices so that we can understand how much you use your mobile device.

<table>
<thead>
<tr>
<th>General Usage Questions</th>
<th>Less than 1 hour</th>
<th>1-2 hours</th>
<th>3-4 hours</th>
<th>4-5 hours</th>
<th>5-6 hours</th>
<th>More than 6 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many hours per day do you use your mobile device?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>How many downloaded apps do you have on your mobile device?</td>
<td>☐ 0-6</td>
<td>☐ 6-12</td>
<td>☐ 12-18</td>
<td>☐ 18-24</td>
<td>☐ 24-30</td>
<td>☐ More than 30</td>
</tr>
<tr>
<td>Approximately how much time do you spend using downloaded apps on your mobile device per day?</td>
<td>☐ Less than 1 hour</td>
<td>☐ 1-2 hours</td>
<td>☐ 3-4 hours</td>
<td>☐ 4-5 hours</td>
<td>☐ 5-6 hours</td>
<td>☐ More than 6 hours</td>
</tr>
<tr>
<td>Approximately how much time do you spend on your mobile devices web browser per day?</td>
<td>☐ Less than 1 hour</td>
<td>☐ 1-2 hours</td>
<td>☐ 3-4 hours</td>
<td>☐ 4-5 hours</td>
<td>☐ 5-6 hours</td>
<td>☐ More than 6 hours</td>
</tr>
<tr>
<td>Which types of downloadable apps do you currently have on your mobile device? (Check all that apply)</td>
<td>☐ Shopping</td>
<td>☐ Banking</td>
<td>☐ Travel</td>
<td>☐ Food</td>
<td>☐ Searching</td>
<td>☐ News</td>
</tr>
</tbody>
</table>

Which types of websites do you browse to on
- ☐ Shopping
| In a typical week, which types of apps do you use on your mobile device most often? (Check all that apply) | ☐ Shopping  ☐ Banking  ☐ Travel  ☐ Food  ☐ Searching  ☐ News  ☐ Entertainment  ☐ Games  ☐ Weather  ☐ Other: ________________________________ |
| In a typical week, which types of websites do you browse to on your mobile device most often? (Choose all that apply) | ☐ Shopping  ☐ Banking  ☐ Travel  ☐ Food  ☐ Searching  ☐ News  ☐ Entertainment  ☐ Games  ☐ Weather  ☐ Other: ________________________________ |

**Specific Usage Questions**

These questions will help us understand specific instances that mobile apps may be used over mobile web browsers.
<table>
<thead>
<tr>
<th>Specific Usage Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you prefer to use a downloadable app or your mobile devices internet browser for shopping?</td>
</tr>
<tr>
<td>☐ I prefer to use a downloaded app for shopping  ☐ I prefer to use my mobile devices web browser for shopping</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
</tr>
</tbody>
</table>
| ☐ Security/Trust  ☐ Quick access  ☐ Ease of Information Searching  ☐ Ease of use  ☐ Increased Functionality  ☐ Content  ☐ Other:  
  
  __________________________ |
| Would you prefer to use a downloadable app or your mobile devices internet browser for banking? |
| ☐ I prefer to use a downloaded app for banking  ☐ I prefer to use my mobile devices web browser for banking |
| Why did you choose one over the other? (check all that apply) |
| ☐ Security/Trust  ☐ Quick access  ☐ Ease of Information Searching  ☐ Ease of use  ☐ Increased Functionality  ☐ Content  ☐ Other:  
  
  __________________________ |
| Would you prefer to use a downloadable app or your mobile devices internet browser for travel related purposes? |
| ☐ I prefer to use a downloaded app for travel related purposes  ☐ I prefer to use my mobile devices web browser for travel related purposes |
| Why did you choose one over the other? (check all that apply) |
| ☐ Security/Trust  ☐ Quick access  ☐ Ease of Information Searching  ☐ Ease of use  ☐ Increased Functionality  ☐ Content  ☐ Other:  
  
