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CELLULAR LEARNING:

Increasing student performance through mobile technology.

Victor Fitzjarrald

Colorado College MAT Candidate
2008-2009

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MR Supervisor

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INTRODUCTION

Schools across the country have become increasingly concerned with student use of Personal Electronic Devices (PED's).[1] A Personal Electronic Device is considered any piece of technology that is small enough to fit in a pocket yet easily available to the consumer. Modern PED's allow users to access internet resources and create documents from the palm of their hand. It has been said that a modern-day iPhone has more computing power than the United States used to reach the moon in 1969.[2] Concern about the use of PED's is not entirely unfounded, since more than one-in-three people on the planet has one, and that number is expected to increase to more than one-in-two within the next year.[3] Despite the potential benefit of this increasing access to technology, few districts or schools have chosen to teach students how to use that technology appropriately. Most school districts have implemented policies aimed at removing PED's from the classroom entirely.[4] This research will focus on examining the methods of use and effectiveness of PED's as an educational tool. Ultimately this research seeks to develop methods to increase student engagement and performance through the use of student-owned PED's.

National Education policy has begun to focus on evaluating both student and school district performance. This trend, which began with No Child Left Behind (NCLB)[5], has caused the creation of several new education initiatives. These initiatives have recognized and worked to close the achievement gap between American High School students and their counterparts abroad.[6,7] Because of the increasing national concern about student performance, the initiatives which followed NCLB have been largely incorporated as a

means to increase Annual Yearly Progress (AYP) in schools across the country. Several of the initiatives which followed in the wake of NCLB advocate for the use of all technology but do not specifically promote PED's in a 21st Century classroom. Little research has been done on the use of PED's in the classroom, their likely effect on student performance, or their ability to help close the achievement gap.

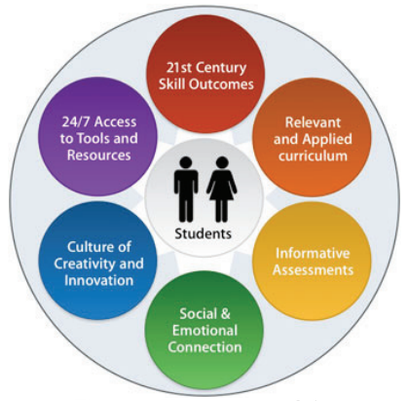

Figure 1: Key aspects of the ACOT2 Program

One of the most successful and heavily endorsed initiatives has been The Partnership for 21st Century Skills.[8] Funded largely by private corporations, the message of The Partnership has permeated the national education system. The Partnership is largely organized to give students more responsibility while infusing technology into the classroom. Lesson plans and resources for teachers have been posted online and are available for any educator to use. These resources are provided with the goal of increasing our ability to prepare future generations for the digital age. Even though The Partnership is the most well-known 21st Century initiative, many of its members have produced their own resources for increasing the use of technology in the classroom.

One of the founding members of The Partnership, Apple Computing, started a project in 2004 known as Apple Classrooms of Tomorrow-Today (ACOT2). Apple provided significant research into the science behind teaching 21st Century Skills forming methods that have become their own educational initiative. ACOT2 was designed to allow educators to write grants for technology under a six-tiered instructional system. Each tier

represents a single aspect of education, ranging from relationships to practical skills (see Figure 1).

The scope of this research was limited to addressing three of these specific areas in education: 24/7 access to tools and resources, 21st century skill outcomes, and informative assessments. The goal of 24/7 access is to teach students how to learn in any environment and access the materials they need for any course using technologies with which they are familiar. Teaching students how to access materials using their own technology is the best way to incorporate the next focal area: planning for 21st Century Skill outcomes. This area aims to provide educators with a framework for increasing the use of technology through improved lesson plans and curricula. Finally, the research turns to a third tier of education: using appropriate assessments. Modern-day assessments should be informative, technology-related, and able to provide immediate feedback for students and educators. These three areas of the the ACOT2 program form the core of the methodology of this project. They also played a significant role in the integration of each piece of technology (or the resources in use) into the curriculum.

It has been postulated that increasing the strength of each lesson using the six-tiered ACOT2 method will have a positive influence on the learning environment due to its multifaceted approach.[9] Because of its ability to increase the effectiveness of a curriculum, the six tiers of the ACOT2 method have been incorporated into many High School programs (SQ3R, Rigor and Relevance, Love and Logic, Kagan Strategies, etc.).

Few prior studies have focused on creating a 21st century learning environment in a low-income school. In this setting, new methods must be developed for connecting with low-income students within the framework of previously established methods. This frame-

work was first presented by Dr. Ruby Payne in her book, *A Framework For Understanding Poverty*. Payne presents educators with methods to increase student engagement. The three areas of the ACOT2 program which were not specifically addressed in this research (Culture of Creativity and Innovation, Social and Emotional Connection, and Relevant and Applied Curriculum) are strongly endorsed by the work of Dr. Payne for teaching in a high poverty environment. Over the last 20 years, these three areas of Dr. Payne's studies have been incorporated into most low-income school management schemes. Because they are more generally used in low-income schools, this research focused on the three areas that were not already built into the policies of the school where this study would take place.

Most studies on 21st Century Education focus on giving the students technology to use at home and during class (i.e. laptops). These programs (1-to-1 laptop programs, Google™ site schools, etc.) are often very costly and time-consuming to implement. With the public calling for increased accountability regarding what students do at school, many school districts are placed under pressure to provide these programs even if they do not have the necessary funds Very few low-cost solutions have been suggested as a means to incorporate 21st Century learning environments into these schools.

In 2000 a multiyear project, known as MoLeNet, began in the United Kingdom that aimed at providing educational outreach by means of mobile computing. In 2007 MoLeNet began a study of the interactions of mobile technologies, PDA's in this case, and their human counterparts.[10] MoLeNet is a Mobile Learning Network which is largely based in the United Kingdom and is based upon one of the broadest definitions of mobile learning, "the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and

learning."[11] This study specifically focused on the interaction of technology, especially social networking services, with students who were determined to be social recluses or outcasts. As the study progressed they found that the students who benefited most from the increased technology were those socially ill-adept students. Coupled with studies that show increased concern with digital isolation,[12] it seems that technology could provide either a positive or negative impact on the classroom environment. This research will attempt to develop methods to implement this technology in an education-appropriate way. Since the average high school student uses at least two digital devices everyday,[13] it seems that allowing them to use their own technology, and teaching them to use it appropriately, may mitigate the time involved in enforcement of no-PED policies (such as those instituted by the State of New York in 2009)[14] in addition to increasing student involvement in class.

In the nine years since the development of methodology to incorporate mobile computing into education, very little information from the MoLeNet studies has crossed the Atlantic. Mobile education in the United States is still in its infancy. Many organizations (Apple, IBM, Microsoft, iTunes, Technology in Education, International Society for Technology in Education) have recently undertaken their own initiatives to study the effects of mobile computing in the classroom. These studies, although similar to the 21st century initiatives, have provided the foundation for long-term studies of mobile learning (or "m-Learning") in which the duration of the study extends far beyond the courtship, or novelty, phase. These will be the first long-term and normalized achievement studies to be conducted with American High School students.

Every organization that stresses the use of technology, especially the use of Personal Electronic Devices, as a means to increase both relevance and student involvement in

the classroom, seeks to provide professional development and training for teachers. In the United States Apple Computing® in conjunction with the newly-formed Google Education initiative, has instituted a new policy allowing educators to create and manage websites and databases to increase mobile and wired computing in the classroom. The Google Teacher Academy (GTA) has certified hundreds of teachers since its inception in 2004.[15] One of the most significant components of GTA is that it mandates that all of the certified teachers provide professional development to educators both in person and on the web.

Many websites have been created to allow the increased use of mobile computing in the classroom. These sites facilitate anything from writing and grading exams to planning lessons. Several private websites have created services which incorporate text messaging and mobile input into quizzes and tests. Teachers that are able to learn to use the technology that these sites provide can diversify their methods of instruction. Studies have shown that incorporating technology naturally increases the relevance of the material as well as the number of 21st century outcomes achieved.[16]

Relevance was incorporated into the National Science Education Standards in 2001. Incorporating relevance into a lesson increases student engagement and performance because the material has direct consequence to their lives. Our academic world should help to facilitate the jump of graduates to their future workplace outside of school. This study aims to determine if incorporating relevant material will become easier by increasing student access to technology. Allowing students to use familiar technologies encourages them to pursue their own ideas and passions, reducing the need for teachers to stress additional tools for relevance in their lessons.

Over the last few years, educators have become increasingly alarmed with the impacts of student-introduced materials into the school setting (weapons, drugs, etc.). With recent developments in cyber-bullying and in-class mistreatment of students, there is a viable reason for alarm. As a consequence of our increasing need to control the school environment (and, therefore, their social environment), students have retreated into a bubble of isolation and started to use technology as a shield. It is not uncommon on college campuses across the country to find that two students are walking side by side and communicating, not with each other, but with people miles away.[17] Due to the lack of privacy in schools and other settings, students seem to cope by increasing their use of social networking technology. Students have developed heightened levels of concealment and use the technology that they are accustomed to regardless of the consequences.

If the tools developed by this research are to be viable for educators, they must include the administration. Due to national outcries de-validating mobile learning, administrators often view mobile technology as nothing more than a distraction. Combating this mentality demands an increased willingness to demonstrate the potential of these technologies by sharing materials and resources between teachers. By integrating the results of this research with programs such as GTA, teachers can increase awareness among their peers as well as administrators.

This study will focus on methods of increasing student participation. Each student will be allowed to use the technology that they have in the classroom. The skills that these students will acquire will have direct and quantifiable learning outcomes in all disciplines. If each student can be shown how to use the technology appropriately, it can be used as a method for increasing participation and relevance instead of simply causing disci-

plinary issues. In order for this change to occur, methods were developed translating lessons from the MoLeNet studies into the American Education system. Since the methods in this study have not been previously demonstrated, this research will provide in-depth analysis of the MoLeNet Methods and will integrate and test them in a 21st Century classroom.

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LITERATURE REVIEW

Since its incorporation into the National Science Education Standards in 2001, relevance has become one of the core tenets of Science Education at all levels. Several studies have shown that increasing the amount of student-determined relevant material (determined via polls and various surveys) increases student retention and performance.[18] With relevance gaining national attention, many resources regarding its implementation were also provided for educators.[19] Many educators recognize the difficulty in increasing relevance in the classroom, because it requires a drastic increase in the time spent preparing daily lessons.[20] It is difficult to mandate, with any success, a program which requires a higher expenditure of time for educators. Although it is difficult to implement, many academic studies have shown that increasing relevance allows for a drastic change in learning outcomes for diverse and disabled children.[21,22] Relevance has been studied at all levels, but few studies currently exist that were instituted solely by the classroom teacher.

The difficulty of increasing relevance lies in the fact that, if you were to survey one-hundred high school age students in the United States, you would receive just as many topics of relevance to the students. It is through allowing the students to determine their own level of inquiry that we can truly allow them to experience their education.[23,24] This shifts the responsibility onto the students to find their own relevance and hopefully some "Intrinsic Motivation."[25]

One of the first publications, or "white-papers", published by the Partnership for 21st Century Skills defined 21st Century learning as,

> ...tak[ing] place in a context of relevance, "just in time," rather than "just incase." And such learning offers "just what I need" – that is, the opportunity to acquire knowledge and skills through learning strategies that are personalized and adapted to the learner's own learning styles and preferences.[26]

This definition demonstrates that in a 21st Century environment students need to have the information and skills to create their own relevance.[27] Increasing relevance is most successfully accomplished when it draws upon a student's intrinsic motivation, that is, a student's internal drive and determination to complete a specific task. Our digital world allows for almost constant input; educators need to focus that input to align with educational goals in a way that is intrinsically motivating for students.[28]

For the incorporation of relevance in a 21st Century setting we must disengage from the active scaffolding technique (where every action is deliberately instructed), and instead develop a framework for teaching appropriate usage.[29] Students need to be taught how to use the tools that are relevant to the material, and then they need to be unleashed to provide their own meaning to the activity. Linn and her colleagues postulated that technology can enhance the classroom environment,

> By helping students contrast the various explanations that they themselves use for everyday scientific events, students are more likely to see the relevance of their own observations to science.[30]

If teachers can provide a framework for integrating technology that students can then use, relevance becomes the responsibility of the individual student. Educators should not be afraid to give students the responsibility to determine what is or is not an appropriate use of technology.[31] Every situation has a different definition of appropriate, and what is appropriate in one context may not be in another. Teachers should refrain from stopping students from using cellphones because the circumstances of life may make its use appropriate and demand an immediate response (i.e. a death in the family, parents on the way to pick up the student, etc.). Giving the students the responsibility requires that they constantly evaluate what is applicable to the task at hand (including stimuli outside of the classroom environment).

The idea of increasing relevance through student interaction with materials from their environment is by no means novel. In 2000 Edwards demonstrated that the performance of students in a physics course increased as they were asked to use cell phones as an object of study. [32] By simply allowing students to use cellular phones as a focus of project work, Edwards demonstrated that technology is an easy way to engage students. One of the reasons that Edwards was so successful is that he demonstrated an application of a theory of Educational Psychology initially postulated by William James.

William James is considered by many to be one of the founders of Educational Psychology. In 1882 he gave a set of lectures to future teachers.[33] In these talks, which occurred over many weeks, one of the central ideas was that,

> Any object not interesting in itself may become interesting through becoming associated with an object in which an interest already exists...The two associated objects grow, as it were, together: the interesting portion sheds its quality over the whole; and thus things not interesting in their own right borrow an interest which becomes as real and as strong as that of any natively interesting thing.

James postulated that an idea will infect another and provide its own emotional interest when the two objects have been nurtured together. Using this theory, James hypothesized that,

> From all these facts there emerges a very simple abstract Programme for the teacher to follow in keeping the attention of the child: Begin with the line of his native interests and offer him objects that have some immediate connection with these.

James determined that it is the role of the teacher is to provide examples that are intrinsically motivating to students which can provide that motivation to other, closely related, subjects. Edwards demonstrated this by incorporating cellular phones as a subject in a physics classroom. In our modern society it seems like one of the best ways to increase intrinsic motivation is to involve mobile technologies.

