Bridging The Gap
Designing High School Learning Experiences for 21st Century College Preparedness

by

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ABSTRACT

In this action research, the need for high schools to embrace a pedagogical shift to teaching 21\textsuperscript{st} century computer and online literacy skills is investigated. This study explored areas of secondary and higher education, technology usage, and online pedagogies, 21\textsuperscript{st} century skill frameworks, and brain function as they pertain to learning and decision-making, with the aim of comprehending the differing high school levels of preparedness for college in regards to 21\textsuperscript{st} century skills. Through literature reviews, a research was designed to further explore the specific areas of a discovered gap in high school students' 21\textsuperscript{st} century skills for college. Pre- and post-unit surveys, in combination with student assignment scores, were complied and examined to reveal a weakness in academic habits and computer literacy skills associated with 21\textsuperscript{st} century learning. The study results support literature review findings of a breach between high school 21\textsuperscript{st} century skill levels and collegiate level necessities. With these findings, it is suggested that instructors become choice architects, giving them the unique ability to nudge high school policy makers and students towards identifying the gaps between the analog and digital worlds of academia, generating more successful students as they transition to university online courses.
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CHAPTER 1

INTRODUCTION

Problem Statement

Over the last few decades, the United States economy has grown from a manufacturing market to a service market, primarily driven by the innovation and information supplied by the progression of technological advancements (Ballanca & Brandt, 2010). Through a shift from analog to digital learning opportunities, the American higher education system has been trying to meet the industry advancement needs by generating experiences in building 21st century skills in information, media and technology. Where modern corporations and higher-level learning institutions have begun adapting their business and learning models to adopt and embrace digital technology, high school education has neglected to embrace the same evolutorial cycle. The American high school system is meant to prepare students for college, providing pupils with knowledge, skills and abilities that will ready them for the transition to higher education. Yet despite its purpose, many high school practices and instruction are being delivered in a manner that does not provide students with concrete skills and habits needed to be successful in 21st century university-level courses.

Significance

High unemployment rates, global work pattern shifts, education funding cuts, rising food and energy costs, climate change: these economic and community issues factor into an increasingly complex future for ourselves and our children (Trilling & Fadel, 2009). The question, as stated by Bernie Trilling and Charles Fadel, then becomes: “How can we help our students learn what is necessary to be prepared for the jobs that might be there when they graduate, and for the kinds of problems they will face in a more uncertain, rapidly
shifting, competitive and connected world?” (2009, page xv). Trilling and Fadel (2009) offer the idea that the conversation about 21st century learning has graduated from discussion and needs immediate, active implementation of a learning process which addresses the future’s uncertainty and its relation to the ever-changing technology.

This argument also suggests that the current generation of students is intrinsically different from its predecessors. As Bob Perlman states, “The digital natives are restless,” (Bellanca & Brandt, 2010, p. 118). The ‘digital native’ generation is constantly bombarded with information through online videos and hypertext. Through this over-inundation of information, the digital native generation has experienced the world in a different manner than their predecessors. Their brains have grown to be wired to compute at the speed and attention rate of the digital world. As Nicholas Carr (2010) suggests, “As soon as you inject a book with links and connect it to the Web -- as soon as you ‘extend’ and ‘enhance’ it and make it ‘dynamic’ -- you change what it is and you change, as well, the experience of reading it” (page 103). The issue here, of having an already restless student, is proliferated in that the information they are asked to regularly decipher is hypertext, which increases a reader’s cognitive load, thus diminishing their capacity for comprehension and retention, therefore making learning in a digitally advanced society even more challenging (Carr, 2010).

These issues, in combination with the fact that 80% of universities across the nation offered some type of online or hybrid courses in 2012, does not simply suggest a need for a more prepared college candidate; it demands it (Cacciamani, et al., 2012). Without better-prepared high school graduates, colleges and the future American economy are at risk for falling behind other countries who are prepared for advancement.

Purpose of Study
This research explored areas of secondary and higher education, technology usage, and online pedagogies, 21st century skill frameworks and brain function as they pertains to learning and decision-making. The aim was to better comprehend high school preparedness for college and generate new knowledge about the subject, with the ultimate goal to encourage educators to implement aspects of 21st century skill learning within their classroom environments.

As educators, we can do our part to prepare students for the demands of their communities, colleges and careers. Accepting the knowledge that we are at, what Malcolm Gladwell (2000) calls, a ‘tipping point’ within the public education sector, we can appreciate the need for a 21st century school model that better prepares our students to be actively engaged in their communities, prepared for their college experiences, and successful in their careers within this millennium (Bellanca & Brandt, 2010).

It is important to note that focusing learning on information, media and technology skills is an initial and crucial step to initiate change and begin bridging the gap between the analog experiences in high school and the digital experiences in college.

The intention of this research was to uncover the disconnect between high school and collegiate level learning for the 21st century in the United States though literary research and a action research project, an illustrative model of how online learning opportunities encourage 21st century skill advancement within high school levels.

Conceptual Framework
The format for this framework is based on the “Statement of the Eames Design Process,” that showed the intersecting areas of concentration when solving a design problem drawn by Charles and Ray Eames in 1969 at the Exhibition “Qu’est-ce Que Le Design?” (Gajendar, 2008). The focus of this research is found in the center intersecting area, where High School Needs, College Needs, and 21st Century Skills meet. The knowledge needs of high school and college level students are broad when beginning at freshman level, and narrow in focus as they reach graduation readiness, hence the similar kidney bean like shapes (refer to Figure 01). Critical 21st century skills develop over time, beginning prior to high-school entry and developing most after college graduation, hence the protruding area going before and beyond the high school and college-need areas. As a visualization of these skills, all three areas are important; however, it is the intersection of all three that best represents the disconnect between high school and collegiate level learning for the 21st century in the United States. It is this area that is most concerning and can also provide the best information to use to create change.
Operationalization

**Online Learning.** Online learning, for the purposes of this study, is defined as an education in which instruction and content are delivered predominantly over the Internet (Watson & Kalmon, 2005). The term does not encompass printed-based correspondence education, broadcast television or radio, or stand-alone educational software programs that do not have a substantial Internet-based instructional component (U.S. Department of Education Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service, 2010).

**Hybrid Learning.** Hybrid learning, within the context of this study, is any instructional time a student learns partially at a supervised brick-and-mortar location away from home and partially through online delivery with some element of student control over time, place, and pace (Horn & Staker, 2011).

**Digital Native.** Digital Native refers to the members of the first generation to grow up surrounded by digital technology and media, and therefore are raised with a familiarity of computers and the Internet from an early age. They are born after the Digital Immigrant generation, who learned to use technology later in life (Prensky, 2001).

**21st Century Skills.** Twenty-first century skills refer to the skills and habits needed for students to thrive within the 21st century. Laid out by the Partnership for 21st Century Skills (P21) in their Framework for 21st Century Learning, these skills include Life and Career Skills, Learning, and Innovation Skills, and Information, Media, and Technology Skills. The 21st century skills considered in this study focus mainly on student literacy of the Information, Media, and Technology Skills, and the academic habits related to the Life and Career Skills section (Bellanca & Brandt, 2010). The Information, Media, and Technology Skills tier breaks down into three subtopics: Information Literacy, Media Literacy and
CHAPTER 2

LITERATURE REVIEW

To date, research conducted about the advantages and disadvantages of online education as it pertains to higher education has been widely published. Many published works discuss teaching online literacy or entry-level courses on a ‘how-to’ level only; they provide statistics and theories for how online education should be executed for both the secondary and higher education levels. Additionally, members of P21 have also completed research, involving frameworks for 21st century skills needed for current and future learners within the high school and university levels of education. Because very few publications specifically discuss online education and 21st century skills as they pertain to the fine arts, these publications provide a platform from which further research can be conducted.

For this particular study, the research scope was narrowed to discuss information relevant to the Information, Media, and Technology Skills tier of the P21 learning framework (Trilling & Fadel, 2009). Specific topic areas include the current state of secondary and higher education, technology usage, and online pedagogies and brain function as it pertains to learning and decision-making.

Current State of Online Learning at the University Level

The world has gone through fundamental changes in the last few decades, so much so that the role of education has changed along with it (Trilling & Fadel, 2009). American universities, for example, were put forth as institutions to prepare students for the workforce. The state university systems were products of the Industrial Revolution and American territorial expansion (Khan, 2012). Though many skills needed during these times, such as critical thinking and problem solving, are just as relevant today as they were then, it is how these skills are acquired through learning and practice in the 21st century that is
rapidly changing (Trilling & Fadel, 2009). As time progresses, so too does technology, and as technology is progressing, new skills are needing to be mastered, such as digital media literacy, an idea not even imagined fifty years ago (Trilling & Fadel, 2009). Our economy has grown from an industrial manufacturing market to a service-minded economy, driven by information and innovation. Over three-quarters of all jobs in the United States are now in the service sector (Ballanca & Brandt, 2010). Thus the United States higher education system is trying to keep up with the demands of a growing technologically advanced workforce.

As corporations are pivoting their presence online more and more, American universities are shifting their course offerings online, as well, to address the digital media literacy skills found in the 21st century workforce. In a 2001 survey given to American university chief academic officers, 65.5% agreed, “Online education is critical to the long-term strategy of my institution” (Allen & Seaman, 2011, p.8). Those administrators were correct: from fall 2002 to fall 2010, student enrollment in one or more online college courses grew 18.3%, from 1.6 million students to 6.1 million students (Allen & Seaman, 2011, p.11). In 2013 the proportion of college students nation-wide taking online courses reached an all-time high of 32% (Allen & Seaman, 2013, p.4). As these figures show, the growth achieved in just a decade is staggering, and university administrations are responding to the demand and potential that online education offers.

