

The Acquisition of Internet Enhanced Learning Tools in Today's Schools

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Abstract

This inquiry was conducted into how individual schools or school districts obtain and maintain their technology Internet enhanced learning and study tools. This study was not concerned with specific computer application software. The research was conducted over a one-week period in Portland, Oregon and Vancouver, Washington, U.S.A. in August of 2017. Although only a short span of time was covered the visitation of two private senior high schools and a public-school district was included. In this age of technological enhancement for learning acquiring even the most basic of Internet enabled devices can become costly. Additionally, the responsibility for broken, lost, or stolen devices can become problematic as to who is ultimately responsible the school or the student. If the learner comes from a low income single parent family the cost of redistribution may total close to \$1000 U.S. dollars depending on the device. This investigation therefore, covered the key issue of how devices are obtained and maintained in a fair and equal manner. The research discovered that many individual schools and districts have had to come up with their own specific solutions to settle this dilemma. Monies from bonds or special levies are usually required in the instance of public schools. Private schools on the other hand have had to come up with their own unique solutions. This small sampling is prevalent to the current situation in many schools throughout the U.S. and may also be comparable to various schools throughout the world. Each of the case study will be rationalized so that readers can come away with a deeper understanding of the problem that exists today and workable solutions that may be appropriate for their own instructional and learning situation.

Keywords: Education Technology, I-pad, School, Tablet computing, Teaching

Introduction

Three case studies were explored to ascertain how if any technological devices were obtained for student learning. In this context 'technological devices' were assumed to be either portable devices such as I-pads or tablet computers. Mobile devices such as Smart Phones were not included. Many schools today have differing acceptance levels as to the possession and use of smart phones on school grounds. The case studies involving portable devices were two private senior high schools and a large public-school district. All three instances were located within the Portland-Vancouver metropolitan area of Oregon and Washington state in the United States of America. Vancouver, Washington is located across the Columbia river and is easily accessible by car from the Oregon side. All three cases were located within an hour of each other. Numerous electronic correspondences were exchanged beforehand to ensure availability of the interviewees. The interviewer had a limited amount of time and was travelling a great distance. Likewise, the interviewees time was also limited due to the start of the upcoming school year, administrative duties and other necessary

functions. The interviewer travelled from Japan to Portland, Oregon and interviews were agreed to be held during the week of August 22nd – 26th. Fortunately, the interviewer allotted a window of five days since the three different interviewees had last minute scheduling changes and the original days and times were altered to fit everyone's needs within that week. In the end all three interviews were successfully held with each interview averaging around 2-3 hours. The two interviewees at the private schools happened to both be the school principals. One of the two principals graciously guided the interviewer through the school for over an hour, where he was able to see computer stations, computer carts, and given an extensive description of the wi-fi and security measures for each classroom. A variety of classrooms were shown as were explanations given as how they are implemented for various subjects such as languages, the sciences, mathematics, and others. The information age presents many challenges for those in education and government (Selwyn, Gorard, & Furlong, 2006). Acquiring the latest computing devices is now at the forefront of every schools list of things to do. These three case studies show how creative schools have had to become just to give students a basic education that now includes specialized pieces of equipment for everyday learning.

Methodology

The predominant aim of this research was to explore how learning institutions are acquiring the needed technological tools for today's Internet connected discovery environment. This research was an extension of an earlier research into how I-pads are being used in elementary schools (Carley, 2011). The methodology used was designed to be simple and concise to utilize the time available in the most efficient manner. Before arrival in the United States the interviewer had attempted to contact numerous public and private schools within the Portland, Oregon, city area. For assorted reasons only the 2 private schools and a representative from the tech. department of a public-school district were able to fulfil the time constraints. The three principal areas of discussion were:

- How portable computing devices are obtained?
- What are the financial resources for upkeep and maintenance?
- Who is responsible for lost, broken or stolen equipment?

Through the course of the interview and discussion other areas of interest were talked about but the main area of research centered on the three key points. By way of oral interview and note taking the needed information was easily obtained and recorded. Follow-up questions or clarification on some key points was conveyed by way of e-mail. Each case study was then immediately summarized from the written notes that had been taken. Due to little previous data having been collected by scholars on this subject there were no prior examples to consult.

It was assumed from the beginning of the research that this would be a fact-finding mission that could eventually lead to deeper and more thorough careful and diligent pursuits. In the future it was also hoped that the sampling could be increased to include a larger cross-section of public and private schools throughout the United States. In the U.S. each of the 50 states have different funding allocations for education based on many key factors such as population, tax base and future educational desires. This situation is not unique to the United States through and a more global focus is also a possibility.