Increasing intrinsic motivation by incorporating relevance has been largely studied in Academia. In 2005 Knight and her colleagues at the University of Colorado at Boulder demonstrated that student retention could be increased by limiting the time spent lecturing in a Cell Biology course.[34] Knight's findings seem to counter the age old idea that students only learn when in direct supervision by an educator.[35] Initially, Knight used surveys to determine what was relevant to the students, and gave them time that would have otherwise been spent lecturing, to examine those ideas. She successfully demonstrated that increasing engagement could be accomplished by increasing the ability of students to communicate about course material which was initially outside the scope of the course. MoLeNet successfully demonstrated that these techniques could be used in conjunction with technology.[36]

MoLeNet has been leading the pack on increasing relevance through technology. Every year the project publishes a survey of current literature which summarizes most of the relevant material on the subject.[37][38] The MoLeNet team describes a system where students and facilitators can use relevant technology (PalmPilots in this case) to lead the students down the path of creating their own relevance. Each student was given a device at the start of the course that they could experiment with. The studies demonstrated an increased interest in coursework by both the students and the educators.[39] One of the most remarkable studies in the MoLeNet program analyzed the effect of technology on, and its ability to reach, disabled and socially challenged students.[40] In the United States the only programs which can be closely related to the MoLeNet program are 1-to-1 Laptop programs (where each student is given a laptop for both personal and school use). 1-to-1 Laptop programs are costly and require significant resources to develop. The methods developed by MoLeNet may be more cost-effective, but none of these programs use technology that the students already have.

Apple Computing, in developing the ACOT2 program, has provided a compilation of studies which may allow mobile education to cross the Atlantic. ACOT2 initially looked at the beneficial effects of technology on students who were determined to be social recluses.[41] The results of ACOT2 showed that student interaction increased in those students, which is in direct correlation to the studies conducted by the MoLeNet program in the United Kingdom (even though they use different technology).

The most well-known avenue in the United States for incorporating relevance is through inquiry. In the latter half of the 20th Century, the American Association for the

Advancement of Science (AAAS), began to design and implement the National Science Education Standards. At the same time, National Education Policy has become increasingly concerned with the need to assess students at all levels.[42] The standards created by AAAS formed the basis of State science education standards and the basis of our assessment framework. These standards specifically incorporated the use of inquiry in science classrooms.[43] Although these standards have been revised several times since their inception in 1986, they still include specific provisions to increase inquiry.

When the AAAS created the first set of National Science Standards, many scientific organizations saw the importance of increasing inquiry in the classroom. Many of these organizations have provided resources for Educators to incorporate relevance in their disciplines. One of the most striking resources was produced by the American Chemical Society (ACS). The ACS produced a book which specifically outlines how to teach introductory chemistry from an inquiry approach.[44] After the success of its book on incorporating inquiry, the ACS designed an entire curriculum for the teaching of high school chemistry. Chemistry in the Community (or ChemComm for short) is being taught at high schools around the country.[45] The ChemComm program teaches students Chemistry through real world applications that are relevant to the students. Although the ACS produced some of the longest-lasting resources for increasing inquiry, many other organizations have similarly determined that inquiry is a large part of learning the natural sciences..[46]

Several other initiatives including, POGIL[47], AVID[48], and MESA[49] have begun to incorporate inquiry into their programs. The National focus has shifted to incorporating inquiry into every discipline. Inquiry is viewed as a means to created tangible learning objectives through the incorporation of student discovery.[50] No organizations currently exist that demonstrates a tangible link to incorporating inquiry through technology.

Many people have studied the effects of technology on the classroom environment. One of the earliest mentions of the use of technology as a learning tool was by B.F. Skinner in 1954. In his article, "The Science of Learning and the Art of Teaching," Skinner states, "If the teacher is to take advantage of recent advances in the study of learning, she must have the help of mechanical devices."[51] Even in 1954 the technology existed to start envisioning technology as the teacher in the classroom.

In the U.S. studies tend to focus on the use of computers and almost entirely neglect the use of mobile technologies. The Partnership for 21st Century Skills has done extensive studies on the effectiveness of integrating technology into the classroom.[52,53] Entire books have been published showing the relevance of incorporating technology.[54,55,56] These resources show how the technology can be a great motivator for students as well as a tool for educators. Technology has been demonstrated as a great way to increase differentiation and the ability of the teacher to determine relevant material.[57] It is the ability to increase the scope of the learning environment that makes technology such a great resource, though integrating that technology in a manner that is consistent with 21st Century Learning Outcomes and Assessments can sometimes be difficult.[58]

Incorporating the use of mobile technologies has a direct and tangible 21st Century Learning Outcome. Students will be able to use technology for life-long learning. The goal

of incorporating technology is to create high school graduates that have the resources to succeed in our ever-changing world.

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METHODS

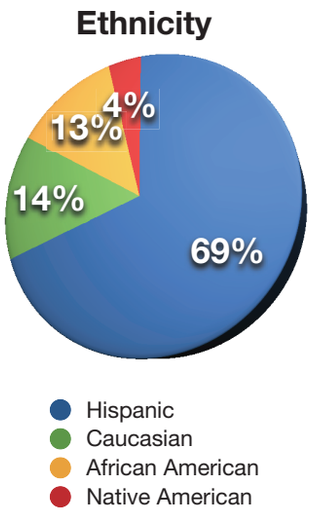
Introduction

This study focused primarily on increasing the use of small personal electronic devices in a highly controlled classroom environment. Throughout the course of the 2008-09 academic year, 68 10th grade biology students (3 class sections) and 36 11th grade chemistry students (2 class sections) were taught to answer daily questions at the start of each class period (known as "bell-work," these activities were mandated by the current administrators). Over the course of this study, 240 "bell-work" questions were asked of each student, forming a sample set of 24,960 responses. Of those questions, half (or 12,480) were asked before cellular phones were introduced, and the other half were asked after the incorporation of cellular phones as a classroom response system.

Student Demographics	
Gender	
Male	64
Female	40
Ethnicity	
Hispanic	72
Caucasion	15
African-American	13
Federal Assistance	
Free and Reduced Lunches	87
Behavior	
1+ Referrals	68
Disruptive	72

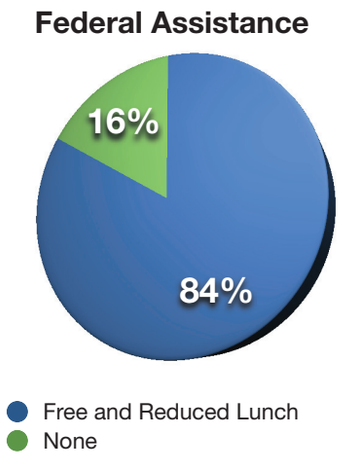
Each class was unique, but the make up of the class conformed to district socio-economic statistics. Socio-economic and demographic information was sampled using district averages as a baseline in comparison to the 104 students in the study. Each student was given a demographic questionnaire that specifically asked questions regarding their economic situation and ethnicity. The initial questionnaire was composed of 30 questions

that ranged from basic ethnicity to total household income. Students were asked to voluntarily participate and all of the 104 students involved chose to participate in the study.



Of the 104 students sampled, 72 of them identified as Hispanic, which was the largest reported demographic from district level sources. Of the remaining 32 students, the majority identified as Caucasian (15), and the remainder was a mixture of Native Americans (4) and African-Americans (13). Including self-reported household income numbers, the students in the study identified themselves as being close the district averages. District data reports that 78% of students district-wide qualify for Federal Assistance Programs such as free-and-reduced lunch. Of the students in the study 87 reported that they received some sort of Federal Assistance (83.6%).

Students were also informally asked to self-identify if they had received any behavioral referrals, and 65% reported that they had (68 students). Students were also asked if they routinely bring personal electronic devices to school. Of the 104 students in the five courses more than 89% reported bringing some small electronic device to class. Within that 89% (92 students), 78% (72 students) reported that they use those devices in a disruptive way within their classes.



Students also reported that they had not ever been taught the basic rules of etiquette for using personal electronic devices. Few students knew of the possible rewards for using electronic devices in class, such as texting search engines to get definitions or using ipods to listen to lectures. This study focused on teaching those students the many ways that they can use personal electronic devices in a productive manner.

Research Design

All of the students in the sample study had been given introductory "bell-work" questions at the start of class that they were required to complete. During the course of the first semester it had become apparent that the students used that time to converse with friends rather than completing their daily assignment. This study focused on changing the implementation of those questions, in the second semester, to determine if students would be more interested in the daily assignments if they were allowed to use personal electronic devices to answer them.

To facilitate student use of technology in the classroom, a new program was instituted based upon previous studies by MoleNet and ACOT2. Students were asked to create an account on the web-based program called Poll-Everywhere.[59] Poll-Everywhere is free for educators and allows students to text responses to an online database which cross-correlates those answers and provides summary reports. This method is similar to the incorporation of promethians or clickers, which are used extensively in higher education.[60]

Using this method has significant time-saving benefits when compared to previous generations of classroom reporting devices. Educators are not required to distribute clickers or take class time to set up apparatus. This method also has the benefit of allowing students to use the technology that they currently have, which gives them more freedom and responsibility in the classroom (and hopefully passes an intrinsic motivation on to the subjects being studied).

Within the Poll-Everywhere system there are structures in place for the development and presentation of questions. Poll-Everywhere supports the creation of free text responses, where students can text in a full sentence response (i.e. What is the definition of ecology?), multiple choice questions (i.e. Who would you vote for?), and goal polls (which are effective at keeping class scores). These three formats allow for multiple input from the students, and allows for the creation of quizzes and similar assessments. The scope of Poll-Everywhere may initially seem limited, but through the customization tools incorporated into the site, the educators are given a myriad of options including changing presentation layouts and colors.

Students were also taught how to text online databases and web-search tools to find and define terms (Google Mobile, ChaCha™, etc.). The students were allowed, from their seats, to search Google for definitions and find relevant data. This gives students the freedom to find their own motivation in the classroom and to search for those ideas and themes that interest them.

In my 10th grade Biology courses, this study was implemented at the start of a unit on the merits and evidence supporting the Theory of Evolution. In Chemistry the incorporation of mobile technology began at the start of the unit on Periodic Trends. At the start of each unit, a 10 question pre-test was given to determine how those students were performing and to set the basis for a normalized growth analysis. This normalized growth data will show the overall growth of student knowledge on the subject, and is similar to an analysis of AYP.

Each test question was presented in the Poll-Everywhere format via Keynote presentations to the class from a MacBook computer (see technical appendix for more information). Within these presentations the class was given keywords (see examples in the appendix) that they were required to text in order to complete the questions (which is how the poll-everywhere framework operates, see the screenshots in the technical appendix). Students were graded on if they responded to the questions as well as completion and correctness of responses. This study used three forms of primary data: Pre/Post Tests, Participation, and Correctness.

After the initial pre-test each class was given warmups as Poll-Everywhere questions; results were actively streamed from the Poll-Everywhere website after the students had completed the questions. Those students who did not own text message or internet-capable phones were asked to record their answers on notecards. Every day the students were given anywhere from five to ten embedded questions. Student participation and the knowledge growth during those questions are reported in the data and analysis section of this paper.

Pre/post test data were compared and analyzed using the methods from Stahl and Clark.[61] Once the normalized data sets were generated, they were cross referenced to student participation data on the daily warmup questions. Analysis was done to determine the reaction of students to the new technology by comparing student opinion polls to the participation and results data from the Poll-Everywhere.

Sample Selection

The study was performed with high school students because of the author's access to these classrooms, and because of the basic understanding of functional mobile computing devices common in this age group. Each student was required to take an introductory poll to ensure that they could use the mobile devices that they carried. Parents were informed of the study, and were asked to sign a permission slip allowing their student to use phones in class.

To make the selection process easier, courses which were shown to have significant disciplinary problems were removed from the sample size. It was shown on the initial pilot questions that students need to be fairly well-disciplined prior to giving them the levels of freedom that this study required.

When students walked into class, a daily warm-up (or "bell-work") question was projected at the front of the class. Each Poll-Everywhere question was embedded into a Keynote slide which was presented through an LCD projector. Students were given 5 minutes at the start of class to find and report the answer to the question. As the class progressed instructions, pictures, and videos were also projected for the students. During each transition (or movement from one area of focus to another), a slide would be projected that asked several questions to check the students understanding of the material being presented.

Feedback on these questions was given immediately by presenting the results of each Poll to the entire class. The projected results display no identifying information, so each student could remain anonymous if they chose. When the results were displayed we would discuss the answers (spending no more than two or three minutes on each question) and come to a class consensus on the correct answer.

This study was carried out in an ethnically diverse and impoverished school, because students in this environment rarely have the opportunity to participate in 21st Century initiatives. Every lesson, through the methods of this study, became an extension of the ACOT2 program and produced 21st Century Learning Outcomes without the need for every student to have a computer.

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[59] Vyduna, Jeff (2008). Polleverywhere.com

[60] Duncan, Douglas (2005). *Clickers in the Classroom*. Pearson Publishing. Boston MA.

[61] Stahl and Clark. (1897) The Effects of Participatory Expectations in Classroom Discussion on the Learing of Science Vocabulary. *American Educational Research Journa*l vol. 24 (4) pp. 541-555

RESULTS

Introduction

Overall data for participation, growth, and correctness was compiled using Numbers 2009. Each student was given an average score for the questions they completed this semester. That average was computed using Easy Grade Pro, an Apple-compatible grading program. Averages reported in this study are based upon the class performance data and are reported with all relevant statistical information. After the averages were computed, those averages were added to the master data set, and all statistical analysis was performed upon that master data.