Universities have also begun partnering with corporations so that both can benefit from the accessibility of online education. Most notably, in 2014, Arizona State University formed the Starbucks College Achievement Plan, a partnership that creates an opportunity for eligible Starbucks employees and partners to finish a bachelor’s degree with full tuition reimbursement for juniors and seniors through a unique collaboration with Arizona State University’s online degree programs (Arizona State University, 2014). With the backing of
university administration and American industry, it is no surprise that in 2012, of all colleges in the United States, more than 80% offered at least one online or hybrid course (Cacciamani, et al., 2012, p.874). It is this shift from analog to digital learning and the rise of online accessibility and course offerings that define the current state of university level learning.

**Current State of High School Education**

It is the responsibility of educators to guarantee that today’s students are ready to live, learn, work, and thrive in this high-tech, highly participatory world (Ballanca & Brandt, 2010). To that end, American school systems are conspicuously out of sync with the culture of today’s society (Ballanca & Brandt, 2010). Where modern corporations and higher-level learning institutions have begun shifting to the digital realm, high school education has not followed the same evolutionary cycle. During his lecture at the 2005 National Education Summit On High Schools, Bill Gates (2005) stated, “America’s high schools are obsolete…our high schools were designed fifty years ago to meet the needs of another age. Until we design them to meet the needs of the 21st century, we will keep limiting – even ruining – the lives of millions of Americans every year.” These strong statements clearly define the current state of the American high school: as an educational system, it is out of date and out of touch with current academia and the real world.

In his book *Education Nation: Six Leading Edges Of Innovation In Our Schools*, Milton Chen (2010) also discusses the idea that current high school models are out of date. He points out that the education system is clinging to a 20th century factory model and is losing relevance for the 21st century learner. Chen puts forth the notion of “the time/place edge,” where he rejects the antiquated view that learning occurs in discrete time periods and specific places (2010, p. 139). He argues that schools should be redefining the day beyond traditional
boundaries, much like universities do: staying open later and on Saturdays to provide additional extended academic support for students, providing additional recreation opportunities and enabling additional experiences with project-based learning (Chen, 2010). Chen believes that this approach paves the way for a new world where learning and school shift to a democratization of knowledge with open access 24 hours a day, 7 days a week (Chen, 2010).

The complexity of modern society and the inequitable preparedness that current high schools give is another argument that comes up when researching the current state of high school education. With an increasingly complex society, we need to change our education system to match (Roblyer, 2006). Societally speaking, the idea of a nuclear family is no longer the reality for the majority of high school students. Many students do not receive the family and social support that they need to stay in school, nor are they motivated to be engaged in school learning that seems irrelevant to their future (Bellanca & Brandt, 2010). Possibly in relation to this, high school dropout rates have reached a crisis level, with only 70% of students graduating from high school on time with a traditional diploma (Bellanca & Brandt, 2010). J.T. Gatto (1992), in his book *Dumbing Us Down: The Hidden Curriculum Of Compulsory Schooling*, argues that the current model of schooling further separates parents and children from vital interaction with each other. He argues that children need to spend more time in their communities, learning alongside their families. He believes this will breed stronger families, in turn creating better schooling communities that encourage engagement and completion (Gatto, 1992).

The U.S. Department of Education, as well as educational pioneers such as Bill Gates, Milton Chen, and J.T. Gatto, clearly recognizes that the American high school education system is out of date. Although educators and policymakers have advocated for a
move away from the traditional school system, and according to a study by the U.S. Department of Education (2010) showing online learning for K-12 students as one of the fastest growing trends in educational technology, most schools still follow an antiquated model (Chen, 2010). It is clear our current model needs to let go of the tired school structures, as they have lost the power to engage a digital minded learner (Alvermann, 2010). If we truly want to reform our school system, we need to modernize and revise our thinking on how education should happen, so that we can prepare children to learn effectively in the 21st century.

**Online High School Classes as a Solution**

If the American high school system is meant to be preparing students for college, then their practices and instruction need to be delivered in a manner that provides students with concrete skills and habits necessary to be successful in university-level courses. In addition, as universities are following the digital media literacy trends of a growing technology-driven, service-minded workforce, it is imperative that high school learners are exposed to similar experiences. Yet the growing number of universities adding online and hybrid course offerings, in conjunction with the outdated practices of the American high school education system, shows a clear disconnect in pedagogical alignment. To narrow the gap between the analog and digital learning inequalities of high school versus university learning environments, high schools need to be offering online and/or hybrid-based instructional classes to better prepare students for college in the 21st century.

One simple fact dividing high school students and college success is that they are ill-equipped for the complex interactions and academic discipline needed to be successful in college-level online courses. In her 1999 case study of college students participating in an online course, which taught online course-taking skills and literacy, Suzanne Stokes cited
evidence that supports the idea that a majority of students are technologically unprepared to take part, successfully, in fully online courses. The purpose behind the course offering was to develop basic competencies for participating in and learning through online courses, while gaining confidence to continue with their educational program (Stokes, 1999). Stokes stated, "Only students who have the equipment and skills to manage the new technologies will be successful," and elaborated, “When students recognize the usefulness of computers, the desire to learn is increased” (Stokes, 1999, p.162). This exhibits that there is, in fact, a disconnect in the technological experiences of incoming students within college level learning environments, and although it is dated, Stokes’s case study clearly demonstrates that once students understand the purpose of technology in the classroom, getting technology literacy buy-in and engagement from the student is possible.

Another reason the American high school system should be shifting to online learning experiences is that their students have changed with the times, meaning that the current generation is intrinsically different from its predecessors. The digital native generation is one of restlessness; they are constantly bombarded with information and are likely to have a computer, Internet access, and smartphones at home (Ballanca & Brandt, 2010). Opposite this, at school, they sit at small desks, write by hand, and do paper worksheets. Due to differences like this, it is no surprise the current high school model is disengaging them. As Nicholas Carr (2010) states in his book *The Shallows: What The Internet Is Doing To Our Brains*, "Knowledge is what you recall, and what you recall is limited to what you can hold in your mind" (p.56). As knowledge is relevant to the ability to hold information in the mind, it is imperative that learning activities in school are engaging and
relevant to captivate a restless student’s mind. Again, introducing online learning experiences could be one way to captivate restless students in an academic fashion.

Concurrently, university leaders are beginning to also recognize the disconnect between the information, media, and technology skills of incoming students in recent years. In a 2007 survey, 80% of academic leaders cited the need for more discipline on the part of online students, and in 2012, that consensus grew to more than 88% (Allen & Seaman, 2013, p.6). A potential solution to this detachment between high school and university skill sets in technology could be the introduction of online and hybrid course offerings at the high school level.

Currently, Distant Learning programs, online-based academic offerings, are common for rural areas in the United States but a relatively small amount of high schools on the national level have implemented online or hybrid courses for traditionally enrolled students, let alone require it for graduation (iNACOL, 2013). In 2006, Michigan became the first state to require online learning for their high school graduates (iNACOL, 2013). Since then, four states – Alabama, Arkansas, Florida and Virginia – have added the requirement (iNACOL, 2013). Georgia, New Mexico, and West Virginia recommend that students take online learning courses before graduation but do not require it (iNACOL, 2013). These states have implemented online learning regulations due to the numerous benefits that online and hybrid learning environments offer, such as expanding course offerings, offering personalized learning, affording falling behind students a chance for mastery of content, and providing a data-rich, interactive learning model for schools that is relevant to their 21st century-minded students (Bakken, et. al, 2011). Chen discusses the promise of online learning opportunities in high school as leveling the educational playing field by providing high-quality learning to all students (Chen, 2010). Chen also points out that technology has brought about what he
calls “the death of the lecture,” which has made it possible to provide learning experiences that are more highly engaging to a restless, digitally-advanced, and knowledge-hungry generation of students (Chen, 2010).

Suggesting a change in the entire functionality of the American high school education system is a daunting, time-dependent, and seemingly impossible task. However, as universities and corporations continue to grow along with technological advancement, the high school education system will eventually be forced into changing if it wants to stay at all relevant. In order to speed up this change, the American high school education system is in need of a nudge. In their book *Nudge: Improving Decisions About Health, Wealth, and Happiness*, Richard Thaler and Cass Sunstein (2009) discuss the idea that decisions and changes can be initiated by nudging humans into a fixed direction using small changes in contexts. They introduce the idea of people who have “the responsibility for organizing the context in which people make decisions” as choice architects (Thaler & Sunstein, 2009, p.3). These choice architects leave small details to elicit major impacts on people’s behavior. Many people, as it turns out, are choice architects. For instance, a person describing possible education options to a student is a choice architect. In this scenario, the person has the opportunity to lay out indicators to influence which decisions the student makes regarding their educational options (Thaler & Sunstein, 2009).

What educators, administrators, and policy makers can do is recognize their influence as choice architects to design learning experiences that include online learning opportunities for high school students to impact a change that overhauls the American public high school system. As an example of this in action, we can reference the opportunities given to the students in the action research project, described in the next section. Though small in scale, only lasting the length of one academic unit, and with little
done in terms of extra work on the part of the educator, the online educational experience affected lasting results for the involved students. Nudging students with opportunities like the aforementioned action research project, over time, will allow students to gain valuable pre-knowledge for future online college level learning.

