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ONE TO ONE COMPUTING

IMPACT OF ONE-TO-ONE COMPUTING ON MIDDLE SCHOOL
LANGUAGE ARTS TEACHING AND LEARNING

by

Hebba Medhat Haroun

A Thesis Submitted to

The Department of International and Comparative Education

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in

International and Comparative Education

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accepted for the faculty of
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ONE TO ONE COMPUTING

Abstract

The State of Maine was the first state in the U.S.A (and in the world) to implement One-to-One Computing in schools in 2001. Former Governor of Maine, King Angus believed that students needed to acquire 21st Century Skills to have a sustainable future in the working force. Many schools in the U.S.A. started taking on the initiative of One-to-One Computing after Maine. Also in third world countries, the United Nations Development Program (UNDP) along with major computer corporations provided subsidized laptops for many students worldwide. In the wake of 21st Century Skills, attaining One-to-One Computing has been a goal for most educational institutions.

A private American School in Egypt initiated a pilot program providing all students in 7th and 8th grade with a laptop. In a qualitative study, based on interviews with the following: teachers, students and parents, it determined the impact One-to-One Computing had on Language Arts teaching and learning. The research examined how the One-to-One Computing Program altered teachers' pedagogical approach to teaching and how that impacted the way students learn. The research implied that teachers are more creative and has allowed for more student and peer collaboration amongst the students. Students also reported having acquired the skills needed for the 21st Century, which include: responsibility, creativity, technological literacy, and organization. One-to-One Computing has enabled students to access, review and summarize digital information quicker. 21st Century skills are required for success in the work force but should all countries and schools acquire One-to-One Computing programs? Is there a procedure that must be followed before the program is implemented in schools? The study concludes with suggestions and limitations to the study.

CONTENTS

Chapter 1 - Introduction.....	1
Chapter 2 - Literature Review.....	9
Chapter 3 - Methods	22
Chapter 4 - Findings and Discussion.....	25
Chapter 5 – Conclusion and Recommendations	43
References.....	46

Chapter 1 - Introduction

Fundamental Issue of Research:

The Task Force on Maine's Learning Technology Endowment issued a report in 2001 highlighting the fundamental issue under investigation. Silvermail (2004) explained the following:

We live in a world that is increasingly complex and where change is increasingly rampant. Driving much of this complexity and change are new concepts and a new economy based on powerful, ubiquitous computer technology linked to the Internet. Our schools are challenged to prepare young people to navigate and prosper in this world, with technology as an ally rather than an obstacle. The challenge is familiar, but the imperative is new: we must prepare young people to thrive in a world that doesn't exist yet, to grapple with problems and construct new knowledge which is barely visible to us today. It is no longer adequate to prepare some of our young people to high levels of learning and technological literacy; we must prepare all for the demands of a world in which workers and citizens will be required to use and create knowledge, and embrace technology as a powerful tool to do so. If technology is a challenge for our educational system, it is also part of the solution. To move all students to high levels of learning and technological literacy, all students will need access to technology when and where it can be most effectively incorporated into learning (p. 2).

The Task Force on Maine's Learning Technology Endowment reiterates the purpose of technology, not only to equip students with 21st Century skills for today but also to equip them with the skills that will prepare them for the future.

Evolution of Technology

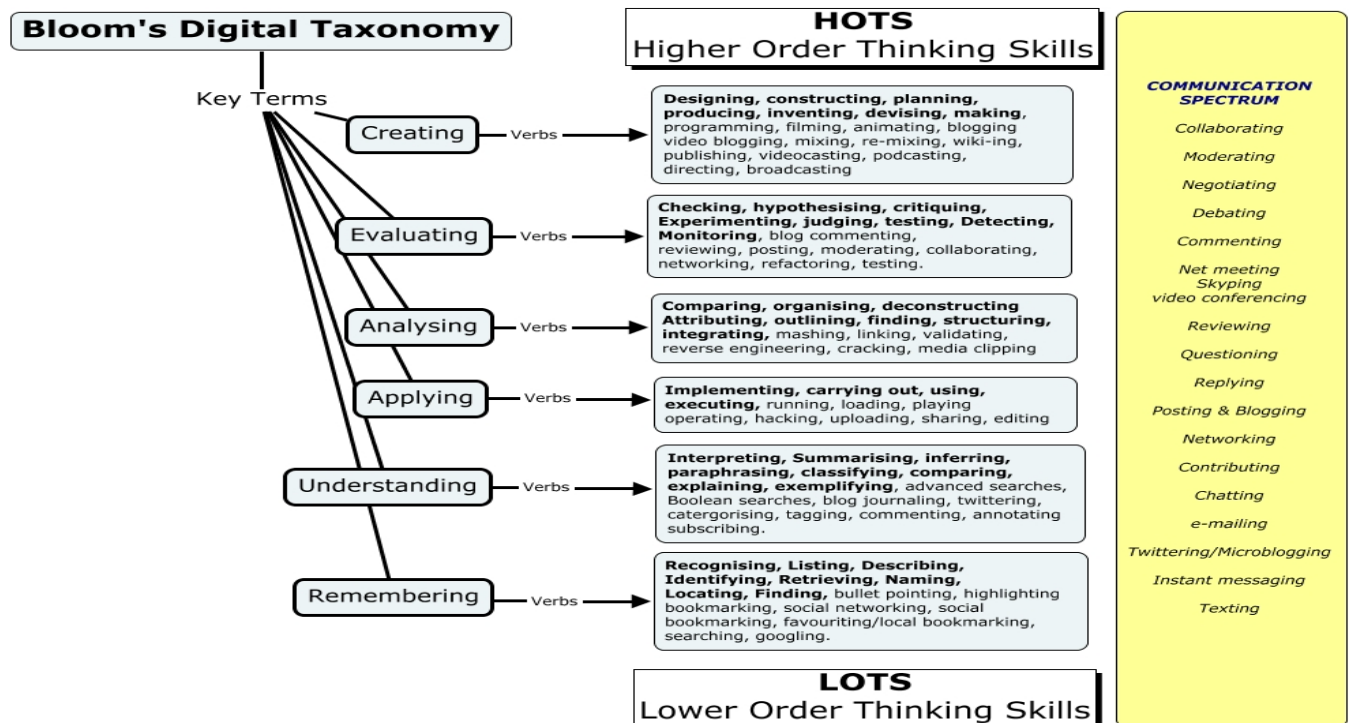
The 21st Century Skills help students collaborate and work globally with students in different cultures, think critically, and create new solutions. Technology is an essential educational component of the 21st Century; it will shape our approach to education and be a major method for students to acquire the edge they need in today's work force. Students in the 21st Century do not know of life without a computer. A report by the Economist Intelligence Unit (2008) claimed that children born between 1982 and 2001, referred to as "millennial," use the computers and the internet more than any other age group. "According to United States Department of Education, 90% of children between the ages of 5-17 use computers and more than 90% of the children between 12-18 age group use internet" (Barrios, 2004, p.5). The new generation of students is much more skilled in dealing with and understanding new technological concepts than those that preceded it. "As a result, societies around the world will need to consider how to make the most of these new opportunities, and; thus, ensure that they remain competitive in the global marketplace" (Glenn, 2008, p.16).

