DESIGNING USER INTERFACE THAT ENHANCES GENERATION Y & Z'S UNDERSTANDING OF THE CONTEMPORARY WORLD

by

ALISA SURE O'NEAL

A THESIS

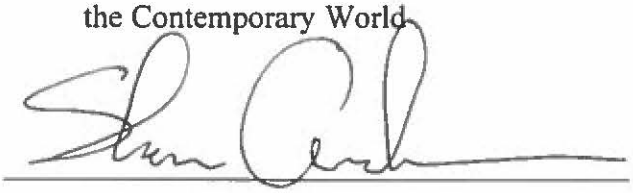
Presented to the Department of Advertising
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Science

June 2016

An Abstract of the Thesis of

Alisa O'Neal for the degree of Bachelor of Science
in the Department of Advertising to be taken June 2016

Title: Designing User Interface that Enhances Generation Y & Z's Understanding of the Contemporary World

Approved: 

Shan Anderson

This paper suggests a product that is digital and has an emphasis on visual learning to address the issue of American students not understanding their globalized world. The fact that geography is not prioritized in the U.S. education system is a contributing issue. The Department of Education's policies have hindered the efforts made by agencies and individuals to incorporate the education of geographic sciences in schools. The generations in school today, and for those who will follow, have a different learning personality than has never been seen before. It is one that reflects a childhood development aided by technology. The proposed product uses experience design techniques to create an eBook for these students and promote their understanding of the contemporary world.

Acknowledgements

I would like to thank Professor Anderson for helping me examine different digital platforms to present information, along with guiding me through the process of planning and executing my thesis. I would like to thank Professor Koranda for advising me on topics to research, the possibilities of complications that may arise from these areas, and how to address them in developing a strong thesis. I would like to thank Professor Southworth for advising me on the Honors College requirements and for helping me understand how Digital Humanities is changing the academic landscape. I would like to thank Professor Murphy for being a major resource in the education of geography aspect of my thesis by providing insight and resources. I would also like to thank my family for being an emotional support system along with my supportive friends. I would like to acknowledge a major resource for my thesis as being my fellow peers in the Honors College who were by my side editing and providing aid throughout the entire process. This thesis would not have been possible without all the people who influenced my work.

Table of Contents

Introduction

The joke "God created war so that Americans would learn geography" is not only a line used by Mark Twain, Ambrose Bierce, Paul Rodriguez and Jon Stewart, but it also exemplifies the geocentric stereotype placed on Americans and how they interact with the rest of the world. Internationally, Americans are viewed as ignorant of worldly affairs. Whether this is accurate or not, I believe a major reason behind this belief stems from the lack of geographic knowledge Americans exhibit. Looking at the U.S. education system in recent years, there is a noticeable deficit when it comes to the teaching of geography. Without a basic understanding of the world and the locations of its people and cultures, one cannot comprehend the workings of the modern world. As Alex Trebek (2013), host of the National Geographic Bee, says in an interview with Chuck Todd,

> As I have told reporters over the years, if you know geography and the background of civilizations and the religions, you will be much better off in terms of understanding where they are coming from. Why are they ticked off at us? What have we done to alienate these people? We like them and most of them like us, but why are they doing this and that? Well, geography will help – and as you mentioned a few moments ago, geography is neglected. (p. 1).

Trebek lays out the foundation for this thesis, which proposes a digital educational tool that emphasizes visuals in order to provide a foundation in geography for students to better understand the modern world. The understanding of geography is a growing field with the help of the Internet and the connectivity in which it enables. *The Economist* (2003) writes,

> In the early days of the Internet boom, there was much talk of the "death of distance." The emergence of a global digital network, it seemed, would put an end to mundane physical or geographical constraints. There

> was some truth in this. E-mail made it cheap and easy to stay in constant touch with people, whether they lived around the corner or on the other side of the globe. Companies could communicate with customers and employees no matter where they were…geography is far from dead. Although it is often helpful to think of the Internet as a parallel digital universe, or an omnipresent "cloud," its users live in the real world where limitations of geography still apply. And these limitations extend online.

My inquiry begins with the research question that generates my thesis. It proposes the benefit of utilizing the aspects of the digital age to present geography as a subject to be interpreted by students with a specific learning persona. In support of the thesis, the remainder of the paper will be organized as a case study for an educational campaign and/or product development. The order is as follows: Problem, Audience, Insight, Proposal, Support, and Executions. Due to this paper's strong experience design (XD) focus, the Execution section explains the planning and reasoning for the design of the prototype, along with the prototype and plans for evaluation.

Research Question

How has the educational system in the United States affected Millennials' understanding of the world in terms of contemporary conflicts? What can be created to address this issue and be effective with the demographic? What would a product look and behave like that caters toward the learning needs of the user?

My hypothesis stems from the lack of emphasis on geography and monotonous methods of teaching social sciences, which have resulted in a gap in American students' education. To understand a conflict, one must know the geographic aspects and history of the region where it takes place. For example, when looking at the 2015 earthquake in Nepal, knowledge of where the country was and the earthquake's epicenter was uncertain among Americans, especially the youth. Knowledge of the surrounding natural features and cities is crucial to understanding the effect of the natural disaster. Two major avalanches occurred as a result of the earthquake because the epicenter was near the mountainous region of the country. Understanding that many people live in these mountains, that the urban landscape is located at the bottom of these mountain regions, and that many of the buildings were outdated, (a number even being listed UNESCO World Heritage sites), would help a student comprehend how many of the causalities were killed due to landslides and buildings collapsing. In addition to geography providing a better understanding of the modern world, I hypothesize that the education of this subject may be best delivered through interactive technology.

Problem

Americans who are not proficient in geography do not have the ability to comprehend events occurring across the world, especially conflicts. The lack of mastery derives from the absence of instruction in geography within the U.S. education system. This is not a new story; for years, teachers and organizations have pushed for geography in the curriculum, and as a result, standards and programs have been created by outside agencies. The problem lies in funding and the priority placed on the subject. Another complication is that geography has been placed under other subjects such as history and used only in reference to mapping and memorization. The Geography Education Standards Project (1994) writes, "Geography is not a collection of arcane information. Rather, it is the study of spatial aspects of human existence. People everywhere need to know about the nature of their world and their place in it. Geography has much more to do with asking questions and solving problems than it does with memorization of isolated facts" (p. 18). In general, the field of geography is misunderstood in the United States. The standards and programs in place are not being instituted due to the prioritization of testing.

Background

Geography is more than simply maps and the location of places. The Oxford English Dictionary defines "geography" as,

> The field of study concerned with the physical features of the earth and its atmosphere, and with human activity as it affects and is affected by these, including the distribution of populations and resources and political and economic activities; also as a subject of educational study or examination.

Thus, geography is the study of the spatial organization and material character of Earth's surface. The subject is crucial in understanding the relationship of countries and peoples of the world. Many world leaders have degrees in geography or in similar subjects. Yet, this is not the case in United States, because the subject is rarely taught in schools. The most recent "Nation's Report Card" (2014) of student proficiency in geography reported a 27% proficiency rate. The assessment included questions that reflected two areas of testing: Content (space and place; environment and society; spatial dynamics and connections) and Cognitive (knowing, understanding, and applying). The official standard for competence in geography from the National Geography Content Standards, as written by Downs (1994), is an individual

> Who is geographically informed, someone who knows and understands the three core elements of geography: subject-matter knowledge, geographic skills, and essential perspectives (spatial and environmental) from which to view the world. (p. 183).

The national reports by the U.S. Department of Education (2010, 2014) state that 27% of students are at proficiency, but if one looks at the specific results, it is evident that the percentage decreases as students' age increases. These results reflect students' inability to comprehend our world at a complex level. Overall, there is an issue with the lack of proficiency in the subject of geography in the American education system. One reason for this that is widely acknowledged is the effects of the No Child Left Behind law, which will be discussed later in this paper.

Shift of Importance

The phrase quoted in the introduction, "God created war so that Americans would learn geography," is most often attributed as a remark of Mark Twain. The phrase is often used in satirical comedy, but has merit. Schulten (2001) writes,

> On Friday, February 20, 1942, President Roosevelt asked Americans to buy a map of the world. In his noontime radio address Roosevelt announced that he would explain the nation's wartime strategy over the airwaves the following Monday, and that a clear sense of geography would greatly facilitate this task. (p. 204).

War and violence dominate the media, along with the ever-changing effects of globalization. When there is a conflict in which the United States is involved, such as a world war, the conflict is at the forefront of discussions. Television, radio, newspaper, newsfeeds, and homepage stories reference the conflict and ensure that Americans are aware of the situation. However, they do not have a complete understanding of the environmental and cultural repercussions that contribute to the conflict. World War II marked a change in the United States when the whole nation was updated hour-by-hour with the war efforts due to advancements in communication technology. The war was being fought by all Americans, abroad and state-side, fostering interest by the majority of Americans.

The National Research Council of the National Academies (2010) describes another example of how war stimulates the education of Geography: "The 2003 U.S. invasion of Iraq prompted an outpouring of scholarship on U.S.-based geopolitical visions" (p. 96). Schulten (2001) writes about how the collective aspect of war and inherent geography associated with it heightened the popularity of the subject within American homes. She writes, "War has perennially boosted popular interest in

geography. The Spanish-American War and World War I boosted map and atlas sales and focused attention on the place of geography in American education" (p. 206). The years that follow show the development of national standards for geography education in the United States due to the growing popularity of the field. Today the subject has funding and standards, but is depicted as low-priority.

No Child Left Behind

In 1965, the ESEA (Elementary and Secondary Education Act) was signed into law by President Lyndon B Johnson with the intent to promote full education opportunity.