Though it will take a soft approach to persuade educators, administrators, and policy makers to switch from their currently well-practiced, analog education system to a newly modeled digital education world, change is possible. Using Thaler and Sunstein’s (2009) idea of nudging and connecting educators as choice architects, it is possible to initiate change within the high school learning environment through small steps that bring forth great outcomes of real-world/relevant experience for high school learners in the 21st century.
CHAPTER 3

METHODOLOGY

The research questions and methods overviewed in this section, combined with the goal of this research to generate knowledge regarding the disconnect between high school and collegiate level learning for the 21st century in the United States, informed the applied action research project. First, a literature review of information relevant to the Information, Media, and Technology Skills tier of the P21 learning framework (Trilling & Fadel, 2009) was carried out. Specific topic areas included in this review were the current state of secondary and higher education, technology usage, and online pedagogies and brain function as they pertain to learning and decision-making. From this review, an action research project documenting the 21st century academic habits and skills learned via hybrid and traditional learning environments was carried out.

Research design

When looking to discover patterns, find solutions, and inspire change, both qualitative and quantitative research methods are necessary. Utilizing both qualitative and quantitative methodologies can lead to a superior level of quality information (Robson, 2002). The design of this research was a mixed approach. Both quantitative and qualitative data were used to provide a deeper understanding of the educational gap in 21st century skills between high school and college levels.

Research for this study included a literature review in the areas of the current state of secondary and higher education, technology usage, and online pedagogies and brain function as they pertain to learning and decision-making, with emphasis on how they relate to the Information, Media, and Technology Skills tier of the P21 learning framework (Trilling & Fadel, 2009). The mixed method approach also included on-line surveys that gathered data
from the participating group of students and graded assignments following the Cambridge IGSCE Art & Design grading rubric (Appendices A & B).

A course website was constructed as it was the most versatile and functional tool to distribute online course assignments and surveys to the involved hybrid students. The Wordpress platform was chosen to develop the website due to its functionality when updating information and quickly constructing web content. Wordpress allows the creation of a site with basic web knowledge, allows for feedback and discussions with the audience, and offers many performance and application extensions.

**Literature Review Questions, Research Questions & Methods**

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<td>What can be done to design more effective learning output experiences, with regards to 21st century skills, for American high school students to succeed within the challenges of collegiate-level courses they will experience after they graduate?</td>
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<td>Where are college candidates lacking in preparation of 21st century skills?</td>
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<td>What research has been done to provide students with better 21st century skills for college?</td>
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**Figure 2. Research questions and methods for data collection.**

The literature review and research questions (Figure 2) define the type of data/answers this research was trying to collect, as the literature review questions inform the background analysis and the research question informs the action research project. To access a richer collection of data, the primary research question was broken down into three
secondary questions, which informed either the literature review or action research project. Three data collection sources were used: literature review, surveys, and assignments.

**Surveys.** The surveys for this research study were designed to anonymously gather pre- and post-action research data regarding the academic habits and computer/online literacy skills, which document the growth of 21st century skills in traditional and hybrid learning environments. Furthermore, the surveys documented the specific skills in which students believed they were lacking. The surveys provided insights as to where skill preparation was necessary and where it was not. Finally, they provided insights as to why students may or may not have been successful in 21st century skill growth when compared to academic scores.

**Limitations.** Surveys were used as one of the primary sources of data collection. This method generated data from the participating researched students in order to measure pre- and post-research level academic habits and computer/online literacy skills. According to Robson, a research expert, surveys “provide a relatively simple and straightforward approach to the study of attitudes, values, beliefs, and motives” (2002, p. 233). However, with the advantage of simplistically gathering data comes disadvantages that should be highlighted. Robson (2002) cautions “data are affected by the characteristics of the respondents (e.g. their memory; knowledge; experience; motivation; and personality). Respondents will not necessarily report their beliefs, attitudes, etc., accurately (e.g. there is likely to be a social desirability response bias – people responding in a way that shows them in a good light).” To that point, respondents “may not treat the exercise seriously and you might not be able to detect this” (Robson, 2002, p. 233).

**Course Assignments.** Another source of data collection was eight course assignments, three of which were project-based, requiring the use of the Cambridge IGSCE
Art & Design grading rubric. The other five assignments were test-based and graded on correct or incorrect answers. This method was, like the surveys limited. Due to the anonymity of the survey responses, individual survey scores could not be directly correlated to specific individual assessment successes and failures, only averaged against the learning environment type.

**Action Research Project**

**Method.** This research ran for four weeks, from September 1 through September 28, 2014, and covered a single unit focusing on typography within the Cambridge International General Certificate of Secondary Education (IGCSE) Art & Design curriculum, a required sophomore level course at Arizona State University (ASU) Preparatory Academy, a K-12 public charter school sponsored by Arizona State University. ASU Preparatory Academy has two campuses: the Polytechnic Campus, which is located on Arizona State University’s Polytechnic campus, and the Downtown Phoenix campus, which is located near Arizona State University’s Downtown Campus.

**Participants.** The studied group of participants consisted of 105 enrolled 10th grade students at ASU Preparatory Academy Phoenix, divided among five classes. For this study, of the 109 total sophomores in the student body, four students were excluded, due either to transferring to a different class during the unit of study or to having left the school entirely. At the time of this study, the gender breakdown of the total sophomore class at ASU Preparatory Academy was split nearly equally, with 55 female and 54 male (A. Gray, email communication, December 5, 2014). In comparison, the total number of high school students at ASU Preparatory Academy Phoenix was 433, and the gender breakdown was 230 female and 203 male (A. Gray, email communication, January 16, 2015). The ethnic background of the 109 sophomore pupils is overwhelmingly Hispanic or Latino at 69%,
followed by 16% White, 12% Black or African American, 3% Asian/Pacific Islander and 0% American Indian (A. Gray, email communication, December 5, 2014). Similarly, the ethnicity of the entire ASU Preparatory Academy high school consisted of 71% Hispanic or Latino, 14% White, 12% Black or African American, 2% Asian/Pacific Islander and 1% American Indian (A. Gray, email communication, January 16, 2015).

As the majority of the students from the school reside in the local community, the high poverty level in and around the 85006 zip code correlates to the 92 students qualifying for Arizona’s free-and-reduced lunch program, with 76 sophomore students (70%) qualifying for free lunch and another 16 qualifying for reduced lunch (A. Gray, email communication, December 5, 2014).

As noted, many of the demographics for the sophomore class run parallel with those of the high school; however, one important distinction is that of the special education needs. A higher percentage, 22%, of the sophomores has some form of Individualized Education Plan (IEP) in place for their learning disability. This high percentage of students with IEPs
and the small sample size of students that participated in the unit study are two limitations that may skew the generalizability of the results to other populations. However, the results of this study still provide valuable information for the exploration of knowledge development and college preparation for hybrid learning environments.

**Materials.** The course timeline followed the school’s block schedule, offering 90-minute classes from 8:30 a.m. to 4:06 p.m. Hybrid classes met three times per week, Mondays and Wednesdays for 90 minutes each and Fridays for 45 minutes each. Traditional classes also met three times per week, on Tuesdays and Thursdays for 90 minutes each and Fridays for 45 minutes each. The IGSCE Art & Design classes were broken into two learning experiences: traditional and hybrid. Participants were randomly dispersed by ASU Preparatory Academy administration, across five separate classes: two hybrid classes with a total of 49 students and three traditional classes with a total of 56 students. The traditional learning environment involved face-to-face learning, interaction occurred through direct instruction, and course content was delivered to students via lectures and in-class projects. The hybrid-learning environment entailed classes blended of both traditional classroom and online learning activities. In this case, students would view all course instruction online, outside of the classroom, and complete projects during class time.

Instructional content for the typography unit was derived from two video series found on the online video learning website Lynda.com. Hybrid classroom students were instructed to watch and take notes on two clips from Justin Seeley’s ‘Introduction to Graphic Design’ series and 23 clips from Ina Saltz’s ‘Foundations of Typography’ series. All online instructional video information for the hybrid classes was to be completed online, outside of the scheduled class time. In-class time was designated for content discussion, clarification, and project work time. Students were reminded at the end of each hybrid class
period to check the instructional information due for the following class. Instructional information was hyperlinked to the Lynda.com instructional videos within the created course website in the Announcements Blog section, and included specific instructions for viewing each clip.

Instructional content for the traditional typography unit also utilized the same two video series on Lynda.com. Whereas the hybrid classroom students were to watch videos independently outside of classroom time, in the traditional classroom setting, this information was reformatted into semi-interactive lectures that were presented using a projector to the entire class. In-class time for the traditional participants was used for these lecture-based instructional purposes, content discussion, clarification of information presented, and project work time. No outside online access was necessary for instructional purposes in the traditional classes.

The unit included in this action research project consisted of 10 typographic focus areas that fall in line with the following graphic communication curriculum content specifications for the IGCSE Art & Design syllabus: (1) Demonstrating the communication of visual meaning through images while being aware of problems and opportunities, as well as working toward appropriate solutions; (2) Analyzing design briefs and tackling practical design tasks; (3) Studying examples of design, or the work of designers relative to their chosen field, including some at first hand, and relating this experience to their own endeavors; and (4) Demonstrating their understanding of typography and its relationship to images (Cambridge International Examinations, 2013). To execute these Cambridge IGCSE specifications, I referenced Benjamin Bloom’s Taxonomy of Educational Objectives, a framework for classifying statements of what educators expect or intend students to learn (Krathwohl, 2002). Of Bloom’s many cognitive process dimensions, five were most relevant
to this specific unit and action research project: identify and define, question, evaluate, and
construct; analyze; create; and design (Krathwohl, 2002). Based on Bloom’s cognitive
process dimensions, students deemed successful at mastering the typography unit content
were able to: (1) Identify and define letterform anatomy and terminology; (2) Question,
evaluate, and construct the proper use of typographic spacing, alignment, hierarchy, and
composition; (3) Analyze the significance of typography, specifically Helvetica, within
society; (4) Create accurate hand drawn Helvetica letterforms; and (5) Design with type in an
visually expressive manner.