Technology can be thought of as an evolution in thinking; affecting the way teachers think and present information and curriculum. Teachers must create lesson plans to meet the challenges in which students need to apply creative ways of expressing thoughts and ideas to convey their learning. The "Final Report and Recommendations of the Laptops for Learning Task Force" stated that, "In the past, it was not considered essential for every student to learn rigorous content. Many jobs were available for students with minimal academic skills. In today's information age, jobs that once required only low levels of reading and mathematical skills now require higher-level skills. In the future, there will be more to know and more to answer" (Barrios, 2004, p.5). Technology has provided ways to enhance student learning by incorporating

educational innovations such as the use of the interactive whiteboards, Web 2.0, Web Quest, social networking, Wikis and other collaborative and interactive tools. Bloom’s Taxonomy has been revised by Andrew Church to accommodate the integration of technology within the classrooms. He created the Bloom’s Digital Taxonomy (graph 1). Church’s (2008) Bloom’s Digital Taxonomy focuses on lessons that facilitates collaborative learning with digital technology. His position is “I believe that to prepare our students for the future, we must prepare them for change, teach them to question and think, to adapt and modify, to sift and sort. I am fortunate to teach at a school with a mobile computing program, that sees students with personal mobile devices, laptops”(Church, 2008). The updates to the revised taxonomy are more closely aligned to the standards in the [21st Century learning](#) framework (Table 3).

In conclusion, we can say that, with the new evolution of thinking, technology has impacted the way students learn, motivation to learn and improvement in school performance.

Graph 1: Bloom’s Digital Taxonomy



The Impact of Technology

Technology has had a positive impact on students' perceptions and attitudes towards learning. Kulik (1994) "performed a meta-analysis of more than 500 individual research studies on computer-based instruction carried out between 1981 and 1991"(pg.4). Kulik found that students' writing and math scores improved due to instruction with computers. The students with computer instruction scored at the 64th percentile on standardized achievement tests as opposed to students who had the traditional form of learning and scored only at the 50th percentile (Schacter, pg.4). Donovan (2008) studied the impact of writing on fourth grade students in Tacoma, Washington. His sample of 410 students was matched for age, grade, teacher experience, achievement, ethnicity, and gender. Students who composed essays using computers scored higher on writing samples and writing conventions than those who used paper and pencil.

A new dimension in the way students learn has evolved with the concept of One-to-One Computing. Technology has allowed teachers to address a variety of styles (e.g. visual or kinesthetic) accommodating the needs of diverse learners. While students previously were forced to listen to teachers' lectures, technology has helped students to be active, rather than passive participants in their own learning.

Technology has also changed the role of the classroom teacher. Instead of being the sole information providers, teachers can now add a variety of websites and videos to enhance and complement their lessons. Classroom teachers, who understand the benefits of child centeredness and active learning, believe technology enhances learning making a more student-centered environment. Fairman (2004) said, "I think the biggest thing is teachers moving from being the keeper of knowledge to the facilitator of what's happening in the classroom" (p.17).

Chamberlain (2004) said, “the teacher will become a facilitator, guide, co-learner, while the student will be an explorer, producer, and teacher or mentor to other students” (p.4). In other words, by integrating technology in interactive lesson plans, teachers are able to engage students in a participatory process that facilitates effective learning.

Chapter 2 - Literature Review

The concept of One-to-One Computing

One-to-One Computing is increasing in schools all around the world, which means that every student and teacher has a computer (laptop or tablet) with an Internet connection to use in school and at home. Today classrooms are changing to accommodate the educational needs of the 21st Century and support student-centered, personalized instruction. Vahey and Crawford (2002) claim that “Ubiquitous, 24/7 access to computers makes it possible for students to access a wider array of resources to support their learning, to communicate with peers and their teachers, and to become fluent in their use of the technological tools of the 21st century workplace. When students are also able to take computers home, the enhanced access further facilitates students keeping their work organized and making the computer a more “personal” device” (Penuel, p.332).

One-to-One Computing was an initiative created by technology companies such as Microsoft, Apple, Dell, HP, and Intel. Kennewell (2004) says that Information and Computer Technology (ICT) “brings on intellectual challenges because it allows teachers to propose tasks to students within their zone of proximal development described by Vygotsky” (Freiman, et al. p. 210). The zone of proximal development is the difference between what a student can do without help and what he or she can do with help. One-to-One Computing optimizes work in the zone of proximal development. According to Klotz (2003), “it is a motivating factor for students, allowing them to take risks, to explore, to test hypotheses while learning from trial-and-error efforts, and to enhance their intellectual knowledge” (Freiman, et al. p.210).

One-to-One Computing has also had an impact on learning. Overall engagement in learning has increased. Engagement, as defined by Fredricks, Blumenfeld, and Paris, (2004) is “...behavioral motivation (student participation in learning tasks); emotional engagement (reactions to teachers, other participants, activities in the learning task, and school as well as student attitudes, interests, and values); and cognitive engagement (the willingness to exert the effort that the task requires)” (p.74). When students are engaged when taught, they push themselves to learn and become active participants in the learning process.

In a study by Maine Learning Technology Initiative (MLTI) *Trading Roles: Teachers and Students Learn with Technology*, “principals and teachers said they saw an increased use of an inquiry approach, collaborative learning and individualized learning tasks” (p.18). With One-to-One Computing, students out-performed non-laptop students in all subject areas on standardized state assessment tests in Maine. The significant differences on academic measure were most pronounced in the area of English Language Arts assessments (Suhr et al, 2010). One-to-One Computing has shown impact in student’s achievement and engagement in language arts and literacy programs. That is due to the fact that most “studies suggest that the most frequent use of laptops in such programs occurs in language arts classes, where students write papers with laptops, conduct online research, and otherwise use computer-based and online tools to work with texts” (Suhr et al, 2010, p.8).

In a study about the effects of laptop programs on middle school students, Rockman, Chessler, & Walker (1998) “found that students who used laptops wrote better quality compositions, wrote longer essays, revised their writing more frequently, and showed greater interest in school” (p.8). Also, a study in laptop classes led by Warschauer (2008) found that when students used One-to-One Computing in language arts class, the online literacy programs

allowed teachers to provide individualized reading for students. It concluded that although there are many literacy sources online in which teachers can accommodate the needs of different learners they “have previously not been regularly achieved through shared uses of educational computers” (p.64).

One-to-One Computing Learning Initiatives

Many of developed and underdeveloped countries have shown a great interest in providing each and every student with a computer and have formed initiatives to meet the demands of the 21st Century learner.

Some of the largest One-to-One Computing initiatives are the Maine Learning Technology Initiative (MLTI), the Apple Computers of Tomorrow (ACOT), and the Laptop Immersion Program. In developing countries, the One Laptop per Child (OLPC) has been created. Following are descriptions of the various programs, which have shown a promising impact on student achievement.

The Maine Learning Technology Initiative

The Maine Learning Technology Initiative (MLTI) was the first and biggest initiative of any of the fifty states in the United States. The former governor of Maine, Angus King, was interested in new learning initiatives, to prepare students for the 21st Century Skills and also to have a competitive edge over other states. Elaborating on the idea of having One-to-One Computing for all teachers and students, King said, “I want our kids to be the most computer literate, digitally competent group of young people in the world...where the use of the technology is second nature.” In 1999, the timing was propitious for providing computers for Maine’s students and teachers. Maine had a budget surplus of 50 million dollars from a tobacco

lawsuit settlement and in 2001 it was able to distribute laptops to all 7th and 8th grade students in the state. By 2009, all students in grades 7-12 had their own laptop.

As King said in Darwin Magazine (2000),

My job as a leader is to try to look out into the future, see what's necessary and then equip my people with whatever it is. This proposal is for every school, every kid, rich, poor, north, south, east, west, rural and urban. At a stroke, it would begin the elimination of the division between the technological haves and the have-nots.