  __________________________ |
<table>
<thead>
<tr>
<th>Would you prefer to use a downloadable app or your mobile devices internet browser for searching?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ I prefer to use a downloaded app for searching</td>
</tr>
<tr>
<td>☐ I prefer to use my mobile devices web browser for searching</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
</tr>
<tr>
<td>☐ Security/Trust   ☐ Quick access   ☐ Ease of Information Searching</td>
</tr>
<tr>
<td>☐ Ease of use   ☐ Increased Functionality   ☐ Content   ☐ Other:</td>
</tr>
<tr>
<td>____________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Would you prefer to use a downloadable app or your mobile devices internet browser for news?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ I prefer to use a downloaded app for news</td>
</tr>
<tr>
<td>☐ I prefer to use my mobile devices web browser for news</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
</tr>
<tr>
<td>☐ Security/Trust   ☐ Quick access   ☐ Ease of Information Searching</td>
</tr>
<tr>
<td>☐ Ease of use   ☐ Increased Functionality   ☐ Content   ☐ Other:</td>
</tr>
<tr>
<td>____________________________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Would you prefer to use a downloadable app or your mobile devices internet browser for Entertainment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ I prefer to use a downloaded app for entertainment</td>
</tr>
<tr>
<td>☐ I prefer to use my mobile devices web browser for entertainment</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
</tr>
<tr>
<td>☐ Security/Trust   ☐ Quick access   ☐ Ease of Information Searching</td>
</tr>
<tr>
<td>☐ Ease of use   ☐ Increased Functionality   ☐ Content   ☐ Other:</td>
</tr>
<tr>
<td>____________________________________________</td>
</tr>
</tbody>
</table>
Would you prefer to use a downloadable app or your mobile devices internet browser for gaming?

☐ I prefer to use a downloaded app for gaming
☐ I prefer to use my mobile devices web browser for gaming

Why did you choose one over the other? (check all that apply)

☐ Security/Trust   ☐ Quick access   ☐ Ease of Information Searching
☐ Ease of use   ☐ Increased Functionality   ☐ Content   ☐ Other:

_____________________________________________________

Would you prefer to use a downloadable app or your mobile devices internet browser for weather?

☐ I prefer to use a downloaded app for weather
☐ I prefer to use my mobile devices web browser for weather

Why did you choose one over the other? (check all that apply)

☐ Security/Trust   ☐ Quick access   ☐ Ease of Information Searching
☐ Ease of use   ☐ Increased Functionality   ☐ Content   ☐ Other:

_____________________________________________________

Thank you very much for taking this survey, your input is greatly appreciated. Please return to gelawson@live.unc.edu or the address listed below.

Greg Lawson
601 Jones Ferry Rd
Carrboro, NC, 27510

Apt D9 Thank you
27510

Greg Lawson
Appendix C: Electronic Survey

Mobile Device Survey

This survey is intended for use in a study about mobile device usage. The information gathered is entirely anonymous. The information that is collected from this survey will help in distinguishing how people use their mobile devices and why they use apps over mobile web browsers and vice versa. Please answer all of the questions to the best of your ability. In submitting this survey to the surveyor you consent to let him use your answers in his master’s paper and research study.

<table>
<thead>
<tr>
<th>Preliminary Questions</th>
<th>18-25</th>
<th>25-35</th>
<th>35-45</th>
<th>45-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your age range?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>What is your sex?</td>
<td>☐ Male</td>
<td>☐ Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is your highest level of education?</td>
<td>☐ Less than high school diploma</td>
<td>☐ High school diploma</td>
<td>☐ 2 year degree</td>
<td>☐ 4 year degree</td>
</tr>
<tr>
<td>Internet Access</td>
<td>☐ I always have access to the internet</td>
<td>☐ I have access to the internet at home</td>
<td>☐ I only have access to the internet on my mobile device (mobile data plan only)</td>
<td>☐ I do not have access to the internet</td>
</tr>
<tr>
<td>Do you own a mobile device? (i.e. Smart phone or tablet)</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If No, please complete with forecasted usage</td>
<td>☐</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On a scale from 1 to 5 how proficient would you say you are with your mobile device?</td>
<td>1 Very</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
In general, if both had the exact same functionality, would you choose to use your mobile devices browser or download an app?

☐ I would rather use my devices web browser
☐ I would rather download an app

**General Usage Questions**
These questions will help us gauge your particular usage of mobile devices so that we can understand how much you use your mobile device