Design & Procedure

At the beginning of the academic year, prior to any discussion of the typography unit, all sophomore students were asked to complete two anonymous surveys, using a form created on surveymonkey.com; they were unaware they would be asked to answer the survey again at the end of the unit. The first evaluation was an Academic Habits Self-Assessment survey, consisting of 13 yes or no questions regarding access to technology and successful academic habits (Appendix C). In order to better quantify responses from these surveys, a point value was assigned to each response. For the Academic Habits survey, a “Yes” answer was allotted one point, while a “No” answer was allotted zero points, allowing for a high score of 13 and a low score of zero. The second was a Computer/Online Literacy Self-Assessment survey, consisting of 20 questions regarding personal understanding of basic computer skills necessary for success in this particular hybrid unit, due to the nature of each individual assignment (Appendix D). Students rated themselves qualitatively, representing “I Can Do This On My Own” as mastery, “I Need Help With This” as moderate understanding, and “I Have No Experience With This” as little to no understanding. Point values were assigned to these results, as well: three points to mastery, two points to
moderate, and one point to little to no understanding. This point scale indicated total mastery of all skills with a high mastery score of 60 points, and a low score of 20 points indicating little to no mastery of the aforementioned skills.

Throughout the course of this unit, students were required to complete seven in-class assignments that align with the five unit objectives. The seven assignments consisted of: a AIGA Typography Poster Design worth 25 points; a Vocabulary, History & Letterform Quiz worth 20 points; a Helvetica Documentary Questionnaire worksheet worth 15 points; a Helvetica Documentary Quiz worth 15 points; a culminating Expressive Typography Project worth 40 points; an Adobe Illustrator Video Worksheet worth 10 points; and an Expressive Typography Project Digital Redo worth 10 points (Appendices E, F, G, H). Using these assignments and this point value system, it was possible for a student to receive a total high score of 135 points, indicating total mastery of all the unit objectives. At the time, ASU Preparatory Academy Phoenix did not allow a grade of zero on assignments, thus the lowest possible point score allowed 62.5 points. A score of 62.5, or a grade of 50%, would indicate either a student was falling far below comprehension of the unit objectives, or there had been no effort put forth by the student on assignments.

Using the Cambridge IGSCE Art & Design grading rubric for the design based project assessments, students of both the hybrid and traditional learning environments were graded in five categories: (1) Gathering, Recording, Research, and Investigation; (2) Exploration and Development of Ideas; (3) Organization and Relationships of Visual and/or Other Forms; (4) Selection and Control of Materials, Media, and Processes; and (5) Personal Vision and Presentation (Cambridge International Examinations, 2013). This includes the AIGA Typography Poster and the two Expressive Typography projects. The Vocabulary, History & Letterform Quiz, Helvetica Documentary Questionnaire, Helvetica Documentary
Quiz, and Adobe Illustrator Video Worksheet were all graded based on correct or incorrect answers.

After all assignments were completed, post-unit surveys, mirroring that of the pre-unit survey, were collected. After all surveys and assessments were collected, scores were tallied and compared between hybrid environment participation and traditional environment participation. Although surveys were anonymous, student responses to technology access, academic habits, and computer and online literacy scores were compared to the unit assessment scores. Due to the anonymity of the survey responses, individual survey scores could not be directly correlated to specific individual assessment successes and failures, only averaged against the learning environment type.
CHAPTER 4
DATA ANALYSIS AND RESULTS

The students of this study began the unit with a clear differentiation in skill level. The Academic Habits survey had an available score range of 13 to zero, hybrid students’ self-assessed scores ranged from 13 to three, with a median score of nine, while traditional classes assessed their academic habits to range from 12 to five, with a median score of nine, seen in Figure 4

![Pre-unit Academic Habit Totals](image)

Figure 4. Pre-unit skill survey results: Academic Habits Hybrid vs. Traditional

The Computer/Online Literacy survey had an available range of 60 to 20. Hybrid students’ self-assessed scores ranged from 60 to 24 with a median score of 53, and traditional class self-assessed scores ranged from 60 to 33 with a median score of 52. These scores, in Figure 5, must be viewed in light of the qualifying minimum scores per survey, where the minimum score for academic habits is zero and the minimum score for computer and online literacy is 20; a lower participant score indicated a lack of knowledge related to items on the questionnaire.
Figure 5. Pre-unit skill survey results: Computer/Online Literacy Hybrid vs. Traditional

Hybrid participants’ Academic Habit survey scores, as shown in Figure 6, were highest in the “Do I Read and Follow Instruction?” and “Am I comfortable Learning New Skills?” categories, with an 87.80% and 85.37% “Yes” rate, respectively. Academic Habit survey scores were quite low in the “Do I independently create a schedule and stick to it?” category, with a 70.73% “No” rate, followed by the “Am I self motivated?” category, with a 53.66% “No” rate.
As outlined in Figure 7, students were quite confident in many of their computer and online literacy skills, with 14 of the 20 questions having “I Can Do This On My Own” response rates over 60%. Hybrid participant scores from the survey response, “I Can Do This On My Own,” were highest at 97.56% in the “Watching Online Video” category, followed by 92.68% to the skill “Sending and Receiving E-mail.” Hybrid participant’s lowest skill scores came in the “Creating Specialized Folders for Bookmarks” category, with 24.39% responding “I Have No Experience With This,” 43.90% responding “I Need Help With This,” and the remaining 31.71% responding “I Can Do This On My Own.” The next lowest scores fell in the “Reading PDFs On Screen” category. Organizing files, using word processing applications and subscribing to a listserv were also challenging for students, with comparably low scores.
Figure 7. Hybrid pre-unit survey skill individual question results: Online/Computer Literacy

Shown in Figure 9, traditional participants had the highest Academic Habit pre-unit survey scores in the categories, “Do I Read and Follow Instruction,” “Am I Comfortable Learning New Skills,” and “Do I Ask For Help When I Have A Problem?” which all had a 78.43% “Yes” response. The lowest scores were in the “Do I Independently Create A
Schedule and Stick To It?” category, with a 70.59% “No” rate, followed by the “Do I prioritize my responsibilities?” category, with a 50.98% “No” rate.

Figure 8. Traditional pre-unit skill survey individual question results: Academic Habits

Traditional participants’ highest skill scores from the pre-unit Computer/Online Literacy survey fell in the “Watching Online Video” category, where 100% of responders answered “I Can Do This On My Own,” seen in Figure 9. The next highest scores were in the “Sending and Receiving E-mail” category, where 86.27% responded “I Can Do This On My Own.” Traditional participants’ lowest skill scores came in the “Subscribing To A Listserv” category, where 33.33% of students selected the response “I Have No Experience With This.” As shown in the figure below, students were most confident in their ability to send and receive email and related web browsing capabilities, but their knowledge of more complex tasks, such as posting to web discussion boards or organizing and navigating files, were acknowledged to be lacking.
Figure 9. Traditional pre-unit skill survey individual question results: Online/Computer Literacy

The highest pre-unit Academic Habit survey scores for both the traditional and hybrid participants were for “Do I Reading and Follow Instruction?” and “Am I Comfortable With Learning New Skills?” Similarly, the lowest scores were in the same category for both traditional and hybrid participants, which was “Do I Independently Create A Schedule and Stick To It?” In the pre-unit Computer/Online Literacy survey, again, both
traditional and hybrid participant’s highest scores fell in the same skill sets: “Watching Online Videos” and “Sending and Receiving E-mail.” At the low end of skill levels, both hybrid and traditional participants again matched with low scores for “Reading PDFs On Screen.”

For unit assignments, out of a possible 135 points, hybrid participant assignment scores ranged from 134.5 points (99.63%) to 71.5 points (52.96%) with a class median of 102.25 (75.74%) (see Figure 10). Traditional participant scores ranged from 122.5 (90.74%) to 68.5 (50.74%) with a class median of 95.75 (70.93%) (see Figure 10).

![Figure 10. Unit assignment grade totals: Hybrid vs. Traditional](image)

As shown in Figure 11, the highest assignment marks given were toward the end of the unit, in the Expressive Typography Digital Redo and Illustrator Video Worksheet, where the average grade on the Expressive Typography Digital Redo was 9.69 out of 10, and the average grade on the Illustrator Video Worksheet was 8.98 out of 10. The lowest hybrid participant assignment grades occurred with the first two assignments, the AIGA Typography Poster Design and the Vocabulary, History & Letterform Quiz. The average
grade for the AIGA Typography Poster Design project was 16.60 points out of 25, or 
66.41%. The average grade on the Vocabulary, History & Letterform Quiz was 13.35 points 
out of 20, or 66.76%.

