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Alternative Pedagogy: The One Room Schoolhouse and the Trojan Experiment

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Alternative Pedagogy: The One Room Schoolhouse and the Trojan Experiment

by

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Report

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Abstract

Alternative Pedagogy: The One Room Schoolhouse and the Trojan Experiment

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> *"We are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs."*
>
> -- Donna Haraway, A Manifesto for Cyborgs

As we stand beyond the brink of the 21st Century, we are outside of the boundaries where the Ivory Tower approach to education is applicable, particularly in regards to the teaching of practical knowledge and the acquisition of necessary technical skills. We must also, however, address the very real scalability issues inherit in the One Room Schoolhouse approach, as the numbers of students who need education are not likely to shrink anytime soon. We are no longer apes on the savannah and we can no longer afford to act as robotic vessels in search of knowledge from academia's font of knowledge. Technology is the future of our society and it is only growing in complexity. If we are to efficiently instruct our students in the ever-growing fields of general study and technology they face, we need to find a hybrid, or cyborg, approach, melding the ape and the robot.

Table of Contents

Introduction

"Any sufficiently advanced technology is indistinguishable from magic."

-- Arthur C Clarke's 3rd law of prediction

A literary hand wave to faith-based beliefs, religious and otherwise, this quote from author Arthur C Clarke is a favorite among science fiction fans the world over. It acts as a reaction and an outright rejection of irrational beliefs in the mystical and magical. It seems a fitting starting point for a discussion of the science of teaching, the seemingly mystical craft of pedagogy. During my research, it was a revelation that this is not, in fact, an entirely original quote from the esteemed Clarke. The Third Law is actually an adaptation of a line from an earlier science fiction author, a bit of text that resonates louder in its pointedness:

"Witchcraft to the ignorant, ... simple science to the learned"

-- Leigh Brackett

This wording of the sentiment strikes even more directly at the heart of the matter - any phenomenon, no matter how amazing or startling, is nothing more than a bit of the cosmic puzzle, something to be teased out by scientists from the various -ogys, the fields of study collectively known as science.

There are many who will forget this fact, but it is important to remember that pedagogy is not, in fact, some dark mystical art, it is no divine gift bestowed upon a select few educators - the ability to massage knowledge directly into the cranium of their pupils. Pedagogy is, like all of the -ogys, a scientific practice, one that can be adapted to fit any number of situations, geographies, teachers and students. Throughout the years there have been many recognized modes of pedagogy, from the lengthy question-and-answer sessions of Socrates to the unstructured and unregimented grade less approach of

The Evergreen State College in Olympia, Washington.

The current educational gold standard, in the Western and Western-influenced world, is a model that I will, without pejorative intent, call the Ivory Tower approach. In this academic structure, the teacher or professor is seen as a pure and infallible source of information in their field, a high Priest or Priestess of education, who passes their knowledge directly to their pupils. The pupils are in turn expected to take the information into their notebooks, mechanically memorize it and be prepared to regurgitate the information onto a quiz or test in the near future. It is frowned upon for a student to question a teacher's knowledge as much as it is frowned upon for a teacher to invite dissenting opinions into the classroom, tarnishing their hallowed image. This approach is very common at the primary and secondary levels of school and in undergraduate education. More holistic approaches are common at the Kindergarten and graduate school levels.

By historical standards, this approach to education is a fairly recent creation, with the first known academic usage of the term "Ivory Tower" accredited to the French poet Sainte-Beuve in a poem from 1837 criticizing the detached literary affect of fellow French poet Alfred de Vigny. It can be seen as a product of the Industrial Revolution and the newly discovered efficiencies of factory production. With the increasing numbers of the merchant class and the introduction of the middle class throughout the 18th and 19th centuries, there was a growing population of children without labor obligations to their families who needed educating. This increase in enrollment necessitated larger class sizes and more structure in the educational process, which is typified by the French university model, which involved strict discipline and control over every aspect of the university. This method has the benefit of reliability and scalability, educational results can be expected to remain roughly consistent from year to year, and additional students

only require additional instructors who can follow the established course structure.

The second educational model under examination is organized around a communal structure and common goal of increased knowledge; this will be known as the One Room Schoolhouse approach. At its core, this approach involves aggregating students of varying levels and educational / practical backgrounds into a single educational group and allowing for a negotiation of skills to occur between the students, with the instructor acting merely as a mediator, not an infallible source of knowledge. The primary educator in this system is social interaction, an age-old human skill. This model is wonderfully illustrated in Raphael's Renaissance fresco "The School of Athens" which portrayed an idealized Grecian Academy, with various groupings of students interacting with each other in the pursuit of knowledge.

Ideally, every student in the group will have a slightly different foundation of knowledge, coming from both previous educational experiences and their holistic life experiences. The heterogeneous composition of these educational groups serve to enrich the experience for everyone as the students collaborate on work of varying levels, forcing them to engage one another to receive or administer help. An obvious flaw of this system is its inherit unpredictability as every teaching interaction is unique. With every educational group different by design, it is impossible to assure reliable results from one year to the next. The model also requires internal motivation from the students - opportunities for osmotic learning in a lecture environment are erased. Additionally, the model does not scale very well, as large groups are often forced to splinter off into smaller groups and lose the attention of the mediating instructor.

Communal learning is not a new system and should not be treated as such. In fact, empirical evidence has shown that communal learning is not even a uniquely human phenomenon, coming to us from our primate ancestors. In a recent Duke University

primate study, Dr Christine Drea showed the benefit of communal learning in novel and naturalistic foraging tasks and in cooperative problem solving (Drea 2005). Social interactions create opportunities for animals to learn about the social and physical world. The same social interactions and relationships that shape the acquisition and diffusion of information also influence the expression of learned behavior.

Research Statement

"We are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs."

-- Donna Haraway, A Manifesto for Cyborgs

As we stand beyond the brink of the 21st Century, we are outside of the boundaries where the Ivory Tower approach to education is applicable, particularly in regards to the teaching of practical knowledge and the acquisition of necessary technical skills. We must also, however, address the very real scalability issues inherit in the One Room Schoolhouse approach, as the numbers of students who need education are not likely to shrink anytime soon. We are no longer apes on the savannah and we can no longer afford to act as robotic vessels in search of knowledge from academia's font of knowledge. Technology is the future of our society and it is only growing in complexity. If we are to efficiently instruct our students in the ever-growing fields of general study and technology they face, we need to find a hybrid, or cyborg, approach, melding the ape and the robot.