In each data set, two statistical tests were performed. The overall results were subjected to a two-tailed T-test, which was used to determine if there was a statistical difference between the responses prior to the implementation of cell phones, and those that were received post implementation. Participation, average score (correctness), and normalized growth data was analyzed first using the two-tailed T-test based upon the average scores pre and post implementation. Within the master data set sub-populations were selected to determine the effectiveness of these methodologies based upon characteristics of the students involved. Ethnicity, Gender, and class information was analyzed to determine if each sub-population conformed to the average data. Also examined were the effects of integrating cellular technologies on students from low-income families, students with previous behavioral referrals, and students who were previously disciplined for using cellular phones in a disruptive manner in class. Within each sub-population, two-tailed T-tests

were completed to determine if the growth was statistically significant. Chi-squared tests were then applied to the sub-population data to determine if any significant difference existed between similar sub-populations (i.e. comparing hispanic students to African American students). A similar chi-squared analysis was preformed to determine if any difference existed between the sub-populations and the average data. It was found that in no way were any of the sub-populations statistically different than each other, which means that (statistically speaking) all students succeeded in relatively the same way.

When performing statistical analysis, students were divided into subgroups with no students being removed from the data set. It was determined that since public education is based upon equal education for every student data would be unrepresentative if it did not include all students who were in the effected classrooms. Even though there were a number of statistical outliers, they provided a more representative sample and were included. The data was not confined to those students who had electronic devices, because even though some students did not possess the required technology, they were all effected by the implementation of this project.

Normalized growth was computed by looking at the pre-test and post-test scores and individually normalizing the increase in score to the student's pre-test (see the data appendix for more information). Two pretests were completed by each student. At the start of the study, students took a test to determine their knowledge. When the switch was made to mobile technologies, the students were given a post-test to determine their growth in the timeframe studied, as well as a pre-test to determine the effectiveness of the new

technique. Concluding the study was another post-test which allowed for an analysis of growth with and without these new methodologies.

This study started in early March and continued to the end of the school year in late May. The normal trend at the end of a school year is to see a significant decrease in participation, especially from graduating seniors and other upperclassmen. Initial data from this study indicates that by introducing technology as a means of classroom engagement, this trend can be reversed and participation increased.

Overall Data/Analysis

The trends in the overall data were compelling and were only further reinforced by an in-depth analysis of the sub-population data. Initially the participation for this study was 55.32% on average. With the introduction of cellular technologies that averaged jumped to 89.05% (see Figure 2, p=1.18E-27). This jump can be largely attributed to the increase in participation by students who possessed cellular technologies. Variation in the participation post-implementation is almost entirely attributed to students who did not posses cellular technology. All students who possessed the necessary technology used it almost 100% of the time (for the questions asked when students were present).

Increases in average score showed a significant gain after implementation of cellular technology. On average, students showed a score of 33.82% on the initial pre- technology questions. After implementation that average increased to 72% (see Figure 3,

p=1.84E-35). These numbers were computed using the average score (correctness) on the questions administered pre and post implementation.

Normalized growth showed no statistical improvement in any of the data collected (for more information see Appendix: Additional Data). Growth from the initial set of tests (pre-implementation) was 2.564 or 256%, compared to the 4.245 or 424% increase after implementation. On first glance these numbers seem unambiguous, but statistically speaking there was no significant difference between the two data sets (p=0.095, see Figure 4).

After the initial data was compiled, all sub-populations were analyzed using the same techniques.

Sub-population Data/Analysis

Data comparing all sub-populations was compiled and presented for analysis (see Figures 5,9,13). Using a chi-squared analysis of the average scores when comparing specific connected populations (i.e. Males vs Females) revealed that there is no significant difference between any of the populations. All populations correlated to the average distribution of the course, indicating that this method of teaching did not favor any individual group. In order to better understand how students were progressing, each group of sub-populations (groups of sub-populations are related by a common identity, Gender, Ethnicity, etc.) was analyzed to determine the significance between the pre and post implementation Figures.

One of the most obvious divisions of the students who participated in this study is the difference in class. Out of the 104 students, 36 were in a junior-level chemistry course, and the other 68 were in sophomore-level biology. Students in both classes performed similarly in response to the introduction of classroom technology. Chemistry students saw a growth of 39.77% (p=8.53E-16) in participation (see Figure 6), an increase of 37.03% (p=1.54E-14) in average scores (see Figure 10), and showed an increase in normalized growth of 0.18% (p=0.9106, when compared to overall data, see Figure 14).

The biology students also showed statistically significant growth in all areas including normalized growth (please see Figures 6, 10, and 14). Participation increased by 30.54% (p=4.68E-15), average scores increased by 38.78% (p=1.77E-22), and normalized growth saw the only statistically significant increase in normalized growth, which was 2.47% (p=0.049). The statistical p-value for the normalized growth of the biology students is not entirely convincing (showing that there was a 4.9% chance that the data occurred through random chance).

Gender issues are a primary focuses in science education. Many people have expressed increasing concern about the achievement gap between males and females in the natural sciences. Although all students involved in this study showed similar performance (statistically speaking), there was still some variation within each sub-group. The results of this study indicate that males (64 students) and females (40 students) both showed significant increases in participation and average score. Participation increased by 28.88% in males (p=2.35E-13) compared to a 48.51% increase in females (p=2.08E-20) (see Figure 7). On the other hand, males had increased average scores when compared to females (see Figure

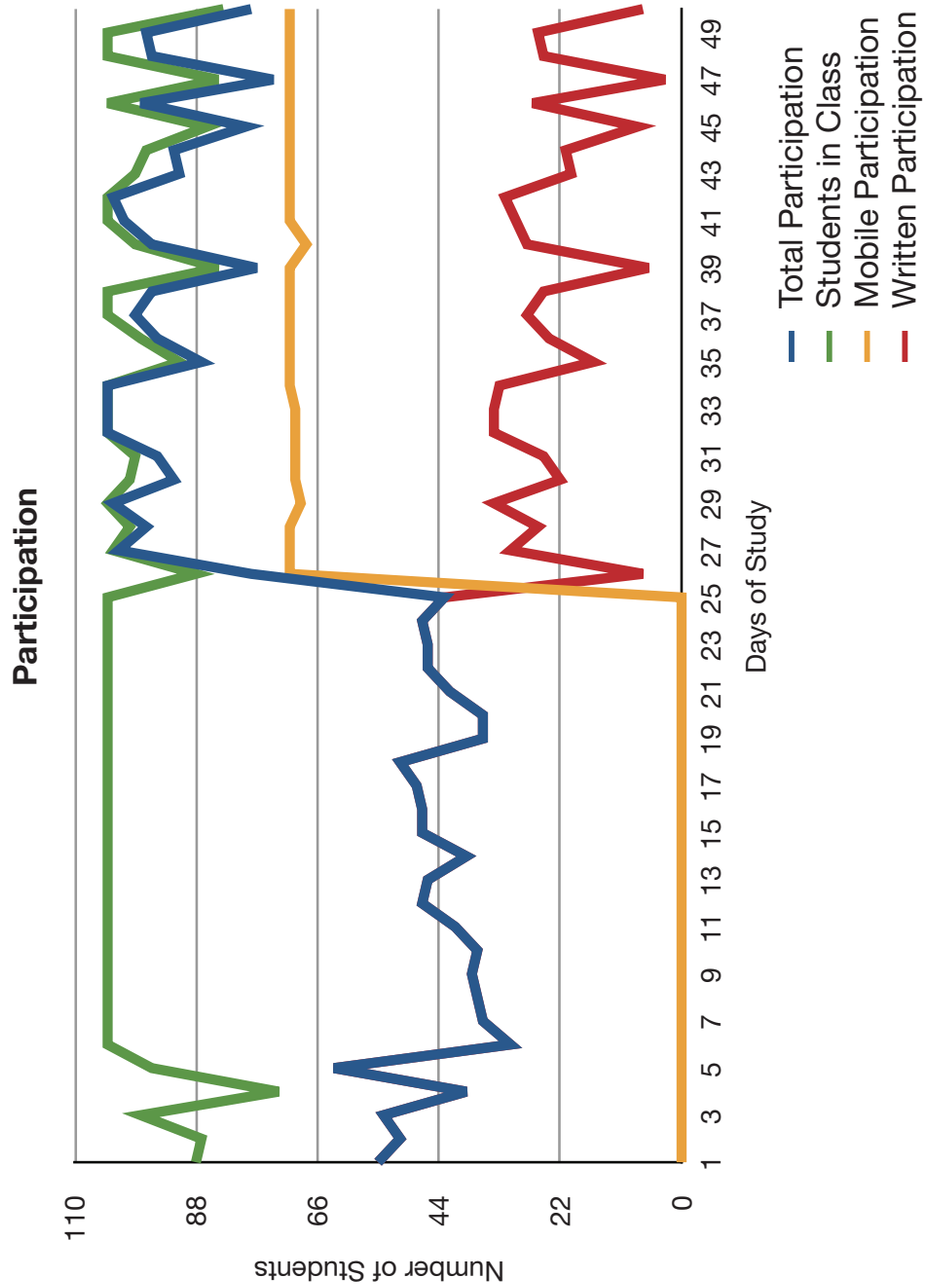
11, males: 39.69% p=1.45E-22, females: 35.85% p=1.08E-13). Both tests demonstrated significant strides after the implementation of cellular technologies.

Students self-identified and placed themselves into three ethnic groups. Those three ethnic populations were Hispanic (72 students), Caucasians (15 students), and African Americans (13 students). Hispanic students showed an increase in participation of 33.31% (p=9.20E-19) compared to increases of 34.62% (p=1.67E-05) in Caucasians and 32.84% (p=2.63E-04) in African Americans (see Figure 8). These increases were not significantly different from each other or the average increases in participation (chi-squared >0.90). Average scores increased by 39.19% (p=7.63E-28) in Hispanics, 35.2% (p=9.18E-05) in Caucasians, and 38.23% (p=8.09E-07) in African Americans (see Figure 12). All three predominant ethnicities in my classroom showed statistically significant increases in participation and score, with chi-squared values indicating no significant difference between the ethnic groups in this study.

Data for several other sub-populations was computed (please see the Appendix:Data for more information) but only one provides significant input into the robustness of these methodologies. Students who were identified as receiving Free-and-Reduced lunch were compared to students who were not on Federal Assistance. Students who qualified for Free-and-Reduced lunch showed an increase in participation of 35.77% (see Figure 17, p=9.49E-25). Average scores increased by 38.71% (see Figure 18, p=1.83E-29). Growth also increased in this population by 2.27 or 227% which, unfortunately, was not a statistically significant increase (p=.0539). Analysis of the students who received Federal Assistance showed that they conformed the overall data. This sub-population is a great

demonstration of the versatility of this study and shows that it can be implemented in a low-income school and still see success.

All of the sub-populations in this study showed significant improvements when comparing pre and post implementation sources of data. The methodologies developed appear to be robust and appropriate for any group of students.



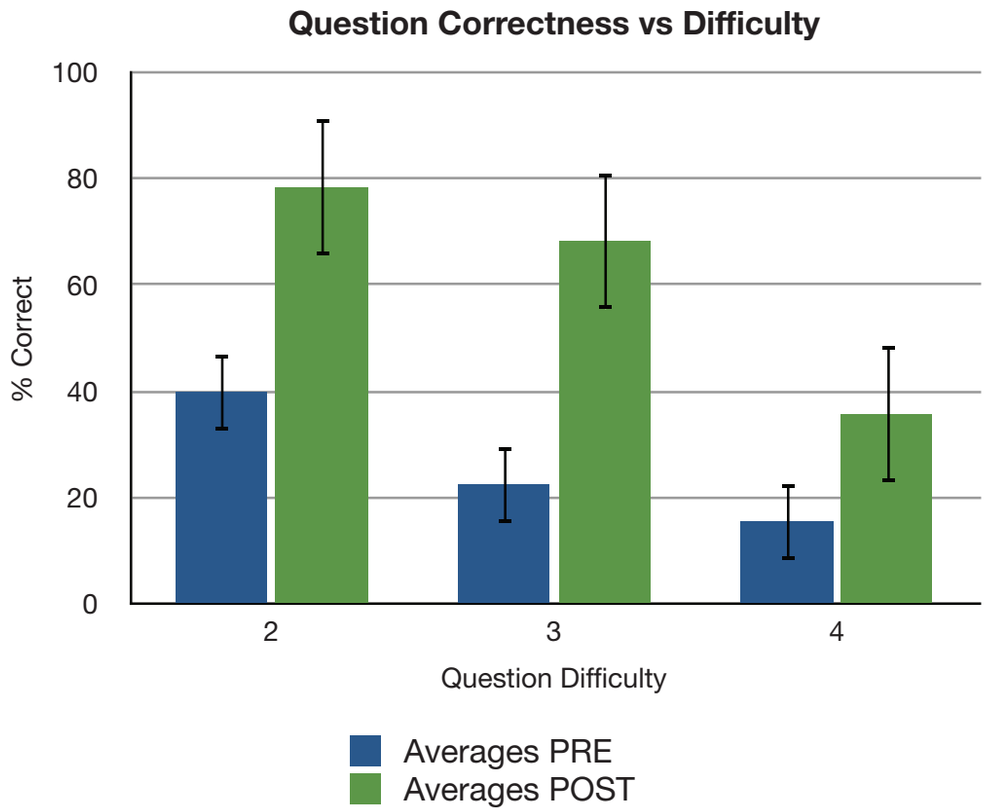


Figure 3: Average correctness of the responses of all students. Increases were statistically significant using a two-tailed T-test (p=1.84E-35). Difficulty level 2 questions was simple recall or defining terms. Level 3 were questions that dealt primarily with observation. Level 4 were specifically questions that addressed critiquing or hypothesizing.