Figure 11. Hybrid unit individual assignment scores

Again out of a possible 135 points, traditional participant assignment score totals 
varied from 122.5 points (90.74%), to 72.5 points (53.70%) and had a class median of 95.75 
points scored (see Figure 12). The highest assignment marks given were in the middle and 
end of the unit, on the Helvetica Documentary Quiz and the Expressive Typography Digital 
Redo. The average score on the Helvetica Documentary Quiz was 13.55 points out of 15, or 
90.36%, and the average grade on the Expressive Typography Digital Redo was slightly 
higher, at 9.34 points out of 10. The lowest traditional participant assignment grades were at 
the beginning of the unit in the AIGA Typography Poster Design, scoring 16.19 points out 
of 25, or 64.75%, and towards the end of the unit in the Illustrator Video Worksheet, at 6.66 
points out of 10, or 66.6%. Like the hybrid class, the Vocabulary, History & Letterform 
Quiz also scored poorly, with an average of 11.72 points out of 20, or 66.76%.
Figure 12. Traditional individual unit assignment scores

Much like the pre-unit survey, the two participating groups scored similarly on the unit assignments. Assessment scores for both the hybrid and traditional participants are lowest at the start of the unit, while the highest marks were generated at the end of the unit.

After all assignments were completed, the students of this study again participated in an online survey with the same questions as the pre-unit survey described earlier. The participants of this study completed the unit much like they started it, with a clear differentiation in skill level. Hybrid students’ self-assessed post-unit Academic Habit survey scores ranged from 13 to four, with a median score of 10, while their self-assessed Computer/Online Literacy post-unit survey scores ranged from 60 to 31, with a median score of 55. Similarly, traditional participants assessed their post-unit Academic Habit survey ranging from 13 to four, with a slightly lower median score of 9.5, and their self-assessed Computer/Online Literacy post-unit survey scores ranged from 60 to 38, with a median of 54. Like that of the pre-unit surveys, these post-unit scores must be viewed in light of the qualifying minimum scores per survey, where the minimum score for Academic Habits is...
zero and the minimum score for Computer and Online Literacy is 20. Lower participant scores demonstrate insufficient knowledge related to items on the questionnaire. Results for the Academic Habits and Computer/Online Literacy post-unit surveys are shown in Figures 13 and 14, respectively.

Figure 13. Post-unit skill survey results: Academic Habits Hybrid vs. Traditional

Figure 14. Post-unit skill survey results: Computer/Online Literacy Hybrid vs. Traditional
Individual survey questions responses from hybrid students for Academic Habits are shown in Figure 15. Like the pre-unit survey, the highest scores for the hybrid participants’ Academic Habit post-unit survey fell in the “Do I Read and Follow Instructions?” category and in the “Am I Comfortable Learning New Skills?” category, each with a 90.70% “Yes” rate. Again, by far their academic habit low scores comes from the “Do I independently create a schedule and stick to it?” category, with a 72.09% “No” rate. The next lowest scores were the “Do I Complete Assigned Work On Time (by due dates)?” category, with 39.53% of post-unit responses marked “No.”

Figure 15. Hybrid post-unit skill survey individual question results: Academic Habits

As shown in Figure 16, hybrid participant’s skill scores from the post-unit Computer/Online Literacy survey were higher than the pre-unit survey, and were highest in the four categories, “Creating File Folders,” “Sending and Receiving E-mail,” “Attaching Files to an E-mail Message,” and “Opening E-mail Attachments,” with 95.35% responding “I Can Do This On My Own.” Hybrid participant’s lowest skill scores came in the “Subscribing To A Listserv” category, with 27.91% of responses answering “I Have No Experience With This.” The “Creating Specialized Folders for Bookmarks” category had a
low score of 41.86% responding “I Can Do This On My Own,” but was still an improvement over the pre-unit survey score of 31.71%.

Figure 16. Hybrid post-unit skill survey individual question results: Online/Computer Literacy

Traditional participant’s highest scores for Academic Habits in the post-unit survey fell in the “Do I Read and Follow Instructions?” category, with a 92.31% “Yes” rate (see Figure 17). The next highest scores were in the “Am I Comfortable Learning New Skills?”
and “Am I Self Motivated?” categories, both with a “Yes” rate of 86.54%. The lowest scores for the traditional participants were in the “Do I Independently Create A Schedule and Stick To It?” with a 73.08% “No” response rate, followed by “Do I Complete Assigned Work On Time (by due dates)” with a 51.92% “No” response rate. These low scores were similar to the pre-unit scores of 70.59% and 45.10% in the same categories, respectively.

Figure 17. Traditional post-unit skill survey individual question results: Academic Habits

As shown in Figure 18, traditional participants’ highest skill scores from the post-unit computer and online literacy survey were in the “Watching Online Videos” category, with zero “I Have No Experience With This” responses and 96.15% responding with “I Can Do This On My Own.” The next highest scores were in the “Creating File Folders” category, with zero responses answering “I Have No Experience With This” and 86.54% responding “I Can Do This On My Own.” During the pre-unit survey, the same category “Creating File Folders” was at 9.80% and 66.67%, respectively for the same responses. Traditional participants’ lowest scores came in the “Subscribing To A Listserv” category, with 26.92% “I Have No Experience With This” responses, but was an improvement over their pre-unit
score in the same category response at 33.33%. As anticipated, the “Reading PDFs On Screen” category improved from the pre-unit survey, with 82.69% responding either “I Need Help With This,” or “I Can Do This On My Own,” as compared to the pre-unit response where 35.29% responded, “I Have No Experience With This.”

Figure 18. Traditional post-unit skill survey individual question results: Online/Computer Literacy
Much like the pre-unit survey, the highest post-unit Academic Habit scores, for both the traditional and hybrid participants, were for “Do I Read and Following Instructions?” and “Am I Comfortable Learning New Skills?” The lowest scores for the post-unit Academic Habits survey where the same for both traditional and hybrid respondents in the categories “Do I Independently Create A Schedule and Sticking To It?” and “Do I Complete Assigned Work On Time (By Due Dates)?” In the post-unit Computer/Online Literacy survey, both traditional and hybrid participants’ highest scores lay in the same skill sets, “Watching Online Videos” and “Creating File Folders”. At the low end of skill levels, both hybrid and traditional participants again matched, scoring low in “Subscribing To A Listserv” and “Creating Specialized Folders For Bookmarks”.

Positive experiences with the unit, as expressed by students in an open response section of the post-unit survey included interacting with the Internet for educational purposes, learning new skills in both creativity and technology, and the video instruction outside of class hours. Some frustrations students had were attributed to uploading projects to the course website, time constraints, and working on instruction at home instead of during class hours. When asked in the post unit survey if they will now use computer and Internet resources less, the same, or more, for class work after this unit, hybrid students answered 30.23% “more”, 60.47% “same” and 9.30% “less”. Traditional students answered 32.69% “more”, 46.15% “same” and 21.15% “less”.

Students participating in this unit-long action research project recognized deficits in their academic habits and computer and online literacy skills through their responses in the pre-unit and post-unit surveys. Skill levels varied drastically from one student to another, as represented in the survey scores. The initial range in individual differences for hybrid pre-unit Academic Habits and pre-unit Computer/Online Literacy surveys were 10 points and 36 points, respectively. The post-unit differences for the same surveys were nine points and 29 points, respectively. The range in differences for traditional pre-unit Academic Habits was seven points and was 27 point spread for Computer/Online Literacy pre-unit survey. The post-unit differences for the same were nine and 22 points, respectively.

As anticipated, the median hybrid Academic Habit scores increased from pre-unit to post-unit by one point, from nine to 10, and the median Computer/Online Literacy pre-unit to post-unit scores increased by two points, from 53 to 55. Alternatively, the traditional median Academic Habit scores increased from pre-unit to post-unit by .5 points, from 9 to 9.5, and Computer/Online Literacy pre-unit to post-unit scores increased by two points, from 52 to 54. These numbers show an increase in knowledge though the shrinking deficiency gaps for both Academic Habits and Computer/Online Literacy skills for the hybrid and traditional learning environment participants, although at slightly different rates. The increase in the scores for both Academic Habits and Computer/Online Literacy skills indicates that initial inequities that might have resulted in later difficulties were minimized.

As reflected in the scores, the pre-unit hybrid participants’ median score for Academic Habit responses was the same as that of the traditional participants at nine, and their self-assessed Computer and Online Literacy median scores were one point higher. The
hybrid group also had a higher median on their academic unit assessments grade by 6.5 points. The higher scores of assessed Computer and Online Literacy skills could be the reason for the more successful unit scores, as knowledge is easier to acquire if the brain already has a precursor to reference (Ng, 2009). For example, in their pre-unit Computer/Online Literacy survey, the traditional environment students responded an average 11.37% of the time with the answer “I Have No Experience With This”, whereas the hybrid environment student had an average of 9.88%. That is a 1.49% difference of starting a class with no experience in the content of the unit; in other words, 1.49% of the content was more challenging for the traditional students to grasp. Knowing that the hybrid students, on average, started this unit off with slightly more advanced understanding of the computer literacy required to complete assignments, it is logical that in the end they scored higher on their class assessments, as they had a larger frame of reference from which to understand new information.

The most drastic example that demonstrates the importance of this pre-knowledge is the scores for the Illustrator Video Worksheet assignment. For this assignment, the students for both the traditional and hybrid classes were given a worksheet and asked to go the Adobe TV website to watch three separate introductory videos about technical skills within Adobe Illustrator CS6. After watching the videos, students were asked to type responses to the worksheet in a Word document and upload their file to the course website. To complete this assessment successfully, four of the 20 computer literacy skills were involved: (1) Navigating Internet Browsers, (2) Using Search Engines To Locate Web Recourses, (3) Watching Online Videos, and (4) Using Word Processing Applications. Students would first need to navigate internet browsers to find the Adobe TV website; second, they needed to use the Adobe TV search engine to find the videos referenced on the worksheet; third,
students needed to watch the Adobe TV tutorial videos online; and lastly, they would need to answer questions using a word processing application.