Personal Stake

The research field of pedagogy is awash with academics focused on conventional education, attempting to find the recipe for academic success for traditional students in K-12 and higher education, however I find myself drawn increasingly to the world of the non-traditional and underprivileged students. Just as it is important for a properly self-motivated student to have a personal stake in his or her own education, I find it to be highly important for a researcher to have a heavy personal stake in his or her own research. I did not find my way to academia by a traditional route; in fact at one point in my life there was a very real possibility of me not graduating from high school, much less achieving an undergraduate degree and continuing to graduate school.

I grew up in what is colloquially known as a broken home, living for many years with a single mother, with no knowledge of my father. After this domestic situation took a turn for the worse, I came to live with my grandmother, a hard working but underpaid Registered Nurse who worked for the local county psychiatric hospital. This unique upbringing resulted in me attending three different high schools, each with vastly different racial and socio-economic compositions, which aroused my curiosity. In what ways might these different schools have affected my education? While researching my high school career I found a tremendous resource in the website http://schooldigger.com, which aggregates information on schools and neighborhoods from the U.S. Census Bureau, National Center for Education Statistics, and the U.S. Dept of Education. This information gave me hard numbers to substantiate my subjective memories of the time I spent at these schools.

My tenure was very short at my first high school, only lasting one semester. The school was Reagan High School, in the Houston Independent School District. It is

located in the Heights neighborhood of Houston, an inner city location that is a mix of old money Caucasian house dwellers and predominantly minority apartment dwellers. According the 2000 census, the 77008 zip code which Reagan serves is approximately 50% Caucasian, 44% Hispanic and 4% African-American. By contrast, the 2000 ethnic composition of Reagan itself was approximately 88% Hispanic, 6% African-American and 5% Caucasian. This school was surrounded by 8-foot chain link fences, patrolled by Houston Police Department officers and enrolled an extremely high percentage of students eligible for federally subsidized free or reduced price lunch. This percentage sat at 56% in 2000 and peaked at 83% in 2006. Reagan also has the unfortunate distinction of being included on a national list of schools with four year graduation rates of 60% or less published in 2007 by The Center for Social Organization of Schools at John Hopkins University by virtue of its 54% four year graduation rate.

The second high school I attended was Eisenhower High School, in the Aldine Independent School District. I spent two and a half years here, and still consider it to be my formative high school experience. The school was located in northwest Houston, serving the major neighborhoods of Inwood Forest and Acres Homes. Acres Homes is a predominantly and historically African-American neighborhood of fairly low socio-economic status. Inwood Forest is a golf course community that was heavily Caucasian in the 1970s, but by the 1990s had changed demographics greatly, with many Asian immigrants and working class African-Americans moving into the neighborhood. The 77088 zip code served by Eisenhower showed an ethnic breakdown in the 2000 census of approximately 53% African-American, 22.8% Hispanic, 17% Caucasian and 6% Asian. The 2000 ethnic breakdown of Eisenhower's enrollment was approximately 54% African-American, 27% Hispanic, 10% Caucasian and 7% Asian. In 2000, 42% of the students enrolled qualified for free or reduced price lunch, a number that has steadily

grown to 69% in 2008.

The last school I attended was Subiaco Academy, an all-boys, private Catholic boarding school in rural Arkansas. I only attended this school for my senior year, but it had the largest impact on my scholarship and is responsible for allowing me to pursue my college career. With only 165 students, this school was far smaller than either of the other two; when I attended Reagan in 1996 it had an enrollment of 2139 students and Eisenhower ranged from 3104 to 2240 students, with a substantial drop in 1999 when a freshman campus was opened to relieve overcrowding. It is also the only school I attended that was predominantly Caucasian; although through international recruiting there were small populations of Mexican, Korean and Curacaoan students. The ethnic breakdown of the 72865 zip code surrounding Subiaco was 96% Caucasian, 1.5% African-American, 1.2% Hispanic and .2% Asian in the year 2000. The ethnic breakdown of the school in 2004, the oldest historical numbers available was 64% Caucasian, 17% Hispanic, 11.5% Asian and 6.7% African-American. There is no data available on free or reduced price lunch eligibility as all students were charged a boarding fee, which covered food expenses.

As the quantitative data shows, these were all very different schools, stretching across a wide gamut of racial and socio-economic ranges. Each, however, taught me the same qualitative lesson - the standard way of teaching from a podium was leaving an entire generation of high school graduates without the technical or critical skills necessary to succeed in our modern world and something needed to be done. In the first two schools mentioned, Reagan and Eisenhower, the student-to-teacher ratios stayed within a reasonable 16-20 range during the times I attended, however every class seemed to be pushing the reasonable limits of a classroom with 30 or so students in each of my classes. With this many students in a room it is seemingly unfeasible for a teacher to

engage them on a personal level and most retreat to the comfort of the lectern, assuming the Ivory Tower position. At my last school, Subiaco Academy, the student-to-teacher ratio is dramatically lower at around 7-8 over the last three reporting periods. With this smaller number, it was much easier for the teachers to interact with students individually, but surprisingly, not all did. This was an even more eye opening experience, as the size of the school gave an easy opportunity to compare and contrast the teaching styles of one teacher to another quickly. Our Honors English teacher was notoriously closed off from her students, preferring the safety of the front of the room and desks aligned in a grid formation while our Calculus teacher insisted on grouping student desks into clusters of four and spent entire class periods traveling from group to group to discuss problem sets up close and personal.

Of particular interest in the case of Reagan is that it was a magnet school in the Houston Independent School District, with a specialization on technology and computers. This afforded the school a spacious computer lab full of top of the line Apple Macintosh computers with full office productivity suites and computer animation software. The lab was sorely understaffed, with only a single computer instructor trained in the different software packages. This teacher was in charge of both the day-to-day office and animation classes, which I was unable to register for as a freshman, and also supervised the extra-curricular computer club, which I was an active member of. From the stories I heard from the older students, it was incredibly difficult for them to pick up more than rudimentary skills from the lecture style daytime classes, but they were able to make rapid progress - particularly in the more intricate computer animation software - if they were left to work alone or in small groups with the freedom to teach themselves as they worked on real world projects rather than the pre-designed tutorials. This preference for modeled and hands-on learning over tutorial style teaching is reinforced in the 1989

software training research performed by Gist, Schwoerer and Rosen.