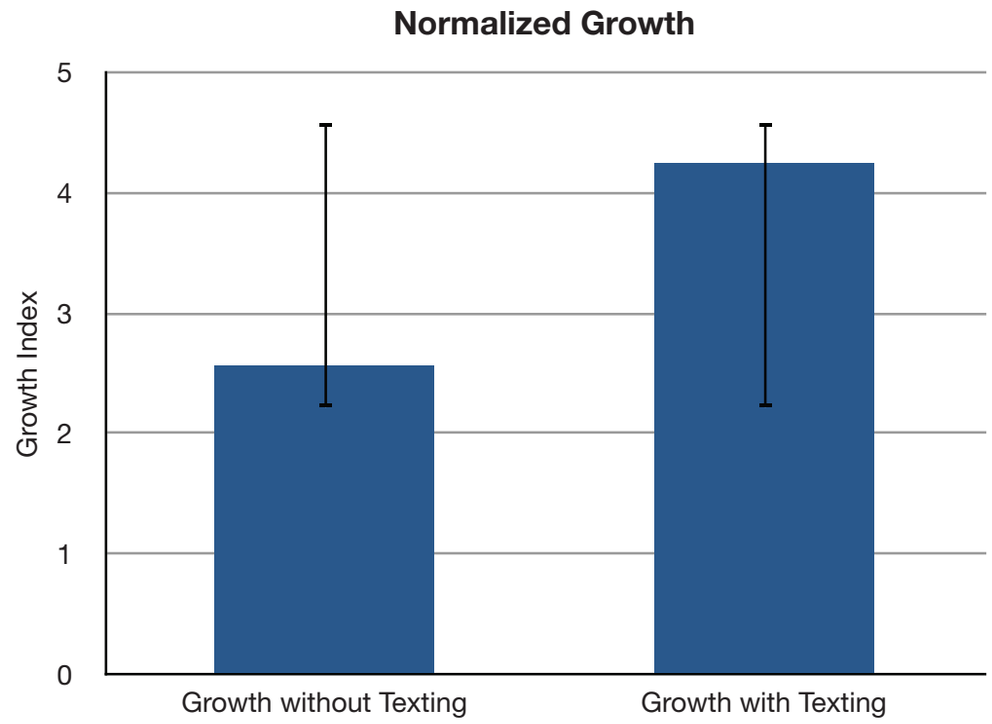
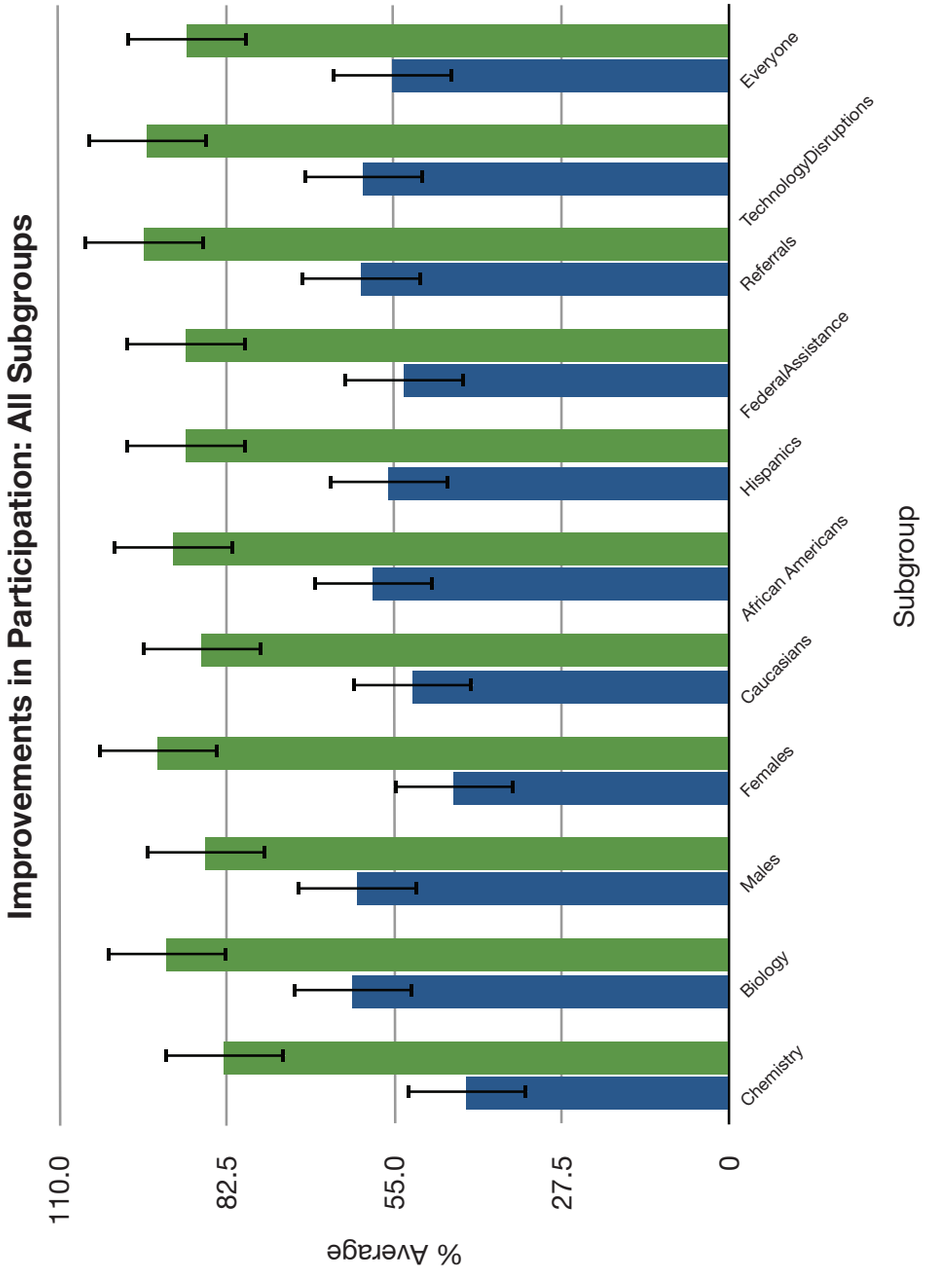


Figure 4: Normalized Growth showed no statistically significant improvement with the use of cellular phones (p=0.09162).



Participation Subgroups

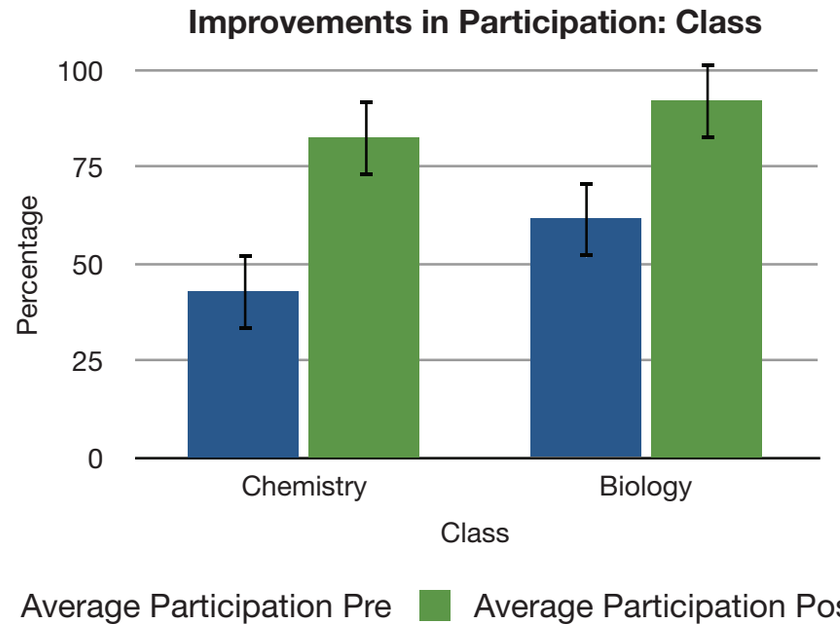


Figure 6: Participation based upon class section, no statistical difference (p=0.9865)

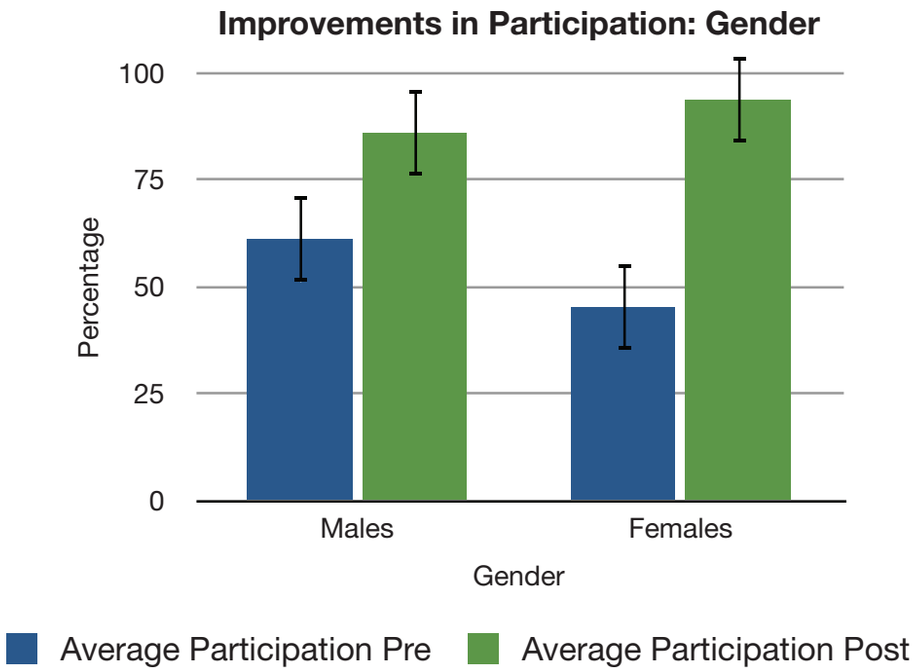


Figure 7: Participation based upon gender, no statistical difference (p=0.9675)

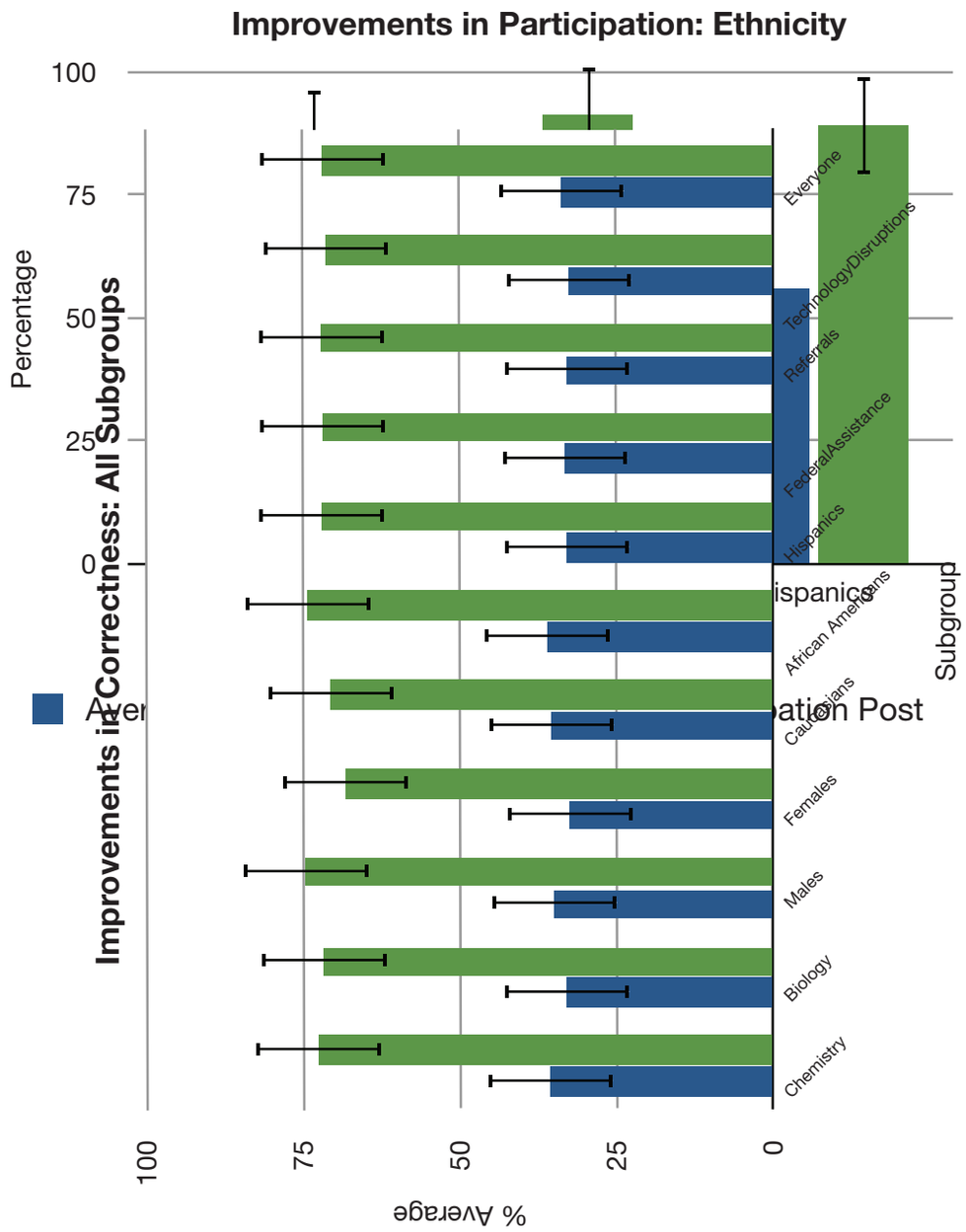


Figure 8: Participation based upon ethnicity, no statistical difference (p=0.9781)

It is interesting to note that in Figures 5-8 there was no statistical difference between the pre and post data for any subgroup. This was based upon a chi-squared analysis of the sub-populations. All groups did show a significant growth between the pre and post data (with $p<<0.001$). The above data suggests that all students, regardless of sub-population, showed significant increases when comparing pre and post implementation scores (using a two-tailed T-test for comparison).