> The U.S. Department of Education states:
> ESEA offered new grants to districts serving low-income students, federal grants for text and library books, it created special education centers, and created scholarships for low-income college students. Additionally, the law provided federal grants to state educational agencies to improve the quality of elementary and secondary education.

This act distributed billions of federal dollars each year into classrooms to serve low-income students (Turner, 2015). It was replaced by NCLB (No Child Left Behind), which was signed by President George W. Bush in 2001 and made effective in January of 2002. NCLB created a system to test schools and students yearly on academic progress. Schools were judged by the Adequate Yearly Progress standards and the goal of the program was to have every American student at grade-level for reading and math by 2014. The U.S. Department of Education's NCLB (2001) outlined core subjects that were to be taught in the U.S. education system: English, reading or language arts, mathematics, science, foreign languages, civics and government, economics, arts, history, and geography. Along with outlining subjects of study, NCLB prescribed

funding for research and resources to promote the teaching of these subjects. The funding levels are shown in Figure 1. As the figure shows, NCLB listed geography as a subject that should be taught in school; however, it did not provide funding or support for educators. This lack of fiscal support and lack of emphasis on testing left little motivation for the education of geography. In an article for *Education Digest*, Kathleen Vail (2004) writes, "With Schools scrambling to meet the requirements of 'No Child Left Behind,' history, geography, and civics are being pushed aside to spend more time on the subjects being tested — mainly reading and math" (p. 32). Other authors Elizabeth Hinde and Gale Olp Ekiss (2005) similarly write,

> Since the passage of NCLB with its testing mandates, elementary schools have focused their energy, money, and other resources on improving reading and math scores. Consequently, the teaching of untested content areas, especially social studies and the arts, has been severely curtailed. (p. 27).

The absence of funding and testing is a large reason why geography has not been effectively taught to American Millienials.

Another reason is the negative attitudes associated with geography and subjects relating to it. Hinde and Ekiss also write of the feelings toward the subject: "Students have used words like 'boring', 'irrelevant', 'textbook-driven', 'dry', and other equally critical words" (p. 27). These word associations reflect the style in which the information was presented to students and the learning techniques used. A look at why digital and visual learning versus traditional oral learning would be a more effective education technique will be discussed later in this thesis. Another idea for why geography is not successfully taught in American schools is that the teachers themselves are not properly educated. The number of geography majors going on to obtain a

secondary degree is decreasing and the average age of teachers with this higher-level education in 2004 was 43 (Bednarz, Stotman and Jongwon, 2004, p. 180). In total, NCLB affected the education of students born between 1985 and the mid 2000s, which I refer to as the Millennials and Generation Y. The effect of the researched work and proposed solution will pertain to Generation Z.

Current State

The Geography Education Standards Project (1994) is "the inclusion of geography as a core subject in Goals 2000: Educate America Act (Public Law 103-227): the culmination of a decade of reform in geography education" (p. 9). It outlines what a geographically-informed person knows and understands. (See Table 1, which sets forth the main 18 standards of geography in the U.S. education system**.)** Along with these standards, the project lists six essential elements to geography: "World in Spatial Terms, Places and Regions, Physical Systems, Human Systems, Environment and Society, and Uses of Geography" (p. 33). The curriculum is divided into three levels of assessment within the K-12 sphere of learning in order to calibrate the level of critical thinking to students' abilities.

Along with having standards and essential topics, geography is seen as a newly prioritized and widely popular subject with the creation of the advanced placement test for human geography, instituted in 2001. The College Board (2016) writes, "Since its inception in 2001, the number of students taking AP Human Geography has grown considerably, from 97,762 in 2002 to 191,773 in 2016, making it one of the fastest growing courses." Along with the additions of national standards and assessments, funding from large organizations is making its way to center stage by funding large-

scale educational programs. The Association of American Geographers (2008) in reference to the *Teacher's Guide Project GeoSTART* writes,

> The National Aeronautics and Space Administration (NASA) awarded the Association of American Geographers (AAG) a one-year $92,834 grant to develop Geo-Spatial Thinking Activities and Resources for Teachers (GeoSTART) as a pilot project to enhance the teaching of geography and earth science. (p. 2).

This project was funded by the U.S. Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE), along with the AAG, thus proving the newfound attention to geography education in the last decade. The interest in geography is growing and the trend is soaring as students discover the growing need for the field in the contemporary world.

Audience

The individuals who grew up with and before NCLB throughout their *entire* schooling are not the audience for this proposed product. Rather, the audience is students currently in the U.S. education system and the students to come. For this thesis, individuals who are currently enrolled or will be attending levels K-12 schooling in the United States are the target audience. This cohort is almost equally male and female and consists of varying socio-economic and cultural backgrounds. The secondary research conducted for this thesis mainly drew from findings of students attending public school; however, the target audience for the proposed execution is students attending public and private institutions.

The target audience will be defined and explored in-depth throughout the thesis, particularly in the sections entitled "Learning Personas," "User Personas," and "User Needs." In summary, this group of people grew up using digital screens. From Face

Timing family members on mobile phones to learning shapes and colors through educational programs on tablet devices, this group has been exposed to hand-held screens from birth. Unlike any other generation, they developed their learning skills through digital means. One's five senses play a vital role in development and this group grew up with technology through touchscreens and audio from digital devices, all with the aid of visuals on a screen. The way they digest and interact with information reflects their development being aided by digital products.

The target audience is also a group that is entering a changing and globalized world. The jobs that they will be obtaining will put them in contact with individuals from across the globe. The resources they will be using, the media they will be digesting, and the conflicts they will be involved with will be multi-national in scope.

Overall, the proposed product aims to be used by educators and students. The target audience for the project is specifically students, as the proposed product places a high value on the user experience of the student and caters to their learning personality. The secondary audience is educators utilizing the tool in classrooms; however, this will not be addressed in this thesis.

Insight

Geography is a naturally visual subject and requires interaction between individuals and data. It commands critical thinking and is an inter-disciplinary field covering many social sciences. According to the National Research Council of the National Academies (2010), “Geographical scientists have played major roles in a variety of international interdisciplinary environmental-change initiatives, and have taken a leading role in bringing vulnerability issues to the fore.” (p. 42).

Need for Geography in Addressing Contemporary Conflicts

Researchers have found that geography is needed for students to progress in the modern world and for society to move forward. The Geography Education Standards Projects (1994) explains the connections as:

> There is now a widespread acceptance among the people of the United States that being literate in geography is essential if students are to leave school equipped to earn a decent living, enjoy the richness of life, and participate responsibly in local, national, and international affairs. (p. 9).

Inequality is growing along with the globalization of the world and its economy. Inequality directly relates to conflict, and so understanding the networks involved is crucial to understanding and preventing contemporary conflicts. Murray (2006) and Dicken (2007) are quoted on this connection in *Understanding the Changing Planet:*

> National Research Council of the National Academies (2010):
> The timing of the recent shift in inequality patterns (the early 1980s) corresponds with the rise of new forms of economic globalization that have transformed spatial relationship around the globe. Expanding transportation and communication networks, trade liberalization, reorganization of financial structures, and the rise of new regional trade agreements have been redefining flows of commodities, investments, labor, and political power across the globe. (p. 83).

The same report quotes O'Louglin et al. (2004) on how these international issues are becoming local with globalization. It states, "The state is no longer the only, or even the primary, actor in economic processes, because markets are now global, regional, and local as much as they are national." (p. 84).

Current Programs

There are programs and curriculum in place for geography education; however, they are not being implemented in an effective manner. One rationale is derived from exclusion of the subject from standardized tests as an effect of NCLB. Another justification is lack of funding and resources provided by states. This can be countered by the funding of private and public organizations, which will be discussed in this section. A third explanation is the lack of trained professionals. A fourth is the way in which the information is taught: it is thrown into social sciences courses as a memorization and mapping component. Along with those major barriers, the teaching tools available and being used by educators are lacking in effective methods of conveying the subject matter. The generation in school at the moment grew up in a world that is consumed with interacting with screens and connecting through the current non-interactive style of education. The style of learning is not as effective with students who developed using technology. These individuals appear to be visual and digital learners. The work being done in geography correlates with this style of learning, and there is an area for development that merges the two in the education sphere.

National Research Council of the National Academies

The National Research Council of the National Academies publishes a report each year highlighting a subject as innovative for the changing world. The report addresses the questions that researchers are currently researching and questions, which need to be answered. The goal of their reports is to influence public policy, government decision-making and public knowledge. The 2010 report is titled "Understanding the Changing Planet" and looks at work being done in the geographical sciences. The report answers many of the questions with current work dealing with environmental change and the issue of resources, inequality due to economic globalization, and the need for an understanding of geopolitics with the new networks from a connected world. Most examples of studies being conducted had a strong visual aspect due to the technology being used in the field. Visualizing information with the use of a map to show change in time, locations of groups of peoples, areas of strong identity associations, and borders all aid an individual in understanding what factors lead to conflict. Figure 2 from the National Research Council of the National Academies report, where O'Louglin and Anselin (2007) are cited, is an example of this concept on the most basic two-dimensional level. Examples from this report are quoted throughout this paper as they provide insight into the current work being done along with the capabilities of technology in the field.

Strategy Statement

Promoting an overlooked subject needed by the target audience to meet their needs by displaying information easily digestible through a product designed for their

learning personality will enable students to prosper in the contemporary and future world.

