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AN ETHNOHISTORICAL EXPLORATION OF EDUCATIONAL TECHNOLOGY IMPLEMENTATION IN METROPOLITAN OMAHA AREA PUBLIC SCHOOLS: ONE LEADERSHIP PERSPECTIVE

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By

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University of Nebraska, 2022

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An Ethnohistorical Exploration of Educational Technology Implementation in Metropolitan Omaha Area Public Schools is a written account of the evolution of 1:1 program in five public school districts. These metropolitan Omaha area districts share their journey in developing programs that provide equity in accessing educational technology to all students. An annotated history of educational technology and the International Society for Technology in Education (ISTE) standards and their effect on education and educators is also addressed.

Acknowledgements and Dedication

First and foremost, I want to acknowledge my mother, Leona Loehr for giving me the tenacity of a bulldog and a “never give up” attitude. Those lessons served me well throughout the years and especially on accomplishing this life-long goal. Also, my mother-in-law, Mary Ward. You are two of the smartest, strongest, bravest, kindest, most giving women I know. I can only hope to follow in your footsteps.

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hot summer day while I was dodging a wasp, and then offering wonderful feedback. I truly appreciate all of your knowledge and support.

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my daughter, Lisa, for her unwavering faith and a constant supply of, “You can do this, Mom!” “You GOT this!” and the occasional stop at Scooters.

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Chapter 1

Introduction

When I began my career as a Media Specialist in the Fall of 1989, educational technology was in its infancy. The traditional multi-drawer card catalog was still in the library, but searches for books could also be performed on one of three Apple IIe computers that were hardwired to a Corvus hard drive. The stand-alone Corvus hard drive ran the Winnebago Computer Cat software that housed the library's holdings. Its backup was two large notebooks filled with over forty 5.25" floppy disks. One set of disks held the equivalent of the physical shelf list and accession books and one set contained all of the cross-references that allowed the catalog to be keyword searchable. Each school's Media Specialist was responsible for adding new materials to their school's library catalog. Each was independent of all others; they were not connected through any type of network. Interlibrary loans were accomplished through a series of emails to other school Media Specialists asking first if anyone had the book and second would they be willing to loan it to the school in need.

Besides a typewriter and the computer running the card catalog and circulation, the other piece of technology common to the libraries was a machine running the DOS operating system that could run an attached CD Rom drive, allowing students and staff to run the new electronic versions of Encyclopedia Britannica and National Geographic's Animals Encyclopedia for research.

Over the next few years, Apple, IBM, Dell, and other computer manufacturers began to see the value in designing computers for the kindergarten through 12th grade education sector. Software companies began to develop more user-friendly graphic user

interfaces (GUIs) that allowed younger students to successfully run computer programs by clicking on images rather than typing in commands.

Starting with one computer loaded with educational games in each grade level to one in each classroom, computers gradually became a standard tool in the classroom. At first, the district was unable to financially support this new interest in classroom technology, so it fell to enterprising school staff to raise funds through bake sales, pizza sales, book fairs, and read-a-thons. If you walked into a classroom at this time, you would see Apple computers sharing a desk with computers running DOS and other operating systems. At one point, I supported 3 different operating systems on 8 different models of computers.

It was during this phase of implementing educational technology that computers became mainstays in the school office. I remember my principal calling me down to the office one day after school. The district had delivered his DOS operating machine to his desk. He was in a panic and forlornly asked, “What am I going to do with this THING on my desk?” This was 1992.

Over the next several years, with district support, the standard became three computers per classroom plus a computer lab that could accommodate an entire class of students at one time. The DOS operating system was replaced with Windows, the Linux and Lotus operating systems came into being, and Apple went from Apple Basic on the Apple II models to Macintosh to iMacs running their own Apple operating systems. Now the big debate was which operating system to choose for the classrooms and the district offices. The central office staff used programs that had originated in the business world for scheduling, keeping books, running payroll and the like. In the secondary schools,

business, science, and mathematics classes pushed for Windows and Linux based operating systems, after all, they were preparing students for a Windows-dominated working world. Meanwhile, as user-friendly GUI interfaces became commonplace in the Apple/Macintosh operating systems, and curricular-based software was offered by forward-thinking developers, graphic arts, design, and elementary classrooms pushed for Apple. As information was gathered, evaluated, and debated, it was decided that there was not a one-platform-fits-all answer for this school district. The intended purpose of the device would determine what make, model and operating system would be used. Cost of devices would also play a role in the final decision-making process.

Staff working in office settings and teachers leading business, science, and mathematics classes gravitated towards the more business-oriented Windows operating system and the devices that ran it. The Apple operating system and devices that used GUI were the natural choice of teachers of graphics and design classes and of younger elementary students. With the development of touch screen technology that still relies heavily on GUI, even the youngest of students can be in control of and learn from educational technology. After performing extensive background research into ensuring equity among students, specific device capabilities, networking requirements, application functions and cost effectiveness, many school districts in the area have established a 1:1 device program.

Over the decades, there has been one person in each school who embraced technology with open arms and offered support to staff and students alike. The Librarian who was the Keeper of Books became the Media Specialist who could make technology cooperate and work for everyone and grew into the Informational Technology Specialist

that led the way to integrating technology into daily classroom life and who has now evolved into the Teacher Librarian, the person who co-teaches with the classroom teacher, ensuring that all students become successful 21st Century Learners.

Want to start an educational revolution? Team with your Teacher Librarian and have a bake sale!

Rationale

When searching school district websites and board policies, there was very little written history of how each district came to the realization that students needed daily access to technology and how to supply that access. As a librarian, the curation of information is crucial to society and mankind's growth and development. "Curation of information is of historical, social and intellectual value" (Good, 2017)

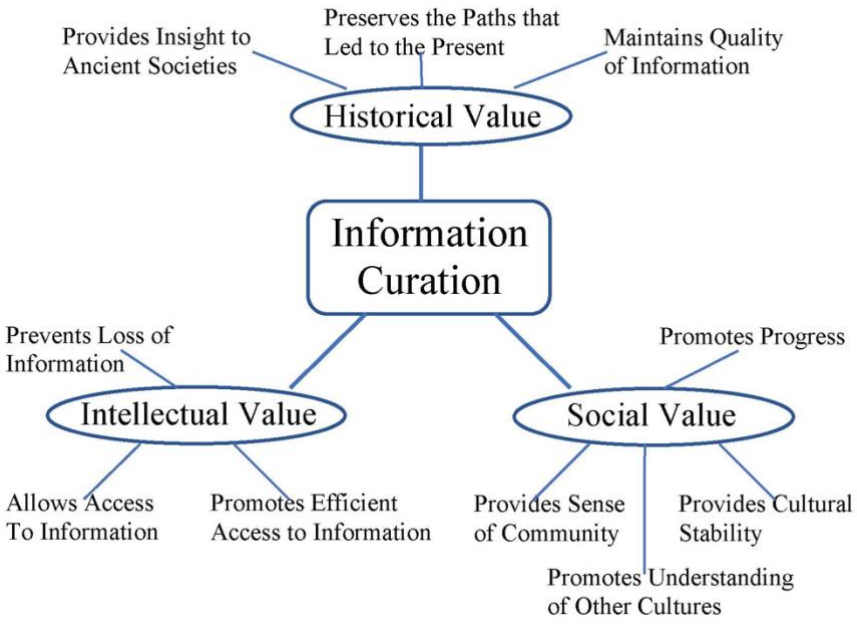


Figure 1: Information Curation

For centuries, man has placed value on information and the curation of it. So much so, that during the Middle Ages, chained libraries appeared as a way to deter theft of books, Kashik, 2015. As man explored other cultures, frequently with the intent to conquer the Indigenous peoples, the libraries became one of the first buildings to be destroyed. By destroying the library, a people's history, beliefs, societal structure, commonality; their essence; was destroyed; leaving them vulnerable as a people to capture and at risk of extinction as a society. These acts of libricide continue today when a group or regime systematically attempts to control a society of peoples, Knuth, 2003. Historical recording of paradigm-changing decisions will provide future generations an understanding of why and how those ideas and trends were pursued. Forward thinking leaders use an understanding of the past to guide decision-making about the future.