According to Silvermail & Gritter (2007), in Maine, 33,000 seventh and eighth graders enrolled in an One-to-One program. The students improved their scores in language arts, math and science. The students who were in the One-to-One Computing program all four years of high school “scored 85% higher than their peers in all five core subjects of the last Maine Educational Assessment” (p.32).

The Apple Computers of Tomorrow

The Apple Computers of Tomorrow (ACOT) program was initiated in 1985 and lasted until 1989. It provided teachers and students in five public schools with computers to use both at school and home. ACOT’s initial goal was to see how One-to-One Computing impacted the way students learned and teachers taught. ACOT (2008) said it was essential for educators and students to have access to computers to enhance their informational literacy skills, which allow students to locate, select, evaluate and synthesize information. Informational literacy is a skill that is important to success in the 21st Century.

The ACOT plan ran into many obstacles. Teachers had to deal with issues such as technological difficulties, lack of Internet access and student misuse of the laptop. In a published

report, “A Report on 10 years of ACOT Research” the ACOT Research Team found that by the end of the first year, even though teachers and students had to learn how to incorporate and deal with new technology, students’ behavior and attendance improved as did their attitude towards learning. ACOT reported that test scores showed that students were performing better and writing more in their assignments. It also found that some classes finished whole units of study quicker than in they had in previous years. (Apple Computer, 1995, p.10)

Laptop Emersion Program

The Laptop Emersion Program (LEP) was established in Harvest Middle School in Pleasanton, California, in 2001 to meet the demands of educating students in an expanding city. The Laptop Emersion Program did not provide students with laptops and students who wished to participate in the program had to provide their own. A Laptop Advisory Committee was formed to meet the mandate of the No Child left Behind Act (2001), that all children can learn, regardless of their economic or social status. Students who could not afford a laptop applied for support from the Laptop Advisory Committee, which loaned computers. Students received a computer two weeks before school started and returned it at the end of the school year. 259 of the 1085 middle school students in the district participated in the program, but the demographics of both groups were comparable so it was possible to study the results of the (LEP) intervention and demonstrate that in statewide tests, students with laptops outperformed students without laptops. The data collection by Gulek and Demirtas (2005) measured students’ overall cumulative grade point averages (GPA’s), end-of-course grades, district writing assessment scores, California Standardized Testing and Reporting (STAR) Program Norm-referenced test scores (California Achievement Test Survey Form Sixth Edition), and criterion-referenced test scores from the STAR California Standards Tests.

Table 1 shows a comparison (Gulek & Demirtas, 2005 p. 14) of students' end of year grades with students' using a laptop vs. students without a laptop. It illustrates that students with a laptop outscored students without one.

Table 1: 2003-2004 End of Course Grades of Harvest Park Middle School Students in English Language Arts with and Without a Laptop

End of Course Letter Grade	Grade 6		Grade 7		Grade 8	
	Laptop	Non-Laptop	Laptop	Non-Laptop	Laptop	Non-Laptop
A	50%	38%	39%	23%	36%	39%
B	42%	32%	45%	33%	54%	40%
C	7%	21%	11%	28%	10%	17%
D	1%	6%	3%	9%	0%	3%
F	0%	3%	2%	7%	0%	1%

Also, students (Table 2) in 2004, STAR Norm-Referenced Test outscored students without a laptop in both Language and Math (Gulek & Demirtas, 2005 p.16)

Table 2: STAR Norm-Referenced Test Results: Language and Math scores with Laptop and without Laptop instruction

		Total Language	Total Mathematics
Grade 6	Laptop	88%	96%
	Non-Laptop	78%	83%
Grade 7	Laptop	86%	83%
	Non-Laptop	76%	76%
Grade 8	Laptop	89%	83%
	Non-Laptop	77%	77%

One Laptop Per Child

In 2006 the United Nations Development Program (UNDP) collaborated and supported the One Laptop per Child (OLPC) (XO-1 Machines) led by Nicholas Negroponte at the World Economic Forum in Switzerland. A number of international leaders at the forum supported the initiative to deliver "technology and resources to targeted schools in the least developed countries" (Switzerland, 2006). The OLPC "felt it was their duty to help third world countries reduce the technological gap in school settings," so in 2007 the One Laptop Per Child Association (OLPC-A), a nonprofit organization, began the process of overseeing creation and distribution of an affordable laptop (under \$100) for students in the developing world. Many people questioned giving children laptops when there were issues such as malnutrition, poor housing and living standards to deal with. The OLPC saw that the distribution of the laptops would be a means to the end of exposing children to a new world of ideas. Negroponte believed that children, supplied with this technology, would take the initiative to learn on their own and teach others in their families to use technology. His beliefs were based on Seymour Papert's constructivist theory that viewed learning as an independent endeavor in which children teach themselves. Negroponte did not believe children should share computers as children should not share pencils; everyone must have his/her own computer to work on just as students usually have their own pencil to write with.

Students in the 21st Century should have access to knowledge and every student around the world should be able to access the same kind of knowledge to be able to express themselves, explore, and create new knowledge. Students in some of the underdeveloped countries now can have the opportunity to be active learners with the One Laptop Per Child initiative bridging the digital divide.

The OLPC has delivered 2, 093,500 laptops to over 40 developing countries including Ethiopia, Gaza, Rwanda, Ghana, Sierra Leone, Argentina Colombia, Mexico, Haiti, Uruguay, Afghanistan, and Cambodia. The XO laptop is durable and adapted to the rigors of conditions in underdeveloped nations, (i.e. it is resistant to dirt and moisture and it has a keyboard that can be customized for different languages.)

The program has already been piloted in several countries with positive results such as increased enrollment in schools, better class discipline and more enthusiasm and participation in class. Although Ethiopia and Uruguay reported positive outcomes from the laptops, they claimed they also experienced problems with connectivity and teacher training. Peru has adopted the biggest pilot program thus far with the OLPC distributing 140,000 laptops to date. There is great enthusiasm among the students and teachers, but they too have complained about limited teacher training. The students in Peru are excited, but they are also confused about the use of the machines.

Implementation of the programs is complex. Many issues need to be considered such as funds, professional development and training for the teachers.

The Implementation Process

A study done by Apple Classrooms of Tomorrow, researchers (Haymore, Ringstaff, & Dwyer, n.d.) identified three stages that teachers go through in the implementation of One-to-One Computing programs as they move from a traditional classroom towards a high access technology classroom. The first stage is referred to as the “Survival” in which teachers and students are learning how to adjust to the new technology and the shift from teacher centered

instruction to learning-centered education facilitated by technology. Both teachers and students feel a sense of frustration. Classroom management is a challenge as teachers learn how to prevent students from just playing with the computer. There is often an increase in noise level and cheating. Teachers find themselves facing technical difficulties while still unable to anticipate them. They are often unprepared with backup plans for when there are power outages or technical difficulties and have difficulty accepting that students need to interact, move and talk while learning in a One-to-One Computing classroom. Teachers are uncomfortable with the shift that some students know more about technology than the teacher does; thus, disrupting the ideology of the traditional role of the teacher in which the teacher is the sole provider of information.

The second stage is called “Mastery.” Teachers in this stage have finally learned how to deal with the misuse of laptops by their students and acquire skills in designing lessons that integrate the new technology in student-centered learning. They are gaining more self-confidence and beginning to anticipate and solve technical problems. They are also more prepared in case a lesson plan does not proceed as anticipated. Teachers realize they must teach students about ethics and the use of computers while developing consequences for those students who do not obey the rules. In this stage, teachers have more experience and are able to catch students cheating. While earlier, teachers spent many hours setting up the classroom alone, now they rely on student help for computer set-up. The teachers begin to see an increase of student engagement and motivation and eventually become accustomed to the higher noise level and the freer movement of students in the room. At some point, teachers begin to share instructional practice with others and start to explore new technological approaches on their own.