I experienced this same lack of engagement later in my high school career at both Eisenhower and Subiaco Academy, with the teachers typically barely familiar with the hardware and software they were charged with instructing us on, leading to lecture straight out of computer textbooks. At Subiaco Academy, as with many smaller schools, the computer duties of the entire school fell into the lap of a monk who formerly acted as the school's librarian. Looking back on these experiences I am genuinely concerned about the technical education not only of current students, but also of the many students who came before, in my generation and older. To reinforce my previous concern, technology is absolutely the future and it is only growing more complex and more integrated into our daily lives.

A cursory and un-scientific examination of an arbitrary day's worth of job postings on Craigslist.org's Houston-specific website shows a stark salary divide between jobs that specifically request computer skills and those that show no preference. It is difficult to even compare the numbers quickly since most of the listings requesting technical skills give potential salaries while the listings without technical requirements are almost exclusively hourly positions. This is the divide between job and career, a gap that could be considered a labor version of the digital divide. On one side of the divide you have hourly employees with little or no benefits struggling paycheck to paycheck, on the other side you have salaried employees with health benefits, paid sick and vacation days and a steady paycheck. It is my argument that the current Ivory Tower methods of teaching technical skills are not adequately preparing students for the future that they face, and I will be performing ethnographic analysis of several alternative, communal methods of teaching technical skills that I feel are far more progressive and will prove a higher efficacy in the long run compared to standard Ivory Tower teaching methods, as

discussed by Mawson in his investigation into alternative pedagogy in New Zealand schools.

Ethnographic Textual Research Method

In my ethnographic survey, I will be focusing on a readily accessible artifact that all three of my subjects share, a publically available wiki that details their beliefs, practices and technical procedures. The wiki has become a de facto method for groups to aggregate their documentation for internal purposes as it possesses a low barrier to entry and most software variations allow for multiple contributions to be made simultaneously, something very difficult with word processing document or more basic HTML websites. This ease of use engenders thorough documentation of events as mundane as the location and time of planning meetings for NYC Resistor and as esoteric and specific as the bootloading instructions for a classroom file and Internet server for the One Laptop Per Child project. I view the wiki as a significant cultural shift in online technology, as significant as the level of the widespread adoption of social media. Never before has it been easier for geographical diverse populations of people to collaborate in near real-time on complex tasks. From an etic perspective, the wiki paradigm gives deep access to information about insular cultures that would previously have been locked away in three ring binders of documentation or even solely existed more informally as an oral culture. Any one of these groups could fill an entire article, or even a monograph, with ease, however I have chosen a lighter analysis of each to provide a more complete survey of this important area.

Ethnography

The first group under investigation is the One Laptop Per Child project, which arose from work in the Media Lab at the Massachusetts Institute of Technology in 2005. The leader of the project is Nicholas Negroponte, founder and former director of the Media Lab, an academic program that focuses on new media approaches to human computer interaction. The focus of the group was the creation of a $100 laptop computer, to be known as the XO-1, which could be distributed in bulk to children around the world to give them early and easy access to computers and the Internet. The project operated under the tenets of constructionist learning, an approach that favored the creation of mental models of knowledge by hands-on experimentation put forth by Seymour Papert and Alan Kay. Several technical setbacks and unfavorable political and business interactions, coupled with the worldwide economic slowdown of 2008 have put the project in a state of near hibernation on a global level, however the online community is still vibrant, and the wiki, located at http://wiki.laptop.org/go/The_OLPC_Wiki, receives daily contributions. The bulk of the content on the wiki is available in 22 different languages, a testament to the worldwide reach of the project and the community.

According to the front page of the wiki, the OLPC is designed around five core principles - Child Ownership, Low Ages, Saturation, Connection, and Free and Open Source tools. I will examine each of these as an introduction to the culture behind the project. Each of these principles has an associated expression to help illustrate the spirit behind them:

- Child Ownership - I wear my XO like my pair of shoes
- Low Ages - I have good XO shoes for a long walk

- Saturation - A healthy education is a vaccination, it reaches everybody and protects from ignorance and intolerance
- Connection - When we talk together we stay together
- Free and Open Source Tools - Give me a free and open environment and I will learn and teach with joy

As a brief aside, Free and Open Source Tools is a reference to the Free and Open Source Software movement, another product of MIT, by way of Richard Stallman, who codified an existing communal ethos in the software community with the creation of the Free Software Foundation in 1985. Free and open source software espouses the sharing of the computer code underneath software allowing for educational and commercial opportunities and the overall increase in software quality.

Child Ownership is an incredibly important idea in the OLPC project. The goal is not to establish computer labs that students can visit on a schedule, but to create a computer with a low enough cost of ownership that each student can have their very own. Each XO-1 computer built comes with a randomly selected color combination in the XO logo on the lid, giving a measure of identity to the otherwise uniform computers. In the operating system users are also given the chance to select custom colors, which are used when graphically representing the users on the wireless mesh network the computers connect to for Internet access and interactivity between machines. The XO-1 should in fact feel as personal as a pair of shoes. As a computer designed for elementary aged children, it is also important for the owner of the laptop to feel the responsibilities involved with the ownership of a piece of technology, treating it well and keeping it safe from harm.

As stated in the wiki, the XO-1 is designed for low ages, from approximately 6 to 12 years of age, at which point they would be ideally ready for more advanced and

complex technology. There is no reason that younger children cannot use it, learning its more basic functions through experimentation, but the full experience is designed for those slightly older. Part of the educational experience is defined as the students tracking their personal educational journey through the years, and to this end, every activity undertaken on the XO-1 is recorded to an internal journaling system, which can be reached from the primary application menu and analyzed, both by teachers and the students themselves.

An important aspect of the success of the OLPC project is saturation. In the wiki, they liken the distribution of the XO-1 to the administration of vaccines. The higher the digital saturation of the project, the higher its efficacy can be; since the laptops are designed to interact with each other their strength grows with their numbers. Better saturation also indicates a larger community of support, as more familiar students and adults can better serve the younger generations in their use of the technology and technology in general. This principle has run into several real problems including the final price of the laptop. With the technology that was required, and without the security of large upfront purchasing contracts from interested governments, the project was only able to get the price of the individual XO-1 laptops down to $188 in quantities of a thousand, nearly double the anticipated price.