To seek development in the world, a shift from viewing conflict as static organizations in competition with one another is necessary. The role geography plays is crucial and if students are educated with it as a priority, change will be more likely. Achieving this is easier with personal interactions and prompts to think critically about networks of people and places. Students are already comfortable interacting with interfaces through computer screens. Allowing them to visualize the many aspects of geography will enable them to understand contemporary conflicts.

Proposed Solution

The generation being investigated in this thesis is unique based on the fact that its members grew up in a world that was becoming digital. Studies have shown that this group of individuals developed different learning personalities because of this change in technology. Both Generation Y and Z appear to be visual learners; thus the best mode to teach them should match their learning personalities. My proposed solution is a Digital Humanities website or eBook that is geared toward exploring contemporary conflicts using geography to educate holistically. The product highlights a particular conflict by providing a map of where the conflict occurred or is currently occurring. See Figure 3 as an example of a clear map portraying information that is used as inspiration for the proposed product. The map will be interactive in that it will have options to change the time period and the filters. Students will be able to see the changes involved in a conflict based on where it occurred. For example, in the example of the Ebola Outbreak of 2014-2015, the map would show the cases that were reported by month. This visual would show the spread and containment of the virus. Along with the map, the product would have text that is similar to that found in textbooks, but shortened and interjected with infographics and icons to see a video clip or photo gallery. This process will be similar to that of reading an article online from the NY Times or BBC. This break between text will maintain the attention of readers more effectively. The presentation of information creates an outlook of the conflicts with the use of discussion questions at the end of each section for personal reflection. These discussion questions will have an humanstic aspect to them in order to emphasize human dignity when talking about subjects that are often taught through statistics and dates. This will bring forth personal

involvement from students and personal make connections, which will help with understanding and memory.

To create this product, I will use the DPS and XD from Adobe to design an eBook that can be downloaded as an app or eBook. The UI and UX design that I will take part in will enhance usability of the product and will take into account the learning models discussed in the next sections.

Support

The digital format for an educational tool to teach contemporary conflicts will be effective because the learning is based on individual interaction with information. The learning personalities of the target audience match with that of the features of an eBook. Along with the UI being effective, the subject has the potential to be successful because of the growing interest and appreciation for the field.

Learning Theories

Learning theories and models help identify the best way to present information that is optimized to the student's learning abilities and needs. There are three main types of learning theories: Learning, Behavior and Control. The Learning Theory states that students only seek information and learn if they are motivated to do so. Weiler (2004) writes of the Behavior Theory, which speaks of the need for positive and negative reinforcements to motivate students to learn. The Control Theory is based on the idea that if a student finds the subject relevant to their "basic human need," they will make an effort to learn it (p. 48). Along with these theories there are models for studying information-seeking behavior. One, written by James Krikelas (1983), stresses "need" and explains the process of seeking information as (1) perceiving a need (2) searching for information (3) finding information (4) using the information and finding either satisfaction or dissatisfaction (p. 46). Carol C. Kuhlthau wrote another model, which emphasizes cognitive skills such as confusion, anxiety, doubt and confidence as determinants in success in information seeking (p. 47). Eisenberg and Berkowitz write of a third model, a component based model, that pulls out the "Big Six Skills" as being

task definition, information seeking, implementation, use, synthesis, and evaluation as more flexible learning theory (p. 47). In all the models listed, motivation is critical. To move past the information-seeking process and have an individual understand a concept, critical thinking is necessary. Weiler (2004) also writes of a study from Grinnell College on the subject of critical thinking that found that students did not like discussing topics in which they did not have prior information. The study did find that students showed use of critical thinking when they found a personal connection to the topic and were more open to participate in discussion (p. 48). The proposed product will attempt to create personal experiences through the interactive feature of the maps and media throughout the text along with discussion questions after each section. The act of actively reading the information and having a mix of visuals and text will spark critical thinking in the reader. The product will evoke "multiplicity," which author Angela Weiler (2004) defines as,

> The ability to acknowledge that the world contains knowledge that the student cannot yet classify as right or wrong, knowledge, which requires further study and thought (the so-called "gray area"). The student progresses from dualism to multiplicity as they encounter more and more diversity and legitimate uncertainty in the world, facts of occurrences that cannot be easily answered or explained. (p. 48).

Multiplicity is an example of critical thinking that involves an active reader and leads to a better understanding of a subject. The interactive feature and discussion questions in the proposed product will reinforce this ideal. The proposed product is specific for the audience of students and educators of Generations Y and Z.

Learning Personas / The Millennial's Learning Personality

Weiler (2004) writes of a study at the University of Idaho that looked at the information-seeking behavior of Generation Y. It found that students of this generation

> Are primarily visual learners, a style which research has shown will almost certainly conflict with the learning style and habits of almost any instructor. Small changes in presentation, such as changing from pure lecture to incorporate hands on activities, will help to hold student interest and increase information retention. (p. 50-51).

Author Kate Manual (2002) writes from a background in library administration and sciences on teaching information specifically to Generation Y. She writes,

> Prominent among their preferences are visual and kinesthetic learning styles. They have incredibly positive views of technologies' potentialities and their own abilities with technologies. Like all students, they learn more effectively when taught in accordance with their learning style preferences and when their worldviews are acknowledged. (p. 197).

Generation Y, a group of individuals who grew up as the world was becoming digitally based, has evolved to be digital learners. For individuals of Generation Z, who were born into a digital world, a learning style that involves technology is most effective. Traditional forms of oral and literal teachings do not resonate as well with this group of learners. An interactive, visual, and digital format to convey information will have a higher chance of creating a positive and effective learning experience for the target audience.

Case Studies

The target audience sees geography in their everyday interfaces like in Snapchat and GPS. Along with daily technology, the inclusion of geography is already being tested in schools. When geography is taught in the context of ethnic and peace studies, it has received positive feedback.

Value of Peace Studies for Educators and Students

There are some schools and programs that are using technology to promote the education of geography and of contemporary conflicts. In the case of educating students of the modern world, the high school I attended, Notre Dame San Jose, offered courses in subjects such as Global Studies, Peace and Social Justice, Contemporary Social Issues, and Modern Conflicts. Some of these courses were required and others were history electives. Many of these courses taught the subjects by using personal connections with an emphasis on human dignity. Another high school that has courses that emphasize "Peace Studies" is the Oakwood School located in North Hollywood, California. The school offers a program entitled "Making Peace in a Violent World: Peace and Conflict Studies," where students travel to Oxford, United Kingdom with their faculty. In recent news, the city of Portland, Oregon, approved a proposal to plan and implement a program to teach ethnic studies in the city's public high schools. This proposal came with the support of students, faculty and parents. One Portland resident explained the importance of including this to curriculum to *Oregonian* reporter Parks (2016).

> She is quoted:
>
> "Eventually, as Oregon continues to diversify, those students are going to have to work alongside people from different backgrounds. The classes, Santos-Lyons said, can give all Oregon students a foundation for understanding each other."

Students' desire to become versed in the contemporary world and its conflicts can be seen in the popularity of programs already instituted by the schools.

GeoLiteracy

An example of the use of technology in the education of geography is GeoLiteracy, a program launched by the Arizona Geographic Alliance in 2002. The program was funded by a grant from the National Geographic Society Education Foundation and Arizona State University. Teachers from different subjects were called in to create a program on geography to be integrated into the language arts classes. They created over 80 lessons that were distributed in CD form along with supplemental materials and trainings for educators. The lessons were designed specifically for each grade-level and Generation Z students. At the lower levels, the exercises start by helping students understand the concepts of space and place. For example, students are asked to map out their classroom by drawing out furniture and the position of a cat. Upper levels tie in cultural connections such as the effect of Columbus's voyages on indigenous populations (Hinde and Ekiss, 2005, p. 28-29). The goals of the lessons are to have students use problem solving skills to learn geography and how it connects to subjects such as history and literature.

Snapchat's Passport Series

Launched in September 2011, Snapchat has quickly become a popular choice of social media for the targeted audience. The application provides services such as sending timed messages to individuals or a group of friends, posting a "story" that lasts 24 hours, and accessing "stories" from companies or "stories" that are available to all users globally. The application portrays videos and images that last a short amount of time, feeding into the short attention span of the younger generations. One feature is "Live Stories" which are "real-time crowd-sourced documentary made up on the fly by

the app's 100 million daily users" (Luckerson, 2015). In 2015, the application started a series that involved a city being highlighted each day and selected user stories being available on an international "story." The "Passport Series" started with major cities such as New York, Los Angeles, Dubai and Toronto and became instantly popular. Cities that were unknown to many Americans were spotlighted such as the capital of Slovakia, Bratislava. The series had positive responses such as that of Dodson (2015), who stated,

> Earlier this fall, Snapchat did a Passport series, spotlighting a different city or country each day with images of national foods and monuments. They were both educational and entertaining: I learned about language in Krakow, food in Paris, and partying in nearly every foreign city that got their moment in the spotlight.

Users were passively learning the geography on their personal device in a global context. Not only were they learning the stereotypical aspects of geography, but also they were seeing the culture and natural landmarks of a nation in an enticing manner. With Snapchat's live stories drawing "10 million to 20 million pairs of millennial eyeballs every day" the number of impressions is extremely high, proving the campaign to be effective (Dodson, 2015).

Google's Food Trends

A report on the culture-based topic of food, Google's (2016) "Food Trends," not only refers to the geography associated with the sustenance, but also dedicates an entire section to this topic that is highly visual. The section enables readers to understand the influences of the recipe along with how the item became a trend by transcending across global boundaries (see Figure 4).