The final stage is called “Impact” where teachers see technology as a positive tool and

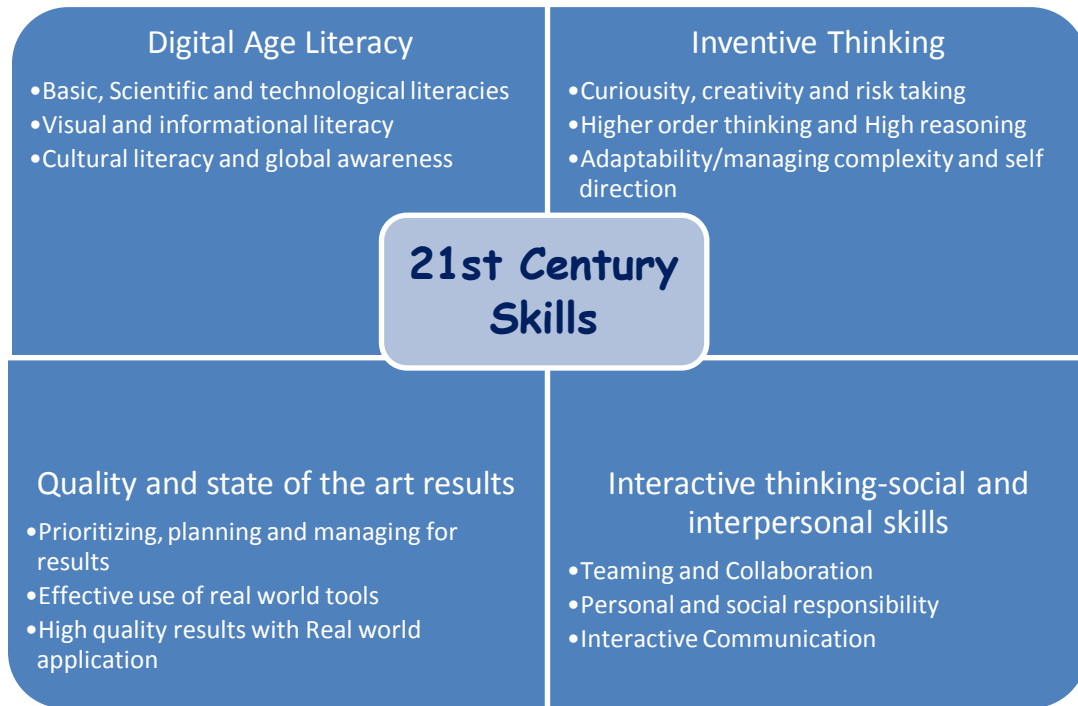
are able to develop individualized instruction, keep records, grade student work and move towards a student-centered method of instruction. In this stage, teachers know that computers are powerful tools and are able to utilize them to their fullest potential. Teachers and students find it very difficult to live without a computer. Teachers in this stage find that computers save time. Teachers are able to create databases that keep track or record grades and teaching materials. The teachers come up with improved techniques of creating assignments and tests creating more than one form of test format to discourage cheating while having individualized assignments for students. In this stage teachers are less threatened by students' ability in computing and use those students as an advantage to help their classroom peers. Finally teachers understand that technology impacts their teaching and that the One-to-One Computing classrooms are not technology centered but learner centered.

Twenty First Century Skills

Many of the initiatives on One-to-One Computing were based on students developing the skills needed for the 21st Century. Ministers, governments and administrators believed that One-to-One Computing was the way forward in the digital and information age.

Pamela Livingston (2006) said,

The digitally enhanced, comprehensively networked world, which our students are entering, demands it. It's a world that demands instant access to information, higher order thinking skills, and the ability to collaborate over distance. One-to-One provides it all – in spades. It's not easy; it's not straight forward; it's time consuming and expensive, but it's the most important thing we can do for our kids to prepare them for the world to come”
(Sturgeon, July, 2007, p.2)

Table 3: 21st Century Skills by Metiri Group and the North Regional Educational Laboratory

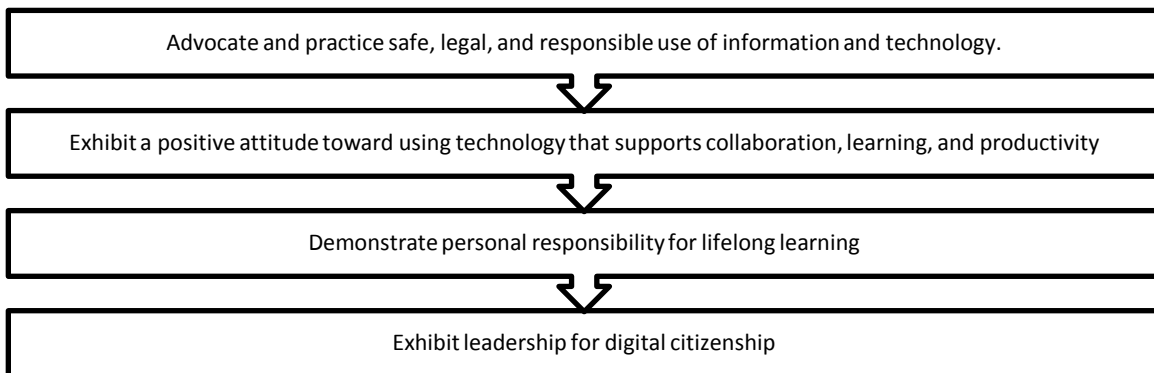
21st Century Skills are directing education today. They meet the needs of today as well as the future by encouraging students to learn collaboration and use higher order thinking skills. The 21st Century Workforce Commission National Alliance of Business states that 21st Century Literacy includes, “strong academic skills, thinking, reasoning, teamwork, and proficiency in using technology. Students need to evaluate and synthesize information given to them.”

Acquiring 21st Century Skills is important because informational technology “is growing at a rate of 30 percent per year which means it is doubling every three years” (Sturgeon, 2007, pg.2). Av and Cosgrove (1997) said being able to access this data, while finding reliable and relevant data, is more important than memorizing information. As students acquire 21st Century skills using computers, they also need to develop digital citizenship.

What is Digital Citizenship?

Digital Citizenship is the behavior of how one deals with technology use. Students living in a digital world must have digital citizenship and not misuse and abuse technology. When technology usage is incorporated in every day life, students must be aware of the standards created by the International Society for Technology and Education (ISTE). ISTE's National Educational Technology Standards (NETS) for students (2007) “help them prepare to work, live, and contribute to the social and civic fabric of their communities.” One of the standards is digital citizenship, which is defined as: “Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior” (NETS, 2007).

Table 4: Standards by the ISTE NETS on Digital Citizenship (2007)



There are nine areas of behavior dealing with digital citizenship (Ribble, Bailey & Ross, 2004).

- 1) Safety: physical well-being in a digital technology world
- 2) Etiquette: electronic standards of conduct or procedure
- 3) Communication: electronic exchange of information
- 4) Education: the process of teaching and learning about technology and the use of technology

- 5) Access: full electronic participation in society
- 6) Commerce: electronic buying and selling of goods
- 7) Responsibility: electronic responsibility for actions and deeds
- 8) Rights: those freedoms extended to everyone in a digital world
- 9) Security (self-protection): electronic precautions to guarantee safety

Students who are part of the One-to-One Computing program must have training and understanding in digital citizenship. Just like teachers spend time teaching children how to be nice to one another, teachers need to spend time teaching students about the responsibility required of the digital age to avoid major issues such as cyber bullying and harassment.