Connection is increasingly important in our modern world. The XO-1 was built with a technology known as mesh-networking, which allows for ad-hoc wireless networks to be created on the fly between individual laptops. This allows for children in a neighborhood to be "permanently connected to chat, share information on the web, gather by videoconference, make music together, edit texts, read e-books and enjoy the use of collaborative games on line." Even without an external Internet connection, the students can interact with one another and download images, videos and e-books

preloaded onto the XO School Server; a centralized server software package designed to be loaded onto low-cost hardware and left safely in the schoolhouse.

The final principle is the philosophical principle of building the hardware and software under the tenets of free and open source technology. With this principle, any and all information about the project is shared freely with any interested parties. While this allows for anyone with the requisite skills to pick up the hardware schematics or software code and resell it on their own, the GNU Public License, part of the core of the Free Software Foundation's work, requires any third parties to redistribute freely any modifications that they make to the designs or code, which in turn improves the overall quality of the project. This iterative and reciprocal design process has created technology in use in everything from university computer labs to nuclear power plants, a tribute to its subtle power. Beyond the practical business implications, having access to the underpinnings of a technology is an educational opportunity of immense importance. The XO-1 allows for ready access to the source code of each and every one of its applications directly within the application itself. All of the main system applications are written in Python, a high-level computer language with syntax considered very conversational, which helps to give students the chance to modify the code, even as the application is running. Also included is a feature to return the software to its factory condition if, or more likely when, the student does something to the code to prevent the application from working.

In addition to the philosophical background, the OLPC wiki is a complete resource on the technical information on the project. You can find the full parts lists for the hardware and learn about suppliers that you could acquire the same equipment from, for repair purposes or even for building your own machine from the ground up. The software portions of the wiki provide link to the source code repositories for the operating

system, each of the system applications and the XO School Server as well as thorough documentation on the coding and usage of the applications, providing excellent educational resources for those interested in the software side of things. To help engage a wider audience of supporters and contributors, the software is also provided in a virtual machine format, allowing you to boot and use the software on your own personal computer without needing to own an XO-1. This is an important part of the OLPC project, as the software is currently supported entirely by the community, as Negroponte and his core team focus on hardware revisions and new designs.

The OLPC project has faced many challenges in the business realm, with Microsoft and Intel at the forefront of fighting the openly designed hardware and software solution that threatened to upset their ever-expanding global strategies. Whatever difficulties they may have faced on the hardware and business side of things, I would argue that the software, philosophical and pedagogical goals of the project have been met or exceeded. It remains to be seen if the OLPC helps to engage the children it was distributed to, and further information promises to be posted to the wiki as it becomes available.

The next two projects that I wish to analyze focus not on educating children but instead on educating adults on varying technological fronts. An often-overlooked field of education is andragogy, which focuses on learning strategies for adults. The German educator Alexander Kapp first brought the term into usage in 1833, but his peers disputed his methods and the practice ground quickly to halt. Andragogy as a field was resurrected in the 20th century by an American, Malcolm Knowles, who codified the ideas of the field with his six assumptions of motivation in adult education:

- Adults need to know the reason for learning something (Need to Know).

- Experience (including error) provides the basis for learning activities (Foundation).
- Adults need to be responsible for their decisions on education; involvement in the planning and evaluation of their instruction (Self-concept).
- Adults are most interested in learning subjects having immediate relevance to their work and/or personal lives (Readiness).
- Adult learning is problem-centered rather than content-oriented (Orientation).
- Adults respond better to internal versus external motivators (Motivation).

In a 1984 book on applying andragogical practices to personal computer training, Knowles noted that instruction should be task-oriented rather than memorization-oriented, something that I feel is important not only to adult-based education, but all education, and is particularly well suited to communal, One Room Schoolhouse style instruction.

The Learn 2 Teach / Teach 2 Learn program is a dual purposed educational spring/summer and fall/winter program based out of Boston in affiliation with, but not administered by, MIT. In this program, local high school students are given the opportunity to be trained in educational techniques and apply their knowledge in a professional setting instructing local residents in computer technology. These adult students are the very group that have been long underserved by high school and even college technology education taught in the traditional lecture tradition. According to the group's wiki, located at http://learn2teach.pbworks.com/, the technology education is available free of charge to community members who are seeking a job or attempting to find a better job with their soon to be acquired technical skills.

As a precursor to teaching adults, the student educators first undergo a summer of intensive training in various technical fields ranging from the use of rapid prototyping

and fabrication equipment to basic computer programming. After they go through the various learning modules, they are then given the opportunity to turn around and teach the same learning modules to another group of peers. With this experience they are then sent to a number of community centers in and around Boston to instruct the adult students in office software packages and basic programming. As a final part of the package, the students are given free reign of the technology housed in the L2T/T2L labs to create their own projects which are exhibited in a science fair fashion at the end of their terms.

Like the OLPC project, the L2T/T2L teaching system focuses on constructionist, hands-on learning activities rather than lecture, encouraging group interaction and team problem solving. I see this project as an important piece of the puzzle in bridging the labor digital divide, directly providing germane technical skills to interested, self-motivated individuals, both at the student-instructor and non-traditional student levels. In one of the more philosophical wiki entries, a L2T/T2L staff member expresses a desire for at least some of the student-instructors to carry on these communal learning techniques as professional educators at the middle and high school levels in the near future, helping to lessen the need for community outreach programs to provide the skills that should have been provided the first time the adult students went through school.

The final project wiki in this survey of One Room Schoolhouses is yet another entirely different beast. The entity is known as NYC Resistor and is a community organized, funded and operated "hackerspace". As defined at hackerspaces.org, a clearinghouse wiki for information on this growing worldwide phenomenon, "Hackerspaces are community-operated physical places, where people can meet and work on their projects." Hackerspaces are a communal embodiment of the garage-tinkerer of America in the 1960s and 1970s, which were the humble beginnings of some of the largest technology companies in America today, including Hewlett-Packard, Microsoft

and Apple. In these spaces, groups of like-minded individuals divide the cost of a physical space and the tools and furniture needed to fill it with function and comfort and work individually and in groups to solve technological problems and to dream up and create unique contraptions for exhibition.