Anticipated Challenges

Addressing the projected challenges a product foresees can be just as important as explaining the support for the idea. Difficulties can kill a product, but they can also identify weak aspects and be used in the betterment of the product. This thesis presents a draft of a product; therefore, issues are inevitable. Going beyond the ineffective features of the UI, I anticipate challenges for the use of the product in general.

One is that a media plan has not been created to seek out the implementation of the product. This is a challenge that has affected other programs of similar nature. The implementation of training, determining which courses the program is placed, and the lack of assurance of objective content are all foreseen issues for this proposal. Another is the pressure standardized testing places on teachers, which leaves them with minimal time for other subjects.

Another challenge that may pose a problem for the product is the use of technology in classes. There is a pushback against digital alternatives due to the traditional forms of educating being with print books and oral lessons. The pushback mainly comes from the baby boomer generation and older. Consequently, older educators and parents may not be inclined to acquire the product. Along with pushback, the use of laptops and iPads in classrooms is not universal at this moment. It is projected that it will be in the near future, which is vital for the success of this product. The examined support for the rationale behind this product combats these possible challenges; however, there is still foreseeable concern in the use of technology in classrooms in general.

Execution

The execution for the proposed solution to the problem addressed is an interactive eBook that explores contemporary conflicts through strong visual cues. The content and design of the eBook will draw upon techniques and standards for the education of geography as the subject embodies the desired outcome for how a user digests the information presented. The key aspect of this proposed product is that every feature of its interface is designed specifically to match the habits of the target audience. To obtain a product that effectively addresses the user's needs in an efficient and positive way, the XD (experience design) is planned out.

Experience Design

The services of the product expand beyond the human-to-product interface. Audiences interact with an output at many touch points from marketing, to purchasing, to packaging, to downloading, and to sharing their experience with other users. Designing for that holistic experience is a type of design that is expanding and improving with each coming year as professionals are developing new platforms of media. Experience design started as the process of designing for the user's experience with a specific digital platform such as a website, app, or software. UX is how a user experiences a system overall. It addresses "objective factors like usage time and mistakes, and subjective factors like aesthetics, usefulness and usability" (Wilson, 2011, p. 7). Human-Computer Interaction (HCI) is the broader discipline that UX falls into that is similar to XD, but focuses specifically on how humans are using computers to complete their desired tasks. This focus on human interaction leads to the specific study

and design of the front-end of a system for ease of use (UI). User interface design addresses all aspects of the user's senses interact and engage. The process to develop UI starts with researching the user, defining and outlining their needs and the tasks needed to address them, charting out possible user-flows, laying out information, prototyping the product, testing the prototype, and evaluating the UI design. Max Wilson (2011) summarizes the aspects of XD:

> User's experience is made up of 3 facets: temporal experience factors, emotional and affective factors, and holistic and aesthetic factors. UX designers aim to make a UI simple to use, intuitive, and effective for a given set of users. Using methods such as wireframes, personas, and scenarios, UX practitioners create conceptual designs that meet the needs of users, and integrate effectively with their working needs. (p. 11).

Overall, the design of a product's interface is important to the experience of the user being positive and, in turn, effective.

User Experience / User Interface

User Personas

The first step in designing UI and UX for a product is identifying the user. Without knowledge of the user, their background, or their lifestyle or their daily uses, one cannot design for them. To identify the user, it is imperative to ask questions. Johnson (2008) suggests some of these defining questions in *GUI Bloopers 2.0: Common User Interface Design Don'ts and Dos*. Johnson (2008) lists,

> For whom is this software being designed?
> Who are the intended users?
> What activity is it intended to support?
> What problems will it help users solve?
> What value will it provide?

> What problems do the intended users have now?
>
> What do they like and dislike about the way they work now?
>
> What are the skills and knowledge of the intended users?
>
> Are they motivated to learn?
>
> How are there different classes of users, with different skills, knowledge, and motivation?
>
> How do users conceptualize the data that the software will manage? (p. 9)

The answers to these questions create a user persona for the targeted audience. The persona describes who is using the project and gives vital information for designing the interface. Stephanidis (2001) writes of designing UI for an audience that is varied in *User Interfaces for All*. He identifies characteristics of the user and shows the importance of designing interface that can be understood by all and is effective for the majority of a diverse target audience. One topic Stephanidis discusses is the use of color. 8% of Western males and .4% of Western females are color blind, which means they confuse colors such as red and green (p. 23). Language is another characteristic of the user that should be analyzed, which is why the trend in UI is the use of icons as visual queues as a universal language (p. 28). Stephanidis also brings forth the concept of environmental effects, and the need to address the environment in which the user will be interacting with the product (p. 29). Cultural differences are another feature to think about when creating user personas as it determines much of how users operate. For example, people living in the Americas and Europe read left to right, while those living in the Middle East read right to left (p. 50). There are many aspects that are drawn together to create user personas, which when understood, could better the UI design of a product.

For my proposed product, the user personas can be seen in Tables 4-5.

User Tasks/Needs

After classifying the user and their personality and habits, the next step is to identify the user's needs for the specific product and the tasks needed to accomplish their goals. To reveal this information, questions such the following can be asked.

> What are the intended users' preferred ways of working?
> How will the software fit into those ways?
> How will it change them? (Johnson, 2008, p. 9)
> Why would they use this product?
> What do they hope to gain in the short-term?
> What do they hope to gain in the long-term?
> What are some of the main goals?
> What influences their actions?
> What similar products do they use?
> How long are they willing to spend?
> What is the priority of their different needs?

The answers to these questions for the proposed product are seen in Tables 4-5. When determining the user's needs and developing the tasks needed, it is important to keep in mind the rich picture. The rich picture is how the product and its system impact the user's everyday life (Wood, 1998, p. 115). In order to obtain a productive response to user needs, creating good interaction design in crucial. User frustration and dissatisfaction, especially with the user's first attempt at using a product, determines the product's lifespan.

Development

When developing the UI, basic rules for both visual and interactive design will be followed. A list of ten rules originally recorded by Nielsen (1990), but presented and

updated by Wilson (2011) consists of addressing: Visbility, Language, Control and Freedom, Consistency, Error Prevention, Support Recognition, Flexibility and Efficiency, Aesthetics and Minimalism, Clear Error Messaging, and Help and Documentation (p. 14-15). Another set of rules is expressed in Table 2, which displays Shneiderman's (2010) *Eight Golden Rules of Interface Design.*

Programs

To create the prototype, I am using Adobe InDesign, and specifically the features such as Interactive for PDF and DPS to show the interface and design the user-flows. I am also using Adobe XD to design the wireframe and develop a working prototype.

The user-flows and wireframes can be found in Figures 5-8.

Evaluation of UI

Once prototypes are created they are given to target users to test in order to get feedback and iterate on the input from their experience. There are many models used to evaluate UI design. In *Empirical methods are the main way of evaluating user interfaces, with user testing probably being the most commonly used method*, Nielsen (1994) lists different methods and when/why they are used (see Table 3). The first round of testing for the proposed product's prototype can be seen in Tables 6-7.

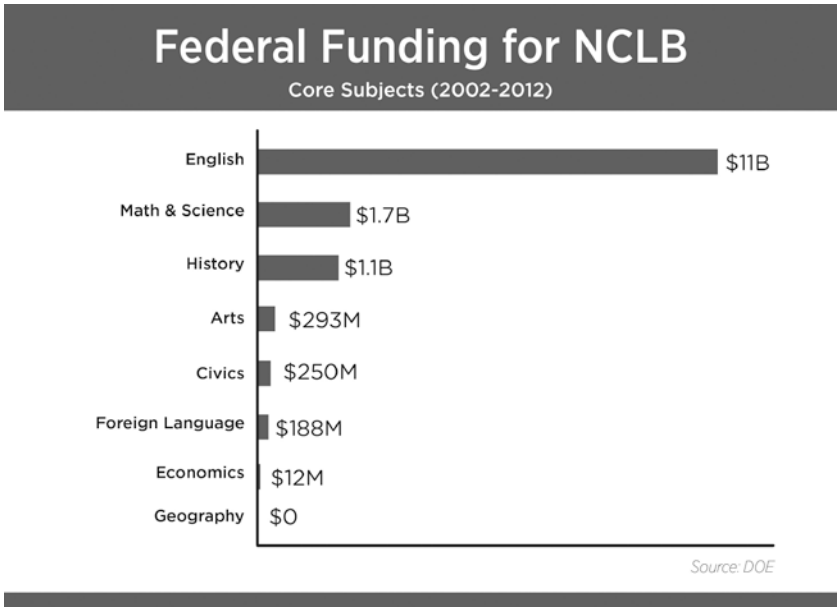
Desired Outcome

After the prototype is evaluated and tested a multitude of times, the goal is to present it to possible partners and funders. Applying for an education grant is an objective along with a partnership with a company that is currently working with mapping technology such as Google Maps and OpenStreetMaps. A partnership with an education organization such as the AAG would also be beneficial to generate the curriculum and training, and to facilitate distribution of materials to educational institutions. The GeoLiteracy Project in Arizona serves as a model for partnerships to develop content and promote implementation. A partnership with companies working specifically in XD, such as Adobe or Apple education, would also provide necessary resources and provide for a beneficial partnership.

Overall, this product is intended to be in schools across the United States where students will effectively learn about their globalized world.