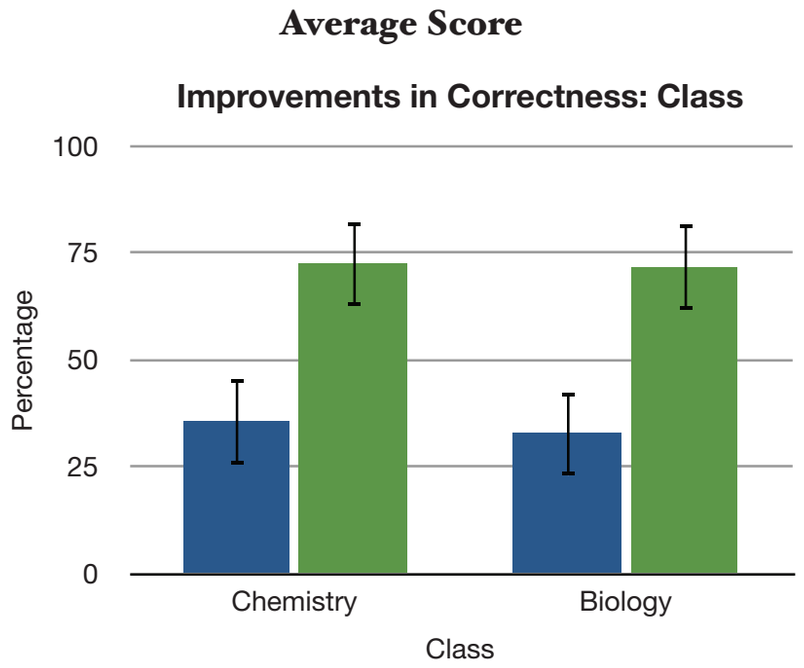


Figure 10: No statistical difference between classes (p=0.8975)

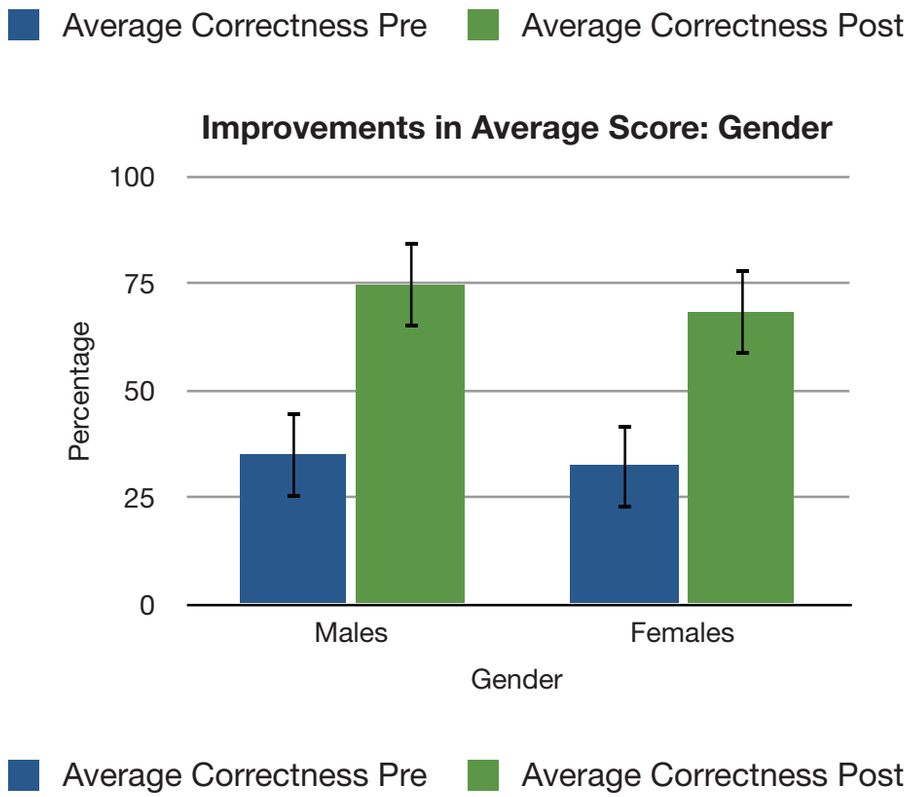


Figure 11: No statistical difference between genders (p=0.9257)

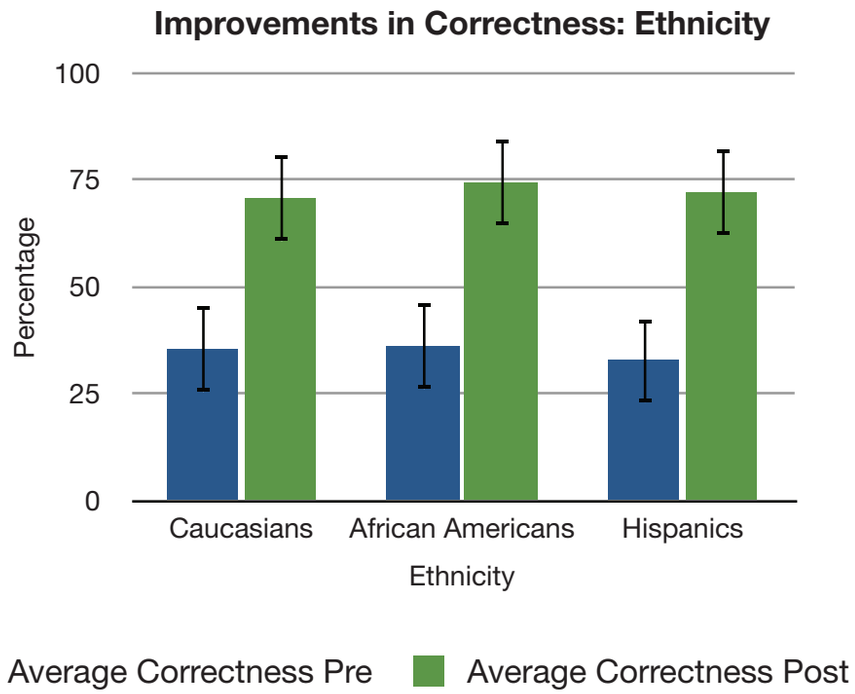
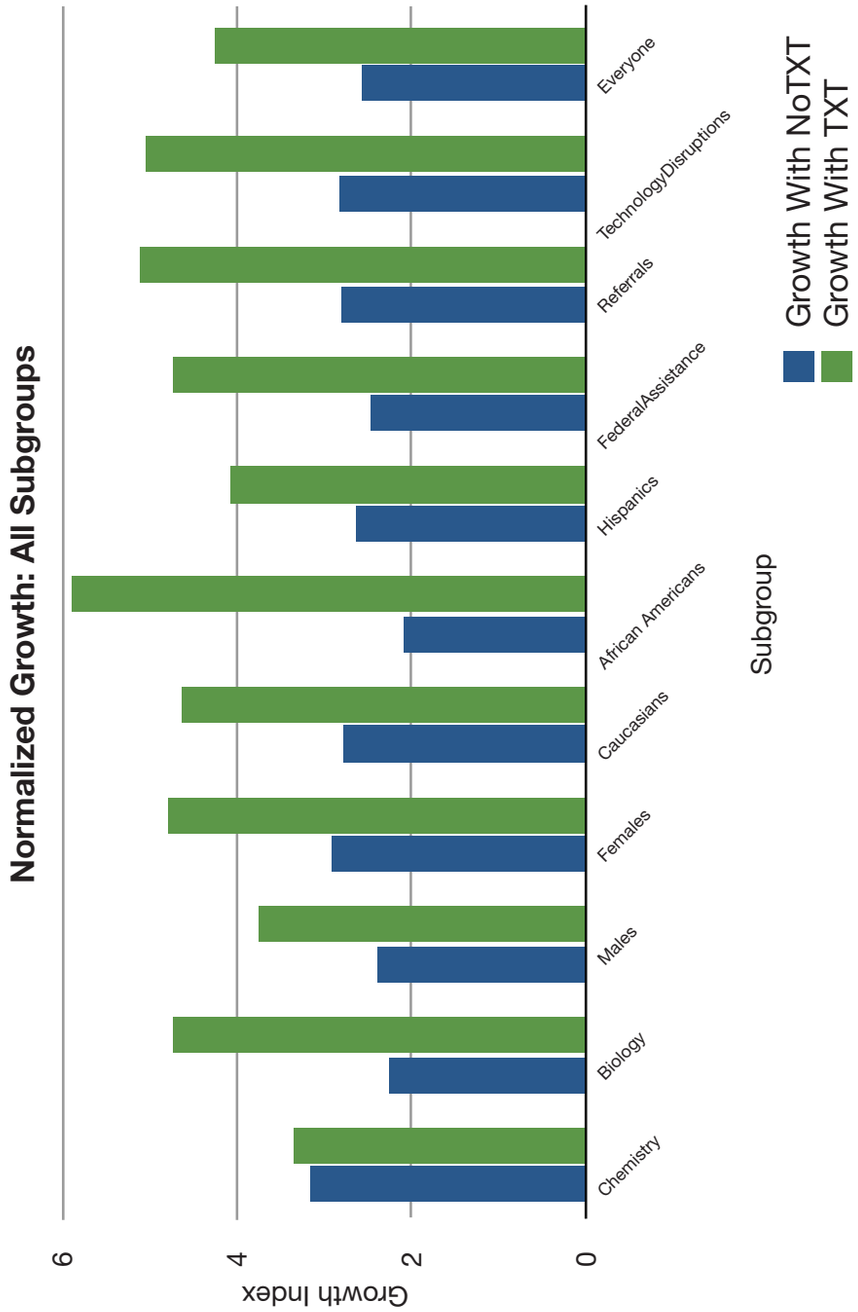


Figure 12: No statistical significance based upon ethnicity (p=0.9346)



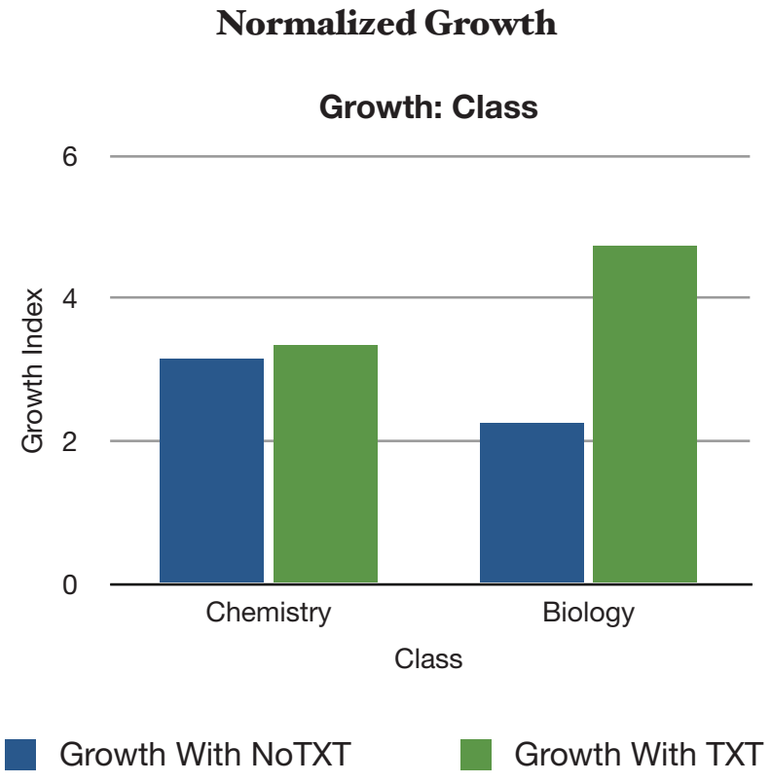


Figure 14: Normalized growth by class (no statistical significance (p>>0.05)

In the normalized growth Figures, no error-bars are represented. The reason this data was specifically omitted was that including error bars changed the scale of the graphs so much as to remove all distinction. That this data is not statistically significant poses several interesting questions (see conclusion).

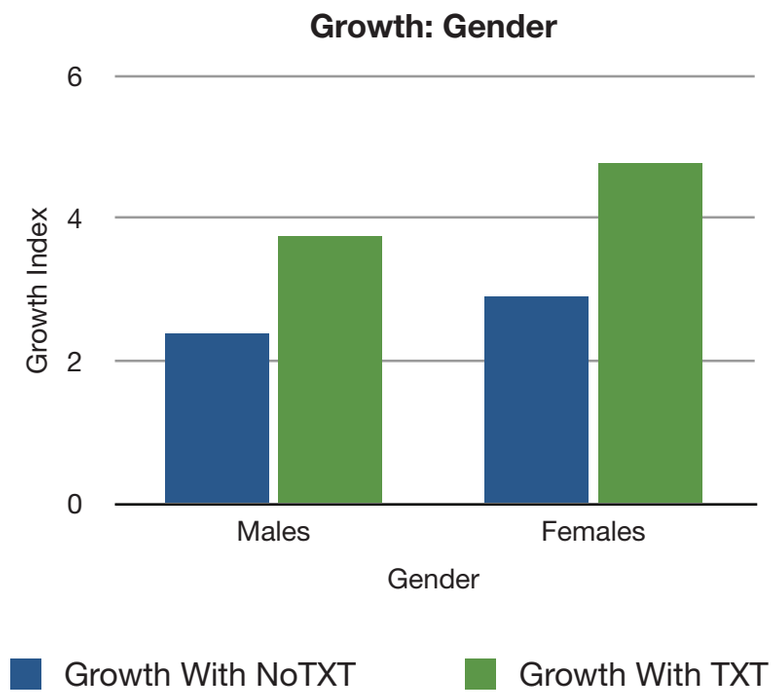


Figure 15: Normalized growth by Gender, no statistical significance (p>>0.05)

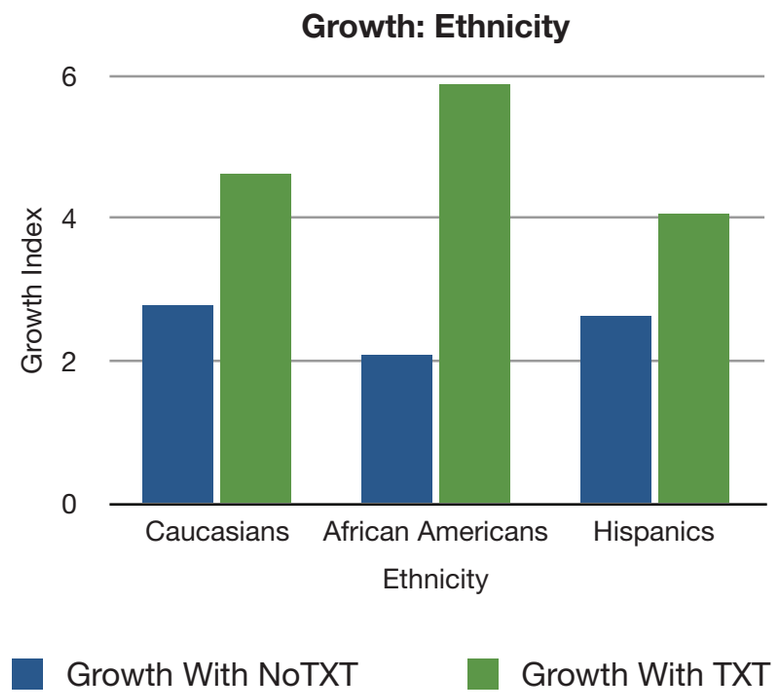


Figure 16: Normalized growth by Ethnicity, no statistical significance (p>>0.05)