NYC Resistor's internal wiki, located at http://wiki.nycresistor.com/wiki/, gives this simple vision statement for the organization, "Build a group of hackers who work on projects together to increase awesomeness." This usage of the word hackers hearkens back to the original meaning, of one who tinkers with technology, wishing to learn the inner workings first hand, and should not be mistaken with the pejorative version of this term used so freely by Hollywood and the media. The space itself is located in the shadow of the Brooklyn Bridge, within easy walking distance of three distinct subway lines, giving easy access to citizens from all of the boroughs of New York. This provides for an eclectic group of individuals to congregate and work together. This is the only group in my ethnographic survey that I have had the privilege of becoming personally acquainted with, meeting several founding members at 2008 Hackers On Planet Earth Conference held by 2600 Magazine.

In the diverse category of hackerspaces, NYC Resistor is unique in its ability to not only provide directly for its own members, but to have the resources to provide technological education to any and all interested parties. The group holds regular workshops on a wide array of topics, from the basics like Soldering 101 which teaches the very basics of electronics construction to more advanced software courses like Game Boy Software Development where students learn to create their own games that will run on the Nintendo Game Boy. Each of these courses is designed and taught by a member of the group, and most of the courses have full notes posted onto the wiki so students can refer back to them and the open nature and spirit of the wiki even allows for non-students

to find the notes and work through the lessons at their own pace. On the front page of the wiki is an exhaustive listing of resources for projects, from local resources of electronic parts and fabric to mail order parts houses that carry the harder to find programmable logic chips and bulk supplies of LEDs. Links leading to active and planned projects provide valuable insight into the workflow of various types of projects and the lead on these are often passed back and forth between individuals and groups of members leading to a cross-pollination that enhances the project and its likelihood of success.

Beyond the important pedagogical and andragogical content of the NYC Resistor wiki is a wealth of cultural artifacts that point to the personality of the group. Much of this is missing from the OLPC and Learn2Teach / Teach2Learn wikis as those groups have a more professional demeanor about their work. Among the featured articles on the main page of the wiki is a list of edible rewards found in video games, like the cherries in Pac-Man and the soup in the Legend of Zelda series, and a tongue in cheek article on the creation of "mustard straws", a reimagined portable receptacle for mustard which lists "mustard straw macramé" among its intended uses. One of the various in-progress projects is a "Park Dowser", intended to be a dowsing rod of sorts that points you to the nearest and the biggest green spaces around you in New York City using readily available GPS data and the low cost, open-source Arduino microcontroller.

Ethnographic Textual Research Conclusion

As a starting point, I feel that this ethnographic survey of these three particular pedagogical / andragogical groups and their wikis provides strong evidence of the growing importance of communal, hands-on learning in the technological field. I am using this to undertake more hands-on research at a much deeper level, hopefully leveraging field research observations and personal interviews with individuals at the instructor and student levels. It is a wonderful thing that we live in a world with such ready access to incredible technology, but I am in full agreement with Guillermo Gómez-Peña's beliefs in his essay "The Virtual Barrio", it is one thing to have this technology, it is another to fully understand and use the technology to its fullest extent. Simply handing Internet access to a child is no longer satisfactory, if it ever was. We need to sit with the child and help guide them through the vast expanses of cyberspace and help them to develop their online, technological identity as readily as we have sat with them in the real world and helped them become full formed adults, just as we need to sit with the modern adults who never had a chance to interface with this intimidating new technological world that seemingly sprang up overnight, around them, leaving them in the shadows.

The Trojan Experiment: Alternative Pedagogy in Digital Media

It is with my personal stake and ethnographic textual research in mind that I detail my Master's project, which has the working title "The Trojan Experiment: Alternative Pedagogy in Digital Media". In this project, I aim to construct a digital media lab in a small private school, develop a curriculum for students in grades 7-12 rooted in alternative pedagogical techniques and communal learning, and attempt to judge the efficacy of the experiment. Digital media was chosen for several reasons. The most superficial reason being my experience teaching digital media creation, presentation and distribution in the ACTLab at UT-Austin under the guidance of Allucquére Stone over the past 8 years, first as an undergraduate Radio-TV-Film student, then as an alumnus of her program working in my free time and currently as a media studies graduate student working with her closely. Second is the abundance of cheap digital media creation equipment as swift enhancements in technology have left consumer grade audio/video equipment of quite high quality in easy financial reach. Finally, and most importantly, I see digital media creation as a natural avenue to teach what I see as an incredibly vital life skill, the idea of narrative.

I see narrative at the root of the most important things that might face a modern student in the classroom and in the real world. At the most basic level, the process of planning and executing an interesting and intelligible academic paper, hopefully one that surpasses the rote minimum of the five paragraph essay so entrenched in current educational practices, is an exercise in the act of narrative. Whether its fiction or non-fiction, all writing should tell a story, be it a story of entertainment, argument or information. Narrative is also central to the act of speaking, particularly in a public setting such as giving a speech to an audience, communicating with colleagues, or even

sitting in a job interview, elucidating the reasons you are the best candidate for the job. On a more esoteric level, narrative skills are highly applicable to troubleshooting in real-world situations, such as generating an effective and efficient workflow through multiple layers of software in the production of an information artifact.

Due to the combination of the experimental and practical natures of this project, the sources I have to pull inspiration and lessons from are quite varied. There is much practical knowledge to be gleaned from the online wikis I detailed in my ethnographic textual research. Although their methods are a bit dated, coming from the late 1980s, the practical education work done by Gist, et al is an excellent resource for technology specific teaching techniques in the andragogical direction.

This project is rooted in several theoretical fields related to education. The backbone of my work comes from the alternative pedagogy of Allucquére Stone as performed in her ACTLab at UT-Austin. I have taken classes and worked with Professor Stone as an undergraduate and graduate student since 2003. In this time I have observed her techniques and spoken with her at length about her philosophies. Some of the primary tenets of her teaching include de-privileging the role of the instructor, creating a safe place for students to fail and emphasizing the presentation of the final work, successful or not, in front of peers as a form of narrative. Another theoretical branch that I have less hands on experience with is the general ideas of alternative pedagogy and andragogy put forth by Mawson and Knowles. Mawson's work focuses on alternative pedagogy directly related to technology education, implementing more self pacing and allowing for students to interact with each other, helping the group to achieve the milestones collectively without rote memorization. Knowles' looked more generally at the often overlooked practice of adult education. There is a known but fuzzily defined boundary between the learning abilities of adolescents and adults, and Knowles was interested in methods to

teach adults, who particularly benefit from hands'-on work facilitated by an instructor and the interaction with other students on common, but not communal, work. The final, and most disparate, theoretical approach I aim to include is the growing body of work on primate learning. As the work of Drea shows, primates, not only great apes but even the lower monkeys, have an innate sense of community and communal learning. It is commonplace for a single monkey to learn a new skill and then begin teaching it to others through hands'-on demonstration, showing that this aptitude for advancing the common good is deeply rooted in our minds, even if is often ignored in the typical classroom lecture setting.