Purpose Statement

The purpose of this constructivist ethnohistorical case study is to explore the implementation of instructional technologies in five metropolitan Omaha area public school districts. For the purpose of this study, four distinct time periods will be explored, pre-1990, 1991-2000, 2001-2010, and 2011-2019. Within these four time periods, implementation of technology, staff responses, choice of formats, and funding will be analyzed to create a historical narrative.

Research Questions

"What process did Kindergarten through 12th grade metropolitan Omaha area school districts use to determine that deploying devices 1:1 was the best fit for their students?"

Sub-questions

1. Between yyyy and yyyy, what technology was available to your students at school?
2. What was the purpose of making this technology available to students?
3. How was the technology actually used?
4. How receptive were staff to technology in the school?
5. How was it funded?
6. Was there a particular event that was a "game-changer" for your students?

Operational Definitions

AlphaSmarts – one of a type of keyboard with a small readout screen run on batteries. Users would type in their information and download it to a printer.

Apple IIe -- third model in the Apple II series of personal computers produced by Apple Computer.

AppleTalk – a networking protocol designed by Apple Computers for their machines.

Betamax – inexpensive video recording format marketed for home use by Sony from 1975 till 1987, (Logie, 2020).

BYOT – Bring Your Own Technology – a plan where students bring their own technology devices; tablets, laptops, phones, etc., and connect them to the school district's wireless network to complete school assignments.

CAD – Computer Aided Design – computer-based program that aids in the design process, frequently used by engineers and designers, (Chai, 2020).

CD-ROM – Compact disk-read only memory -- an adaptation of the CD that is designed to store computer data in the form of text, video, and graphics, as well as stereo sound, (TechTarget, 2020).

Chromebook -- a thin client laptop that is configured with the Chrome operating system (Chrome OS), (TechTarget, 2020).

Code of Conduct – a document created by a school district that explains fair use, acceptable use, copyright compliance, and other expectations of students using devices at school.

Computerized Card Catalog – Also known as an OPAC (Online Public Access Catalog) is an online bibliography of a library collection that is available to the public, (TechTarget, 2005).

Constructivism – "Reality and knowledge reside in the minds of individuals. Knowledge may be uncovered by unpacking individual experiences" (Savin-Baden, 2013. p. 56)

Cooperative Loss Agreement – a document created by a school district that is signed by student, parent and designated district personnel that outlines payment responsibilities for damaged or lost school-owned devices.

DEC Writers -- one of a type of self-standing keyboard with a small readout screen and built-in printer.

Diachronic study -- address research questions related to continuity, discontinuity, development, and evolution. (Widdersheim, 2007. Abstract)

DOS – disk operating system used in IBM and other PC compatible machines

DreamWriters -- one of a type of keyboard with a small readout screen run on batteries. Users would type in their information and download it to a printer.

DVD -- an optical disc technology with a 4.7 gigabyte storage capacity on a single-sided, one-layered disk, which is enough for a 133-minute movie, (TechTarget, 2005).

Ethernet -- the traditional technology for connecting devices in a wired local area network (LAN) or wide area network (WAN). It enables devices to communicate with each other via a protocol, which is a set of rules or common network language, (Chai, 2021).

Historical Case Study -- hybrid diachronic strategy that must analyze cases from the distant past to the present, using eclectic data sources, in order to produce both idiographic and nomothetic knowledge. (Widdersheim, 2007, abstract)

iPad – a touchscreen tablet personal computing device made by Apple, (Steele, 2017).

Laser Disc – Also known as an optical disk -- an electronic data storage medium that can be written to and read from using a low-powered laser beam, Sheldon, 2021).

Libricide – The purposeful destruction of a library that contains a people's history, beliefs, societal structure, commonality; their essence; leaving them vulnerable as a people to capture and at risk of extinction as a society (Knuth, 2003).

Loan Agreement – a document signed by parents and students that outlines the responsibilities of each party concerning devices at school.

Macintosh -- was the first widely sold personal computer with a graphical user interface (GUI) and a mouse. It was created by Apple Computer, (TechTarget, 2009).

One to One (1 to 1 or 1:1) – a plan where students are assigned a device provided by the school to complete school assignments. It is checked out to the student, much like a library book, and the student is responsible for the care of the device. Devices may or may not go home with students.

Opaque projector -- a projector using reflected light for projecting an image of an opaque object or matter on an opaque support, (Merriam Webster, 2009).

Overhead projector -- a projector for projecting onto a vertical screen magnified images of graphic material on a horizontal transparency illuminated from below, (Merriam Webster, 2022).

Scantron – test scoring machine

Strategic Planning -- a process in which an organization's leaders define their vision for the future and identify their organization's goals and objectives. The process includes establishing the sequence in which those goals should be realized so that the organization can reach its stated vision. In education, strategic planning is done at the building and district levels, (Bigelow, 2022).

VHS – video home system -- inexpensive video recording format marketed for home use by JVC beginning in 1976, (Kiddle, 2021).

Windows -- Microsoft's flagship operating system (OS), the de facto standard for home and business computers, (Gillis, 2022).

Instrument

As an elementary Teacher Librarian and Technology Initiator for the past 34 years, I have a personal interest in the ever-changing area of technology in schools. When

I first joined the district, we had a Corvus hard drive in the library that ran our computerized card catalog that was accessed through three Apple IIe computers and one DOS-based computer that ran encyclopedia on CD-ROMs. We held bake sales, book fairs and other fundraisers to fund the purchase of new computers. Eventually, computers could be found in the classrooms and in the front office. Many staff were very reluctant at first to have "that machine" in their classroom, asking for games that students could play during recess, not realizing the educational value they offered. As program writers began to work with school curriculum specialists and teacher librarians embraced the emerging technologies, it became easier for the classroom teacher with the help of the teacher librarian to integrate technology into the classroom that supported the curriculum. With this new-found spark to the curriculum, administrators began to see the value of technology in the classroom and began to allocate budget monies to it. In my review of the literature, I have found very little that tells the story of how this integration of educational technology came to be, and I feel strongly that it is of educational and cultural importance to document this movement, preserving it for generations to come.

Central Phenomenon

Technology has impacted student learning and how teachers deliver lessons. How have metropolitan Omaha area public school districts planned to supply devices to their students? How are they ensuring teacher buy-in for these devices? How have they justified the allocation of funds?

Data Collection Methods

An online questionnaire of five metropolitan Omaha area district technology leaders will be conducted that focuses on the way the school districts have implemented educational technology into their schools, reflect staff responses, and bring to light the developing funding structures. If additional information or clarification is warranted, an in-person, telephone, or email interview will take place. District names will be coded to protect anonymity of the participants.

Survey Questions

1. What technology was available to your students at school prior to 1990?
2. What was the purpose of making this technology available to students?
3. How was the technology actually used?
4. How receptive were staff to the appearance of technology in the school?
5. How was it funded?
6. Was there a particular event that was a “game-changer” for your students?
7. Between 1991 and 2000, what technology was available to your students at school?
8. What was the purpose of making this technology available to students?
9. How was the technology actually used?
10. How receptive were staff to the appearance of technology in the school?
11. How was it funded?
12. Was there a particular event that was a “game-changer” for your students?
13. Between 2001 and 2010, what technology was available to your students at school?
14. What was the purpose of making this technology available to students?
15. How was the technology actually used?
16. How receptive were staff to the appearance of technology in the school?
17. How was it funded?
18. Was there a particular event that was a “game-changer” for your students?
19. Between 2011 and 2019, what technology was available to your students at school?
20. What was the purpose of making this technology available to students?
21. How was the technology actually used?
22. How receptive were staff to the appearance of technology in the school?
23. How was it funded?
24. Was there a particular event that was a “game-changer” for your students?
25. Was technology implementation included in your district or school strategic plan?

26. If yes, when did it first appear in the plan?
27. Did this inclusion in the plan change the way technology was funded?
28. How?
29. In the choice between Bring Your Own Technology and district funded 1:1 Devices, how did your district come to a viable decision?