The only difference between the assignments was that the hybrid students were asked to watch the videos outside of class and then to complete the worksheet during class time, while the traditional students watched the videos and completed the worksheet during the 90 minutes of class time. For this assignment, the average hybrid assignment score was an 89.80%, 23.19% higher than that of the traditional participant average of 66.61%. When evaluating this outcome to the pre-unit assessments of the computer literacy skills of the traditional and hybrid classes, it is clear that the higher scores and pre-knowledge that the hybrid participants had over the traditional participants were impactful to the ability to successfully master the assignment. In three of the four skills outlined for successful completion of this assignment, the hybrid students had a higher percentage of “I Can Do This On My Own” responses. Those categories were, “Navigating Internet Browsers,” “Use Search Engines To Locate Web Recourses,” and “Using Word Processing Applications,” which scored 87.80% hybrid to 86.27% traditional, 75.61% hybrid to 74.51% traditional and 48.78% hybrid to 41.18% traditional, respectively (see Figures 7 & 9). The fourth category, “Watching Videos Online” skill, was quite close, where 100% of the traditional students assessed themselves with the “I Can Do This On My Own” response and only 97.56%, on average, of the hybrid students answered that way. However, the skill of being able to watch videos becomes much less important if the student does not have the knowledge to first get themselves to the online videos.

It is important to point out the “I Can Do This On My Own” category because it was on their own that the students were required to access the videos. Of course, for the traditional class, instruction was available to assist the students during class hours, but the
hybrid students were accessing the videos on their own, outside of class time, and without instructor supervision. Another major cause for the drastic 23% difference in assignment grade was that a staggering 30 of the 55 participating traditional students turned in incomplete worksheets or none at all. From observations made, it was clear that the traditional students had a difficult time navigating the Internet with their browsers, searching for the videos, and, once watched, had difficulties using the word processing application to complete the worksheet. These challenges resulted in students taking more time finding the videos, leaving them with much less time to actually answer the worksheet questions; inevitably, many students just ran out of class time. Alternatively, the hybrid students, who had already experienced the videos before class, had time to reference the videos but spent the majority of the class answering the questions and finished on time. Forty-two out of 49 turned in complete worksheets.

The habit and skill level variability among all students, hybrid and traditional alike, was anticipated and was the driving force behind the thought process of this action research project. It is worth noting that the deficiencies of these habits and skills did not prohibit the participants from successfully completing the unit objectives; in fact, they were able to learn new skills and improve their academic habits in both the traditional and hybrid course formats. However, the additional exposure to unit content and the technology required to complete unit tasks led the hybrid format participants to succeed better academically.

It was the purpose of this study to address the gap in academic habits and technology skill levels of high school students, as it provides a better understanding of how students can perform better in the fast paced online higher education world if these academic deficiencies are filled. The research question asked, regarding lacking 21st century skill preparation, has been answered through the fact that the hybrid students grew in both
academic habits and computer and online literacy skills to outscore their traditional peers, who had proximal pre-survey results. From this we can deduct that the lack of 21st skills preparation resides in academic habits and computer and online literacy skills. Specifically, skills relating to the Life and Career Skills and Information, Media, and Technology Skills tiers of the P21 framework, referenced for this research. This also indicates/suggests that giving students the hybrid experience, lead them to be more successful than that of students without. Although exposure to specific skills, such as downloading and uploading files, accessing online videos, and managing document folders, provides valuable experience, it does not fully encompass the academic habits that are equally important for student success in an online course. Preparing high school students to take online college level courses involves more than teaching just technical computer skills. It is essential that high school students have assignments that build experiences related to self-motivation, time management, and independent problem solving.

From these findings it can be deduced that there should be an urgency to teach students computer literacy skills as well as academic habits, prior to them taking any courses where online, self-directed assignments are routine. Although these students have grown up in a generation where technology is prevalent, it cannot be assumed that students are entering college with sufficient computer literacy skills, which will be required of them in an academic setting. Furthermore, faculty dealing with these unprepared students might find their courses to be less effective or slower in progress, due to the variance in skill level and academic prowess of the incoming students. Though we are in the digital age, the requisite use of technology within an academic and workplace setting is not necessarily a basic understanding for high school level teens. It is up to educators to identify these gaps
between the analog and digital worlds of academia to generate more successful students as more universities transition to courses online.
REFERENCES


APPENDIX A

FRAMEWORK FOR 21ST CENTURY LEARNING
The Partnership for 21st Century Skills has developed a vision for student success in the new global economy.

21st Century Student Outcomes and Support Systems

21ST CENTURY STUDENT OUTCOMES

To help practitioners integrate skills into the teaching of core academic subjects, the Partnership has developed a unified, collective vision for learning known as the Framework for 21st Century Learning. This Framework describes the skills, knowledge and expertise students must master to succeed in work and life; it is a blend of content knowledge, specific skills, expertise and literacies.

Every 21st century skills implementation requires the development of core academic subject knowledge and understanding among all students. Those who can think critically and communicate effectively must build on a base of core academic subject knowledge.

Within the context of core knowledge instruction, students must also learn the essential skills for success in today’s world, such as critical thinking, problem solving, communication and collaboration.

When a school or district builds on this foundation, combining the entire Framework with the necessary support systems—standards, assessments, curriculum and instruction, professional development and learning environments—students are more engaged in the learning process and graduate better prepared to thrive in today’s global economy.
Core Subjects and 21st Century Themes

Mastery of core subjects and 21st century themes is essential to student success. Core subjects include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government, and civics.

In addition, schools must promote an understanding of academic content at much higher levels by weaving 21st century interdisciplinary themes into core subjects:

- Global Awareness
- Financial, Economic, Business and Entrepreneurial Literacy
- Civic Literacy
- Health Literacy
- Environmental Literacy

Learning and Innovation Skills

Learning and innovation skills are what separate students who are prepared for increasingly complex life and work environments in today’s world and those who are not. They include:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration

Information, Media and Technology Skills

Today we live in a technology- and media-driven environment marked by access to an abundance of information, rapid changes in technology tools and the ability to collaborate and make individual contributions on an unprecedented scale. Effective citizens and workers must be able to exhibit a range of functional and critical thinking skills such as:

- Information Literacy
- Media Literacy
- ICT (Information, Communications and Technology) Literacy

Life and Career Skills

Today’s life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills, such as:

- Flexibility and Adaptability
- Initiative and Self-Direction
- Social and Cross-Cultural Skills
- Productivity and Accountability
- Leadership and Responsibility

21st Century Support Systems

Developing a comprehensive framework for 21st century learning requires more than identifying specific skills, content knowledge, expertise and literacies. An innovative support system must be created to help students master the multi-dimensional abilities that will be required of them. The Partnership has identified five critical support systems to ensure student mastery of 21st century skills:

- 21st Century Standards
- Assessments of 21st Century Skills
- 21st Century Curriculum and Instruction
- 21st Century Professional Development
- 21st Century Learning Environments

For more information, visit the Partnership’s website at www.P21.org.
AO1 GATHERING, RECORDING, RESEARCH, AND INVESTIGATION 20%
   a. Investigate and research a variety of appropriate sources
   b. Record and analyze information from direct observation and/or other sources and personal experience

AO2 EXPLORATION AND DEVELOPMENT OF IDEAS 20%
   a. Explore a range of visual and/or other ideas by manipulating images
   b. Show a development of ideas through appropriate processes

AO3 ORGANIZATION AND RELATIONSHIPS OF VISUAL AND/OR OTHER FORMS 20%
   a. Organize and use visual and/or other forms effectively to express ideas
   b. Make informed aesthetic judgments by recognizing the effect of relationships between visual and/or other forms

AO4 SELECTION AND CONTROL OF MATERIALS, MEDIA, AND PROCESSES 20%
   a. Show exploration and experimentation with appropriate materials
   b. Select and control appropriate media and processes, demonstrating practical, technical, and expressive skills and intentions

AO5 PERSONAL VISION AND PRESENTATION 20%
   a. Show personal vision and commitment through an interpretive and creative response
   b. Present an informed response through personal evaluation, reflection, and critical thinking