I am particularly interested in attempting to apply these more advanced, adult-oriented teaching theories to younger students, stretching the idea of adult in the realm of andragogy. In the ACTLab style of teaching there is a particular notion of motivation that I have observed, namely students with the highest personal motivation to create tend to have the easiest time engaging with the unique teaching style. Students with less motivation seem to crave more direction and fail to self-direct their ideas into actionable projects without direct intervention from Professor Stone or the course teaching assistant(s). This direct intervention is contrary to the teaching framework Professor Stone prefers to work in, but is not unheard of, and in my personal experience is the most satisfying work. There is a distinct glint that appears in the eyes of the student once the self-motivated concept of creating personally-meaningful work finally "clicks" in their mind and begins to make since. In my estimation, this "light-bulb moment" is when they shed their previous conceptions of lecture and rote memorization in the classroom and begin to engage more fully in the course, and this is a sublimely enjoyable experience for the teacher. I fear, however, that there might be a direct correlation between this ability to self-motivate and age, that younger students in grades 7-9 might be incapable of this,

and that even the older students in grades 10-12 might struggle with the concept. This is of primary concern for my experiment.

The project itself consists of three distinct parts. The first of these is the buildout of the digital media lab in hardware and software. The lab itself will be located inside Subiaco Academy, a 200 student Catholic boys' boarding school located in a Benedictine monastery in Subiaco, Arkansas, serving grades 7-12 as of Fall 2010. As stated earlier, this school was the last high school I attended, and is directly responsible for preparing and motivating me for a successful college career. It is an ideal test bed for this experiment due to its small size, allowing for a smaller capital outlay on equipment, the flexible nature of teaching in private schools and my personal connection to the institution, including friendships with several current teachers and monks who have expressed interest and support for the project. The lab will consist of 3 computer stations, video cameras, still cameras, audio recording devices, studio microphones and a full complement of digital media software.

Current plans call for 3 22" Apple iMac all-in-one computers, 4 pocket sized video cameras in the style of the Flip Ultra brand, 4 midrange point and shoot digital cameras in the style of the Canon G series, 4 handheld field recorders in the style of the M-Audio Microtrack, 4 desktop studio microphones in the style of the Blue Yeti USB model, software from the Adobe Creative Suite 5 range for photo manipulation, video editing and audio editing and a small library of third party instructional manuals. There are also plans to assemble a small library of DVDs for screening purposes to help introduce the students to various media making techniques and the act of narrative on film.

Concerns in this portion of the project include the limitations that a Catholic institution might place on the media students can consume and create. My teaching experience lies in a public university where students are typically past the age of ratings restrictions and

considered mature enough to view films with cursing and nudity in a classroom setting. Restricting screening materials to PG-13 and below might place an artificial limit on the breadth and quality of the screening materials, although this is yet to be seen. Another concern is the quality of equipment supplied to the students. This project is being funded directly by my uncle and I, each donating a portion of the small inheritance left to us by my grandmother, his mother, in her name to the school that she was unable to donate to herself before her passing. With this budgetary constraint, I am focusing not on the visual or aural quality of the student's work, but on the creativity, personal meaning and attention to narrative given in the production and presentation. There has been some concern about the choice of Apple computers, which command a price premium over similarly spec'ed generic PCs, PCs which might free up budget for higher end production equipment. My thoughts on this are three-fold: first, I do not wish to place a maintenance burden on the school, and in my experience as a desktop support professional, Apple computers are of higher quality construction and have a superior warranty experience to even high end PCs from equally reputable suppliers such as Dell. Second, in my experience as a media professional, the ease of use of Apple computers for media creation is unparalleled, and well worth the premium for allowing the focus of the instruction to be on creation and not on troubleshooting hardware and software incompatibilities. Finally, in my time in the Radio-TV-Film department at UT-Austin, a tenure stretching back eight years now, top of the line production equipment comes and goes, on an almost semesterly basis, but the basic creation and editing skills provided by a quality computer and software package have a much broader range of application and will in turn allow the focus of the educational experience to be on the narrative of the work and not perfecting the visual or aural quality.

The second part of this project will detail the creation of the policy infrastructure and

curriculum to accompany the physical lab. This document will be detailed in the appendix of this report. In speaking with school teachers, the most common problem I have seen with these type of donations of goods is the lack of infrastructure to inform the use of the materials. Simply donating a computer lab is often not enough, as it is unlikely that existing teachers will have the direct experience to use the lab to its fullest extent, and the hiring of a new teacher or in depth training of an existing teacher is often an undue financial burden on the institution that can often lead to the equipment falling into disuse. This makes the creation of an educational framework paramount among my concerns. The curriculum I aim to create will draw heavily from my theoretical influences, with narrative at the forefront, and lecture instruction kept to a minimum.

I am modeling the semester timeline on the way Professor Stone teaches an ACTLab semester, in three parts, with three completed projects as touchstones. These projects should be open-ended, with the students facilitated in their work, but without proscribed guidelines. The focus should be on creating a narrative structure in still image, video or audio that contains personal meaning to the creator. First is a mini-project worth very little gradewise, typically 5-10%, this is used to give the students time to become comfortable with the lack of traditional class structure. The second project, due at roughly the midpoint of the semester, will constitute a much larger portion of the final semester grade, somewhere in the 40% range, and will require commensurate effort and output. The final project, due at the end of the semester, will be seen as a form of capstone for the semester, collecting the various skills accumulated throughout the course into a larger piece of work worth the most percentage of the semester grade. Each of these projects will in turn consist of three parts, with no particular grading rubric applied to them individually, the actual artifact created, the presentation of the artifact and the documentation of the creation and thought process behind it. All of these components

have their own unique narrative component, which will require the student to think through their work from several angles, a critical thought process not often emphasized in classroom settings.