Chapter 3 - Methods

Case Study

An international school located in Cairo was selected for this case study. It is a Pre-Kindergarten through grade 12, independent coeducational day school, which offers an educational program for students of all nationalities. The school was founded in 1945 as a non-sectarian institution. The school year comprises two semesters extending from August 15 to December 20 and from January 9 to June 1. It has a 10-member Board of Trustees, elected or appointed, governing the school. This school offers a rigorous educational program, which follows a general U.S. standards-referenced curriculum model. Students receive an American diploma. During the 2010-2011 school year, there were 158 full-time and 23 part-time faculty members, including 110 U.S. citizens, 39 host-country nationals, and 32 persons of other nationalities.

This school began piloting a One-to-One Computing program among seventh and eighth grade students in the 2011-2012 school year as part of an initiative to increase student achievement and meet the demands and the needs of the 21st Century. This study evaluates the impact the One-to-One Computing program on the overall impact of instruction (improved engagement, motivation, enhanced writing skills, and better tests scores) in Language Arts among students in the seventh and eighth grade.

Research Questions

Has One-to-One Computing enhanced students' understanding and application of global citizenship?

Has One-to-One Computing impacted instruction of Language Arts? Has One-to-One Computing affected social and family relations?

Assumption One: One-to-One Computing has enhanced students' understanding of global citizenship.

Assumption Two: One-to-One Computing has impacted the instruction of Language Arts.

Assumption Three: One-to-One Computing has affected social and family relations.

Data Collection

Qualitative research methods were used for this study. As Creswell (2009) explains, "qualitative research has specific characteristics, in that it occurs in a "natural setting" where the researchers themselves are observing and collecting the data." During the research there was continuous dialogue and discussion with the subjects. The researcher examined the impact of One-to-One Computing on Middle School Language Arts teaching and learning. It also revealed whether One-to-One Computing has enhanced students' understanding of global citizenship, responsibility and affect on family relations. The Middle School has 322 students in grades six, seven and eight.

Participants

The study included: nine seventh and eighth grade students, which the Middle School Language Arts teachers selected based on the students' responsibility and communication skills; three Middle School Language Arts teachers; and four parents of students in the One-to-One Computing program. Evaluation of learning and motivational outcomes from One-to-One computing was analyzed through: 1) focus groups with students; 2) observations within the three classrooms; 3) interviews with three teachers; and 4) interviews with the parents.

The inputs from teachers, students and parents will be used to evaluate and analyze the effectiveness of this methodology. The use of several methods of gathering data is in order to perform “data triangulation” according to Johnson & Christensen (2004) allows comprehension and evaluation of the different perspectives of the study. The focus group discussion was recorded and transcribed by the researcher for analysis.

Consent was obtained from the Middle School Principal, three middle school teachers, and parents of the nine students who participated in the focus group. The Middle School principal recommended the names of the three Language Arts teachers observed in the study. The study occurred between December through April 2012.

As Lock et al., 1982; Marshall & Rossman, 1989; Merriam, 1988; Spradley, 1980 emphasize the significance of attending to the ethical matters involved in qualitative research (as cited in Creswell, 2009). Approval from the AUC Institutional Review Board was received as the study involves human subjects. Student names’ were not identified in the research.

Chapter 4 - Findings and Discussion

Teacher Interview Participants

Three Middle School Language Arts teachers were interviewed at the school. The duration of the interviews was about an hour each. Two teachers were interviewed simultaneously. All the interviews took place in their classrooms.

Teacher Interviews

Three language arts teachers were interviewed about their experiences piloting the One-to-One Computing program. Those interviewed were an 8th grade Language Arts and Geography teacher, a 7th grade Language Arts and Social Studies teacher, and a 7th grade Language Arts teacher. When asked how their experience has been thus far with piloting the One-to-One Computing program, they all said their experience was a good one because they established One-to-One classrooms before the school provided computers for everyone. They used to reserve the laptop carts from the library for their classes, where each student was assigned a computer from the cart for the duration of the class. The teachers all agreed that the only strength of the school's formal One-to-One Computing program was that did not have to hassle with reserving, getting and returning the laptop carts. The teachers did not report any difficulties while implementing the program. When asked if the teachers had formal training for One-to-One Computing, they all said, "No." They taught themselves and since they have been doing it for many years they learned from their own experiences. Some of the teachers collaborate and share new websites or new strategies with their colleagues. One teacher is a self-learner; she follows educators from around the world on Twitter and gets new ideas from them. Unfortunately the teachers did not receive professional development before the implementation of the One-to-One

Computing program. This did not pose a problem for these teachers, but for other teachers who may not be as experienced in the One-to-One Computing, it could affect the way they teach if they are not comfortable with the program.

The teachers saw many benefits for the students with One-to-One Computing. Students cannot use the excuse anymore that they forgot their homework, pencil or paper. Students do most of their work on Google Docs. The teachers agreed that Google Docs was an essential tool in the One-to-One Computing program. It allowed for collaborative work where groups could work on the same document from their very own laptops, students and teachers could edit other students' work from their computers and most importantly they could save their work on the cloud where they could access it from anywhere. Teachers also reported other benefits for One-to-One Computing such as: boys had more confidence sharing their work because boys had been insecure of sharing because of their poor handwriting. The teachers also saw that having access to the computers allowed for students to think critically and creatively.

These teachers had their students create e-portfolios and design its layout. The teacher listed all the standards in their e-portfolios and each student had to demonstrate, create and upload how those standards were met. The teachers and students also used a program called VoiceThread in language arts. The teacher used it as interactive tool where students could login and comment on students' work. It also created a website where students worked together. The teachers noted many advantages for using these different forms of technology. One teacher said she has her students use Twitter. She said Twitter allows students to use only 140 characters per Tweet. She said the advantage of this tool is it forces students to word things simply to convey an idea across. Teachers also felt that One-to-One Computing makes life easier for them because they do not have to carry papers everywhere to grade.

There were a few disadvantages in the program. Students had easier access to cheating! They would also use the side search bar for answers. Also, when students are supposed to be working independently on their computers they used the side chat tool to visit with their friends. To a teacher that is just sitting around, s/he might get the impression everyone is on task and working. The three teachers interviewed all said that in a One-to-One Computing class one must be walking around all the time. When there is a test or an assessment, all computer screens face inward where the teacher sits in the middle so all computers are easy to see.

Teacher Interview Findings

Many factors affect the quality of teaching and the impact on student learning when implementing One-to-One Computing in schools. The case study school took the initiative to have One-to-One Computing among their 7th and 8th graders this year. Three important components in the implementation and action process: teacher experience and professional development, teacher enthusiasm for the program and classroom management skills were examined for this program.

Teacher experience and professional development are important components to provide successful experiences in the implementation of One-to-One Computing. When interviewed, my impression of the One-to-One teachers, was that this was only their first or second year having such classrooms. After having asked the first question from the questionnaire, they related that they had been involved in One-to-One Computing classrooms for several years. They all used to reserve the laptop carts that were available from the school and had computer access for their students in their classroom. These teachers had years of experience in an One-to-One Computing classroom, but they had not received professional development support from the school. They all took the initiative and learned on their own on how to manage One-to-One

classrooms. These teachers demonstrated how their experience allowed them to create a collaborative and creative learning environment for their students.