Format of Survey Questions

Questions are arranged by decade, with a pattern of repeated questions. There will be popup menus to select multiple, generic, common answers and some left open-ended for individuals to share information specific to their district experiences. This will make the survey less intimidating and make it easier to gather and interpret the data.

After the questions are asked for each decade, there are five questions that will be asked to determine involvement of staff and administration in the final decision-making process.

The complete expanded survey can be found in Appendix A.

Data Preparation

A list of metropolitan Omaha area public school districts' head of technology was created. These people were contacted via email and invited to participate in the survey electronically. The data was collected as a Google Form, allowing data to be aggregated and sorted easily, and stored in the Cloud as a Google Drive folder. If additional information or clarification was warranted, an in-person or telephone interview was conducted, and the data from written notes was entered into the Google Form, so that it would be incorporated into the online data. District names were coded to protect anonymity of responders.

Approach

A constructivist ethnohistorical case study was chosen as my approach to the subject since the majority of my information will be derived from primary sources via personal interviews and online questionnaires regarding the history of educational technology in general and of their respective district's 1:1 program.

Constructivism is based on the notion that knowledge lies in the minds of individuals who construct what they know on the basis of their own experiences. (Savin-Baden, 2013. p. 29) Constructivists "believe that that research involves an intent an attempt to understand individual construction of knowledge and also believe that it is their role to understand the ways in which individuals construct meaning, since knowledge, truth, and reality are created rather than constructed." They use "data collection methods such as interviews, narratives, and new or existing artefacts that express individuals' ideas and experiences" (Savin-Baden, 2013. p. 29, 63).

Ethnohistorical case study is a diachronic research strategy that combines the features of historical and case studies. Widderheim, 2017, also stated "this research strategy must 1) study phenomena from the distant past into the present, 2) incorporate existing data sources as well as create new ones. Diachronic studies are important because they address research questions related to continuity, discontinuity, development, and evolution."

Chapter 2

Review of Literature

Introduction

This Review of Literature is a historical overview of the rationale behind, and implementation processes used by school districts across the United States to instill one to one (1:1) devices in kindergarten through 12th grade public schools. It includes, but is not limited to, an abridged history of the development of personal computing devices and the incorporation of these devices in educational settings.

Abridged History of Personal Computing Devices and Use Standards in Education

Formal public education in the United States of America was established in 1635 in Boston, Massachusetts (Chen, 2020). In 1963, the Vocational Education Act was passed in the United States as a response to the Cold War and the Soviet Union's earlier launch of Sputnik (Christensen, 2019).

> Herbert Simon, Nobel Laureate, observed that the developments in science and information processing technologies have changed the meaning of the verb, "to know." It used to mean "having information stored in one's memory." It now means the process of having access to information and knowing how to use it (Simon, 1971).

Students began learning the computer language BASIC and PCs began to appear in a few classrooms. It has only been within the last four decades (Higgins, et al., 2012) that digital devices have impacted the teaching and learning process. In 1981, IBM released the first portable personal computer. It weighed 24 pounds. Toshiba released the first

mass-market computer laptop in 1985, and Apple was available in 1984 (“Evolution of Technology,” 2022). The International Society for Technology in Education (ISTE) was created in 1979 by a group of educators who believed in the “power of technology to transform teaching and learning, accelerate innovation and solve tough problems in education.” ISTE (2022) created a set of standards for skills, competencies, and knowledge for both staff and students that continues to be updated and used by districts and schools worldwide.

Seymour Papert created a program called Logo in the early 1980s that even young students could master and use to create graphic shapes (Christensen, 2019). Papert later went on to combine Logo programming with Lego construction kits. The mid-1980s saw the development of GUI (graphic user interface) from Apple Computer which allowed point and click interactions to become so simple that even the youngest students could be successful. What started off as a machine to play games on quickly developed into an educational tool as software companies began to see value in this new marketplace called education.

The 1990s embraced the formation of the Internet and the creation of the World Wide Web, which introduced the world to email, online video, and enabled two-way communication anywhere and anytime. This new-found “connectedness revolutionized not only business and interpersonal relationships but also education” (Christensen, 2019). Teachers and students could now interact with educators, other students, and specialists from all over the world to enrich their curriculum lessons and broaden their understanding of not just the subject matter, but also personal interactions. Online pen

pals became common, broadening the student's view of the world. This was the beginning of students becoming global digital citizens.

At the turn of the century, Keating and Evans (2001) found that while preservice teachers were comfortable using technology for their own schoolwork and personal needs, they felt unsure of how to incorporate it into their classrooms. Teachers became comfortable using My Space (2003), Facebook (2004), and Twitter (2007) for personal use and began to consider other uses, such as a communication tool to be used with parents and other educators:

> Instant connectivity has branched out from merely a tool of personal communication to a platform for educational instruction and outreach. Social media is now being recognized as an accepted form of instruction in some instances, and groups such as Scholastic Teachers provide excellent support and tips for instructors. Many instructors use social media to communicate directly with their students, or to form forum-style groups for students to communicate with each other, and the method seems to be proving valuable in providing one-on-one attention to student's questions and concerns. ("Evolution of Technology," 2022, para. 5)

In 2006, Mishra and Koehler created the "technological pedagogical content knowledge" model (TPCK) that was based on Shulman's (1986) Pedagogical Content Knowledge (PCK) model.

> TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge

of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones. (Mishra and Koehler, 2006, p. 1029)

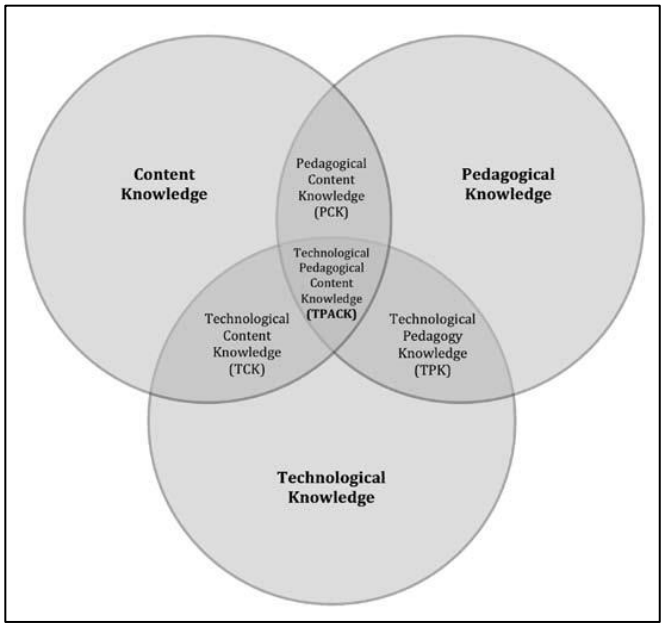


Figure 2: TPCK emphasizes the interconnectedness of content, pedagogy, and technology. (Mishra & Koehler, 2006)

This model gave teachers a starting point when teaching the basic operational skills of technologies and how technology can be integrated into curriculum areas.

In 2013, Puentadura aligned the areas of TPCK with the SAMR Model of Technology Integration to create "a hands-on approach to classroom practice." The SAMR Model gives teachers targets to aim for in integrating educational technology into their lessons.