The actual day to day instruction in the classroom will hopefully be minimal, as we ask the students to find their own way through the hardware and software components, instilling the usefulness of manuals and internet searches as methods of acquiring knowledge. In the real working world, automatic recall of memorized knowledge is rarely necessary, outside of time sensitive situations that might be faced by a doctor or public safety official. The primary skill I find lacking in my own interactions with students is an inability to effectively use the internet to find the answers they need. There is little incentive in our daily lives to disallow the use of our Haraway-style cyborg minds, through the use of reference books and the internet; the cyborg intelligence our modern society provides is the next evolutionary step in intellectual advancement, off-loading mundane trivia like phone numbers and exact word definitions to simple devices like smartphones we can carry with us, leaving us time and mental capacity for higher levels of thought.

There are a couple of topics that I feel must be covered in some form of lecture, as I cannot see a passive way to convey the information to the students. I would like to use less of a formal lecture and more of an example based, Socratic method for these, which feel is an attainable goal. The first is a basic set of technical skills, things that might not be fully comprehended from online tutorials or the book library in the lab. The concept of production workflow, best practices for storing large media files in a sane and usable manner and the basics of outputting work and placing it onto a web server as its means of distribution. These will likely require short lectures with plenty of hands-on experimenting. I do not wish to proscribe any particular manner of accomplishing these

goals and am in fact quite interested in seeing the types of organic working arrangements the students might develop on their own. The second is the more esoteric and troublesome topic of copyright, with the implications of fair-use and the growing community of copyleft activists, Lawrence Lessig and his Creative Commons movement chief among them. This is does not require a proper lecture, in fact I believe these ideas can be effectively conveyed through the viewing of several recent documentaries like "Good Copy, Bad Copy" which investigates the global music "mash-up" community and engaging in discussions with the students about their own practices in copyright respect and violation, in a non-judgemental manner. Of primary concern with copyright is maintaining the full legal ability for these student works to be distributed freely over the internet without the fear of DMCA takedown notices or even more severe legal retributions.

The final step will be the evaluation of the efficacy of my experiment. This evaluation plan will be detailed in the appendix of this report. At the most basic level, I wish to find out if the theoretical frameworks and instructional methodologies in use are successful in engaging the students and helping them to think through the process of narrative development. More specifically, I aim to employ primarily ethnographic techniques to observe the learning process. I intend to observe the students in their work, and also observe the organic changes they make to their physical and digital workspaces, which I hope to be an indicator of the production culture. In order to get a sense of the project from the student perspective I will conduct in person, individual interviews, as well as a written questionnaire, asking students to evaluate the course ideology and the implementation. For a final measure of a hopefully objective manner, I will interview the instructor(s) and observe the media artifacts created by the students. As part of the presentation and documentation process in the individual projects, I would like to ask the

students for a self-evaluation of sorts. Particularly in failure, but often in success, it is common for a project to "push back" at you, and begin to show itself in new and unexpected forms; I would like to hear these stories and how the students worked around them. Even in failure, if they failed to anticipate potential problems and were unable work around them, I hope they learn through the experience and can speak to it.

Through this experiment I hope to not only prove to some degree the efficacy of communal learning and alternative pedagogical and andragogical techniques, but also provide some artistic and technical inspiration to at least a few of the students in the course. My own life has not followed a prescribed course, but has instead been a series of epiphanies, lampposts guiding me through the fog. Subiaco provided the impetus to not only attend, but involve myself deeply with college and helped prepare me for success. In its turn, Allucquére Stone's ACTLab helped provide the impetus to pursue an artistic and technical career and imbued me with a great appreciation for and knowledge of digital media creation and distribution. Later, after several years of work in the professional world, Professor Stone's class, this time taken informally, inspired me to pursue my graduate degree where I discovered my latent interest and talent for teaching. I would like to help put these lampposts earlier in the academic careers of Subiaco students so that they might achieve their potential masters degrees before they begin finding grey hairs hiding in their beards.

Appendix A Evaluation Plan Introduction

The Trojan Experiment Curriculum Evaluation

The Trojan Experiment aims to provide Subiaco Academy with a fully featured and technologically sustainable modern computer lab as well as a uniquely instructive digital media curriculum that will instruct students in the basic aspects of narrative storytelling and digital distribution. This project is being undertaken as a privately funded academic endeavor under the auspices of the University of Texas at Austin, and the work will be supervised by Professors Sandy Stone and Kathleen Tyner.

Subiaco Academy is a boys' Catholic boarding school located in the River Valley region of Arkansas with an enrollment of approximately 200 students. This low enrollment, and the low revenue it provides, limits the opportunities for artistic instruction. Through the Trojan Experiment we hope to provide a unique, engaging and sustainable digital media based educational opportunity for the student body.

Purpose of the Evaluation

This is the first implementation of the Trojan Experiment concept, and an evaluation is necessary for several reasons. First, to ensure the limited budgetary funds are spent in a responsible and effective manner, bringing in the highest quality technology and most appropriate technology for the task. Next, to measure the student experience in both educational and personal terms, hoping for positive results and a desire to continue the program in future semesters. Finally, we seek to measure the sustainability of the program, which has an eye on reducing expertise needed for instruction and maintenance, and using the formative evaluation to provide for the continued improvement of the program.

Goals and Objectives

The Trojan Experiment will attempt to provide a rich digital media based narrative storytelling educational experience. The project seeks to enhance the creative output and enhance the critical media skills of the students. This will be accomplished through a variety of activities, from viewing and discussing existing works to the creation of digital projects including audio recordings and short films.

The project also aims to create a framework for a low-cost, project based digital media lab and curriculum for other organizations to adopt and further improve upon. Through the evaluation process, it is hoped that improvements can be made to the curriculum and to the recommended equipment purchases for such a digital media lab, as the concept is

adopted by other organizations.

Calendar of Activities

The implementation and evaluation of the Trojan Experiment will occur in the Spring of 2012, simultaneously. Final arrangements are still to be made, the tentative calendar of activities is as follows.

December 2011	Finalize arrangements with the school, including teaching space and financial considerations
December 2011	Obtain research approval from UT IRB board
January 2012	Instrument development for quantitative and qualitative evaluation cycles
January 2012	Equipment purchase and buildout of digital media lab at Subiaco Academy
February 2012	Begin 8 week educational cycle
April 2012	Finish educational cycle Final project presentations
February through April 2012, ongoing	Evaluation cycles including: • Pre and post questionnaire of students • Pre and post interviews of students • Post interviews with instructors • Ethnographic investigation of student working environments / habits
May 2012	Finalizing of evaluation, dissemination of results

Methodology

The evaluation of the Trojan Experiment has the benefit of a purposive sample, which will consist of 8-10 high school aged students at Subiaco Academy. The demographics of the institution suggest that these students will be roughly 60% white Anglo, 15% hispanic, 15% black and 20% Asian and other. The non-white students are

predominately foreign born, with large contingents from the Dutch Antilles, Mexico and South Korea.