Figures

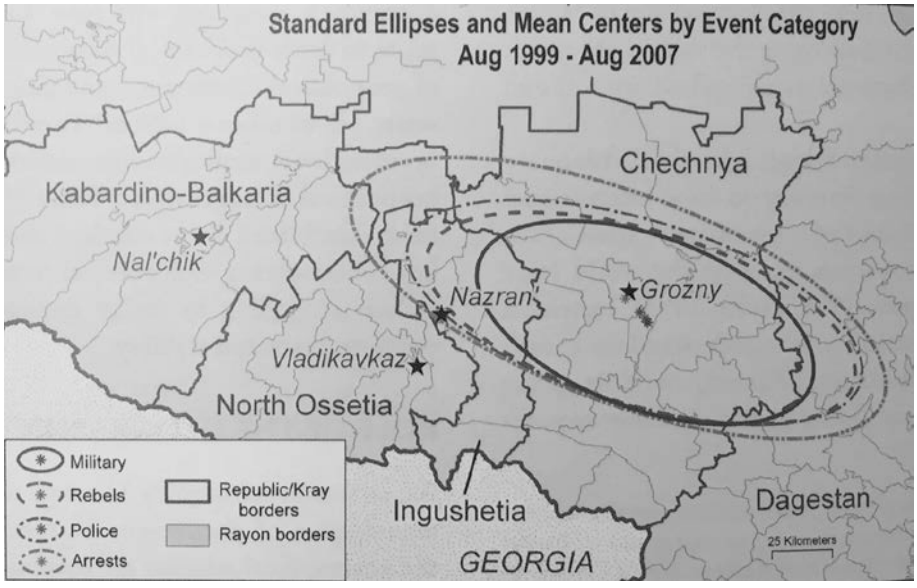
Figure 1



The amount of funding awarded to the core subjects listed in NCLB.

Source: U.S. Department of Education (2014)

Figure 2



Source: National Research Council of the National Academies 2010, p. 92

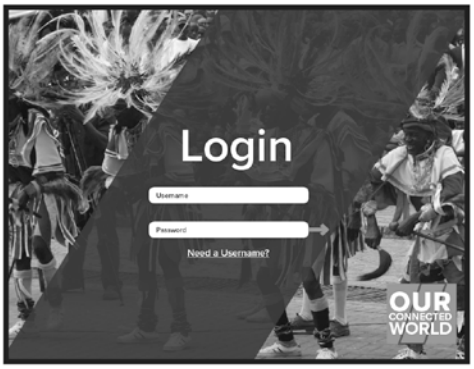
Figure 3

Source: Wikipedia

Figure 4

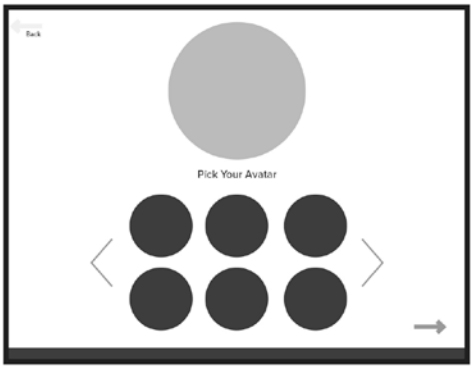
Source: Google (2016)

Figure 6
Product Flow for Grade Levels 9-12



Students enter the eBook using a username/password. If a new user, they click "Need a Username"

They will enter their information, ensuring that they include their class code so that they can participate with their peers



To ensure individuality, students have an avatar to represent them in class discussions, which they create after signing up.

The home page has a map that can be zoomed in or zoomed out by pinching (thumb and pointer finger). The "Join Your Class" bubble brings them to the region or conflict that their class is exploring that day

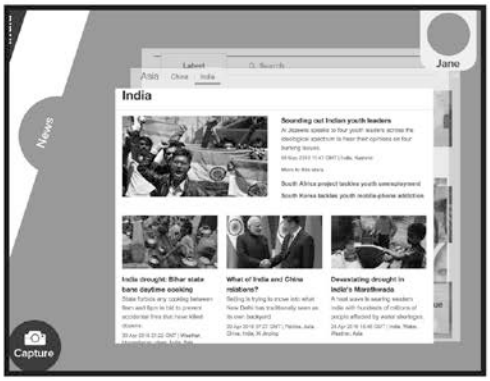
They are prompted by a summary of the conflict with interactive features are they read through the body copy. They are encouraged to take notes on their notepad and take screenshots of things they want to remember for the class discussion.

Students have other options to enhance their understanding such as a map, a compilation of news stories and their notebook.

Figure 6 continued
Product Flow for Grade Levels 9-12

At the end of each section summary, students will see the discussion questions that they will be asked during the class discussion. They can type in their answers to use later.

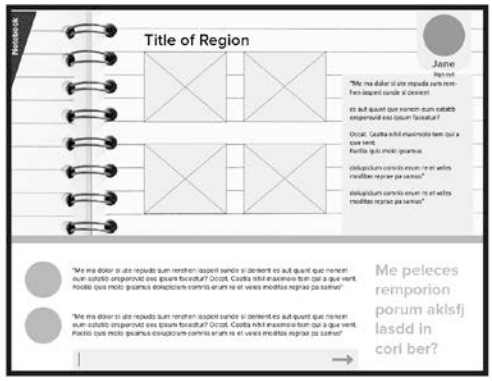
To aid their understanding of the situation, students can pull left on the "Map" tab to see an interactive map similar to Google Maps.



In a similar fashion as the "Map" section, students can learn more by pulling the "News" tab. Here students see recent news headlines on the conflict.

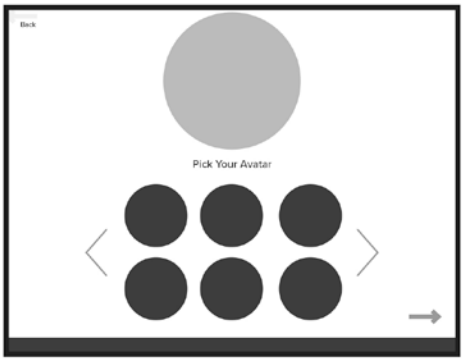
At a preset time, students will be asked to join a class discussion.

The discussion appears on the bottom of their screen, while the top allows them to continue exploring the product to aid their answers. One place they can go is their notebook.

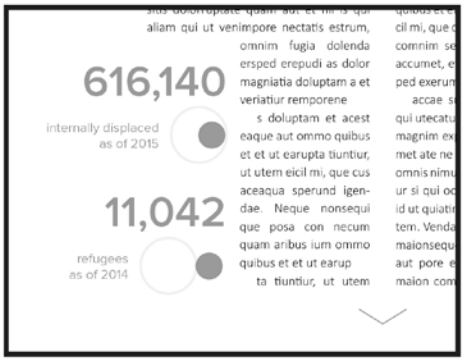


Their notebook has all the screenshots they took for each section along with the notes they recorded

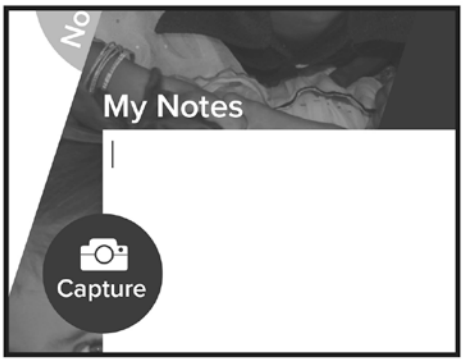
Figure 7
UI Highlights



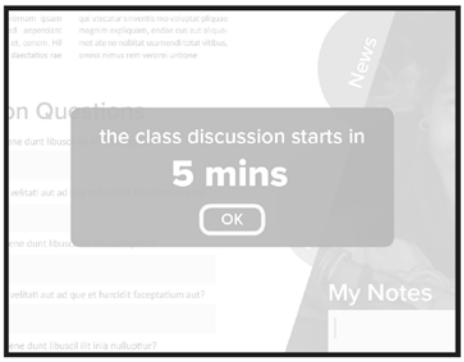
The avatar feature is important to the user because with their most used media being social media, they love having personal profile. Making the experience personal, places more pressure on students to work hard because the are being held accountable for it



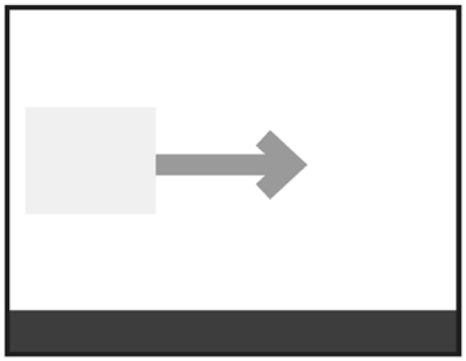
Graphics and media that evokes the senses such as video, audio and animations break up long bodies of text. All graphics display information in a highly visual way such as showing the difference between refugees and internally displaced people with the placement of circles.



One major critique of digital education tools, is the inability to take notes. Each page offers students the ability to type up notes or take a screenshot to look back on later.



Reminders that blur the background and that are in orange, surprise the user. They call attention to an announcement and ensure the reader reads it by having to engage with the alert by pressing "OK."



To move on, a green arrow is used. Arrows represent movement and the green enhances the idea of positive progress. The arrows are used throughout the product as a visual cue to students to move forward.

There are many interactive features available. For the map, students can pick a year in time through a slider which shows time and the sliding is a natural instinct.