Literature Review

There is little research and academic findings on how technological devices are acquired by learning institutions. There are huge differences between school districts, cities, and even individual States in the United States of America. Information for other countries of the world is even more challenging to come by. While many schools have embraced portable computer devices for instructional practices the move toward a CALL (Computer Assisted Language Learning) environment for language and other subjects may be daunting. MacDonald and Creanor (2010) mention “there is no doubt that the use of online and mobile technologies offers students a measure of freedom and flexibility.” All levels of education are embracing this new form of learning. Walker and White (2013) contend that “the 21st century university is heavily reliant on technology; in fact, higher education was the first sector to adopt mass use of technology.” This is also leading to a broader term of what is ‘teaching’ and ‘learning’ which in turn have led to additional terms being contrived such as ‘global professors’. Thirunarayanan (2005) states that “the global professor of the future will have to teach anytime that students need to learn.” “Global professors will work in shifts, much like workers in the industrial era used to, in order to meet the needs of the global learners.” Facer (2011) contends that our understanding of concepts such as ‘school’, ‘teacher’, and ‘curriculum’ may change as technology becomes more embedded in our personal lives and in society. With these diffing teaching responsibilities and definitions will also come the need for additional prowess of varying abilities. Hampel and Stickler (2005) have suggested an added set of skills by those teaching languages on line for example.

‘Engagement’ is the key buzz word in education these days brought on by the availability of the ever-connected Internet. Engagement of learners begins with an engaged instructor and reflective teacher (Brookfield, 1995). Draves and Coates (2011) have declared that “even with the incorporation of the Internet in instruction and education, the teacher becomes more important to a student’s learning, not less important, in this century.” Unfortunately for the students ...the best teachers are leaving high-poverty schools that need them most, because they can earn more money and respect in other districts or even in other occupations (Collins & Halverson, 2009).

Findings

The findings are summarized to also encompass other key outcomes that were not cited in the original methodology. As the interviewer progressed through each case study items and situations that were unique to each instance began to come to light. A major common factor between all three case studies is that they each strived for 1:1 computing and learning between lecturer and learner. Emphasis on student centered learning was repeatedly mentioned in all three case studies. Also, computer storage for vast amounts of data along with the security of such information was explored. Virus protection, spamming, the size and experience of the tech crews also was discussed as it was extremely relevant to the overall research. The three case studies established assurance in these topics by varying manners depending on financial resources, economics and size of the student body.

Case study #1

This private co-educational senior high school had a combination of I-pads and Dell portable computing devices. The school itself funded all the resources through donations and tuition. Dell computing company offered discounts and other options on their products. Additionally, a Dell sales representative happened to be an alumnus of the same senior high school which obviously worked in the school's favour. Their main storage facility was through cloud computing services which again the school financed on their own.

The student body and faculty included sufficient numbers of full-time faculty along with 56 part-time teachers that tutored a student body of 893 high school students. Each student did not have their own tablet computer per say but were instructor assigned one depending on the class and teacher desires. This allowed instructors to use computers if they so desired or not. The principal emphasized that there was no pressure on the instructors to do so.

Computer carts had been purchased so that they could be wheeled from classroom to classroom as so needed. Each cart then had enough tablets in either I-pad or Dell format to equip each student with one during that scheduled learning cycle. When class was completed the pupils would then return the devices to the cart. The cart would then stay in the same room or be wheeled to another instructional area. Teachers seemed satisfied with this arrangement. It was commented that each instructor had varying levels of usage with the portable devices. Some instructors even did not like them and forgo their integration into lessons. It was also mentioned that the management of the devices depended on the subject. Science teachers in general were stated as not particularly enthralled with their capabilities.

At the time of the interview it was stated by the principal that they currently had 11 carts that cost roughly \$100,000 apiece. It was also reported that more of the movable learning centres was in the process of being procured. The devices themselves were generally being used in all forms of class and subject work but it was up to each instructor's discretion.

Additionally, there were port stations (library, science rooms, other areas) located throughout the school for easy student access whenever they were needed. These were also primarily put into place for any economically disadvantaged students who did not have a computer readily available at home. It was estimated that the number of these students was very low but still for educational fairness these extra access stations were made easily accessible. Students could use these devices before or after school, also occasionally on the weekends or around final times when there was more time allotted for their utilisation by learners.