The evaluation will incorporate multiple methodologies of both quantitative and qualitative forms.

For quantitative data, the evaluation will include a pre and post questionnaire, delivered online, of 10 to 20 questions. The pre and post questionnaire will be administered to students and the post questionnaire will be administered to instructors, the data will be used to gauge perceived efficacy of the curriculum and overall personal satisfaction on the part of both students and instructors.

Qualitatively, a pre and post interview protocol will be administered to the students and instructors to attempt to gain more insight into the satisfaction with and overall quality of the instruction.

For an in depth look at the actual working environment of the students, an ethnographic investigation is planned that will focus on the student customized aspects of the software and hardware provided. This data will be gathered through personal observation on the part of the evaluator in the form of computer screenshots and still photos.

Evaluation Design Matrix

Study	Sample	Methodology	Estimated Time
Pre and Post Interview (Student)	8-10 Male Students	Oral Interview	1 day, each
Pre and Post Questionnaire (Instructor)	1-2 Instructors	Online Questionnaire	1 day, each
Pre and Post Questionnaire (Student)	8-10 Male Students	Online Questionnaire	1 day, each
Ethnographic Workspace Investigation	8-10 Male Students, 1-2 Instructors	Observation Protocol	Length of project (6-8 weeks)

Dissemination Plan

The dissemination plan for the Trojan Experiment and Evaluation materials will incorporate the tenants of open publishing, in the vein of MIT's Open Courseware. The

primary distribution system will be an online website using a content management system that allows for public comments. All of the materials, curriculum and evaluation, will be released under a Creative Commons license that allows for full reuse by third parties, with the hope that this will help encourage the use and further development of the curriculum. A working example of this dissemination plan can be see at http://codev2.cc/, where Lawrence Lessig posted the full text of the first edition of his book "Code" and asked the public to submit changes and updated content, which was turned into the second version of the book, "Code 2.0". The entire project was released under Creative Commons license, sold on Amazon and through other book resellers and made available as a free download at Lessig's personal website. This allowed for the collaborative efforts of a community to improve the end product and reward them with the choice of how much to acquire the book.

Appendix B Evaluation Plan Logic Models

Evaluation Focus Area: Enhanced creative and critical narrative skills in students
Audience: Students

Evaluation Focus Area	**Audience**	**Question**	**Use**
Enhanced creative and critical narrative skills in students	Students	Do the students gain experience in creative endeavors	Evaluation of the artistic instruction
		Does student output increase in quality	Evaluation of the artistic instruction
	Instructors	Do students exhibit thoughtfulness in creations	Evaluation of critical skills in program
		Does student output increase in quality	Evaluation of artistic instruction
Enhanced confidence in narrative abilities in students	Students	Do the students undertake more ambitious works	Evaluation of confidence building
	Instructors	Do the students undertake more ambitious works	Evaluation of confidence building
		Do the students gain confidence presenting their works	Evaluation of confidence building
	Parents	Do students express themselves more freely and fully	Evaluation of narrative strategies

Program Evaluation Logic Model

GOAL: Enhanced critical media skills of students

Activities	**Outputs**	**Beginning Outcomes**	**Intermediate Outcomes**	**Advanced Outcomes**	**Measurement**
Consumption and creation of narrative focused projects in various mediums	Comic Strips Audio Stories Photo Essays Short Films	Enhanced understanding of narrative form and intent	Enhanced critical media skills	Enhanced ability to critique and create media	Interviews of participants and instructors Questionnaires of participants and instructors

GOAL:Enhanced creative output of students

Activities	Outputs	Beginning Outcomes	Intermediate Outcomes	Advanced Outcomes	Measurement
Creation of narrative focused projects	Comic Strips Audio Stories Photo Essays Short FIlms	Enhanced creative skill across mediums	Enhanced creative skills and confidence to attempt new mediums with minimal instruction	Increase of confidence in narrative-focused creative activities	Subjective analysis of output Peer review of output Interviews and questionnaires of participants and instructors

Appendix C Evaluation Plan Interview Protocol

Thank you for taking the time to participate in this project. We hope that your experience will help future generations of Trojans by giving them more artistic and technical outlets despite the limited resources of the school.

Before attending this program, what kind of experience did you have with creating digital media?
- Online writing?
- Audio creation?
- Video creation?

What are some of the difficulties you faced when using this software?
- iMovie?
- Garageband?
- Pixelmator?

Where did you go for help when you had software difficulties?
- Instructor?
- Other students?
- Internet searches?
- Physical reference books?

What are some of the difficulties you experienced with the hardware?
- The iMac?
- The camera?
- The audio recorder?

Did your projects take any unexpected directions?
- Unexpected outcomes?
- Good / bad surprises?

When working on the projects, what kind of creative problems did you run into?
- How did you solve the creative problems?

How did you solve creative problems in your work?
- Difficulties with filming / recording subjects?
- Projects too long or too short?

What are the challenges of public speaking for you?
- In church?
- In school?

After this program, how would you assess your ability to speak before a large group?
Easier than before?
Harder than before?

How do you feel when others criticize your work?
What do you learn from this criticism?

Were there any projects that you were unable to finish?
Why?

Were there any projects that you think were too hard?
Any that were too easy?

Thanks again for taking the time for this interview. We've all enjoyed working with you and I hope you have had an enjoyable experience with this project. Do you have any other questions for me?

Appendix D Evaluation Plan Questionnaires

Student and Instructor Questionnaire

http://www.surveymonkey.com/s.aspx?PREVIEW_MODE=DO_NOT_USE_THIS_LINK_FOR_COLLECTION&sm=R7OsdnAroLc5RwP1I0kx8h3gUcfw/hXrsYCInVSWt9Y%3d

Student Demographic Questionnaire

http://www.surveymonkey.com/s.aspx?PREVIEW_MODE=DO_NOT_USE_THIS_LINK_FOR_COLLECTION&sm=0rvp5piRv8C7PUW3W0uej0YrwvtmRdWzlWtEA2PBaIo%3d

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