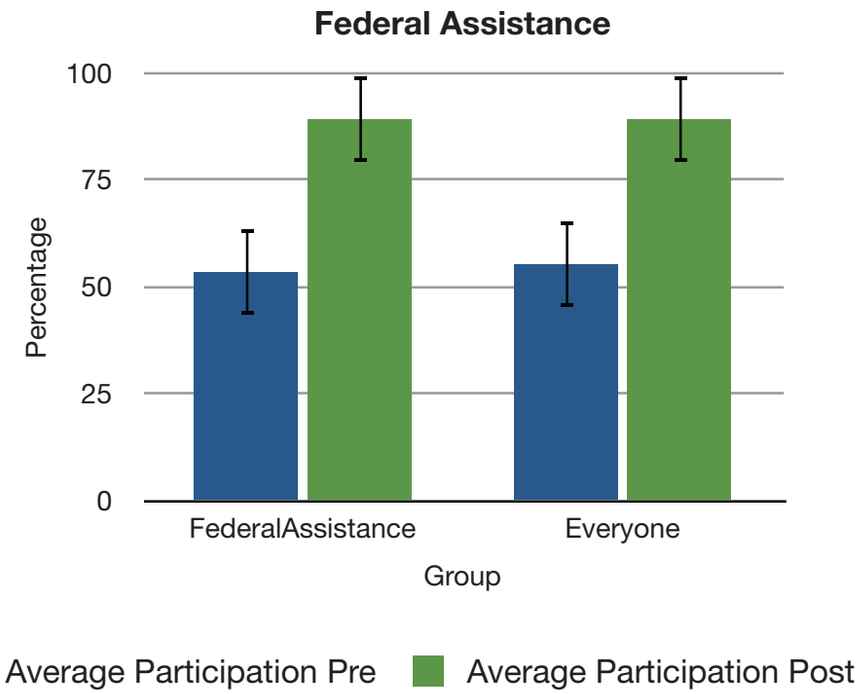


Figure 17: Participation of students on Federal Assistance (p=0.8976). Shows no statistically significant difference.

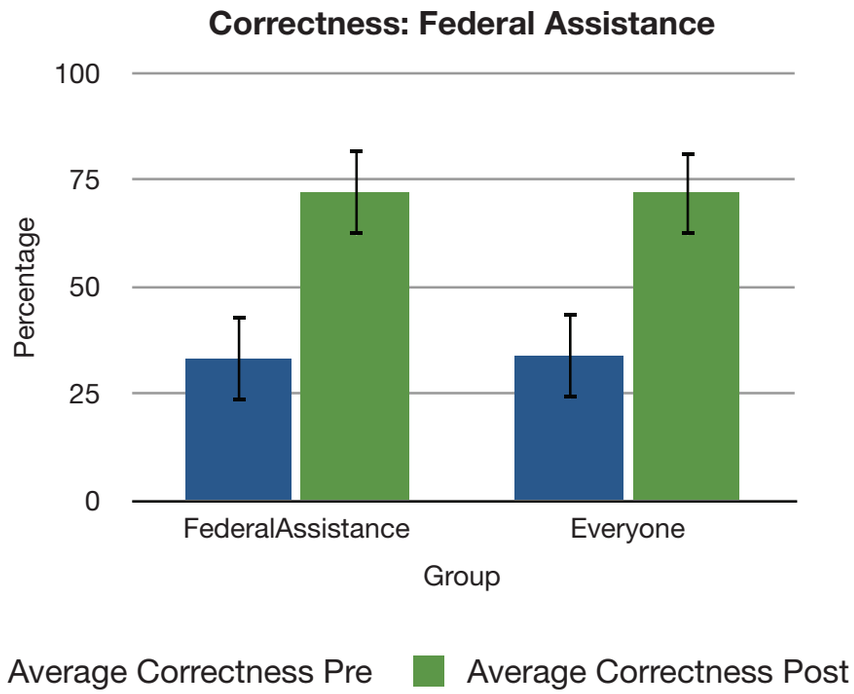


Figure 18: No statistical difference in correctness (p=0.9341)

CONCLUSIONS

This work has conclusions that affect the way we, as teachers, interact with technology as well as students in our classrooms. We can no longer just mandate bans on cellular phones in the classroom. Those mobile technologies that were seen as nothing more than an expensive disruption now have concrete evidence to support inclusion in curriculum guides and technology standards. Research to date has focused solely on the introduction of methodologies, data, and reasons why this research is important. Now I have the chance to provide the stories of success that that have been lacking.

Personal Electronic Devices can have direct positive influences on the classroom environment. Seeing the ideas from James and Skinner expressed in a classroom model built to demonstrate the robustness of 21st Century Techniques was entirely unexpected. The first time I asked my students to define a term using Google, I witnessed James's theory that motivation can be transfered between objects. In the first week of the study, I set out to teach my students how to define terms using Google Mobile. Before class started I had placed a biology textbook at every student's desk. When the students walked in, I immediately asked them to define homozygous. All of the students in class that day looked at the question and immediately began talking to their friends. It took more than 10 minutes to get one member of the class to open the text book, which was right in front of them, to define the term. As soon as someone provided the definition, I had all of my students text Google to see if the internet definition agreed with the definition from the textbook. Immediately, more than half of my class was eager and engaged in the lesson, which is something that was a real struggle without this technology. Observing the students when they

were engrossed in answering test questions or finding definitions really showed how powerful using Personal Electronic Devices can be.

Unfortunately, educators are not always given the choice to use these technologies in their classroom. No Child Left Behind specifically tries to address the need in classrooms to tailor education for every student. It was demonstrated by MoLeNet that mobile technologies can be used as an effective means of differentiating to student needs, yet despite the connections that can be drawn between these policies, ever more school districts are banning cellular phones in class. The Partnership for 21st Century Skills has demonstrated the importance of technology in curricular content, but they have never used mobile technologies as a part of their studies. This study is so unique because it successfully and quantitatively integrated the ideas of MoLeNet into the American public education system.

MoLeNet is the single most important influence in changing the mentality of administrators and politicians in the United States to favor the use of mobile technologies in education. Since its inception, MoLeNet has provided ever more applicable and relevant materials for educators. Many of those materials were mentioned in this study, but the power of MoLeNet extends far beyond the bounds of the literature it produces. As a Government-funded initiative, MoLeNet sets the precedent that mobile education is worth investigating. If the movement towards mobile education becomes a national initiative, the methodologies and programs of MoLeNet will provide an excellent model for its implementation in the United States.

In education there are so many initiatives, that I sometimes forget the reasons they are being implemented. This study has a very clear outcome: it teaches students how to use technology in an appropriate way. About halfway through the study, I had a student return from a long vacation. He had not been instructed in the rules regarding the technologies in my classroom, and when he saw other students use their cellphones to get definitions or submit answers he pulled out his phone. The first thing I saw him do was show a YouTube video to the student sitting next to him, and I immediately confiscated the phone (as per school policies). He was obviously upset at having his phone confiscated, and saw no reason why it should have happened. Later that day he came in to see me and confessed that he knew it was inappropriate to show videos in class, and he said "I thought I could do it since other kids were using their phones." I explained that in my classroom you can use technology if you can justify it. Define a word, but don't be afraid to show me the text message. Answer phone calls from your parents as long as you are willing to do it respectfully and only when I give you permission. Once he understood the expectations regarding that technology, he never did anything that was out of line. This student is a great example of how we are given the opportunity to teach what is or is not appropriate behavior with technology, which is not something that is usually taught.

When that rapport and respect was established in the classroom, it was remarkably easy for me to manage the incorporation of these technologies for learning-appropriate goals. I needed to teach the students how to use the technology and when it was appropriate to use it. Shortly after teaching my students how to use these technologies in an appropriate way, one of the Math teachers appeared at my door. She explained to me how Joe

(not his real name) taught her how to define terms using text messages. She just stopped by to tell me to keep up the good work. It was great to see that my students had understood what it meant to use technology in an appropriate way, and that those ideas were carrying over to their other educational endeavors.

I think that the most compelling aspects of this study is its cost. None of the methods mentioned in this class cost any money (unless you are charged for sending and receiving text messages). That fact alone will allow these technologies to be incorporated more into mainstream teaching. Coupled with the students who succeeded in this study, the results show remarkable promise for teachers everywhere.

This study is novel in the American Education System. The unique nature stems from taking methods designed by foreign governments and converting them into a framework that can be incorporated into the 21st Century initiatives. No published studies existed prior to the implementation of this study that focused upon the same educational objectives. I think that the results of this study show significant promise in changing the mentalities of educators and politicians.

The trials of pioneering methodology are not easy, and I spent a significant portion of my time feeling out what would work. My students did a great job of refocusing my efforts from time to time. They would often tell me "that didn't really work today, you should do it differently tomorrow." Almost nothing about this study went well at the beginning. I guess that is to be expected when you try something new. The methods that I developed for this study will continue to impact my teaching for the duration of my career.

Fortunately, nothing seemed to pose significant difficulties in implementing these strategies in my classroom. The students were eager and the administration was open-minded. Initially, the administrators in my school refused to allow me to conduct this study. I invited them down to witness it in action before they completely disregarded it when they witnessed it in practice they gave their approval. Now that these methodologies exist, I hope that more educators will be able to access these technologies.

This study has several very direct implications. An online community is being established which will allow educators to share ideas and resources for mobile education in the United States (see cellularschool.com for more information). Now that a study with direct quantifiable data exists, it will hopefully help school districts decide if a ban on mobile usage in their schools is appropriate. It may be too late to help the teachers in New York City, but hopefully a similar ban will not occur in other cities.

The data from this research has changed my view of technology in education. We can no longer afford to write off those technologies that students use in their everyday lives. This research will continue into the next few years to show its effectiveness over time. As the research progresses, more students and more teachers will be influenced by its effects. Hopefully other educators will find it applicable to use technologies that are currently thought of as distractions (ipods, video games, social networking) as educational tools. The next few years will see a significant increase in the technologies available to teachers, and I am looking forward to what time will bring for mobile education in the United States.

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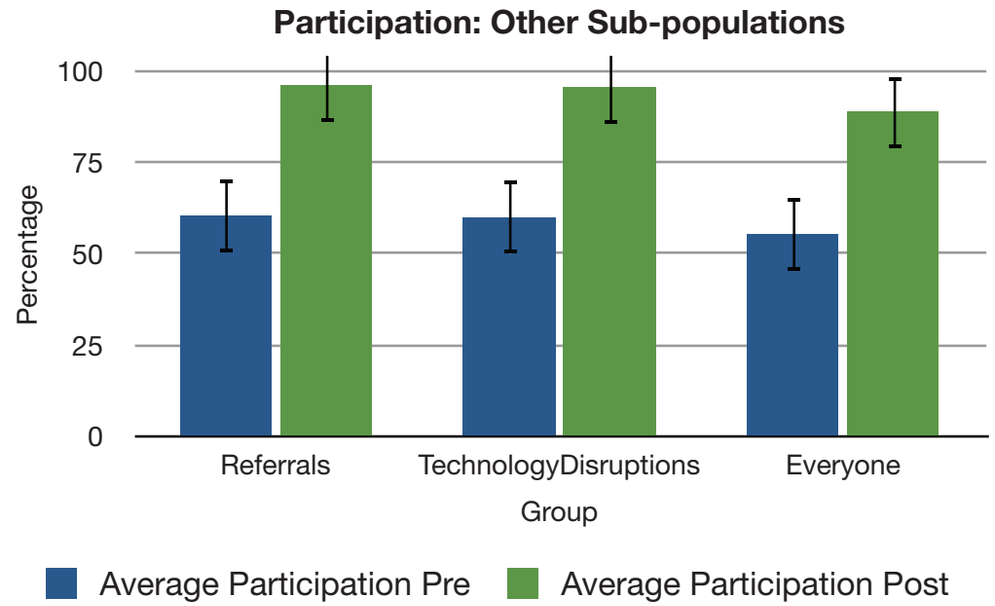
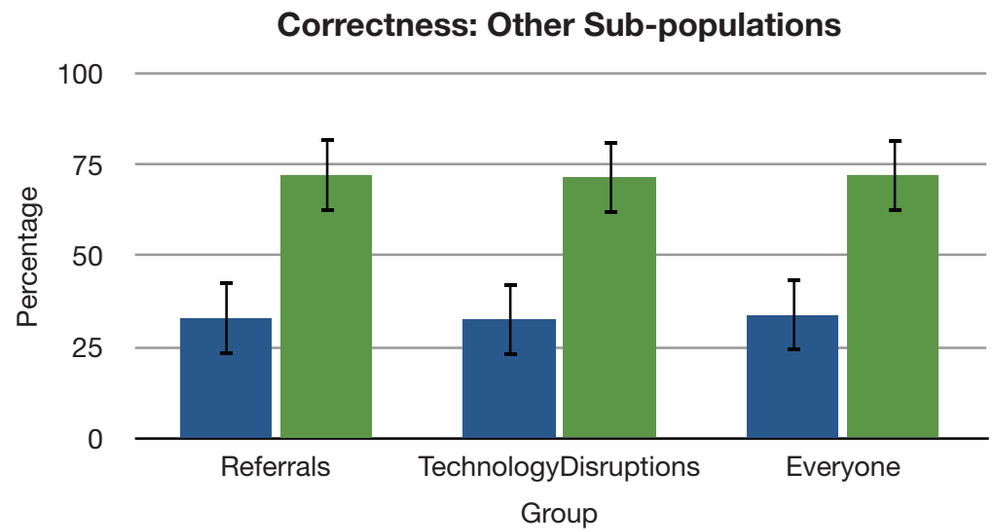
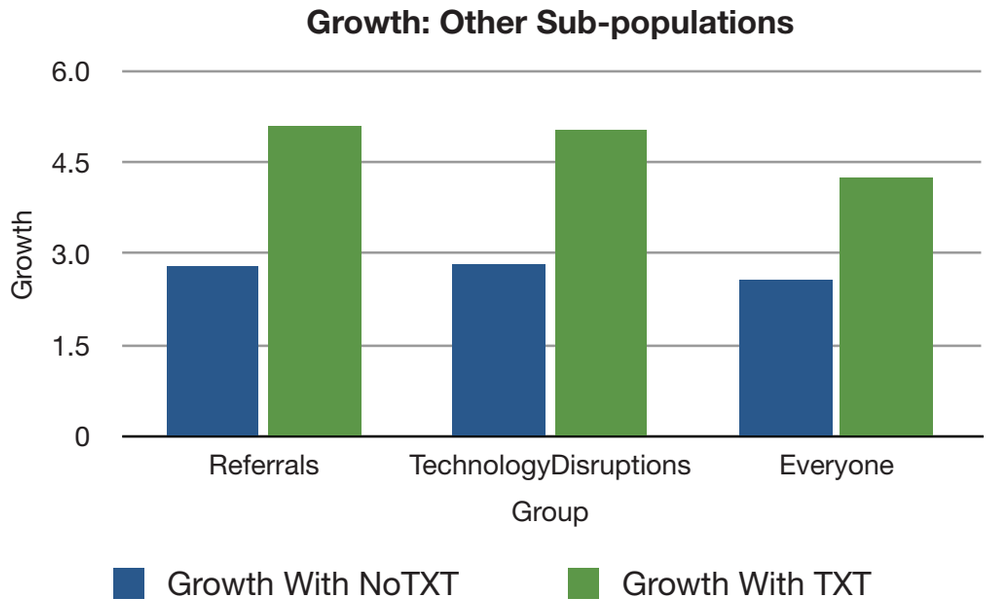
APPENDIX: DATA