Tech assistance at this private school was handled by a single individual. In times of crisis such as the wi-fi going down or other challenges there were occasional problems. The school was considering expanding their tech team, but this cost more money. A central application in usage by most instructors was Canvas, any other applications or software was at the discretion of each department and/or instructors.

Broken or mishandled equipment was dealt with on a case by case situation. It was remarked that there was only a slight problem with faulty equipment. The I-pads and Dell tablets are quite strong and durable for numerous students to use repeatedly. Accidents have

happened such as droppage with the owning computer supplier replacing the device at little or no cost to the school in most cases. Students are reminded though to ‘handle with care’.

Case study #2

The second case study was also a co-educational private senior high school. The economic background of students at this facility was much higher than case study #1. This was their 4th year of using the portable computing devices. I-pads were the tool of choice at this school.

The school was more selective in their acceptance of student body. The students body numbers along with those of faculty members was also slightly lower than the first school but this had no bearing on the overall results. Those enrolled were usually in high standing academically and had experience with computing devices since they or their parents owned such devices.

This school was different from the other private school in that they required all students to purchase their own I-pad device. It did not have to be the latest most expensive device. Some students in fact had I-pad mini’s and all other types in between but it needed to be instructor approved and able to run the required apps.

The advantages of individual family purchase were numerous with the primary benefit being that learners had the devices in their possession 24/7. This allowed for learner autonomy and group work on a continuous basis if so desired. It was also pointed out that in times of inclement weather (snow days) when school was abruptly cancelled or there was a delayed opening, instructors could easily relay to student’s additional homework or needed information. Along the same lines the students could easily correspond with their instructors for guidance and assistance. Students and teachers were most satisfied with this arrangement along with guardians who saw their children learning and studying at home if need be. Overall the 24/7 connectivity assurance was praised by all users, students, teachers, parents.

Since students retained their own devices the monetary responsibility toward the school was minimal. If a device was lost, broken or stolen, it was the family that bared the burden. The school was aware of each family’s income status since tuition was paid on a sliding scale. In instances of a lower income residence appropriate measures were provided by the school.

Specific applications were installed by the school to ensure fairness and ease of completing and turning in assignments based on subject. There were some slight glitches from time to time with ‘air drop’ problems, occasional word processing, connectivity from time to time and of course on I-pads, most often Flash Player does not work.

There was also the requirement to educate the family (parents) on available school information and other resources. Again, as earlier indicated, there were funds and resources for low-income families but basically all these children came from higher income homes. This was a minor hinderance, but the principal felt it was worth mentioning.

The difficulty for the teaching staff was that this school was only one of a few in a vast area that had such an updated computer and learning system centered around the I-pad. The principal mentioned that a new instructor coming into the school unfamiliar with all the I-pad functions usually required 3-4 years to get up to speed.

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The principal also proudly emphasized that the role of student and teacher was evolving from the traditional approaches to a teacher as facilitator with co-learning, tech supported instruction. Students were learning and accessing authentic material such as virtual museums, creating their own inventions, while building on and learning from each other. All of this was accomplished inside and outside of the traditional classroom format. The principal in closing mentioned five key points of the I-pad intertwined education at their learning facility.

- i. I-pad adds interaction between teacher and students on down days. No time is wasted.
- ii. Tech is a tool, but it can never replace the teacher.
- iii. Instantaneous feedback from teacher to student and student to teacher is possible
- iv. It is possible to flip the whole educational experience
- v. The role of the teacher is changing

Case study #3

This was a large public-school district. It encompassed many elementary, junior high and senior high students. Initial funding came from the passage of a tax levy during the year 2014/2015 and was passed by the local voters. Thusly it has the backing of the residents of the surrounding school areas. A lease agreement was established between Apple and the school district to accommodate all the students and teachers.

The project to implement I-pads into student hands began at the junior-high level. It then progressed up to the senior high and then downwards to the lower grades. There are 4 senior high schools that are currently totally integrated into the system.

The I-pad was introduced to all 5th graders in the district in the year 2016. In September of 2017 it was being rolled out to the 3rd and 4th graders. This brings the total number of I-pads in student hands to around 18,000.

The tech team numbered 18 with all members being paid instructors/problem solvers, etc. The individual who graciously explained the system was from an elementary teaching background and had taught at one of the local school until filling in at his current position. All other tech members were former classroom teachers it should be noted.