Another component in having a good One-to-One Computing program is to make sure the teachers in the school understand the benefits of the program as well as be willing and able to take on the challenge. The three teachers interviewed were supportive of the idea because of their conviction that students must acquire the 21st Century skills. Unfortunately, they knew of other teachers in the school that resented the idea because it was imposed on them. These teachers exemplified their passion for One-to-One Computing. Teachers, who have a passion for something, put all their efforts in producing the best creation of a good educational and learning environment for students. These teachers were up to date on the latest technological tools and collaborated among themselves with online chats and with other teachers around the world, sharing and learning from one another about useful, creative and improved ways to help students learn.

The last component investigated was that of classroom management. Teachers were very aware how to monitor students when taking exams. They had more than one version of the test; they also had students turn computer screens to face the center of the classroom where the teacher was sitting in the middle to avoid the temptations of cheating. They were very aware of the different ways students can look up things as if they are working but actually having side chats with their classmates. They all said that when you have One-to-One Computing classrooms the teacher must constantly move around observing and making students are on task.

Observations In The Classroom

Participants: Three Middle School Language Arts teachers were observed while teaching at the school. The observations reported and analyzed the approach teachers used when teaching One-to-One Computing classrooms. Teacher A was observed twice for 30 minutes, Teacher B was observed for 60 minutes and Teacher C was observed for 30 minutes.

Teacher A: Observation 1 (30 minutes)

The researcher attended teacher A's class at 11:50. Her Language Arts class lesson focused on the use of apostrophes. All the students had computers on their desks and when she spoke she told the student to 45 their computer, which meant to put the computer screens down at a 45-degree angle. This allowed students to focus on instruction given by the teacher. Once she gave instructions she told the students to connect to a website called Socrative. Socrative is a "smart student response system that empowers teachers by engaging their classrooms with a series of educational exercises and games." Socrative can work on tablets, smart phones and laptops. Once the students logged in, the teacher had a sentence up on the Smart Board with an apostrophe misplaced along with two multiple-choice answers of which sentence had the correct placement of the apostrophe. Once the children selected their answer on their laptop, they put their computer screen at a 45-degree angle. This allowed the teacher to know they were ready. The Socrative System allowed the class to see how many agreed to sentence "A" and how many agreed to sentence "B". Then they discussed why students agreed to "A" and why students agreed to "B". This program assured that all students participated without putting the spotlight on anyone student. All were engaged.

Teacher A: Observation 2 (30 minutes)

The teacher started class by announcing that the students' persuasive essay papers are graded and they are on Moodle. Moodle is a free e-learning platform that helps educators create online courses with a focus on interaction and collaboration of content. Students can see their grades and progress on Moodle. All the students had their computers open and she told them to close them so they could listen to instructions. She announced that they were going to have to give a speech on a personal meaningful topic. They would have to complete at least 20 hours of research, which included watching professionals giving speeches from Ted Talks (best talks and performance from the best TED conference), research the problem online, and write their speech. The lesson was primarily on how to research, create, and give a speech on a controversial or meaningful topic. Then she had students watch a few speeches on their computers while wearing headphones and focus on how the speech was given focusing on eye contact, voice projection, body language and visuals. Students seemed engaged watching some of the speeches. The teacher told her students to continue watching other Ted Talks speeches at home and that she had a list on Moodle of specific speeches she wants them to watch. She said they could connect their computers to the TV so the whole family could watch at home.

Teacher B: Observation (60 minutes)

Teacher B, a language arts teacher, invited me to her classroom to observe a Socratic Seminar on assisted suicide. The seating arrangement in the class was different from the usual traditional seating. She had a small circle with seven student desks and then a bigger circle around the smaller circle with ten student desks. Before she started the class, she advised the students about their homework. They typed their homework either in an online planner they had created or they had the option of writing the homework in an e-mail and sending it to themselves. The

homework was for students to find two different Internet sources for an opposing issue they were writing on and one quote supporting their issue. They needed to have this on Google docs by their next class session. Then she asked the class to close their laptops because the Socratic Seminar was to begin. The students in the small circle read an article on assisted suicide prior to coming to class. The students in the big circle read an article against assisted suicide. The purpose of the Socratic seminar was “to achieve a deeper understanding about the ideas and values in a text. In the seminar, participants systematically question and examine issues and principles related to a particular content, and articulate different points-of-view. The group conversation assists participants in constructing meaning through disciplined analysis, interpretation, listening, and participation.” The teacher recorded the session. She told students in the small circle to start evaluating and support reasons for assisted suicide. Each student was allowed a turn and each was able to speak freely, to ask and answer questions. Students on the outside circle were not allowed to talk but if they had something to say they had to come sit in the “hot seat” located in the small circle. This activity was done so students can verbalize arguments using supporting details from the article read. Next session, students would be able to use their computers and write why they supported or opposed assisted suicide.

After the session the researcher emailed the teacher and asked her two questions: (1) Why did they use paper articles? and (2) How often are paper articles used since One-to-One Computing had been implemented?

She replied with an email response:

She said regarding the questions about 1:1, that they use paper articles rarely. Earlier in this unit she found an editorial from the LA Times that she turned into a Google Doc and shared with her students. She used that as a class to identify the components of persuasive nonfiction and the

students color-coded the text in the article accordingly. The reason this article was on paper, was that she had taken it from a book. She wanted the kids to highlight and mark up the facts and other components of persuasive nonfiction. If she had turned it in to a PDF, they would not have been able to manipulate the text. If she had found the text online she would have converted it to a Google Doc and shared it. She said two students had their computers open during the seminar, because she converted the articles to PDF and linked them to her class website as a back up. Several students chose to use the digital copy of the article and put their notes on a separate Google Doc. She always provides the students with an option to see what works best for them. She tried to teach them to evaluate the pros and cons of different strategies and use what works for them. Some of her kids still prefer to take notes on paper with colored pens while, others would rather type their notes into a Google Doc.

In Language Arts kids use their computers almost daily. She explained how she set up the Novel Study Unit. She had the room set up in five stations so that the students rotated through each every 15 minutes. Three of the stations utilized the laptops:

- Moodle Station: Kids logged in to Moodle where they would find a critical thinking question about the pages they had read for that day. They would type their own response and then see their classmates' responses and could reply to them like a chat room about the book.
- Journal Station: Kids set up a journal on Google Docs in which they would respond to a personal life connection to what they had read for that day.
- Vocabulary Station: Students used a variety of online tools to work with the vocabulary they were finishing in the book that was new to them (www.visuwords.com, quizlet.com etc.)

Teacher C: Observation (30 minutes)

I attended a teachers' 7th grade Language Arts Class. When students got to class they were advised to do silent reading. Some children were reading from their Kindle or from a book. The children read for about ten minutes and then he told the students to write a summary of what they read on Google Docs. Once the students wrote a summary of what they read, they had to go into their partner's Google Docs and read what they wrote and then respond to their summary. Once they were done, they had to put their computer screen down so that the teacher would know they finished.

While the students were working, the teacher, explained to me that this process helps students to get in the habit of learning how to summarize what they read while the idea of a student checking each others' work and response holds the students accountable. He also showed me from his computer how he can watch a student through Google Docs, where he can click on the students' name and see them typing on the screen. The teacher can comment on the students' writing while the students are in the writing process.

Once they were finished, On Edu 2.0., a portal that the teacher uses, he had the agenda for the day. Students have access to the portal where they can see what they need to have in class for the day. The teacher prefers to use Edu 2.0, he said it is like Moodle, but it has many more advantages. He said that Edu 2.0 was created for teachers.