<table>
<thead>
<tr>
<th>General Usage Questions</th>
<th>Less than 1 hour</th>
<th>1-2 hours</th>
<th>3-4 hours</th>
<th>4-5 hours</th>
<th>5-6 hours</th>
<th>More than 6 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many hours per day do you use your mobile device?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>How many downloaded apps do you have on your mobile device?</td>
<td>☐ 0-6</td>
<td>☐ 6-12</td>
<td>☐ 12-18</td>
<td>☐ 18-24</td>
<td>☐ 24-30</td>
<td>☐ More than 30</td>
</tr>
<tr>
<td>Approximately how much time do you spend using downloaded apps on your mobile device per day?</td>
<td>☐ Less than 1 hour</td>
<td>☐ 1-2 hours</td>
<td>☐ 3-4 hours</td>
<td>☐ 4-5 hours</td>
<td>☐ 5-6 hours</td>
<td>☐ More than 6 hours</td>
</tr>
<tr>
<td>Approximately how much time do you spend on your mobile devices web browser per day?</td>
<td>☐ Less than 1 hour</td>
<td>☐ 1-2 hours</td>
<td>☐ 3-4 hours</td>
<td>☐ 4-5 hours</td>
<td>☐ 5-6 hours</td>
<td>☐ More than 6 hours</td>
</tr>
<tr>
<td>Which types of downloadable apps do you currently have on your mobile device? (Check all that apply)</td>
<td>☐ Shopping</td>
<td>☐ Banking</td>
<td>☐ Travel</td>
<td>☐ Food</td>
<td>☐ Searching</td>
<td>☐ News</td>
</tr>
<tr>
<td></td>
<td>☐ Entertainment</td>
<td>☐ Games</td>
<td>☐ Weather</td>
<td>☐ Other: Click here to enter text.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Which types of websites do you browse to on your mobile devices browser? (Check all that apply)</td>
<td>☐ Shopping</td>
<td>☐ Banking</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
In a typical week, which types of apps do you use on your mobile device most often? (check all that apply)

- Shopping
- Banking
- Travel
- Food
- Searching
- News
- Entertainment
- Games
- Weather
- Other: **Click here to enter text.**

In a typical week, which types of websites do you browse to on your mobile device most often? (Choose all that apply)

- Shopping
- Banking
- Travel
- Food
- Searching
- News
- Entertainment
- Games
- Weather
- Other: **Click here to enter text.**

**Specific Usage Questions**

These questions will help us understand specific instances that mobile apps may be used over mobile web browsers.
Would you prefer to use a downloadable app or your mobile devices internet browser for shopping?

☐ I prefer to use a downloaded app for shopping  
☐ I prefer to use my mobile devices web browser for shopping  

Why did you choose one over the other? (check all that apply)  
☐ Security/Trust  ☐ Quick access  ☐ Ease of Information Searching  
☐ Ease of use  ☐ Increased Functionality  ☐ Content  ☐ Other:  Click here to enter text.

Would you prefer to use a downloadable app or your mobile devices internet browser for banking?

☐ I prefer to use a downloaded app for banking  
☐ I prefer to use my mobile devices web browser for banking  

Why did you choose one over the other? (check all that apply)  
☐ Security/Trust  ☐ Quick access  ☐ Ease of Information Searching  
☐ Ease of use  ☐ Increased Functionality  ☐ Content  ☐ Other:  Click here to enter text.

Would you prefer to use a downloadable app or your mobile devices internet browser for travel related purposes?

☐ I prefer to use a downloaded app for travel related purposes  
☐ I prefer to use my mobile devices web browser for travel related purposes  

Why did you choose one over the other? (check all that apply)  
☐ Security/Trust  ☐ Quick access  ☐ Ease of Information Searching  
☐ Ease of use  ☐ Increased Functionality  ☐ Content  ☐ Other:  Click here to enter text.
<table>
<thead>
<tr>
<th>Question</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you prefer to use a downloadable app or your mobile devices internet browser for searching?</td>
<td>☐ I prefer to use a downloaded app for searching</td>
<td>☐ I prefer to use my mobile devices web browser for searching</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
<td>☐ Security/Trust ☐ Quick access ☐ Ease of Information Searching</td>
<td>☐ Ease of use ☐ Increased Functionality ☐ Content ☐ Other: Click here to enter text.</td>
</tr>
<tr>
<td>Would you prefer to use a downloadable app or your mobile devices internet browser for news?</td>
<td>☐ I prefer to use a downloaded app for news</td>
<td>☐ I prefer to use my mobile devices web browser for news</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
<td>☐ Security/Trust ☐ Quick access ☐ Ease of Information Searching</td>
<td>☐ Ease of use ☐ Increased Functionality ☐ Content ☐ Other: Click here to enter text.</td>
</tr>
<tr>
<td>Would you prefer to use a downloadable app or your mobile devices internet browser for Entertainment?</td>
<td>☐ I prefer to use a downloaded app for entertainment</td>
<td>☐ I prefer to use my mobile devices web browser for entertainment</td>
</tr>
<tr>
<td>Why did you choose one over the other? (check all that apply)</td>
<td>☐ Security/Trust ☐ Quick access ☐ Ease of Information Searching</td>
<td>☐ Ease of use ☐ Increased Functionality ☐ Content ☐ Other: Click here to enter text.</td>
</tr>
</tbody>
</table>
Would you prefer to use a downloadable app or your mobile devices internet browser for gaming?