Figure 7 Continued
UI Highlights

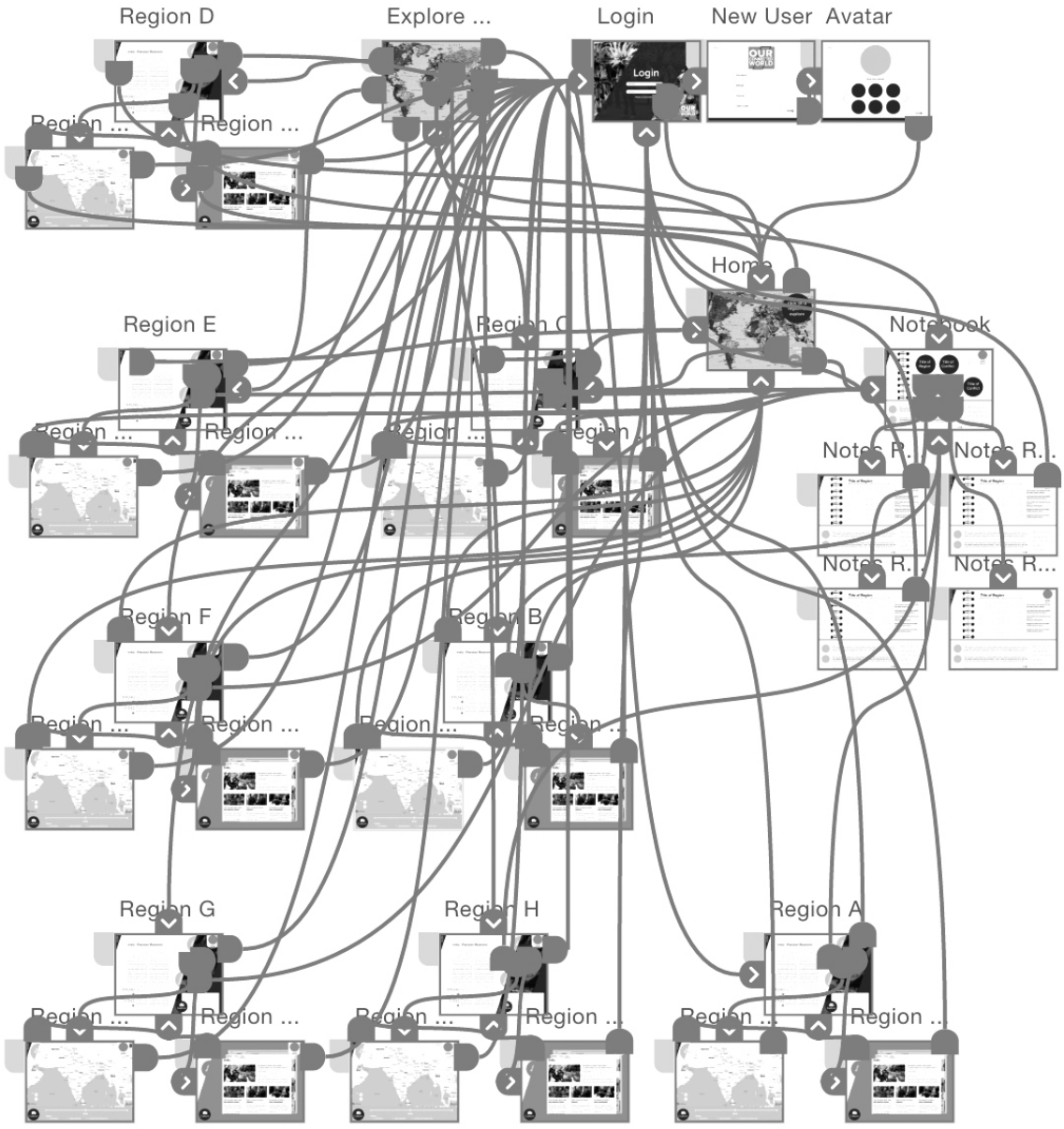
When students write in the discussion forum, their avatar appears next to the comment to reinforce individuality along with accountability.

Graphics such as the outlines of a nation and the area being discussed highlighted are present throughout the product. There is not a page that a student is on, that does not have a geographical reference.

All maps are from a mapping resource such as Google Maps or OpenStreetMaps. Because of this, users can interact with them by zooming in and out.

To access the additional resources such as the map, students slide the tab to the left and right. This movement is natural for them and gives the idea that they are adding layers of additional information.

Figure 8



Wireframe created in Adobe XD

Tables

Table 1

	A Geographically informed person knows and understands:
1	How to use maps and other geographic representations, tools, and technologies to acquire, process and report information from a spatial perspective.
2	How to use mental maps to organize information about people, places, and environments in a spatial context
3	How to analyze the spatial organization of people, places, and environments on Earth's surface
4	The physical and human characteristic of places
5	That people create regions to interpret Earth's complexity
6	How culture and experience influence people's perceptions of places and regions
7	The physical processes that shape the patterns of Earth's surface
8	The characteristics and spatial distribution of ecosystems on Earth's surface
9	The characteristics, distribution, and migration of human populations on Earth's surface
10	The characteristic's, distribution and complexity of Earth's cultural mosaics
11	The patterns and networks of economic interdependence on Earth's surface
12	The processes, patterns, and functions human settlement
13	How the forces of cooperation and conflict among people influence the division and control of Earth's surface
14	How human actions modify the physical environment
15	How physical systems affect human systems
16	The changes that occur in the meaning, use, distribution, and importance of resources
17	How to apply geography to interpret the past
18	How to apply geography to interpret the present and plan for the future

Source: The Geography Education Standards Project (1994)

Table 2

UI Goals	Description
Strive for consistency	Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout.
Enable frequent users to use shortcuts	As the frequency of use increases, so do the user's desires to reduce the number of interactions and to increase the pace of interaction. Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.
Offer informative feedback	For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.
Design dialog to yield closure	Sequences of actions should be organized into groups with a beginning, middle, and end. The informative feedback at the completion of a group of actions gives the operators the satisfaction of accomplishment, a sense of relief, the signal to drop contingency plans and options from their minds, and an indication that the way is clear to prepare for the next group of actions.
Offer simple error handling	As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible mechanisms for handling the error.
Permit easy reversal of actions	This feature relieves anxiety, since the user knows that errors can be undone; it thus encourages exploration of unfamiliar options. The units of reversibility may be a single action, a data entry, or a complete group of actions.
Support internal locus of control	Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions. Design the system to make users the initiators of actions rather than the responders.
Reduce short-term memory load	The limitation of human information processing in short-term memory requires that displays be kept simple, multiple page displays be consolidated, window-motion frequency be reduced, and sufficient training time be allotted for codes, mnemonics, and sequences of actions.

Source: Shneiderman (2010)

Table 3

Method	How/Why
Heuristic Evaluation	the most informal method and involves having usability specialists judge whether each dialogue element follows established usability principles
Cognitive Walkthroughs	Uses a more explicitly detailed procedure to simulate a user's problem solving process at each step through the dialogue, checking if the simulated user's goals and memory content can be assumed to lead to the next correct action
Formal Usability Inspections	Uses a six-step procedure with strictly defined roles to combine heuristic evaluation and a simplified form of cognitive walkthroughs
Pluralistic Walkthroughs	Meetings where users, developers, and human factors people step through a scenario, discussing each dialogue element
Feature Inspection	Lists sequence of features used to accomplish typical tasks, checks for long sequences, cumbersome steps, steps that would not be natural for users to try, and steps that require extensive knowledge/ experience in order to assess a proposed feature set
Consistency Inspection	Designers represent multiple projects inspect an interface to see whether it does things in the same way as their own designs
Standards inspection	Has an expert on some interface standard 'inspect the interface for compliance."

Source: Nielson (1994)

Table 4

User Persona

Questions	**Answers**
For whom is this eBook being designed?	• The perspective education or technology company wanting to invest in education tools.
Who are the intended users?	• Students in the United States aged 5-18 (grade levels K-12) *the main target audience for the XD design • Educators teaching social science courses
What products do the users use?	• Digital: o Smartphones o iPads o laptops o desktop computer o eReaders
What activity is it intended to support for the use?	• Educating on the contemporary world
What problems will it help users solve?	• Understanding the reasons and factors that feed into conflict • Presenting information in a manner that they are familiar with and already have positive associations with
What value will it provide?	• An understanding of their world • An advancement in obtaining jobs with global companies • A positive experience when reading/watching the news • Removes fear of what lies beyond the U.S.'s borders
What problems do the intended users have now?	• A lack of understanding/knowledge of the world o Beyond basic history and social media related tidbits • A misconception of what geography is • A negative connotation with the term
Why do they have a negative connotation with the term?	• Currently the term is used in reference to locating a country on map • Associated with memorization • Associated with subjects such as history o ("negative" because the target audience overwhelmingly feels that history is "boring")
What are the skills and knowledge of the intended users?	• Depends on grade level o Critical thinking skills varies o Prior knowledge of history and

	environmental sciences varies o All have experience with digital interfaces
Are they motivated to learn?	• In a learning environment, so already in that mindset • Motivated when the subject interests them • Yes, if they understand the material and in turn have positive associated memories
How do they absorb information?	• Through personal contact and interactions • Visually
How are there different classes of users, with different skills, knowledge, and motivation?	• Different grade levels • The higher the grade level, the more knowledge they have of world history and so understanding contemporary conflicts can become easier with critical thinking • The higher the grade level, the more accumulated knowledge they have • The higher the grade level, the level of rigor is increased in their studies

Information gathered from secondary and primary research. Primary research was conducted by informal questioning of individuals of the targeted audience.