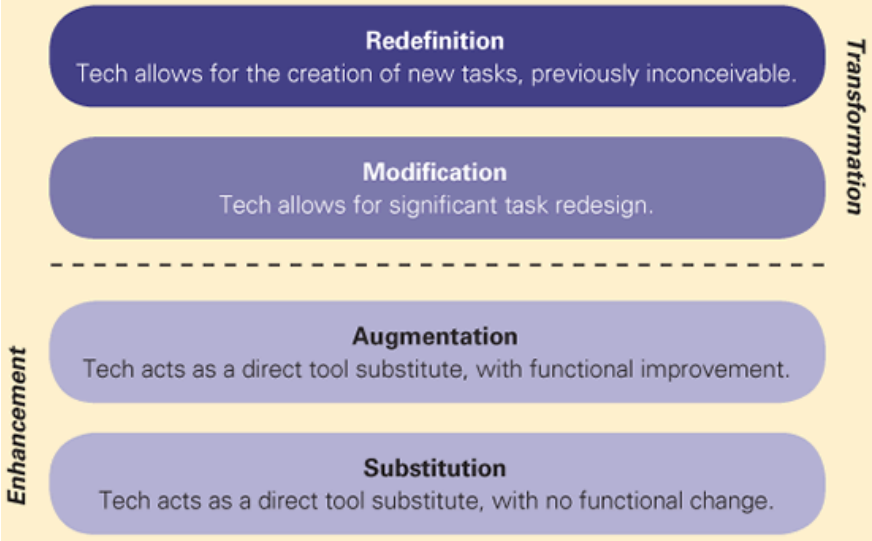


Figure 3: SAMR Model of Technology Integration. (Puentedura, 2013)

An example of Substitution is where technology is used as just that, an online worksheet rather than one on paper. Augmentation of a writing lesson would be using a computer word processing program with spell check instead of a pencil, paper, and dictionary. Teachers actively creating ways to share learning through technology is an example of Modification, PowerPoints instead of an oral or written report. Redefinition allows students to share learning through technology in ways that were previously unimaginable.

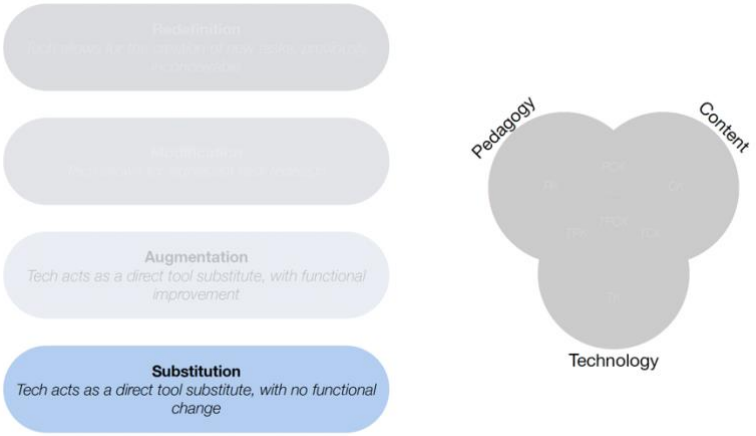
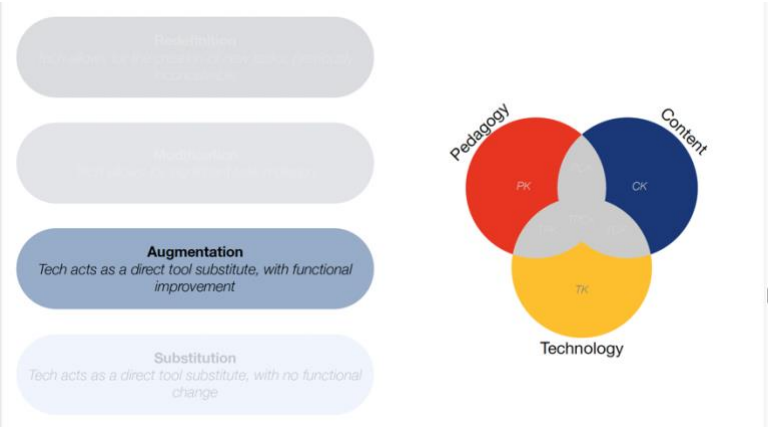


Figure 4: Substitution does not align with TPCK. (Puentadura, 2013)

Figure 5: Augmentation is the three basic areas of TPCK (Puentadura, 2013)



Substitution and Augmentation are considered the Enhancement levels of technology integration, where teachers begin to use educational technology to improve their teaching.

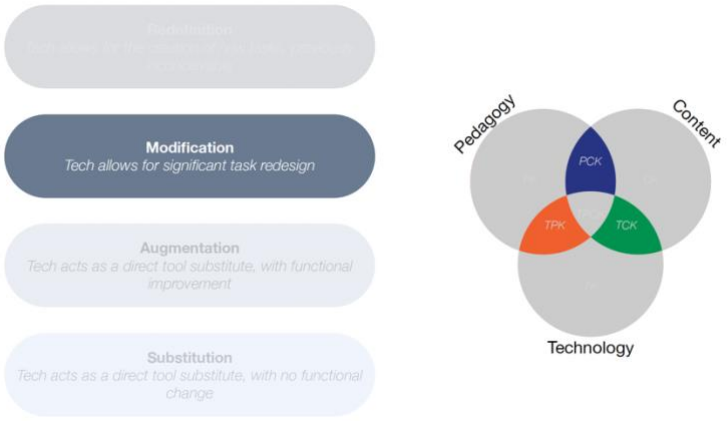
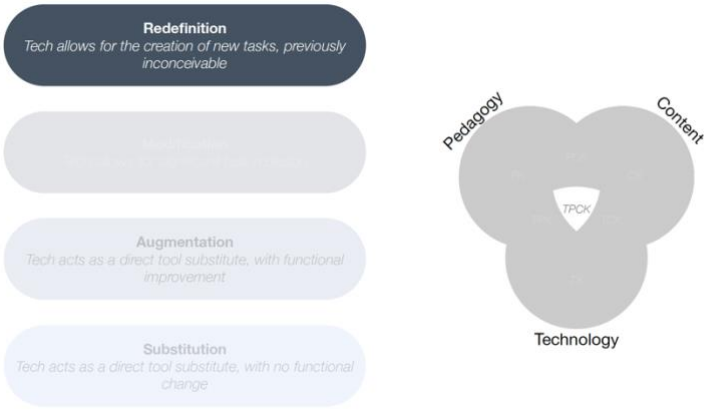


Figure 6: Modification is where two areas intersect (Puentadura, 2013)

Figure 7: Redefinition happens when all three are areas conjoin (Puentadura, 2013)



Modification and Redefinition are considered the Transformational levels of technology integration. In these levels teachers use technology to significantly redesign lessons and allow for the creation of new and innovative tasks.

According to Molnar (1997), the computer was no longer a luxury, but was now a necessity for many schools and universities. Many universities required incoming first-year students to own a computer. What began as a grassroots revolution driven by students, teachers, and parents, was now a new educational imperative as important as having books and libraries.

As society has become more technologically literate and dependent, schools and educators have risen to the challenges of keeping up with the fast-paced innovations in educational technologies and of producing students that possess the skills necessary for success in a technologically rich environment. Teacher certification programs put future educators in the role of a student to gain the necessary skills and to become confident in teaching 21st Century Skills (ISTE, 2022, Introduction) to their students:

> The ISTE Standards serve as a framework for innovation and excellence in learning, teaching and leading. As a body of work, the suite of standards has guided educator practice, school improvement planning, professional growth, and advances in curriculum. The ISTE Standards have been updated as learning have evolved, and now the ISTE Standards will be considered a single work comprising of four sections: Students, Educators, Educational Leaders, and Coaches. As a compilation, the ISTE Standards provide a holistic and comprehensive guide to transforming systems in order to transform the lives of our students. (ISTE, 2022, Introduction)

ISTE Standards for student learning are: Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative Designer, Computational Thinker, Creative Communicator, and Global Collaborator with each of these having four distinct and specific goals.

Empowered Learners "leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences" (ISTE, 2022, Students: Empowered Learners). This standard is divided into four goals that include leveraging technology to achieve personal learning goals, network building, using technology to seek feedback and demonstrate their learning, and lastly understand, troubleshoot, and transfer knowledge to explore emerging technologies.

Digital Citizens "recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical" (ISTE, 2022, Students: Digital Citizens). Students who are responsible Digital Citizens are aware of and take an active role in managing their digital identity by engaging in positive, legal, and ethical behaviors. They also respect the rights of others and share intellectual property appropriately. Managing personal data by understanding digital privacy and security allow Digital Citizens to safely navigate and track their online use.

Knowledge Constructors have the skills to "critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others" (ISTE, 2022, Students: Knowledge Constructors). Student goals for becoming a Knowledge Constructor include

planning and employing effective research strategies in their intellectual and creative pursuits. Students also need to be able to evaluate data for its accuracy, credibility, relevance and perspective and then be able to curate into collections and collusions that are meaningful. Lastly, Knowledge Constructors explore real world issues and problems, build knowledge, develop ideas, and pursue solutions.