Each student chose a novel to read in which he or she would have to write an essay in class, which they would reflect on an essential question, "Is taking a stand against injustice worth the price you will pay?" They will be writing from many views: the author, the character and themselves. All the students started working and writing in their on Google Docs document.

The teacher told me that he changes the seating arrangement in the class according to each lesson. He doesn't like student desks to be organized the traditional way of one desk behind the other.

Teacher Observation Findings

Observing in the classrooms was gratifying. Seeing how children learn in the 21st Century as opposed to how the older generation was taught was exciting. There are so many tools that teachers can use to enhance their lessons with One-to-One Computing. Each teacher can use the tools according to their needs and preferences. Teachers were able to manage the students' behaviors, many of them were engaged and on task. Students were also accommodating and shared battery chargers when needed. One-to-One Computing allowed students to collaborate, to think critically, and create. All of which are skills for the 21st Century.

Focus Group

Participants: Nine individuals participated in the focus group: eight females and one male. Seven of the nine participants were eighth grade students and two were seventh grade students. The duration of the focus group discussion was thirty-five minutes, which was held the school of study. Student voices were recorded during the interview and then transcribed by the researcher.

Within the focus group there was a consensus that participation in the One-to-One program enhanced their organization, research and typing skills. Students identified many positive outcomes due to the program. Because they do not have to manage lose or shuffle through papers to find specific assignments or readings, all is stored on the laptop because teachers send articles and worksheets to be read and completed online. Students also felt more prepared in class because all their homework assignments were on Google doc. They could no longer use the excuse of forgetting their homework in their locker or at home. Many also

commented that if they do not understand a homework assignment, they could easily communicate with teachers by sending an email from any location. Waiting for access to a computer lab, or station at home, to send out an email was an action in the past.

Students also commented that they get their work completed much faster with the One-to-One Computing program. If there are terms in a reading, which are understood, they can easily look them up simultaneously. The students said that keeping the computers taught them more responsibility as the laptops are more expensive than copybooks or texts.

Students' competencies to conduct research increased. Typing in key words on the laptop screen was more efficient than flipping and searching through books. They frequently use the online library database, EBSCO, to locate current articles instead of going to the library for older print editions or to work in a quiet environment. Students have been introduced to online tools such as Diigo, to bookmark important information and EasyBib to cite sources. Moreover, students all agreed that their typing skills improved. One student said that last year he used to type using only one finger and now he uses all his fingers while typing.

When asked if their grades had improved, some said they have received better grades in Language Arts because they used to get points deducted for spelling mistakes on their handwritten essays but now that they type everything on the computer, self correction is used to correct their identified mistakes. Students noted the importance of spelling words correctly, but also believe they learn when they view the corrections done by the computer. Finally, students concluded that they write better essays because typing on the computer is much faster; thus, giving them more time to add details and make edits. Only one student said he has received better grades, but wasn't sure if it was due to One-to-One Computing.

Students understood the concept of digital citizenship. At the beginning of the year teachers spoke to them about LARK, being Legal, Appropriate, Responsible, and Kind. Every now and then the teachers remind them about how to be a digital citizen. Students also said they know that not all sources on the net are reliable. Their teachers have given the students access to Turnitin.com to avoid plagiarism. This tool helps them track their citing mistakes while helping them to document things correctly.

During group projects, students work collaboratively. They use Google Docs where they all can add and edit their group's work simultaneously. One-to-One Computing made checking grammar and punctuation easier than passing around the only copy to edit manually. Now everyone can work on it together. Paper is rarely used in class. They said they have used paper only once this whole semester as tests and assignments are done online.

Students carry their computers to and from every class. They don't mind carrying the laptop because it is light and easily accessible. Students said they are on the computer a lot at home for both homework and social networking purposes. Some believe that their time on the computer has taken away from their family time, but also admit that their family members are also on the computers for social networking or work. One student's father is completing an online degree.

After students spoke about the positive aspects of One-to-One Computing, they identified some negatives. A major concern was that the Internet speed at school is slow and sometimes was down. Once they had an exam to complete using Moodle, an online platform, but it wasn't working so the test got postponed. Many of the students also admitted there was a problem with cheating. Some students would have another window open while taking tests online. Some students found it tempting to access Facebook or other social media sites, even when doing their

homework at home. Consequently, they feel it often takes them longer to complete work because they usually have two tabs open: one for homework and the other for social networking. Switching between the two tabs adds up in time.

Students are very dependent on the computers. When asked to handwrite something, they are reluctant because they feel their typed work is a lot neater. One student recalled that when they had a substitute teacher unfamiliar with the One-to-One Computing Program, they had to handwrite the test. The students were worried that the substitute was not going to be able to read their work. Another a major student concern was mentioned by the eighth grade students. They are worried about ninth grade as there is no One-to-One Computing Program in high school. Students are upset because now they are so used to using computers, they feel they will be at a disadvantage once they go to high school. They do not want to go back to the old way of researching and handwriting things like before. They feel if the school takes away the computers that it will be counterproductive for them.

Students concluded, "Everyone uses computers; we are in the 21st Century and teachers are exposing us to the skills needed and are preparing us for the future."

Focus Group Findings

The findings from the student interviews were that One-to-One Computing has had an impact on their learning. They have acquired skills that enhance their experience in the digital age. They have become more organized, collaborative, creative, responsible and technologically literate. Also they have become more confident with the usage of tools to bookmark pages; searching for key concepts; and citing sources used. All the things needed to produce quality essays in Language Arts. Finally, the One-to-One program has increased students' time on computers both at school and at home.

Parent Interviews

Participants: Three parents of the students in the One-to-One Computing program were interviewed about the program. Two of the parents interviewed are parents to boys.

Parent A Interview:

Parent A is an Egyptian parent to an eighth grade girl. She is very happy with the One-to-One Computing program. At the beginning of the year the school provided parents with a workshop to introduce the program and shared a few examples of what a One-to-One classroom would look like. She believes that One-to-One for differentiation for the needs and talents of the child. She was disappointed by the fact that the school will not provide computers for the kids when they go into high school. The school is going to bring One-to-One Computing to the sixth graders so that all of Middle School will be in on the program. The school said they do not have the budget to provide computers for both sixth and ninth graders.

Parent A says her daughter shares what she does in class with her. She feels her daughter has become more creative and confident with the use of computers. Her daughter also helps trouble shoot when mother has a problem on the computer and has taught her how to use iMovie and a program called Sticks. She said her daughter has become more critical of her work and likes to reflect on it before sharing with class members. When her daughter shares with the class they are able to give her feedback and suggestions for improvement. Her daughter is able to access more information easier than before. The parent has found that the assignments the teachers have given her child are very relevant and meaningful. She recalled an assignment that her child was given where they heard a short story and needed to create a radio announcement for the story they heard. Her daughter was the leader for this cooperative learning group so everyone sent his or her recording, which she had to edit, add music and combine for a final

radio announcement. She felt the project was very complex but allowed her daughter to be exposed to many new skills. The combination of effective teachers and the One-to-One Computing program has positively affected the way her child learns.

Her daughter does not go to the library and but likes to read information on the net. She also likes to access social networking sites such as Tumbler. She allows her daughter to have her computer in her own room. Parent A is very conscious of family time; they make time everyday where they sit together.

Parent A said she feels this generation is different than hers because she feels she connects and understands what her children are doing. There isn't a big gap between her and her children. She feels they speak the same language. They all use the Internet for social networking purposes. Her husband also reads the daily news online. Her daughter takes her computer wherever she goes.