Table 5

User Needs

Question	Answer
What are the intended users' preferred ways of working?	• Individually, but in a group setting • Personal interaction
How will it change them?	• It will provide them with new information and understanding
Why would they use this product?	• To educate themselves • For a grade in the class setting • Evaluation of their level of understanding
What do they hope to gain in the short-term?	• Rewards o Physical and literal • Name and place recognition • A grade on an assignment
What do they hope to gain in the long-term?	• A greater understanding of the world • Skills in critical thinking • Insight in different fields
What are some of their main goals at this stage in their life?	• Passing school • Having friends • Being happy
What influences their actions?	• What their friends are doing • If they have a positive experience with it o If they have the personal motivation to do it
What similar products do they use?	• Video games • Movies • Online articles • Websites that present stories and information such as Buzzfeed • Social Media such as Snapchat and Instagram
What do similar effective products have in common?	• Personal • Digital • Expressing oneself through the medium
How long are they willing to spend?	• If seen as educational, a specific about of time • If for pleasure, unlimited
What is the priority of their different needs?	• Doing something "right" • Enjoyment from the product • Learning something new • "Mastering" a product

Information gathered from secondary and primary research. Primary research was conducted by informal questioning of individuals of the targeted audience.

Glossary

Adobe InDesign: a program that is used to combine graphic elements into layouts for the purpose of publication

Adobe XD: a program created by Adobe that is used to design prototypes and display them online.

Digital Humanities (DH): an interdisciplinary field that uses new media and information technologies to answer cultural, historical, philological, and social questions. It uses new technologies of the information age to curate information and ensure accessibility.

Digital Publishing Suite (DPS): capability of Adobe InDesign to create and publish mobile-app and tablet experiences.

Elementary and Secondary Education Act (ESEA): signed into law in 1965 by President Lyndon B Johnson to promote full educational opportunity.

Generation Y: group of people born between 1985 - early 2000s (not definitive) that grew up during the change to a digital world.

Generation Z: group of people born between the late 1990s - present day (not definitive) that were born into a digital world.

Geography: the study of the world focusing on the physical aspects of Earth and looking at human involvement with the world's features such as land and resources.

Graphical User Interfaces (GUI): the point of contact between the digital product and the user. It uses graphic elements instead to text to signal the user to manipulate what is on the screen.

Human-Computer Interaction (HCI): the interaction between humans and computer systems. Study uses psychology, engineering, graphic design, computer science, and erogoniomics.

Hierarchical Task Analysis (HTA): an approach used to describe users' performance of tasks organized by human factors. The analysis provides an understanding of a user's tasks needed to achieve a goal.

Millennial: term used to describe group of people born between 1985 to the early 2000s. Can also be referred to as Generation Y.

No Child Left Behind (NCLB): reauthorized ESEA and the law came into effect in January 2002 after President George W. Bush signed it in 2001. The goal of this act was to increase grade-level reading and math scores by 2014.

Object Oriented (OO): used to describe a system that organized around objects rather than actions and data rather than logic.

PANDA: a methodology for designing UI. It starts with Participatory Analysis, then Design, and ends with Assessment.

Task Object Design (TOD): addressing the tasks of a user and organizing the user-flow to address said tasks.

User Experience (UX): overall, how an user will experience a system, including objective factors like usage time and mistakes, and subjective factors like aesthetics, usefulness and usability.

UX Design: the process of enhancing customer satisfaction by improving the usability, ease of use, and pleasure of the product-customer interaction.

User Interface (UI): the element the user sees and interacts with at the front-end of a system.

UI Design: the design of a product's content and layout into an attractive and responsive way for users.

Work Objective Decomposition (WOD): the work of the target user population in detail.

Experience Design (XD): practice of designing products and services with the quality of the user and their experience in mind. It is the UX of a product on a larger scale.

Works Cited

The Association of American Geographers. (2008). Teacher's Guide Project GeoSTART: Geo-Spatial Thinking Activities and Resources for Teachers of Geography and Earth Science. *Association of American Geographers*.

Bednarz, S. W., Soltman, J. P. and Jongwon, L. Preparing Geography Teachers in The United States. *International Reasech in Geographical & Environmental Education* 13.2 (2004): 176-183.

The College Board. (2016). "AP Human Geography Frequently Asked Questions."

Dicken, P. (2007). *Global Shift: Reshaping the Global Economic Map in the 21st Century.* New York, NY: Guilford Press.

Dodson, C. P. (2015). Why Snapchat's Live Stories are the Most Powerful New Social Media. *Fast Company.*

Downs, R. M. Being and Becoming a Geographer: An Agenda for Geography Education." *Annals of the Association of American Geographers*, 84(2), pp. 175-191. *Association of American Geographers.* Cambridge, MA and Oxford, UK: Blackwell Publishers, June 1994.

"The Economist." (2003). The Revenge of Geography. *Technology Quarterly:* Q1 2003.

"Geography," n.2. (2015). *OED Online*. Oxford University Press.

Geography Education Standards Project. (1994). *Geography for Life: National Geography Standards.* Washington, D.C: National Geographic Research & Exploration.

Geography Education Standards Project. (1994). *Geography for Life: National Geography Standards.* Washington, D.C: National Geographic Research & Exploration.

Google. (2016). "Food Trends." *Think with Google.*

Hinde, E. and Ekiss, G. O. (2005). No Child Left Behind ... Except in Geography? GeoMath in Arizona Answers a Need. *Social Studies and the Young Learner* 18(2), pp. 27–29.

Johnson, J. (2008). GUI Bloopers 2.0: Common User Interface Design Don'ts and Dos. *UI Wizards, Inc.* Burlington, MA: Morgan Kaufmann Publishers.

Luckerson, V. (2015). How Snapchat Built its Most Addictive Feature. *Time.*

Manual, K. (2002). Teaching Information Literacy To Generation Y. *Journal of Library Administration* 36 (1–2): 195–217.

Murray, W. (2006). *Geographies of Globalization.* London: Routledge.

National Research Council of the National Academies. (2010). "Understanding the Changing Planet." Washington D.C.: The National Academies Press.

Nielsen, J. (1994). *Usability Inspection Methods. In Conference Companion on Human Factors in Computing Systems.* Boston, Massachusetts: ACM, 413–414.

Nielsen, J. and Molich, R. (1990). *Heuristic Evaluation of user interfaces. In Proceedings of the SIGCHI conference on Human factors in computing systems: Empowering people.* Seattle, Washington: ACM, 249–256.

O'Louglin, J., and Raleigh, C. (2007). The spatial analysis of civil war violence. In *A Handbook of Political Geography*, eds. K. Cox, M. Low, and J. Robinson. Thousand Oaks, CA: Sage.

O'Louglin, J., Staeheli, L., and Greenberg, E. ed (2004). *Globalization and Its Outcomes.* New York: Guilford Press.

Parks, C. (2016). Ethnic studies classes coming to all Portland high schools. *The Oregonian/Oregon Live.*

Shneiderman, B. (2010). "Eight Golden Rules of Interface Design." *Designing the User Interface*.

Schulten, S. (2001). *The Geographical Imagination in America, 1880-1950*. London, England: The University of Chicago Press.

Stephanidis, C. (2001). *User Interfaces for All.* Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Trebek, A. (2013). Schools downplaying geography lessons. *Daily Rundown.* Host. Chuck Todd. NBC News.

Turner, Cory. (2015) No Child Left Behind: What Worked, What Didn't. *NPR Ed.*

U.S. Department of Education. (2010). The Nation's Report Card. *Institute of Education Sciences. National Center for Education Statistics.*

U.S. Department of Education. (2014). The Nation's Report Card. *Institute of Education Sciences. National Center for Education Statistics.*

U.S. Department of Education. (2001). No Child Left Behind. *ESEA.*

U.S. Department of Education, Office of Elementary and Secondary Education. Elementary and Secondary Education Act.

Vail, K. (2004). Fighting over history in our schools. *Education Digest*, Vol. 69 Issue 8, p31-38.

Weiler, A. (2004). Information-Seeking Behavior in Generation Y Students: Motivation, Critical Thinking, and Learning Theory. *The Journal of Academic Librarianship*, Volume 31, Number 1, pages 46-53.

Wilson, M. (2011). *Search User Interface Design.* Swansea University. Morgan and Claypool Publishers.

Wood, L. E. (1998). *User Interface Design: Bridging the Gap from User Requirements to Design.* Boca Raton, Florida: CRC Press.

Works Consulted

Bialasiewicz, L., Campbell, D., Elden, S., Graham, S., Jeffery, A., and Williams, A. J.. (2007). Performing security: The imaginative geographies of current US strategy. *Politcal Geography* 26: 405-422.

Blundell, B. G. and Schwarz, A.J. (2006). *Creative 3-D Display and Interaction Interfaces*. Hoboken, NJ: John Wiley & Sons, Inc.

Dalby, S. (2007). Regions, strategies, and empire in the global war on terror. *Geopolitics 12*(4): 586-606.

Diaper, D. and Stanton, N. (2003). *The Handbook of Task Analysis for Human-Computer Interaction*. CRC.

Elden, S. (2009). *Terror and Territory: The Spatial Extent of Sovereignty.* Minneapolis: University of Minnesota Press.

Ellis, D. and Swinder, K. (2016). *Manipulative Design*. Austin, TX: South by Southwest Interactive Conference, March 13th, 2016.

Flint, C. (2005). Dynamic Metageographies of Terrorism: The spatial challenges of religious terrorism and the 'War on Terrorism.' In *The Geography of War and Peace*, ed. C. Flint. Oxford: Oxford University Press, 198-216.

Goodchild, M. F. (2008). Commentary: Whither GVI? *GeoJournal* 72:239-244.

Krugman, P. (1993). *Geography and Trade.* Cambridge, MA: M.I.T. Press.

Kukulska-Hulme, Agnes. (1999). *Language and Communication: Essential Concepts for User Interface and Documentation Design*. Oxford, England: Oxford University Press.

O'Louglin, J., and Anselin, L. (1991). Bringing geography back to the study of international relations: Spatial dependence and regional context in Africa, 1966-1978. *International Interactions* 17:29-61.