Innovative Designers use a "variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions" (ISTE, 2022, Students: Innovative Designers). Students who are Innovative Designers have a deliberate design process and select digital tools to manage this process that leads them to test theories, generate fresh ideas, test and refine prototypes, and calculate possible risks involved in devising solutions to real-world problems while showing tolerance for ambiguity, perseverance, and aptitude for working with open-ended problems.

Computational Thinkers "develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions" (ISTE, 2022, Computational Thinkers). The four ISTE goals for Computational Thinkers begin with composing technology-based problem definitions and finding solutions. The goals continue with students being able to collect and work with data and data sets and use digital tools to represent that data in diverse ways, and break problems down into component parts that develop solutions and facilitate both problem-solving and decision making.

Creative Communicators "communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals" (ISTE, 2022, Students: Creative Communicators). These

students are able to choose appropriate tools to meet their communication objectives. They are responsible creators of original works and remixed digital creations and can communicate their ideas clearly and effectively through a variety of digital objects. Creative Communicators customize their content and select the medium appropriate to their audiences.

Global Collaborators “use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally” (ISTE, 2022, Students: Global Collaborators). Through technology, collaboration can be much more easily achieved now than any other time period in history. Digital tools help students broaden their understanding, learning, and ability to examine issues and problems from multiple viewpoints. These same collaborative digital tools allow teams to work towards common goals and investigate and achieve solutions.

These seven ISTE standards provided educators with a compass to guide educators through the fast-paced innovations in educational technologies and help them produce students that possess the skills necessary for success in a technologically rich world.

Figure 8: ISTE Standards for Students (ISTE, 2022)

Before teachers can lead their students in mastering educational technology, they must also embrace these standards. ISTE developed a set of seven standards for educators to support their students. ISTE standards for educators are divided into two sections labeled Empowered Professional and Learning Catalyst.

The Empowered Professional is divided into three goals: Learner, Leader, and Citizen. As a Learner, educators are continually improving their practice through "setting goals to explore and apply pedagogical approaches made possible by technology" (ISTE, 2022, Educators: Introduction). They pursue professional interests and participate in local and global learning networks. The educator as learner "stays current with research that supports improved learning outcomes."

The educator as Leader seeks out opportunities for leadership to support their

students and improve their teaching and own learning. These educators “shape, advance and accelerate a shared vision of empowered learning with technology” (ISTE, 2022, Educators: Leaders). They also “advocate for equitable access to educational technology” (ISTE, 2022, Educators: Leaders) for all students. Being a model for their colleagues in identification, experimentation, evaluation, curation, and adoption of new digital resources as well as learning tools.

ISTE defines an Educator Citizen as a teacher who inspires students to “positively contribute and responsibly participate in the digital worlds” (ISTE, 2022, Educator: Citizen). These teachers create experiences for the learners to “make positive, socially responsible contributions and exhibit empathic behavior online” (ISTE, 2022, Educator Citizen) that help build relationships. They establish a “learning culture that promotes curiosity and critical examination of online resources” (ISTE, 2022, Educator Citizens). Digital literacy, protection of digital rights, and media fluency are also a focus in their classes. Educators “model and promote of personal data and digital identity and protect student data privacy” (ISTE, 2022, Educator Citizens).

The heading Educator as Learning Catalyst is divided into four standards: Collaborator, Designer, Facilitator, and Analyst. As a collaborator, “teachers dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems” (ISTE, 2022, Educators: Learning Catalyst). They dedicate planning time to collaborate and co-learn with colleagues and students and to troubleshoot technology issues. Collaborative teachers “expand students’ authentic, real-world learning experiences” (ISTE, 2022, Educators: Learning Catalyst) through local and global virtual contact with experts and students. When communicating

with students, parents, and colleagues, these teachers demonstrate high levels of cultural competency, interacting with them as co-collaborators in student learning.

The Educator as Designer is described as teachers who "design authentic, learner-driven activities and environments that recognize and accommodate learner variability" (ISTE, 2022, Educator: Designer). These educators "use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs" (ISTE, 2022, Educator: Designer). They "design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning" (ISTE, 2022, Educator: Designer). Teachers who "explore and apply instructional design principles to create innovative digital learning environments that engage and support learning" (ISTE, 2022, Educator: Designer) embody the ideals of being a designer.

"Teachers facilitate learning with technology to support student achievements" (ISTE, 2022) describes those teachers who fulfill the qualifications of ISTE Facilitators. They foster a culture where "students take ownership of their learning goals and manage the use of technology and student learning strategies in digital platforms, virtual environments, and hands-on makerspaces" (ISTE, 2022, Educators: Facilitator). These teachers "create learning opportunities that challenge students to use a design process and/or computational thinking to innovate and solve problems" (ISTE, 2022, Educators: Facilitator). Nurturing student creativity and creative expression to communicate ideas, knowledge or connections is another goal of a teacher as a facilitator.

Teachers who understand and use data to drive their instruction and support students in achieving their learning goals are defined as Analysts. These teachers

"provide alternative ways for students to demonstrate competency and reflect on their learning using technology" (ISTE, 2022, Educators: Analyst). They also use technology to "design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction" (ISTE, 2022, Educators: Analyst). This assessment data is used "to guide progress and communicate with students, parents and education stakeholders to build student self-direction" (ISTE, 2022, Educators: Analyst).

Teachers who embrace and practice the ISTE standards for educators are easy to find in their school, their students embrace the ISTE Standards for Students and personify the ideal 21st Century Digital Citizens.

Figure 9: ISTE Standards for Educators (ISTE, 2022)

ISTE has also designed a closely aligned set of standards for Education Leaders,

aimed at district level administrators, and for Coaches, those who are not in the education field, but support or supply educational technology. By including these groups, it facilitates the consistency of vocabulary and expectations across the board.

The ISTE Standards for Educational Leaders are closely aligned with the standards for educators, but with a focus more on the administrative or district level. The first topic is Equity and Citizenship Advocate. ISTE, 2022, defines this into four sections: ensuring that teachers can use technology to meet student needs; ensuring equitable access to devices; model digital citizenship; and cultivate responsible online behavior in students. Becoming a Visionary Planner by engaging education stakeholders to create a shared vision of technology use and use that shared vision to create "strategic plans that articulate how technology will be used to enhance learning" (ISTE, 2022. Educational Leaders). Once the strategic plan is in place, they are to evaluate and monitor the success of the plan and communicate the results with stakeholders by sharing lessons learned. The third section create an Empowering Leader that will "create a culture where teachers and learners are empowered to use technology in innovative ways to enrich teaching and learning (ISTE, 2022. Empowering Leader). The ISTE standards for producing an Empowering Leader include empowering

> "educators to exercise professional agency, build teacher leadership skills and pursue personalized professional learning; build the confidence and competency of educators to put the ISTE Standards for Students and Educators into practice; inspire a culture of innovation and collaboration that allows the time and space to explore and experiment with digital tools; support educators in using technology to advance learning that meets the diverse learning, cultural, and social-emotional

needs of individual students; and develop learning assessments that provide a personalized, actionable view of student progress in real time."

ISTE (2022. Systems Designer) guides leaders to" build teams and systems to implement, sustain and continually improve the use to technology to support learning." The four sections address establishing robust infrastructures, ensure adequate resources, protect privacy and security, and establish partnerships that support the strategic vision. In order to become all of these things, ISTE standards for Empowering Leaders ends with being a connected learner that "models and promotes continuous professional learning" by setting goals, participate in professional learning networks, use technology regularly, and develop the skills needed to lead and navigate change."

Figure 10: ISTE Standards for Educational Leaders (ISTE, 2022)

ISTE Standards for Coaches has a focus of how people and groups both outside of education and in educational administrative roles can impact teaching and student

learning. Coaches inspire teachers to embrace technology and provide training to incorporate it into their classroom equitably. These coaches assist educators with understanding and using data to drive and improve the quality their lessons, thereby increasing student engagement. They work with teachers and administrators to provide students with the technology they need to be successful learners and global citizens.