TOTAL: 100%
<table>
<thead>
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<th>MARKS</th>
<th>AO1: Gathering, recording, research, and investigation</th>
<th>AO2: Exploration and development of ideas</th>
<th>AO3: Organization and relationships of visual and/or other forms</th>
<th>AO4: Selection and control of materials, media, and processes</th>
<th>AO5: Personal vision and presentation</th>
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<td>1 – 3</td>
<td>Very limited in terms of investigation and research or recording from direct observation and/or other sources.</td>
<td>Very limited exploration and manipulation of images or development of ideas through processes.</td>
<td>Very limited ability in recognition and organization of visual elements. Slight evidence of expression of ideas visually and few aesthetic judgments.</td>
<td>Very limited ability in exploration and experimentation with materials. Slight evidence of ability to select and control media and processes.</td>
<td>Very limited personal and creative response. Slight evidence of personal evaluation and critical thinking.</td>
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<tr>
<td>4 – 5</td>
<td>A little investigation and research from sources. Some limited recording from direct observation and/or other sources.</td>
<td>A little exploration and manipulation of images. Some limited development of ideas through processes.</td>
<td>A little ability in recognition and organization of visual elements. Some limited expression of ideas visually and few aesthetic judgments.</td>
<td>A little ability in exploration and experimentation with materials. Some limited ability to select and control media and processes.</td>
<td>A little personal and creative response. Some limited personal evaluation and critical thinking.</td>
</tr>
<tr>
<td>6 – 7</td>
<td>Some evidence of investigation and research from sources. Attempts to record from direct observation and/or other sources are made.</td>
<td>Some evidence of exploration and manipulation of images. Attempts are made to develop ideas through processes.</td>
<td>Some recognition and organization of visual elements. Attempts are made to express ideas in visual and/or other forms and make aesthetic judgments.</td>
<td>Some ability in exploration and experimentation with materials. Attempts are made to select and control media and processes.</td>
<td>Some ability in personal and creative response. Attempts are made to make personal evaluation and show critical thought.</td>
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<tr>
<td>8 – 9</td>
<td>Adequate ability in investigation and research from a variety of sources and in recording from direct observation and/or other sources.</td>
<td>Adequate exploration and manipulation of images and in developing ideas through processes.</td>
<td>Adequate ability in recognition and organization of visual and/or other forms and makes aesthetic judgments.</td>
<td>Adequate exploration and experimentation with materials and an adequate ability to select and control media and processes.</td>
<td>Adequate personal and creative response with adequate personal evaluation and critical thinking.</td>
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<td>10 – 11</td>
<td>Satisfactory investigation and research from a variety of sources. Some competence in recording from direct observation and/or other sources.</td>
<td>Satisfactory exploration and manipulation of images. Some competence in developing ideas through processes.</td>
<td>Satisfactory ability in recognition and organization of visual and/or other forms and making aesthetic judgments.</td>
<td>Satisfactory exploration and experimentation with materials. Some competence in ability to select and control media and processes.</td>
<td>Satisfactory personal and creative response. Some competence in personal evaluation and critical thinking.</td>
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<td>12 – 13</td>
<td>Competent investigation and research from a variety of sources. Good ability in recording from direct observation and/or other sources.</td>
<td>Competent exploration and manipulation of images. Good development of ideas through processes.</td>
<td>Competent ability in recognition and organization of visual elements. Good ability to express ideas visually and make aesthetic judgments.</td>
<td>Competent exploration and experimentation with materials. Good ability to select and control media and processes.</td>
<td>Competent personal and creative response. Good ability in personal evaluation and critical thinking.</td>
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<td>14 – 15</td>
<td>Very good investigation and research from a variety of sources. Shows proficient ability in recording from direct observation and/or other sources.</td>
<td>Very good exploration and manipulation of images. Proficient development of ideas through processes.</td>
<td>Very good ability in recognition and organization of visual elements. Proficient ability to express ideas visually and make aesthetic judgments.</td>
<td>Very good exploration and experimentation with materials. Proficient ability to select and control media and processes.</td>
<td>Very good in personal and creative response. Proficient personal evaluation and critical thinking.</td>
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<td>16 – 17</td>
<td>Excellent investigation and research from a variety of sources. Shows expertise in recording from direct observation and/or other sources.</td>
<td>Excellent exploration and manipulation of images. Expertly develops ideas through processes.</td>
<td>Excellent ability in recognition and organization of visual elements. Expertly expresses ideas in visual and/or other forms and makes aesthetic judgments.</td>
<td>Excellent exploration and experimentation with materials. Expert ability to select and control media and processes.</td>
<td>Excellent personal and creative response. Expert in personal evaluation and critical thinking.</td>
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<tr>
<td>18 – 20</td>
<td>Outstanding investigation and research from a variety of sources. Highly accomplished ability in recording from direct observation and/or other sources.</td>
<td>Outstanding exploration and manipulation of images. Highly accomplished ability to develop ideas through processes.</td>
<td>Outstanding ability in recognition and organization of visual and/or other forms. Highly accomplished ability to express ideas in visual and/or other forms and make aesthetic judgments.</td>
<td>Outstanding exploration and experimentation with materials. Highly accomplished ability to select and control media and processes.</td>
<td>Outstanding in personal and creative response. Highly accomplished personal evaluation and critical thinking.</td>
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</tbody>
</table>
APPENDIX C

PRE-UNIT ACADEMIC HABITS SELF-ASSESSMENT SURVEY
Evaluate the following statements (Answer Yes or No).

Do I have a computer at home?
Do I have access to the Internet at home?
Do I have a smart phone?
Do I have access to the Internet on my smart phone?
Am I self motivated?
Do I prioritize my responsibilities?
Do I independently create a schedule and stick to it?
Do I complete assigned work on time (by due dates)?
Do I read and follow instructions?
Am I an independent problem solver?
Am I comfortable learning new skills?
Do I ask for help when I have a problem?
Am I capable of conveying my ideas through writing?
APPENDIX D

PRE-UNIT COMPUTER/ONLINE LITERACY SELF-ASSESSMENT
Evaluate the following statements.

1 - I HAVE NO EXPERIENCE WITH THIS
2 - I NEED HELP WITH THIS
3 - I CAN DO THIS ON MY OWN

Navigating files and folders on a computer
Saving files as file types (.doc, .jpg, .pdf, etc.)
Organizing file locations
Creating file folders
Opening files within applications
Sending and receiving e-mail
Attaching files to an e-mail message
Opening e-mail attachments
Navigating Internet browsers
Entering a URL to a new page
Use search engines to locate Web resources
Bookmarking Web pages
Creating specialized folders for bookmarks
Following links in a Web page
Using word processing applications
Reading PDFs on screen
Watching Online videos
Participating in a Web discussion board
Subscribing to a listserv
Taking quizzes on Edmodo website
APPENDIX E

TYPOGRAPHY QUIZ
Select the correct answer.

1. WHAT IS TYPOGRAPHY?
   ○ The activity that translates an text into something useful.
   ○ The art of setting, arranging, and designing type.
   ○ The art of visual communication through the use of text.
   ○ The process of designing physical objects such as cars, chairs and computers.

2. TYPOGRAPHY PROVIDES YOUR DESIGNS...
   ○ context
   ○ a voice
   ○ the ability to tell stories
   ○ all of the above

3. THE CARVED LETTERS ON ROME’S TRAJAN COLUMN ARE THE...
   ○ ancestor of all sans serif typefaces
   ○ ancestor of all grotesque typefaces
   ○ ancestor of all serif typefaces
   ○ ancestor of all script typefaces

4. WHO, IN 800 A.D., DESCREED THAT THE CAROLINGIAN LETTERFORMS SHOULD BE UNIVERSALLY USED?
   ○ Alexander the Great
   ○ Louis the Pious
   ○ Napoleon Bonaparte
   ○ Emperor Charlemagne

5. A BEAUTIFUL EXAMPLE OF PRINTED BLACKLETTER TYPE CAN BE FOUND IN THE...
   ○ Gutenberg mouse
   ○ Gutenberg Bible
   ○ Gutenberg novel
   ○ All of the above

6. KERNING IS...
   ○ the space between lines measured from the baseline to baseline.
   ○ calculated spaces between every possible letter combination.
   ○ the adjustment of the spaces between two specific letters.
   ○ the overall adjustment of space applied equally to a word, a line, or a passage of text.

7. TRACKING IS...
   ○ the adjustment of the spaces between two specific letters.
   ○ the overall adjustment of space applied equally to a word, a line, or a passage of text.
   ○ calculated spaces between every possible letter combination.
   ○ the space between lines measured from the baseline to baseline.

8. TRACKING IS USED TO FIX...
   ○ Widows
   ○ Orphans
   ○ Rivers
   ○ All of the Above

9. A WIDOW IS...
   ○ a word or a part of a word hanging out at the end of a paragraph.
   ○ a word or a part of a word at the top of a column.
   ○ a gappy word spacing that flow through text.
   ○ All of the Above

10. RIVERS ARE MAINLY FOUND IN WHAT ALIGNMENT?
    ○ Justified text
    ○ Centered text
    ○ Flush left text
    ○ Flush right text

11. TYPEFACE = FAMILY MEMBERS
    True  False

12. HELVETICA, BOLD, 40PT IS A FONT
    True  False

13. SERIF TYPEFACES ARE EASIER TO READ.
    True  False

14. ALL TYPEFACES HAVE THE SAME X-HEIGHT.
    True  False

15. ONLY DISPLAY TYPE SHOULD BE KERNED.
    True  False

16. LEADING IS THE SPACING BETWEEN INDIVIDUAL LETTERS.
    True  False
Select the correct answer.

17. DIDOT IS WHAT TYPE OF TYPEFACE?
   - Serif
   - Sans Serif

18. WHAT CATEGORY DOES IT FALL INTO?
   - Oldstyle
   - Transitional
   - Modern

19. FUTURA IS WHAT TYPE OF TYPEFACE?
   - Serif
   - Sans Serif

20. WHAT CATEGORY DOES IT FALL INTO?
   - Geometric
   - Humanist
   - Geometric

Fill in the blank.

21. - 34.

\[\underline{\text{Type}} \underline{\text{A h g f}} \underline{\text{Q v}}\]

Answer in full sentence form.

35. DESCRIBE HOW TYPOGRAPHY CAN AFFECT THE OVERALL EMOTION OF A DESIGN. BE SURE TO DISCUSS TWO SPECIFIC EXAMPLES.
APPENDIX F

HELVETICA DOCUMENTARY WORKSHEET
6. What is your reaction to the grunge style of type and design? Why do you think you respond to it that way?

7. Imagine that the post office, your local bank or other government or corporate entity whose signage is familiar to you started using a different typeface. How would that change their image or your feeling about that business or organization?

8. What might you take away from this film in terms of possible effects on your work or other aspects of your daily life?