Parent B Interview:

Parent B, an elementary computer assistant, is an Egyptian parent to a seventh grade boy. Parent B is also happy with the One-to-One Computing program. It helps parents who have only computer at home. Instead of parents and children using one computer, it relieves the traffic on the computer at home. She feels her son feels a sense of ownership having his own computer; giving him more time to create and explore new sites and technological tools. She noted that not everything he does on the computer is educational or for school, but it allows his creative side to surface. She said he created an Imovie of his favorite soccer play, Messi. She does not feel that One-to-One directly impacts his learning, but feels some of his skills have improved such as knowing how to access information more quickly. His digital instinct is much faster, if she and

her husband are talking about what movies are out, he will automatically search for what movies are playing at local cinemas.

Her son reads mostly on the Internet and she argues with him as to why she never sees him reading a book. He is always on the computer and as a parent she feels she has very little control on what he is doing and reading. She said that when she asks him what is he doing, he always says he is doing his homework, but she said she knows he is not doing his homework all that time. This causes tension in the household, but she believes she needs to prioritize her battles with her son. She is constantly reminding him to pray, and she believes this is more important than arguing about the time spent on the computer. She complained that her son is on the computer until it is time to go sleep.

When they only had one computer at home, she felt her son would do his work faster because he had an allotted time to be on the computer as it was shared with his older brother. She also felt he socialized more with her at home or tried to find something to do in the house, but now all he does, is go on the computer. The primary computer in the house used to be in the living room for all to use, but now since he has own computer he works in his room. The positive aspect about technology and computers is that it brought connectivity to families who live in other countries. Through programs such as Skype and FaceTime, her brother, who lives in Dubai, has been in touch more frequently. Unfortunately, face-to-face interactions and verbal communication has reduced for everyone. Instead of calling someone to greet them or say Happy Birthday, it is easier to just send a message through Facebook.

She said she is not aware of the work her son does; he does not share his work and believes it has to do with his age. When asked if her son was aware of digital citizenship, she was not sure, but argues with him about reliability of some sources found on the net.

She too expressed concern about the school's decision not to provide students with computers when they go to high school. After households get used to having another computer in the house, its loss will pressure the family to buy another computer.

Parent C Interview:

Parent C, an American, is a parent to a seventh grade boy. She believes that with One-to-One Computing her son has become more proficient in using the computers. She is amazed how her son can maneuver in and out between different websites. She sometimes asks her son for help to trouble shoot computer problems. She believes the program has allowed her son to have more responsibility because he has to take care of the computer. She is also glad that the school provided her son with a computer because now he doesn't have to use hers.

She is not aware of what her son does in school. He does not share much with her. As a parent one does not have access to Moodle sites to see what their children are doing. Her son did share a site online that his teacher introduced him to called Freerice.com. When answering online questions, the UN World Food Program donated 20 grains of rice for every correct answer to help end world hunger. Her son does go to the library sometimes, but he has a Kindle to read books. Her son loves to read books. He is on the computer more often now, but she does not believe it is due to the One-to-One Computing but rather because of a new game he likes to play called Mind Craft.

Having the computer has not affected their family time because they have family night where they play games and sit with one another. In her generation she said she did not have computers in her household and she used to play outdoors a lot. Now kids are on the computer a lot and don't play outside as often. She believes it has to do with other factors as parents, in

general, are not comfortable anymore leaving their kids to be free in the streets like before because of kidnappings and murders.

Parent Interview Findings

Parents interviewed supported the One-to-One Computing program. They were grateful that the school provided the students with their own computer reducing the wait time students needed to wait in order to use the computer at home when other siblings were on it. Parents believe the One-to-One Computing has allowed their children to be more creative and responsible. Parents addressed the issue of continuity of the program in high school and how that would put both the student and parent in an awkward position. Students will be at a disadvantage while parents will feel pressure to buy a computer. Finally, there needs to be a balance of time spent on the computer and interaction amongst family members.

Discussion

The researcher found that One-to-One Computing Program has allowed students and teachers to collaborate. Teachers collaborate with other teaching professionals in the school as well as internationally via online while students collaborate with their peers in group projects, research and discussion forums. Teachers and students have also become more organized with the program. Teachers are able to collect all the students' work on one platform, making it easier for teachers to check students' work and grade without carrying student papers everywhere. While, students do not have to hassle with loose papers anymore, everything they need such as worksheets and homework is on the computer. The teachers, parents and students reported that having access to the computers all day has allowed the students to be more creative. Unfortunately, the students and teachers reported easy access to cheating while taking exams and distractions from Facebook and side chats while teachers teach.

Chapter 5 – Conclusions and Recommendations

One-to-One Computing is paving the way for new experiences in schools. Schools around the world strive to be a model school with the latest technology. The main goal for the implementation of the One-to-One Computing Program at the school was to have students acquire 21st Century Skills. Students acquired all the 21st Century skills: digital age literacy, inventive thinking, use of real world tools and interactive thinking and social skills. The program had an impact on teachers' pedagogical approach to teaching Language Arts which impacted the way students learned in class.

The creativity that these teachers interviewed possessed with One-to-One Computing was impressive. They provided meaningful lessons that related to real life experiences, engaging students in their learning. One-to-One Computing is a powerful tool for teaching, but teachers need to believe and have a passion for teaching in order to impact one's learning. The teachers definitely had a passion for teaching and learning new information, they are self-learners who connected with a larger community of learners to learn new ideologies and tools to use in the classroom. The criteria for an exceptional teacher is someone who makes an impact on students while using technology as a tool for students to use their higher order thinking skills. These teachers were all in the "Impact" stage. They believed that One-to-One Computing has changed the way students learn making it easier, collaborative, engaging and unique to the learning process. They reported endless limits to the use of technology and classroom management skills enforced in their classrooms. Each of these teachers were examples of teachers who make an impact on students' learning.

Students reported having a positive experience with the One-to-One Computing Program.

They are heavily reliant on the technology because of its efficiency and speed. Students acquired the 21st Century skills because of both the technology and the quality of teachers. They became more digitally literate, creative, collaborative, responsible and efficient. Students also became aware of digital citizenship where students practice to be safe and responsible while searching and using the Internet. Teachers also, are teaching students responsibility by giving the students access to Turnitin.com so they do not plagiarize someone's work. Overall, the main benefit of the program is that students' research skills and analysis have improved. The program has lead students to write more and produce higher quality essays; increased access to information and has attributed to problem solving skills.

Parents are also happy with technology allowing their children to be more creative and digitally literate. Parents believe their children have been given more responsibility by taking care of their computers. The drawbacks for some of the parents, is that technology does interfere with the quality time spent in the household with family members. Parents believe that quality time needs to be set for the family to spend together. The other drawback of the program is the lack of continuity. Parents are disappointed with the school because it will not provide computers for the kids in high school. Since the revolution in Egypt the schools enrollment has dropped affecting the budget.

One-to-One Computing is effective as long as there are skilled teachers who understand and know how to use the computers efficiently. Technology is an effective tool when used correctly.

Limitations

There were a few limitations to the study, the teachers interviewed at the private American school in Egypt had extensive experience in the One-to-One Computing. The teachers in the study reported they did not receive professional development from the school and have heard

that some teachers are experiencing difficulties and frustration from the program. In the future, the researcher would like to explore the impact it had on teachers who were not technological savvy and who were frustrated by the program and see how that affected the way students were taught. Also the researcher would like to explore the effects of not having the continuity of the program in the high school and study how students will survive without the One-to-One Computing Program.

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