Figure 11: ISTE Standards for Coaches (ISTE, 2022)

A fifth section of the ISTE Standards covers Computational Thinking Competencies for Educators, organizing the standards by the specific roles of Learner, Leader, Collaborator, Designer, and Facilitator:

> Leaders and educators around the world have the enormous responsibility of preparing all students for success in a future where computing power underpins every aspect of the systems we encounter in our daily lives. Ensuring that every student understands and is able to harness the power of computing to

> improve their success in their personal, academic, or professional lives is an ambitious goal. The ISTE Standards: Computational Thinking Competencies for Educators is intended to help all educators contribute to making that goal a reality. (ISTE, 2022, Computational Thinking)

The International Society for Technology Education has been continuously updating and adapting these 21st Century Standards for students, educators, education leaders and coaches for over twenty years, making adjustments to embrace constantly changing technologies. As computers evolved from room-filling banks of magnetic tape reels into laptops and handheld tablets and smartphones, they are "replacing pens and pencils as the accepted 'tools of the trade' for students" (Jackson, 2013, para. 2). As computers began to infiltrate schools, teachers became masters of integrating the devices into their students' traditional curriculum, rising to the challenges as the ISTE Standards were created and expanded.

Empty classrooms and corners of libraries became computer labs where teachers could bring their entire class in to learn computer skills and keyboarding. Desktop computers in a lab setting gave way to laptop computers in carts that could be moved into classrooms. "As teachers gained skills and developed more integrated lessons that included or required more access to technology, the need for more student devices arose (ISTE, 2022, Conclusion).

Options for Programs Meeting Students' Needs

To answer these needs, school districts were faced with making important decisions. School leaders began to look at ways to acquire more technology for staff and student use.

Many school districts chose to implement BYOT (Bring Your Own Technology) programs, where students were allowed to bring their personal devices from home and connect to the school's network. Will allowing students to bring their own technology devices from home affect their learning? Current studies of the adult brain show an increase in activity in the learning centers of the brain when that person uses their own technology device on the Internet as opposed to an unfamiliar device. Since students' brains are more malleable, will the amount of authentic learning taking place be affected when using BYOT (Bring Your Own Technology)?

Why should school districts implement a Bring Your Own Technology (BYOT) program in their elementary buildings? Embracing 21st century learning skills demands a technology-rich environment where classrooms can become student-centric rather than teacher-centric (Norris & Soloway, 2011). BYOT is the means to move a district towards personalized learning and differentiated instructional strategies that change the focus from tools to authentic learning (Mitchell, n.d.). Studies show a marked improvement in student engagement and a higher quality of student work (Wong, 2011). Embracing BYOT can provide students with a "classroom without walls or limitations for pursuing information" (Curtis, 2003). Students who use technology are given the opportunity to utilize learning principles such as pre-existing knowledge, active learning, mental models, transfer, and learning for understanding (Curtis, 2003).

Other studies conducted by Jim Taylor (2012) have discovered that frequent exposure to technology and the internet are actually causing children's brains to become "wired" in ways that are significantly different from those of previous generations. Marked improvement in visual-spatial relations, increased attentional ability, improved reaction times and the ability to identify specific details otherwise buried in visual clutter are noted in children who are comfortable using technology (Taylor, 2012). Brain researchers have also noted that students who are very comfortable with the technology they are using become better at absorbing information, switching tasks, blocking out background noise, and are embracing a new form of literacy that is comparable to previous generations reading books (Tapscott, 2008).

Providing the classroom teacher with the knowledge and skills to create a successful, technology rich classroom environment is vital to a successful BYOT program. Offering sufficient staff development that includes time to become comfortable and confident with the technology and their own skills will empower teachers to allow their students to grow with technology (Springfield, 2013).

Five Best Practices for BYOT in the Classroom -- Thompson (2012)

1. Model what you want BYOT to look like in the classroom
2. Treat devices like books
3. Allow charging only at certain times
4. Establish procedures for early finishers
5. Allow students time to explore apps and get to know it

In addition, teachers that have clearly defined, high expectations will aid in the successful integration of technology devices into the classroom.

Issues with compatibility, security and licensing of the educational applications, and the troubleshooting of a vast array of devices during the school day made this option an impractical choice for most districts.

A more popular choice was a one-to-one (1:1) program where the district provided a device to each student. An Instructional Technology Leadership study released in 2019 by the Consortium for School Networking (CoSN) reveals that 1:1 programs were more common in Middle Schools (63%) and High Schools (60%) than in Elementary Schools (42%). Once the decision had been made to go with a 1:1 program, the next big decision was what device to choose. Leaders soon discovered that there was not one single device that met the needs of every school district. Cuban said in 2001 that the medium (computers) should not be confused with the message (effect). Breed, 2019, found that the most successful 1:1 programs selected technology devices that supported the learning goals of the district. Successful districts also took into consideration how the devices would be used, strictly at school or also at home. Cross-curricular functionality was also considered; was the device able to satisfy the requirements of an English class as well as those of a science class or a fine arts class. Another consideration was how robust was the existing infrastructure; and what upgrades would be necessary to support additional devices; what protocols were already in place to protect data security and privacy, and what needed to be addressed in those areas. One last concern was the true cost of the device, including providing support, additional hardware, protective cases, software, and professional development. Successful 1:1 programs have provided a potential foothold for change and a distinct driver for going further (Weston, 20100).

Weston goes on to suggest that this foothold must lead to taking on bigger questions in education, that lead to scalable and sustainable change.

Options for Devices Meeting Students' Needs

One to one programs could potentially use any number of devices: smartphones, desktop computers, laptops, Google Chromebooks, tablets, and hybrid devices (Breed, 2019), and many districts provide multiple devices at various grade levels, dependent upon curricular needs.

Portability and reliable accessibility are two factors to consider when choosing devices for a 1:1 program. Desktop computers by their very design and nature immediately fail the portability requirement. With inconsistent connectivity, small screens, tiny onscreen keyboards, varying data plans and limited ability to run many educationally based applications remove smartphones from most 1:1 equations. Google Chromebooks are similar to a laptop but run on the Chrome Operating System which made them incompatible with many of the programs and educational applications that run on Windows or MacOS, thereby limiting their functionality. They also rely heavily on internet connections which can be troublesome in some areas. However, they are less expensive than a traditional laptop (Tracy 2021).

Laptops have the functionality of regular desktop computers, allowing students to perform all the tasks they have traditionally done on a desktop, (Jackson, 2013), including searching the internet, creating presentations, reports, and projects, sending emails, and collaborating with experts and other students. Prices are less than that of a

desktop model and many vendors will negotiate the price if a district is buying a large quantity. Laptops are more prevalent in secondary school 1:1 programs.

Portable touch screen devices known as tablets, are highly portable and intuitive to use. They are better suited to younger students with their format being similar to the more familiar smart phone operating systems and having similar onscreen keyboards (*Tablets vs laptops*, 2020). Some tablet programs allow for drawing or annotating directly on the screen, using either a fingertip or some type of stylus. More economical than larger devices, tablets allow internet access and are able to run a growing assortment of educational applications. Battery longevity is another factor to consider when selecting a tablet model. Most companies that supply these devices have improved battery longevity over the past few years, but it still needs to be considered. Device management programs at the district level allow for the remote installation of software, implementing updates/patches, and running security checks (Breed, 2019). Device management at the school level allows the classroom teacher to view and monitor each student's device, helping them become responsible digital citizens. With the tablet's focus on GUI interfaces and similarity to operation of a smartphone, tablets are often the device of choice for younger students.

Chapter 3

Methodology

Purpose Statement

The purpose of this constructivist ethnohistorical case study is to explore the implementation of instructional technologies in five metropolitan Omaha area public school districts. At this stage in the research, four distinct time periods will be explored, pre-1990, 1991-2000, 2001-2010, and 2011-2019. Within these four time periods, implementation of technology, staff responses, choice of formats, and funding will be analyzed to create a historical narrative. Currently, there is no specific history of the process recorded for any of the included districts.