9. What changes, if any, has this film made in how you think about print and graphic design?
1. _________________ IS THE NAME OF THE TYPEFACE FEATURED IN THE FILM WE WATCHED?

2. THE NAME MEANS _________________________ IN LATIN.

3. ______________________ & ______________________ WHERE THE CREATORS?

4. THE TYPEFACE WAS INTRODUCED TO THE WORLD IN ____________.

5. IT WAS A PART OF THE ______________________ ART MOVEMENT?

6. WHY IS HELVETICA SO EASILY UTILIZED ON A GLOBAL SCALE FOR SUCH A DIVERSE AMOUNT OF DESIGN PROJECTS? GIVE ONE EXAMPLE FROM THE DOCUMENTARY THAT REPRESENTS THIS.

EC. WHAT IS THE ORIGINAL NAME OF HELVETICA?
- Helvetica Grotesk
- Akzidenz Grotesk
- Die Neue Haas Grotesk
- Alte Haas Grotesk
APPENDIX H

EXPRESSIVE TYPOGRAPHY PROJECT
EXPRESSIVE TYPOGRAPHY PROJECT

You will be given one word. In one composition, arrange your word to express its meaning (do not add additional words). The composition is 10 x 10 inches square. You may vary the size, spacing, placement, and orientation of the letters. You may execute your project only by hand drawing and painting your letterforms with pencil and ink from direct observation.

Using only the typeface Helvetica Regular, you may repeat, omit, slice, block, or overlap words or letters. You may not distort the letterforms in any way. Consider the entire space of the square. Use tape or spray mount to mount your trimmed 10 x 10 compositions to a sheet of 12 x 12 inch black mounting board. Tape this sheet of paper with your name on it to the back side of your black mount paper.

Tape your project word here:
APPENDIX I

IRB APPROVAL
Modified Study Snapshot

Date: Monday, February 23, 2015 8:31:02 AM
View: SF: Basic Information

Basic Information

1. * Title of study:
   ASU Preparatory Academy Phoenix: A Grand Experiment

2. * Short title:
   ASU Preparatory Academy Phoenix: A Grand Experiment

3. * Brief description:
   ASU Preparatory Academy Phoenix: A Grand Experiment

4. * Principal investigator:
   Josephine Marsh

5. * Does the investigator have a financial interest related to this research?
   - Yes  - No

6. * Will an external IRB act as the IRB of record for this study?
   - Yes  - No

7. * Attach the protocol:
   - Document
     Category Date Modified Document History
     View A grand experiment915IRBapproved.doc(0.01) Protocol

   Use one of these templates:
   - HRP-503a - Protocol Template Social Behavioral
   - HRP-503b - Template BioScience

View: SF: Funding Sources (not integrated with Grants)

Funding Sources

1. Identify each organization supplying funding for the study:
   Funding Source  Sponsor's Funding ID  Grants Office ID  Attachments
   There are no items to display
1. Identify each additional person involved in the design, conduct, or reporting of the research:

<table>
<thead>
<tr>
<th>Name</th>
<th>Roles</th>
<th>Financial Involved E-mail Interest in Consent</th>
<th>Financial Involved E-mail Interest in Consent</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joshua Adams</td>
<td>Graduate Student</td>
<td>no</td>
<td>yes</td>
<td>480/965-6074</td>
</tr>
<tr>
<td>James Blasingame</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:James.Blasingame@asu.edu">James.Blasingame@asu.edu</a></td>
</tr>
<tr>
<td>Aydali Campa</td>
<td>Undergraduate Student</td>
<td>no</td>
<td>no</td>
<td><a href="mailto:acampa1@asu.edu">acampa1@asu.edu</a></td>
</tr>
<tr>
<td>Michele Chi</td>
<td>Co-Investigator</td>
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<td><a href="mailto:Michele.Chi@asu.edu">Michele.Chi@asu.edu</a></td>
<td>480/727-0041</td>
</tr>
<tr>
<td>Carol Connor</td>
<td>Co-Investigator</td>
<td>yes</td>
<td><a href="mailto:Carol.Connor@asu.edu">Carol.Connor@asu.edu</a></td>
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</tr>
<tr>
<td>Jessica Early</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Gustavo Fischman</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:fischman@asu.edu">fischman@asu.edu</a></td>
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<tr>
<td>Elisabeth Gee</td>
<td>Co-Investigator</td>
<td>yes</td>
<td><a href="mailto:Elisabeth.Gee@asu.edu">Elisabeth.Gee@asu.edu</a></td>
<td>480/965-2864</td>
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<tr>
<td>Maria Goff</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:MariaGoff@asu.edu">MariaGoff@asu.edu</a></td>
</tr>
<tr>
<td>Timothy Horn</td>
<td>Graduate Student</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:Timothy.Horn@asu.edu">Timothy.Horn@asu.edu</a></td>
</tr>
<tr>
<td>Julia Houston Cunningham</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:Julia.Houston@asu.edu">Julia.Houston@asu.edu</a></td>
</tr>
<tr>
<td>Seokmin Kang</td>
<td>Co-Investigator</td>
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<td>yes</td>
<td><a href="mailto:Seokmin.Kang@asu.edu">Seokmin.Kang@asu.edu</a></td>
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<tr>
<td>David Krauter</td>
<td>Co-Investigator</td>
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<tr>
<td>Matthew Lancaster</td>
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<td><a href="mailto:Matthew.Lancaster@asu.edu">Matthew.Lancaster@asu.edu</a></td>
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<tr>
<td>Na Li</td>
<td>Co-Investigator</td>
<td>no</td>
<td>no</td>
<td><a href="mailto:na.li.1@asu.edu">na.li.1@asu.edu</a></td>
</tr>
<tr>
<td>Katherine McEldoon</td>
<td>Co-Investigator</td>
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<td>yes</td>
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<tr>
<td>Tyler Naiman</td>
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<td><a href="mailto:Tyler.Naiman@asu.edu">Tyler.Naiman@asu.edu</a></td>
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<tr>
<td>John Sadauskas</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:John.Sadauskas@asu.edu">John.Sadauskas@asu.edu</a></td>
</tr>
<tr>
<td>Christina Saidy- Hannah</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:Christina.Saidy@asu.edu">Christina.Saidy@asu.edu</a></td>
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<tr>
<td>Caroline</td>
<td>Co-Investigator</td>
<td>no</td>
<td>yes</td>
<td><a href="mailto:Caroline.Savio@asu.edu">Caroline.Savio@asu.edu</a></td>
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### External team member information:

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<tr>
<th>Name</th>
<th>Description</th>
<th>Email</th>
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<tr>
<td>Sinem Siyahhan</td>
<td>Co-Investigator</td>
<td><a href="mailto:sinem.siyahhan@asu.edu">sinem.siyahhan@asu.edu</a></td>
</tr>
<tr>
<td>Glenda Stump</td>
<td>Other Professional Co-Investigator</td>
<td><a href="mailto:Glenda.Stump@asu.edu">Glenda.Stump@asu.edu</a></td>
</tr>
<tr>
<td>Adai Tefera</td>
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<td><a href="mailto:Adai.Tefera@asu.edu">Adai.Tefera@asu.edu</a></td>
</tr>
<tr>
<td>Hans Van Der Mars</td>
<td>Co-Investigator</td>
<td><a href="mailto:Hans.Vandermars@asu.edu">Hans.Vandermars@asu.edu</a> 480/727-1653</td>
</tr>
<tr>
<td>Ruth Wylie</td>
<td>Co-Investigator</td>
<td><a href="mailto:Ruth.Wylie@asu.edu">Ruth.Wylie@asu.edu</a> 480/727-5175</td>
</tr>
<tr>
<td>Dongchen Xu</td>
<td>Graduate Student</td>
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<tr>
<td>David Yaghmourian</td>
<td>Other Professional</td>
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### Student Study Team Members:

<table>
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<th>User Name</th>
<th>First Name</th>
<th>Last Name</th>
<th>Email</th>
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### Study Scope

1. **Are there external sites where the investigator will conduct or oversee the research?**
   - Yes  
   - No

2. **Does the study do any of the following:**
   - Specify the use of an approved drug or biologic?
   - Use an unapproved drug or biologic?
   - Use a food or dietary supplement to diagnose, cure, treat, or mitigate a disease or condition?
   - Yes  
   - No

3. **Does the study do any of the following:**

---

View: SF: Study Scope

71
- Evaluate the safety or effectiveness of a device?
- Use a humanitarian use device (HUD)?
  - Yes
  - No

View: SF: Recruitment Materials

Consent Forms and Recruitment Materials

1. Consent forms: (include an HHS-approved sample consent document, if applicable)

<table>
<thead>
<tr>
<th>Document</th>
<th>Category</th>
<th>Date Modified</th>
<th>Document History</th>
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<td>Consent Form</td>
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   Refer to the following templates and instructional documents:
   - HRP-502a - Consent Document Social Behavioral
   - HRP-502b - Consent Document BioScience
   - HRP-502c - Consent Document Short Form
   - HRP-091 - Written Documentation of Consent

2. Recruitment materials: (add all material to be seen or heard by subjects, including ads)

   There are no items to display

View: SF: Supporting Documents

Supporting Documents

Attach supporting files, naming them as you want them to appear in the approval letter:

<table>
<thead>
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<th>Category</th>
<th>Date Modified</th>
<th>Document History</th>
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   There are no items to display

Suggested attachments:
   - Completed checklist of meeting Department of Energy requirements, if applicable
   - Other study-related documents not attached on previous forms

Finalized Documents

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