An important feature that was pointed out is that although there are so many computing devices the tech team can locate any I-pad anywhere at any time. They are also able to lock any device should it become necessary. Each student I-pad has been enabled to be a one user device only. This was especially important to establish since in the initial phases some of the senior high school students fended that their devices were lost or stolen. The enterprising students then went on to E-bay and attempted to sell their (the school's) I-pad for some quick pocket money. Since that time and now that students know the score, the attempted marketing of their school resources has ceased. It should also be noted that updating and refreshing the newer versions of the I-pads is simplified but there are occasional bugs or problems.

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In the case of an actual breakage which may occur from time to time it is usually negotiated between the family and the school district. Again, the background of family financial resources is taken into consideration. As this is a public-school district the percentage of single parent or low-income families can vary from area to area. The district usually supplies two free replacements if there are problems, but it is on a case by case assessment.

As far as that of teacher education, it is obviously a huge issue. Many teachers, especially at the lower levels have the devices but are not sure what to do with them. Classes and in-service times are constantly being scheduled. To assist instructors the Vancouver school district has made their own catalogue of self-apps, all made and designed by the teachers themselves. Teachers are not required but encouraged to implement I-pads in learning scenarios where useful.

Overall security is well established through firewalls and other devices. Spam and viruses are a constant threat but there have been no major instances to report. Most threats are autoblocked by the built-in Apple software itself. Vigilance is the key, as it was pointed out.

Naturally, during the interviewers concluding remarks the question was raised as to what happens when the tax levy runs out (supposedly five years). The individual being interviewed seemed assured that there would either be a new levy or alternative funding would be found to keep it going. The progress that had been made seemed astounding, but it was quite evident that not every school district could allocate the funding and maintain such a huge operation for an extended time. Neighbouring school districts did not have the same luxury and had to make do with more traditional teaching methods such as chalk and a board or a far less number of accessible computing devices.

Discussion

While it is evident from the findings that schools are coming up with innovative methods to acquire the latest technology tools for education what has also become evident is the disparity between rich and poor, private and public schools. Furthermore, not so obvious is how individualized learning is taking shape with more and more students using tablet or smart phone devices. Beyond this economic gap of many public and private schools is an 'I interim' that is beginning to take form; where only 'I' matter. A personalized instructional approach may seem like a clever idea but how can students be evaluated and progress from year to year if everyone is on a different page? Therefore, these new forms of educational technology demand our attention and scrutiny (Selwyn, 2017). In addition, the approach of many U.S. technology companies is bolstered by an implicit sense of 'American Individualism' – that is, 'the belief that "the good society" is one in which individuals are left free to pursue their private satisfactions independently of others, a pattern of thinking that emphasizes individual achievement and self-fulfilment' (Andre & Velasquez, 1992).

Additionally, and always important is not only the technological tool but how the tool is used. Instruction using computers offers learners a broad spectrum of resources that can be easily accessed backed up by videos and other media forms. Depending on the subject and topic manner the expansion by way of the Internet is unparalleled. The Web's multi-media environment allows teachers to focus on authentic texts in wonderful ways (Blake, 2013). Unfortunately, not everyone is a wonderful teacher with vast amounts of experience

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to integrate this new-found knowledge. A wrench alone will not fix a car, likewise a hammer and saw does not build a house. A computer in the hands of a learner without sufficient training by the lecturer is nothing more than an expensive tool or teaching toy at best. On the one hand, it should be abundantly clear by now that not all technology satisfies all the goals if the ideal classroom pedagogy, digitally enhanced or otherwise (Blake, 2013).

Interesting though is that most often teachers implement the tools in the classroom that they themselves may be playing with outside the learning sphere. Twitter and Facebook are two examples of social media that was originally designed for interaction between individuals. Now these two online communications tools are becoming a standard part of many educational programs. Language teachers frequently incorporate in the curriculum only those technologies that they use outside the school environment in their own personal lives, despite whatever preservice and in-service training course they received on CALL (Computer Assisted Language Learning) (Egbert, Paulua, & Nakamichi, 2002).

In this context, training new professionals and retraining seasoned educators in order to enter the brave new digital classroom is the responsibility of the field as a whole, but it begins with each teacher's desire to participate in the process of changing how they and students view the world (Blake, 2013).

Teacher education like student learning is a continuous evolving process that has no simple solution. With the expanding nature of technology, it is no wonder that educators seem to be on an endless path of catch-up to gain the latest information.