Radford, T. and Capelo, L. "Designing Collective Action for Global Development." Austin, TX: South by Southwest Interactive Conference, March 12th, 2016.

Redding, S. and Venables, A. (2004). Economic geography and international inequality. *Journal of International Economics* 62:53-82.

The Sudden Demand for Maps. (1939). *Publishers' Weekly* 136, no. 1: 881-83.

Stone, D., Jarrett, C., Woodroffe, M., and Minocha, S. (2005). *User Interface Design and Evaluation.* San Francisco, CA: Morgan Haufmann Publishers of Elsevier.

Teacher's Guide to Modern Geography. *American Association of Geographers.*

Wojdylo, J. (2015). What City Will Be the Next on 'Life' Snapchat Stories? *Wojdylo Social Media.*

Preliminary Works Consulted Annotated Bibliography

"Adobe Digital Publishing Solution." San Jose, CA: Adobe Systems Incorporated, 2015.
This website explains what Adobe DPS is, and it gives links to examples of its use and reviews. I will be using this source to get inspiration for what can be created for the prototype of my solution.

Bednarz, Sarah Witham, Joseph P. Soltman and Lee Jongwon. "Preparing Geography Teachers in The United States." *International Reasech in Geographical & Environmental Education* 13.2 (2004): 176-183.
This source dives into the reasons why American students are not as proficient in geography as other students internationally. The reason it gives for the issue is a lack of education for the teachers. This source is useful to my research because it provides other reasons for a lack of geographic understanding other than NCLB, in which most research on has been done.

Cowan, Brian. "Why 'Digital Natives' Aren't Necessarily Digital Learners." *The Chronicle of Higher Education* (2011) *ProQuest.*Web. 27 Nov. 2015.
Cowan writes of the "digital native" and their characteristics. He writes of other variables that come into play with this generation that can hinder their learning. This source is useful to my research as it provides a counter to my argument that Generation Y and Z would benefit from a digital learning experience. It also provides other areas to look at in my research.

Downs, Roger M. "Being and Becoming a Geographer: An Agenda for Geography Education." *Annals of the Association of American Geographers,* 84(2), pp. 175-191. *Association of American Geographers.* Cambridge, MA and Oxford, UK: Blackwell Publishers, June 1994.
Downs defines what it means to be a geographer and how an educator can reach the level to teach the subject. This source is useful to my research because in the definition of a geographer, Downs writes of the connection between geography awareness and the contemporary world and news.

Hinde, Elizabeth and Gale Olp Ekiss. "No Child Left Behind ... Except in Geography? GeoMath in Arizona Answers a Need." November/December 2005. Social Studies and the Young Learner 18(2), pp. 27–29.
This source dives into the problems surrounding the education of social studies such as geography. It gives blame to NCLB and to the bad connotation of the

subject amongst teachers and students. This source is helpful to my research as it examines sources of the problems in the U.S. education system surrounding geography.

"Geography, n.2." *OED Online*. Oxford University Press, September 2015. Web. 30 November 2015.
The Oxford English Dictionary gives multiple definitions of a word and where the word and specific definition originated. This source is useful to my research because it is the most trusted dictionary source.

Manual, Kate. ‘‘Teaching Information Literacy To Generation Y,’’ *Journal of Library Administration* 36 (1–2) (2002): 195–217.
Manual describes the unique learning styles of the Millennials. She writes positively of the use of technology in the education of this demographic. This source is helpful to my research because it gives examples of learning methods and specializes in the learning capabilities of the generations I am targeting for my research.

Loveless, Douglas J., Debbie C. Sturm, Chengpi Guo, Kimiko Tanaka, Shenghua Zha and Elizabeth V. Berkeley. “Cross-Disciplinary Collaboration to Engage Diverse Researchers. *James Madison University*. Stillwater, OK: New Forums Press, Inc., 2013.
This source documents the MRF (Madison Research Fellows) program and its impact. It has not been proven useful to my topic because it only speaks of this program and does provide information useful to the subject of geography and contemporary conflicts.

Painter, Anthony and Louise Bamfield. “The new digital learning age: how we can enable social mobility through technology.” *RSA.* 1-78.
This source spoke highly of the use of technology in the modern world. The chapters that pertained to my research were on incorporating technology into classrooms. It brought forth four skills of digital learners and importance of the motivation theory.

Prensky, Mark. “Digital Natives, Digital Immigrants Part 2: Do They Really Think Differently?” *On the Horizon.* Vol. 9, 6. November/December 2001.
Prensky explores the make up of “digital natives” and how growing up with technology has provided them with a different learning experience that should be addressed. He promotes the idea that the human brain does change based on the stimulation it receives from the outside. This source is useful to my research because it reiterates the idea that the millennial generations would benefit from a digital and interactive form of education.

Rednarz, Sarah Witham, Jospeh P. Stoltman, and Lee Jongwon. *“Preparing Geography Teachers in The United States.”* 13.2 (2004): 176-183. *Academic Search Premier.*

This source provides information and tools to help teachers promote geography in their classroom. It explains the importance of the subject and gives way in which to incorporate it into other lesson plans.

Sheneman, Laura. “Digital Storytelling: How to get the best results.” School Library Monthly/Volume XXVII, Number 1/September-October 2010 40-42.
Sheneman provides tips and tools available to librarians in particular for digital storytelling. She also describes a study she conducted on the ease of use of these methods and the results with the students. I will use the statistics she provides in promotion of bringing technology into the classroom.

Suni, Eric and Tese Neighbor. “Teaching Global and Local Conflict in the Classroom.” *World Affairs Council,* October 2006.
This packet was created as a resource for participants of a professional development program hosted by the World Affairs Council. It provides links to resources that educate conflicts happening around the world. Some have specific educational resources and lesson plans. This is helpful to my research because it provides me with many examples of contemporary conflicts being conveyed in an interactive, digital way.

Thompson, Penny. “The digital natives as learners: Technology use patterns and approaches to learning.” *Computers & Education,* 65, 12–33. Stillwater, OK: School of Educational Studies – Educational Technology, 2012.
The source documents a study that investigated the “digital native” generation as learners. The results showed that the support to claims that digital natives learn at a greater rate using technology in school is scarce. This source will provide me with a counter to my argument.

Trebek, Alex. “Schools downplaying geography lessons.” *Daily Rundown.* Host. Chuck Todd. NBC News, May 23, 2013.
In this episode of the *Daily Rundown*, Chuck Todd hosts Alex Trebek, the National Geographic Bee and Jeopardy host, on the subject of geography and today’s youth. Trebek provides statistics including those of NCLB as well as anecdotes from his experiences. I will be using quotes from him to provide a rationale for why my thesis is important and the connection geography in schools has to the understanding of the modern world.

Turner, Cory. “No Child Left Behind: What Worked, What Didn't.” *NPR Ed.* October 28, 2015.
This radio broadcast and transcript looks at the repercussions of NCLB in the United States. It dives into what worked, and what did not work through references to reviews and articles written on the subject. It also explains the current state of NCLB. This is useful to my research because it provides sources to look at for a critique of the law as well as summarizes many of the arguments.

U.S. Department of Education, Office of Elementary and Secondary Education. "Elementary and Secondary Education Act."
The source is the U.S. Department of Education's webpage on the ESEA. It provides the history of the act, information on NCLB and the current state of the act in the United States. This source is useful because it provides the official statement of the acts I am looking at and the current use of them. It is reliable because it is a government website.

U.S. Department of Education, Office of Elementary and Secondary Education, *No Child Left Behind: A Desktop Reference,* Washington, D.C., 2002.
The source is downloadable PDF of the No Child Left Behind Act. It is credible as it is retrieved from the Department of Education's webpage. It will be useful for my research because I introduce it as a reason for the problem my thesis is addressing. The source informs me of the inclusion of geography in the national standard along with the funding, or lack there of, given to the subject.

U.S. Department of Education. "The Nation's Report Card." *Institute of Education Sciences. National Center for Education Statistics.* 2014.
This "report card" looks at the progress in the proficiency in geography for American eighth-graders. It shows the progress between 2010 and 2014.

U.S. Department of Education. "The Nation's Report Card." *Institute of Education Sciences. National Center for Education Statistics.* 2010.
The source is a national assessment of educational progress in the subject of geography in American schools. It looks specifically at grades 4, 8, and 12.

Vail, Kathleen. "Fighting over history in our schools." *Education Digest.* April 2004. Vol. 69 Issue 8, p31-38.
The source provides information of how NCLB affected the education of history, geography and civics. It specifically discusses the teaching of "social sciences" in school and the lack of resources to properly teach it. This is helpful to my research because it highlights the trend that I have seen as an effect of NCLB: subjects being neglected due to the high value placed on math and reading.

Weiler, Angela. "Information-Seeking Behavior in Generation Y Students: Motivation, Critical Thinking, and Learning Theory." *The Journal of Academic Librarianship,* Volume 31, Number 1, pages 46-53. November 2, 2004.
Weiler's piece looks at the action of information seeking specifically with Generation Y. She addresses the behavior, motivation, critical thinking and learning theories surrounding the act of seeking information. This source provides insight to my thesis by presenting different learning theories along with specific learning personalities related to Generation Y.

Xu, Hui. “Using Mathematical Software in High School Math Class: A Case Study.” International Journal of Information and Education Technology, Vol. 6, No. 12, December 2016.
Xu argues that the education of math at the high school level is best taught through technology. He provides examples of interactive models such as the Newton iteration method and the Maple-aid-teaching method. This source has not been useful to my research because it specifically deals with the education of mathematics