Additional Sub-population Data:

Below is the data that was not included thought to be relevant enough to directly reference in the body of the paper.







These graphs depict the performance of students with previous behavioral referrals and previous disruptions caused by technology when compared to the entire group.

Significant improvements were accomplished in the areas of participation and average scores, but the normalized growth showed no statistically significant growth.

Sub-population Individual Figures

The Figures below are depicting the growth of students in each area. This is taking sub-populations and plotting individual students (indicated by number) with their scores pre and post implementation of cellular technologies. Figure A1 displays the p values for all growth between pre and post test data for all sub-populations.

T-tests

	Participation	Correctness	Pre	Post	Growth
Male	2.35E-13	1.45E-22	1.63E-40	6.02E-26	0.196107271
Female	2.08E-20	1.08E-13	2.19E-19	7.50E-17	0.346355068
Biology	4.68E-15	1.77E-22	1.22E-36	6.09E-28	0.049352622
Chemisry	8.53E-16	1.54E-14	4.28E-22	1.53E-15	0.910568664
Federal Assistance	9.49E-25	1.83E-29	2.49E-45	1.15E-35	0.053966025
Previous Disruptions	1.45E-18	2.69E-26	8.23E-39	1.94E-28	0.135056577
Referrals	9.51E-18	4.33E-25	1.76E-38	3.41E-27	0.123736043
White	1.67E-05	9.18E-05	2.01E-09	9.02E-08	0.512429294
African American	2.63E-04	8.09E-07	2.67E-10	2.96E-05	0.357479959
Hispanics	9.20E-19	7.63E-28	6.04E-38	1.19E-29	0.19942854
Everyone	1.18E-27	1.84E-35	3.14E-57	4.88E-42	0.091627656

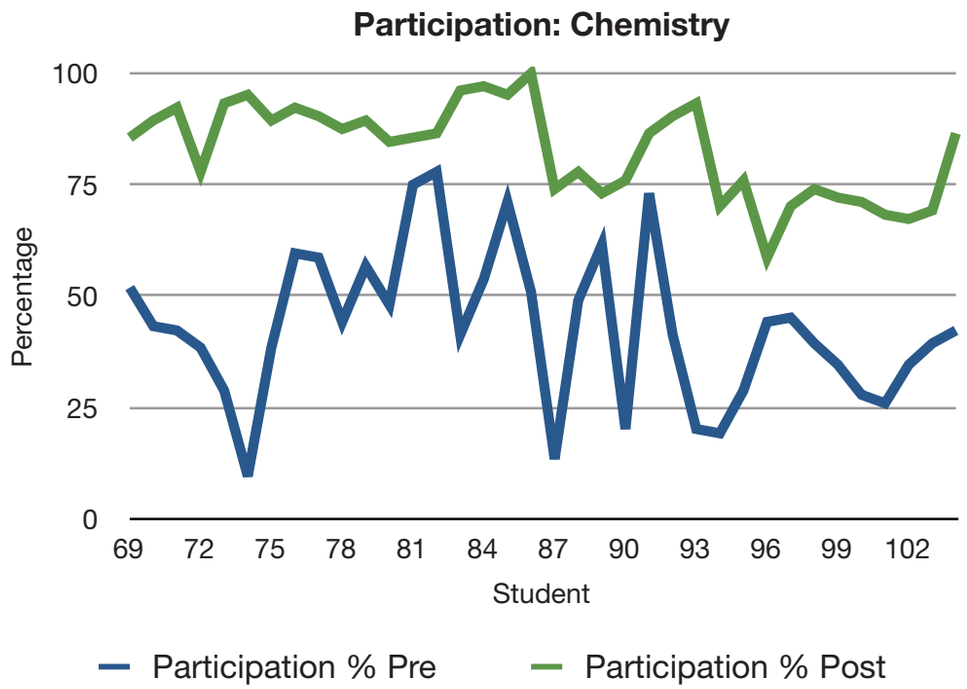


Figure A2: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A3: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

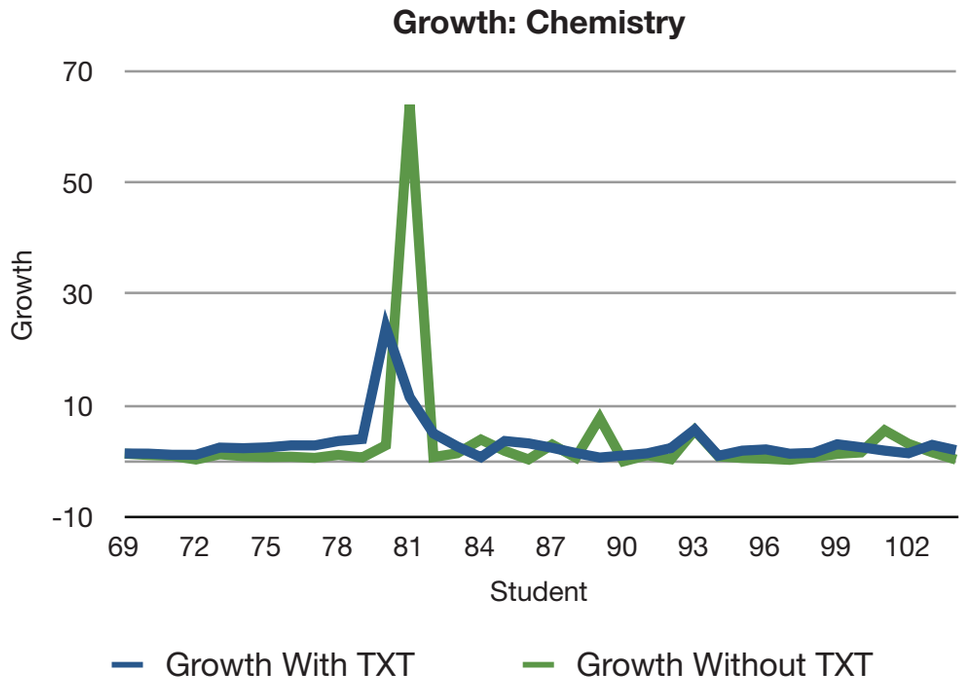


Figure A4: This graph depicts the change in growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

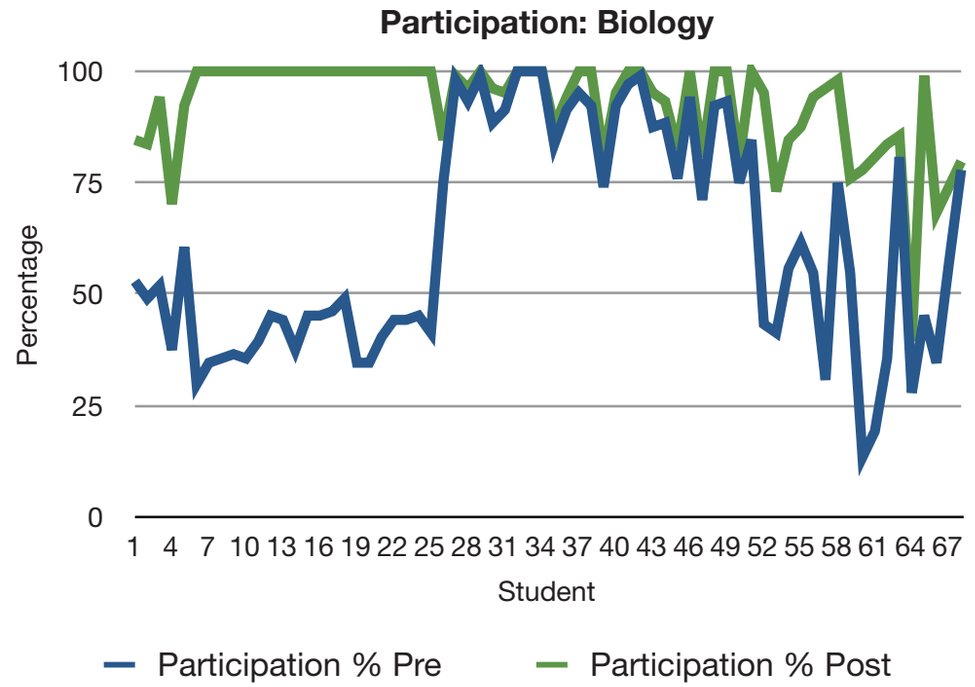


Figure A5: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A6: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A7: This graph depicts the change in average gowth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A8: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A9: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

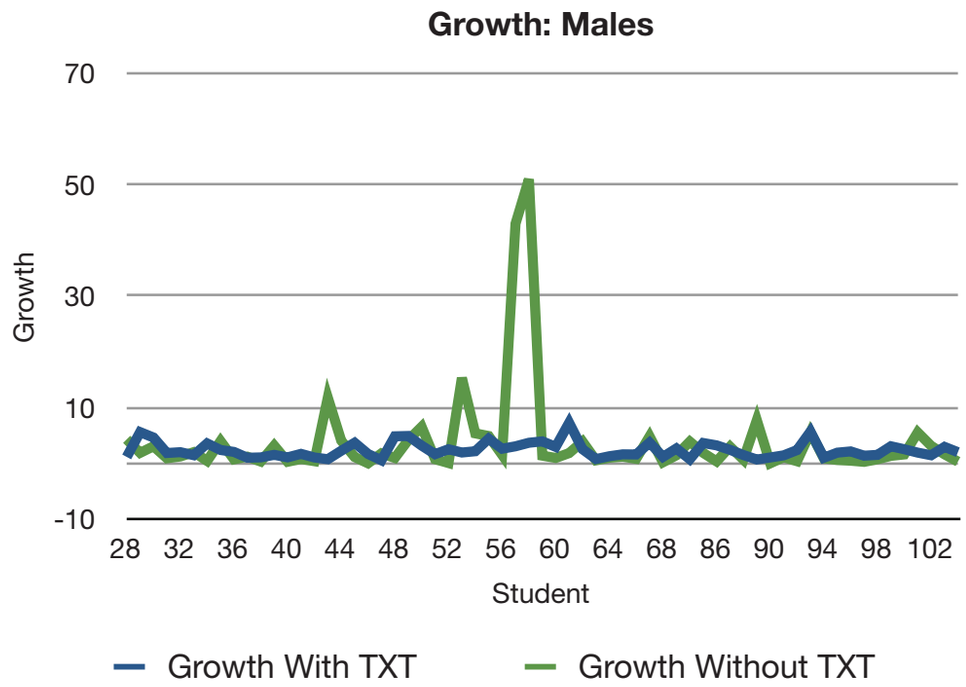


Figure A10: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

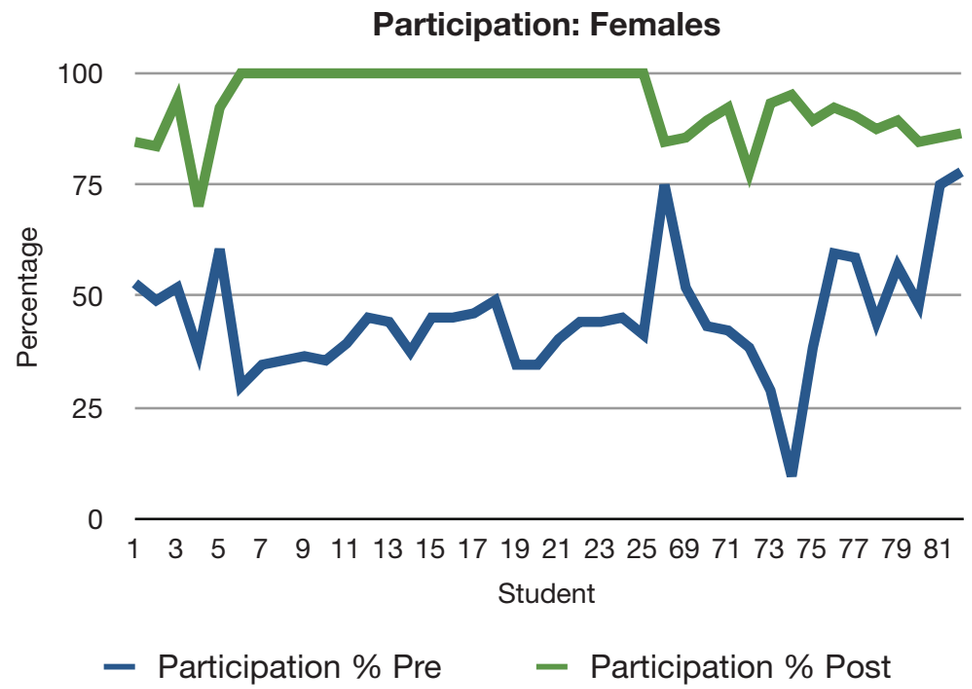


Figure A11: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A12: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A13: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