Limitations

The cost factor is a huge deterrent to the acquisition of equal distribution of portable computing across all the United States. Even though the costs of computers and network connections have declined considerably in recent years, cost is still a serious barrier to these technologies becoming central to schooling (Collins and Halverson, 2009) The barriers of inadequate teacher training and excessive costs are problematic—significantly inhibiting the use of technology in classroom settings—but are not insurmountable (Hasselbring & Glaser, 2000). Governments and educators on the highest levels need to make funding decisions that affect millions of current and future learners.

The fairness and equality of computing devices along with their accessibility to even download and upload speeds is also an area of huge diversity. Despite prevailing claims of democratisation and empowerment, it seems that many forms of technology-based education are not of equal benefit to all people (Selwyn, 2017). Many times, the companies and manufacturers of the computing devices are the one that have the most to gain. While these builders of technology do tend to offer discounts for educators or supply large numbers of computing to lower striving school districts, in the end it is their high profits that have benefited from high tech.

Recommendations

Funding of school necessities has become extremely critical in many schools. Basic supplies such as pencils and paper for some students are difficult to acquire except by way of inordinate means. State funding at the local level can be hit and miss between competing school districts. Many teachers these days will dig into their own personal funds to meet the needed requirements for each learner. Added to the basic needs are now technological

devices that are streamlining education through connectivity to the Internet. The cost of these high-tech learning tools is not something an individual instructor can readily supply to their students compared to notebooks and paper for example.

In the United States, a critical point is being reached with regards to necessary teaching implements. Computers and printers have become the new papers and pens for students even at the earliest of ages. Technology spending in schools varies widely across the country, as some districts reap the benefits of grants and parental donations, while others tap local, state and federal funding (Pandolfo, 2012). In Japan, where this author resides, a similar problem has progressed. This is none the less true of many other countries as well.

To obtain the necessary technology tools to assist learners in the most proficient ways most often requires a combination of various resources. While private schools most often have influential donors to tap into, public schools do not have this luxury in most instances. Funding methods such as bonds, fundraising events, government grants and equipment donations are the most likely sources. Spending on high-tech devices in schools reached \$13 billion worldwide in 2013, according to one report, with the U.S. spending more than \$4 billion that year on mobile devices alone. Globally, education technology spending will reach \$19 billion by 2019 (Kajeet, 2017).

Conclusion

The cost is not cheap and estimates for portable computing devices can run from a few hundred to over one thousand U.S. dollars for a single device with the average running between \$500-\$600 (Statista, 2016). Obtaining such devices can be a daunting task for today's school administrations. In addition to the high cost of purchasing machines are the high cost of maintenance and software (Collins & Halverson, 2009). Increasing the number of educational devices will lead to new opportunities for understanding and mastery (The White House, 2013). There is a huge benefit to enabling today's students to be tech savvy for tomorrow's workforce. Technology is both beneficial and necessary in preparing students for the future (Chung, 2002). Students believe that they can produce better work and attempt more difficult activities with the assistance of technology, and their parents agree (Passey et al., 2004). It is inevitable that students will have socioeconomic differences. However, if all students have access to computers during the school day, some of these differences can be avoided, especially when it comes to owning and being able to access an electronic device (Obama, 2013). When students are limited by technology access, their potential to succeed is restricted by the resources in their individual schools. With Internet access, many opportunities are available for any child anywhere (Cate, 2017). Technology offers more opportunities for students to work at their own pace and for teachers to better work individually with students as well (The White House, 2013).

Throughout the three case studies, having instructors make their own apps was a cheap way to acquire new software and to see that it was being used. The sample figures in this research while only numbering three different case studies also displayed overall the very distinct methods that each case formulated to meet their own needs. Obviously if a school falls under the category of being public or private there is already a weakness involved for those that are public schools. Private schools usually have the resources and networking services available to circumvent pending financial problems. While public schools may be able to depend on a steady flow of cash it may be only a trickle for a limited time compared to private schools. Private schools also most often have the advantage of their student body coming from higher income families that are willing to contribute their

own money for the educational welfare of their offspring. This in turn causes an inequality in education. As technology becomes more and more necessary for a proper education the gap will only widen. There seems to be no clear answer as to how technology and the use of tablet computers or other devices can be fairly distributed throughout all the schools. Today's teaching tools involve more than installing an extra blackboard or converting from blackboards to chalk-less white boards. As has been recently phrased this 'digital divide' or the gap between those who have technology and those that do not, is only going to widen. How this can be bridged has yet to be ascertained.

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