- I prefer to use a downloaded app for gaming
- I prefer to use my mobile devices web browser for gaming

Why did you choose one over the other? (check all that apply)

- Security/Trust
- Quick access
- Ease of Information Searching
- Ease of use
- Increased Functionality
- Content
- Other: [Click here to enter text.]

Would you prefer to use a downloadable app or your mobile devices internet browser for weather?

- I prefer to use a downloaded app for weather
- I prefer to use my mobile devices web browser for weather

Why did you choose one over the other? (check all that apply)

- Security/Trust
- Quick access
- Ease of Information Searching
- Ease of use
- Increased Functionality
- Content
- Other: [Click here to enter text.]

Thank you very much for taking this survey, your input is greatly appreciated. Please return to gelawson@live.unc.edu or the address listed below.

Greg Lawson
601 Jones Ferry Rd
Carrboro NC, 27510

Apt D9 Thank you
27510

Greg Lawson
Appendix D: Survey Preference Results Graphs

The graphs in this appendix reference the preferences for each of the major categories of my survey under the “Specific Usage Questions” section.

Shopping Preferences

![Shopping Preferences Graph]

- Security/Trust: 26.7%
- Quick access: 48.3%
- Ease of info searching: 42.5%
- Ease of use: 40.8%
- Increased functionality: 27.5%
- Content: 17.5%
- Other: 8.3%
Banking Preferences

Banking Preferences

<table>
<thead>
<tr>
<th>Preference</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security/Trust</td>
<td>63.3%</td>
</tr>
<tr>
<td>Quick access</td>
<td>48.3%</td>
</tr>
<tr>
<td>Ease of info searching</td>
<td>12.5%</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>41.7%</td>
</tr>
<tr>
<td>Increased Functionality</td>
<td>30.0%</td>
</tr>
<tr>
<td>Content</td>
<td>5.8%</td>
</tr>
<tr>
<td>Other</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

Travel Preferences

Travel Preferences

<table>
<thead>
<tr>
<th>Preference</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security/Trust</td>
<td>10.8%</td>
</tr>
<tr>
<td>Quick access</td>
<td>39.2%</td>
</tr>
<tr>
<td>Ease of info searching</td>
<td>37.5%</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>43.3%</td>
</tr>
<tr>
<td>Increased Functionality</td>
<td>27.5%</td>
</tr>
<tr>
<td>Content</td>
<td>15.0%</td>
</tr>
<tr>
<td>Other</td>
<td>5.0%</td>
</tr>
</tbody>
</table>
Searching Preferences

<table>
<thead>
<tr>
<th>Preference</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security/Trust</td>
<td>15.0%</td>
</tr>
<tr>
<td>Quick access</td>
<td>35.0%</td>
</tr>
<tr>
<td>Ease of info searching</td>
<td>42.5%</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>44.2%</td>
</tr>
<tr>
<td>Increased Functionality</td>
<td>27.5%</td>
</tr>
<tr>
<td>Content</td>
<td>16.7%</td>
</tr>
<tr>
<td>Other</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

News Preferences

<table>
<thead>
<tr>
<th>Preference</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security/Trust</td>
<td>5.8%</td>
</tr>
<tr>
<td>Quick access</td>
<td>53.3%</td>
</tr>
<tr>
<td>Ease of info searching</td>
<td>30.0%</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>46.7%</td>
</tr>
<tr>
<td>Increased Functionality</td>
<td>22.5%</td>
</tr>
<tr>
<td>Content</td>
<td>22.5%</td>
</tr>
<tr>
<td>Other</td>
<td>5.0%</td>
</tr>
</tbody>
</table>
Entertainment Preferences

Gaming Preferences
Weather Preferences

![Weather Preferences Chart]

<table>
<thead>
<tr>
<th>Item</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security/Trust</td>
<td>7.5%</td>
</tr>
<tr>
<td>Quick access</td>
<td>74.2%</td>
</tr>
<tr>
<td>Ease of info Searching</td>
<td>18.3%</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>58.3%</td>
</tr>
<tr>
<td>Increased Functionality</td>
<td>16.7%</td>
</tr>
<tr>
<td>Content</td>
<td>16.7%</td>
</tr>
<tr>
<td>Other</td>
<td>2.5%</td>
</tr>
</tbody>
</table>