Research Questions

"What process did kindergarten through 12th grade metropolitan Omaha area school districts use to determine that deploying devices 1:1 was the best fit for their students?"

Sub-questions

1. Between yyyy and yyyy, what technology was available to your students at school?
2. What was the purpose of making this technology available to students?
3. How was the technology actually used?
4. How receptive were staff to technology in the school?
5. How was it funded?
6. Was there a particular event that was a "game-changer" for your students?

7. Was technology implementation included in your district or school strategic plan? If yes, when did it first appear in the plan? Did this inclusion in the plan change the way technology was funded? How?
8. In the choice between Bring Your Own Technology and One to One Devices, how did your district come to a viable decision?

Chapter Organization

This study will be organized alphabetically by the coded name of the responding districts. Data will be presented in order of the survey questions within each district's responses. The Literature Review is divided into three sections. It begins with an Abridged History of Computing Devices and includes a section on the International Society for Technology in Education (ISTE) Standards and their effect on devices and curriculum. Second is a section on Options for Programs Meeting Students' Needs that explores some of the ways educators have attempted to get devices into schools. Lastly, there is a section on Options for Devices Meeting Students' Needs that looks at the devices that could be considered for use in schools.

Philosophical Background

A historical case study was chosen as the researcher's approach to the subject since the majority of the information will be derived from primary sources via online surveys and personal interviews regarding the history of their respective district's 1:1 program.

The researcher's ontological view is realism, programs for technology integration do exist. District faculty know the history of their programs' conception and integration.

The knowledge gained by reading the completed surveys will be subjective by nature since it will be based on the varying experiences that the participants have had within their districts.

The researcher's epistemological assumption is that this information is historicism in that the knowledge has developed in the context of a specific historical time period, pre-1990 through 2019. The information gained from the completed surveys will be subjective by nature since it will be based on the varying experiences that the participants have had within their respective districts.

This researcher's perspective is to be objective; it is not intended to be a comparison or evaluation of the individual districts' 1:1 program, simply a historical record of events that have occurred. The research perspective is unbiased, impartial, and based on facts obtained through the completed surveys.

Reflexivity

As an elementary Teacher Librarian and Technology Initiator for the past three decades, the researcher has had a personal interest in the ever-changing area of technology in schools. When the researcher first joined the district, there was a Corvus hard drive in the library that ran the computerized card catalog that was accessed through three Apple IIe computers while one DOS-based computer ran encyclopedia on CD-ROMs. Bake sales, book fairs and other fundraisers were held to fund the purchase of new computers. Eventually, computers could be found in the classrooms and in the front office. Many staff were reluctant at first to have one of "those machines" in their classroom, asking for games that students could play during recess, not fully realizing the

educational value they offered. As program writers began to work with school curriculum specialists and teacher librarians embraced the emerging technologies, it became easier for the classroom teacher with the help of the teacher librarian to integrate technology into the classroom that supported the curriculum. With this new-found spark to the curriculum, administrators began to see the value of technology in the classroom and began to allocate budget monies to it. In the review of the literature, there was very little found that tells the story of how this integration of educational technology came to be, and this researcher feels strongly that it is of educational and cultural importance to document this movement, preserving the information for generations to come.

Research Tradition

This constructivist grounded theory research study uses qualitative data obtained from an electronic survey sent to faculty knowledgeable in technology in five metropolitan Omaha school districts.

An identical set of survey questions was asked for each decade, pre-1990, 1991-2000, 2001-2010, and 2011-2019. Past and current faculty knowledgeable in technology in five metropolitan Omaha area K-12 public school districts were chosen to participate.

The research documents the previously non-curated events that led to each district's technology integration plan, thereby serving as a written record for future district educational and technology leaders' planning.

Research Setting

Electronic questionnaires were sent to technology leaders in ten metropolitan Omaha area school districts with five choosing to participate.

Survey sites were selected because they are K-12 public school districts with technology integration plans and because of their location (metropolitan Omaha area).

Data Sources

Sources for the data were faculty members of the selected districts who were knowledgeable in technology and the technology integration plan in their respective districts.

Electronically delivered questionnaires were completed by faculty knowledgeable in technology in each district. Questionnaires were created in Google Forms and the results were stored in the Cloud.

Some participants were interviewed over the phone or in person. Notes from those conversations were kept in a Google Doc in the Cloud with no identifying information retained.

Participants in the research were district faculty who were knowledgeable in the history of their district's path to technology integration. In some instances, participants have changed school districts during the time period covered by the survey. In those cases, the participants were asked to complete the survey for each district they were affiliated with during that time period. Other participants were interviewed either in person, via a phone call or email for their general knowledge of educational technology

or for anecdotal observations. These notes were stored in a document in the Cloud and did not contain any personal information.

Participant's rights and privacy were protected by using an anonymous online questionnaire. No names of responders or district names will be shared in the research, however; administrative titles will be used.

Data Collection Instruments

Electronic Questionnaire

The researcher created an online questionnaire to gather information from each district. The survey is broken down into four decades, asking the same carefully formatted questions for each. The questionnaire is a combination of multiple choice, multiple select, and short answer questions that focus on what was happening in the buildings. The final five questions address what has happened at the district level.

Data Collection Procedures

A list of ten metropolitan Omaha area public school districts' head of technology was created. These faculty and their district level counterparts were contacted via email and invited to participate in the questionnaire electronically. Participants were given three weeks to complete the questionnaire. The data was collected as a Google Form, allowing data to be aggregated and sorted easily, and stored in the Cloud as a Google Drive folder. Districts were immediately assigned a code for privacy. If additional information or clarification was warranted, an in-person, email, or telephone interview took place, and data from the notes were entered into the Google Form, so that it could be incorporated into the online data.

The questionnaire link was emailed to identified faculty members with specific instructions and deadline of three weeks for completion. As questionnaires were completed, they were coded for anonymity. Any additional information that was obtained through direct email or telephone conversations was immediately transferred to the coded Google Forms. Some participants changed districts and had historical knowledge of multiple districts. This was taken into consideration by allowing participants to complete questionnaires for multiple districts; answering only those questions that were relevant to their situation.

Some participants were interviewed over the phone or in person. Notes from those conversations were kept in a Google Doc in the Cloud with no identifying information kept.

Data Analysis Procedures

The researcher read and reviewed questionnaire responses and contacted individual responders via email if clarification or further explanation was needed. An axial coding method was designed by the researcher to focus on the cause-and-effect nature of the questionnaire responses, allowing the data to be reported in an archival fashion.

It is the belief of this researcher that technology should be integrated into K-12 educational curriculum. Being a faculty member of one of the included districts could be considered bias. It is also the belief of this researcher that curation of information is crucial to society and mankind's growth and development; preserving the history of school districts' educational decisions is important to future decisions.

To counter bias, the researcher kept the reporting of data impartial, using a historical point of view. Results were reported in a non-comparative and non-evaluative manner, arranged alphabetically by coded district name.

Summary

In this chapter, the researcher has explained that the purpose of this constructivist ethnohistorical case study was to explore the implementation of instructional technologies in metropolitan Omaha area K-12 public school districts during four distinct time periods, pre-1990, 1991-2000, 2001-2010, and 2011-2019. Within these four time periods, implementation of technology, staff responses, choice of formats, and funding were analyzed to create a historical narrative. The final two questions of the survey allowed the researcher to convey the mindset and driving force behind each districts' actions. The researcher's paradigm, ontological realism view, epistemological assumption and research traditions of constructivist grounded theory were explained. The collection and analysis of the data were explained.

Chapter 4

Results

Introduction

In this chapter the researcher will share information gathered from personal interviews that were conducted via phone call or email and information gathered from the completed questionnaires. Personal interview information is relayed without identification. Districts responding have been assigned a random title to ensure anonymity. Explanations and definitions of terminology used can be found in Chapter One in Operational Definitions.

Informal Conversations

I have had first-hand experience with the roll out of educational technology as a Librarian over the past 30+ years. Many of my friends and colleagues also experienced the evolution of instructional technology in their respective districts. Common experiences led to several informative conversations.