Figure A14: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A15: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

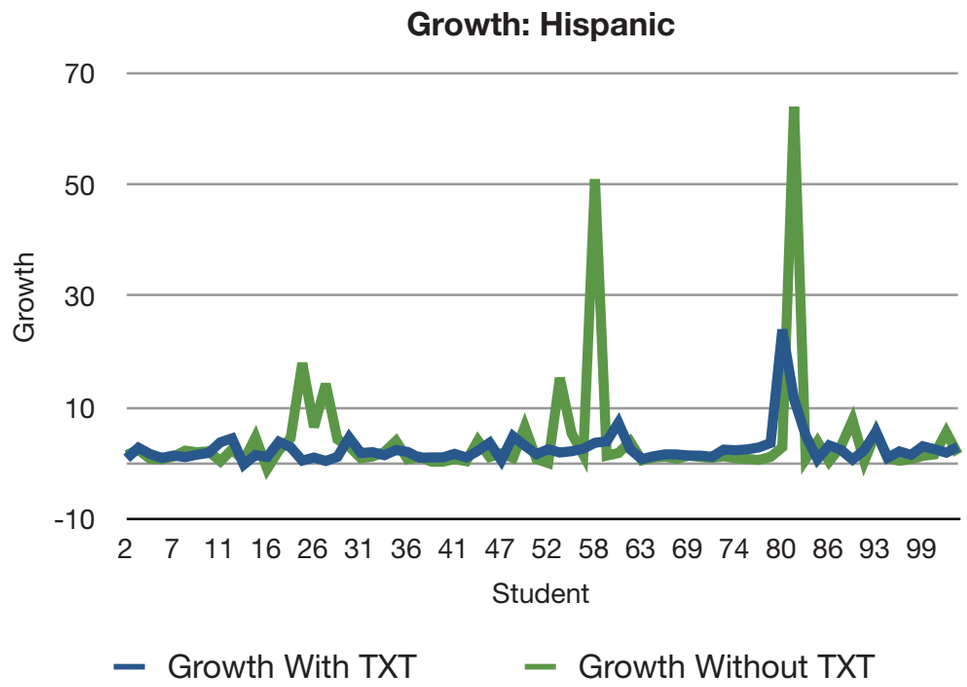


Figure A16: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

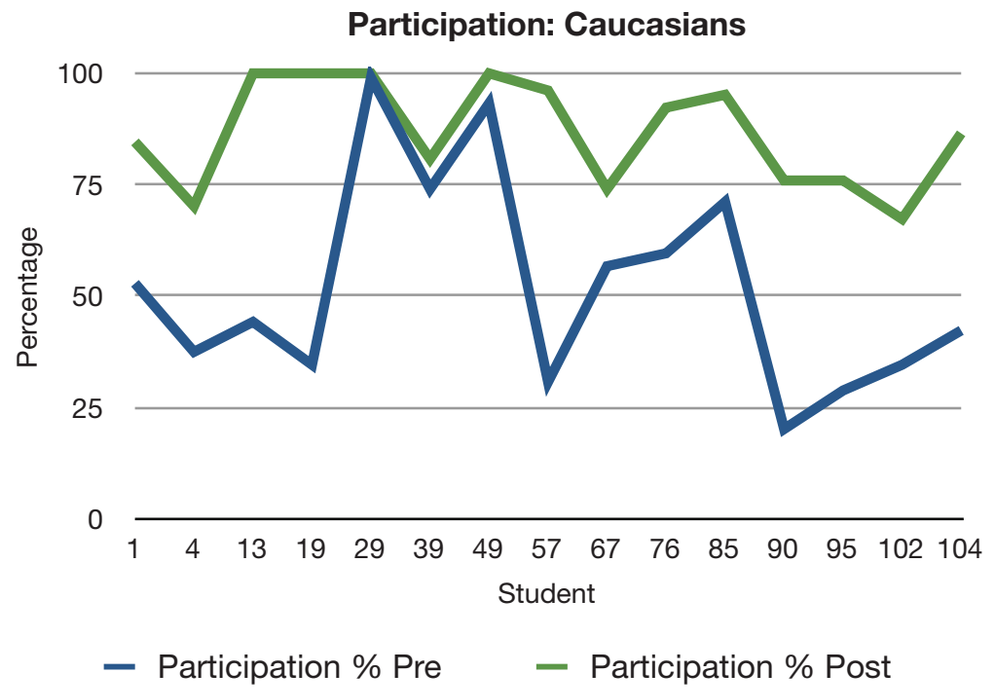


Figure A17: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A18: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A19: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

Figure A20: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A21: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A22: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

Figure A23: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A24: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A25: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

Figure A26: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A27: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

Figure A28: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

Figure A29: This graph depicts the change in average participation pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

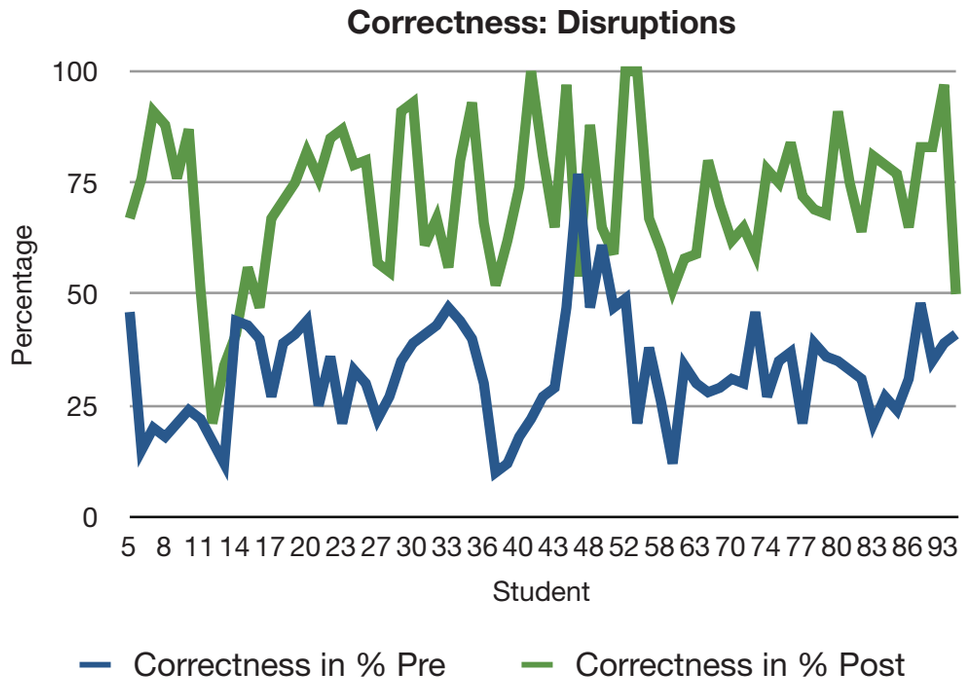


Figure A30: This graph depicts the change in average score pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was statistically significant.

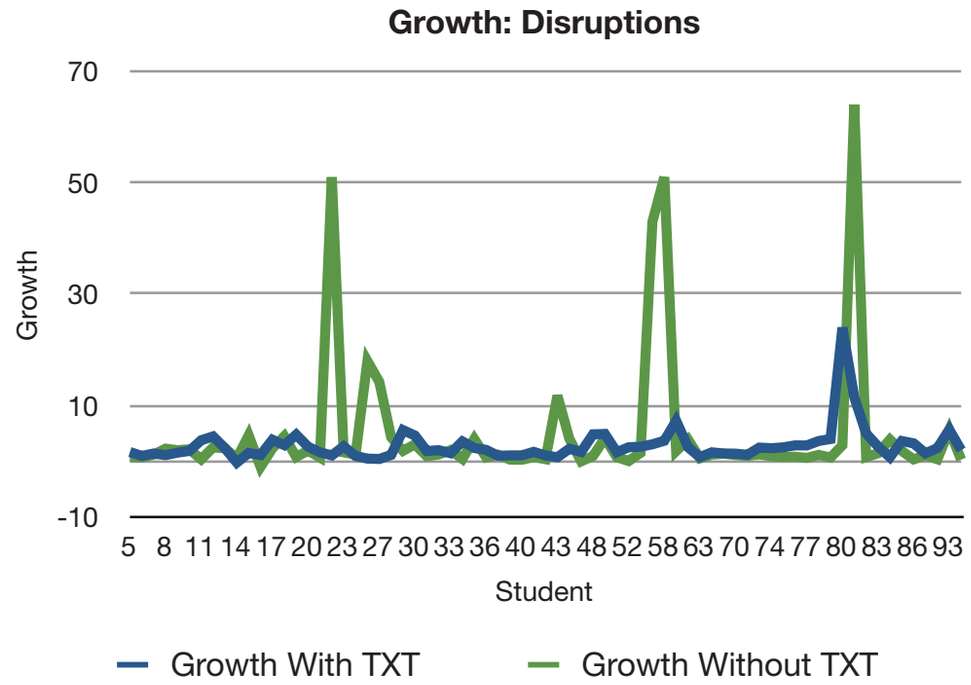


Figure A31: This graph depicts the change in average growth pre and post implementation. Each students cumulative data is represented for this sub-population. The improvement was not statistically significant.

APPENDIX: MATH/STATISTICS

Normalized Growth:

Normalized growth was computed using the following equation:

(PostTest - PreTest)/Pretest = Growth Index

The growth index can be considered a measure of the growth of the student when it is compared to where that student started. It is to be expected that all students will show some progress from pre to post tests, but the growth index allows for the comparison between classes.

Statistics:

Two-tailed T-tests were run on all of the pre and post data to determine if there was a significant difference between the data sets. These tests were performed using the statistical package included in Numbers 2009.

Chi-Squared tests were also performed on sub-populations to determine how they compared to other groups. Numbers can not compute a standard 2x2 chi-squared test, so those equations were entered by hand as follows:

$$\sum_{i=1}^{k} \left(\frac{X_i - \mu_i}{\sigma_i} \right)^2$$

Which can be deciphered as taking the sum of the the following equation:

$$\frac{(\text{Observed-Expected})^2}{\text{Expected}}$$

The chi-squared number was then converted to its corresponding p-value using the relevant degrees of freedom.

APPENDIX: TECHNICAL

Computer:

The technical aspects of this study was done exclusively on a 13" MacBook (4.1) running OS-X 10.5.1 (Leopard) with the following specifications:

2.4 GHz Intel Core 2 Duo Processor

4 GB of RAM

Numbers 2009 was used to do all mathematical and data conversions. Easy Grade Pro was used to collect and grade student scores for each question. Planbook Mac was used to plan the lessons for this study.

It is recommended that you have a DSL in order to use the Poll-Everywhere website.

Mobile:

Not all mobile carriers allow for the services used in this study. At the moment all carriers can access google, polleverywhere, and chacha with the exception of Cricket.

It is recommended that students have service plans that do not charge for each text message that is sent or received (which are common with all major carriers).

APPENDIX: RESOURCES

Planning:

The pages that follow provide relevant planning information such as letters to parents and class rules.

Feb 25, 2009

Dear Parents/Guardians:

As many of you know, I am currently pursuing my Masters Degree at Colorado College. A significant part of my program is the completion of a Masters Thesis. I have chosen a topic which is interesting to all students a teachers alike. My study is going to look at the use of small electronic devices as an educational tool.

In order to incorporate these ideas into the classroom, each student needs to sign an acceptable use policy. That policy is attached so you understand exactly what is expected in the classroom. It is very similar in content and message to the policy which every student at Harrison is required to sign in order to use school computers.

I am asking that you give me and your Son/Daughter consent to use these devices in class. That use will be strictly monitored and punishments will be as swift and severe as school policy permits. This is a privilege and the students should look at it as such.

I would also like several of my classes to create websites. Information that is posted on student websites will be placed in the public arena with significant monitoring by myself and the Information Technology staff for the district. Attached to this letter is the policy and terms of use of these websites for your reference.

Your feedback would be greatly appreciated. If you have any questions about the two forms please feel free to contact me anytime.

Sincerely yours,

Victor Fitzjarrald

vfitzjarrald@hsd2.org

Enclosed: Cell Phone Policy

Website Policy

Students are allowed to use cellular phones and other educationally based mobile phones only with my expressed permission. Students must follow the rules and procedures listed below or they will not be given this privilege.

Course Name: CHEMISTRY

Students initial on the lines marked (s)

Guardians initial on the lines marked (g)

---

1. _____(g) The cell phone and/or internet service on my son/daughters mobile phone has unlimited text messages so I will incur no additional expenses through its use.

2. _____(g) My student has unlimited internet access on his/her mobile device and will incur no expenses for use of the internet in class.

3. _____(s) All students will only use mobile devices when instructed by the teacher in every classroom.

    i. _____(s) Students will not send text messages to people outside of the room during any point in the lesson.

    ii. _____(s) Students will not initiate or receive phone calls during the lesson.

    iii. _____(s) Students must have their phones and mobile devices out at all times during the lesson if they wish to use it during class.

    iv. _____(s) Any disruption of class due to a mobile device that is being improperly used will cause an immediate confiscation and the student will need to pick up the device from school administrators

4. _____(s) All other mobile devices (iPod touch excluded but it must still follow the rules above) are not to be used at any time in the classroom and normal school policies apply to such devices.

5. _____(s) When in doubt ask!

I, _____(s), _____(g), agree that the rules above are correct and valid and that I will follow the rules and consequences for breaking them, including (but not limited to): Loss of privileges, confiscation, and administrative referrals.

_____ Student

_____ Guardian

Proof

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