Speaking with these local School Technology Leaders, Librarians, Teacher Librarians and Media Specialists (all referred to as Librarians hereafter), it became very clear that while some classroom teachers were willing to embrace educational technology devices into their curriculum, many of the classroom teachers looked to their schools' Librarian for guidance in general operations, troubleshooting and curriculum integration. There were a few anecdotes of teachers not wanting "one of those things" in their classroom, of teachers' initial view of computer use as a "treat or reward for good behavior or completed work," and of having the Librarian always leading the lessons. Librarians came to be known as the resident authority on integration and special projects.

As more devices entered the classrooms and students acquired more access, there were more opportunities for "accidents" to happen with regards to online security. A Librarian was working with a student to find a picture of a bluebird; they quickly discovered that "bluebird is the slang term for a Japanese exotic dancer." One Librarian referred to herself as the "Computer Cheerleader" as she was the one encouraging her staff to experiment and eventually embrace the technology. As time passed and classroom teachers became more comfortable with educational technology, they began to view the Librarian as more of a co-teacher, sharing the responsibility of assisting students in meeting the ISTE standards.

All of the Librarians spoke to the fact that at some point, their district included educational technology in their building level strategic plans. Several Librarians shared that their district level strategic plans also included educational technology programs and devices. With the implementation of these guiding plans in place came "the end of the technological wild west" as one Librarian said.

Initially, most devices were chosen based on cost, "going with the least expensive" device. Later, as standards such as those created by ISTE were adopted by districts, devices were chosen for their ability to help deliver and enhance the existing curriculum to meet those standards and ensure student success.

Another commonality that was evident in the conversations was the focus on the equitable distribution of devices to students. Schools and districts in lower socio-economic communities or schools and districts that had a wide range of household incomes were very concerned with equity when it came to educational technology. Their utmost concern was giving each student the same level of access. While a small number

of districts and schools entertained the idea of a BYOT program, the aforementioned negatives in chapter two far outweighed the advantages and led districts to adopt 1:1 programs.

Meeting educational technology standards and the equitable distribution of student devices were the two biggest factors in districts deciding to adopt 1:1 programs.

District A

School District A has supported educational technology both financially and philosophically since the turn of the century.

From 2001 through 2010, DOS desktop computers could be found in the libraries and computer labs and DOS/Windows laptops were also in classrooms. The main purpose of these devices was to provide internet access. Business classes were also using various Microsoft Office products. Overall, staff were receptive to using these devices in their classrooms. These devices were funded by specifically allocated district funds.

2011-2019 saw an increase in interest and use of educational technology. DOS desktop computers continued to be used in the libraries and computer labs and DOS/Windows laptops in classrooms. As District A embraced a 1:1 program, Chromebooks were found not only in shared carts but as 1:1 devices as well. The devices were used to run libraries' card catalogs, provide internet access, integrate educational technology into existing curriculum, and to provide 1:1 opportunities for students. Staff were very receptive and began using Google Workplace applications (Sheets, Docs, Forms, etc.) in many curricular areas, incorporating the technology into their daily routines. The devices continue to be funded by specifically allocated district funds.

It was reported that District A's 1:1 program is popular with students and with staff. The staff are especially pleased that they no longer have to check out and move carts of devices. District A has not included educational technology in either their individual schools' or district's strategic plans.

Why choose a 1:1 program over a BYOT program? District A leaders "felt it would be easier for students and staff to troubleshoot issues if the students were using

similar devices.” Equity between schools and students was a priority that also influenced the decision to go 1:1.

District B

District B has made a concerted effort to support educational technology both financially and philosophically for many decades.

In the early years, pre-1990, staff could find mimeograph machines, 16mm film projectors, televisions on carts with VHS or Betamax players, Scantron devices, and overhead and opaque projectors to assist in delivering and evaluating classroom instructional content. To allow students to interact with the curricular content, some schools had a small lab of Apple IIe computers and many schools had 1 or 2 Apple IIe computers in classrooms or grade level pods. These were mainly used for word processing and skill and drill programs. Printing for students was limited and most printers were dot-matrix. In general, there was one Apple IIe that ran the library circulation software and 2 or 3 Apple IIe machines on which staff and students would perform card catalog searches. In the main office, there was a mix of typewriters, word processors and DOS-based computer desktops. Across the district, staff had mixed reactions to the appearance of these devices in schools. Some teachers embraced the incoming technology and saw its potential for education. Some teachers saw the technology as one more thing on their already full plate to incorporate into their classrooms, while other teachers viewed it as an opportunity to have kids play games as a reward. Funding for these devices came from district or foundation funded grants, corporate grants, teacher-awarded grants, Parent Teacher Organizations/Associations, and school-run fundraisers such as bake sales, pizza sales, candy sales, book fairs, etc.

Between 1991 and 2000, internet connectivity became available in the schools and changed the landscape of educational technology. Office staff were supplied desktop

DOS/Windows based devices, paid for by the district, replacing typewriters and word processors. Early in this decade, funding for student-use devices continued to come from district or foundation funded grants, corporate grants, teacher-awarded grants, Parent Teacher Organizations/Associations, and school-run fundraisers such as bake sales, pizza sales, candy sales, book fairs, etc. Their use was primarily for word processing and educationally based computer games and software. In addition to the combination of Apple products and DOS/Windows based machines, laser disc players were made available for staff to use. Major encyclopedia and database companies began producing CD-Rom versions of their print products, such as World Book and National Geographic Animal Encyclopedia for use in libraries. The number of computers in classrooms began to increase, as did the size of computer labs, as a result of the installation of three to four AppleTalk and later Ethernet drops in every classroom and additional drops in computer labs and libraries. Apple Computers came out with the faster and higher performing Macintosh line of desktop computers that were created with educational use in mind, offering built-in CD-Rom and multimedia capabilities. More teachers began to understand the positive impact computers could have on student engagement, learning and test scores. Teachers began to integrate this new technology into their existing curriculum, and district curriculum leaders began to notice the impact these devices were having on the students and staff. There were, however, many teachers who considered computers in the classroom as a fad. A non-scientific observation of technology support staff at the district level, discovered that staff using educational technology effectively with students had a direct negative correlation with the number of years a staff member had been teaching; older teachers were not quick to embrace technology in their

classroom. During this period, the term educational technology first appeared in both individual school mission statements and in the district's mission statement.

From 2001 through 2010, Windows desktop computers and sometimes laptops could be found in the offices, while Windows desktops and Macintoshes could be found side-by-side in libraries, computer labs and in classrooms. These devices were to not only provided internet access, but also ran the library's now district-wide integrated online card catalog and offer research sources on CD-ROM. Libraries began to grow their collection of DVDs that supported the quickly changing curriculum. Teachers began to integrate educational technology into existing curriculum which allowed them to differentiate lessons, thereby increasing student engagement and elevating test scores. During this time period, District B invested in upgraded infrastructure and hardware deployment, resulting in individual schools and the district purchasing on-line educational subscription-based software and systems for classroom (gradebooks) and student information (attendance) management. As these district-wide systems were implemented, teachers had little choice but to be receptive to the influx of devices and the programs they ran. District B not only invested in infrastructure, hardware, and programs, but also in staff development to become proficient in successfully using the devices for clerical, classroom management and educational purposes. These devices were funded by specifically allocated district funds. and district or foundation funded grants. District B began to ensure equity between all buildings by creating district standards for both hardware and software. All technology was now handled by the district. As one technology support person put it, "The days of the 'wild west' in technology were over." Wireless internet connectivity became the norm and student and staff personal devices

began to infiltrate the schools. This created new challenges and issues that needed to be addressed through mission statements and policy changes.

From 2011 through 2019, educational technology became a constant in District B's schools. As district standards were set, specific models of computers were chosen for their functionality. Classroom and computer lab standards became Macintosh based at the elementary level and Windows based at the secondary level. To make more technology available, there was a short period of time where students were allowed to bring devices such as laptops, tablets, smartphones, and computers from home to use at school. This led to numerous technical support issues and created large inequities between those who were able to afford their own devices and those who were unable. Educational technology began to permeate every area of curriculum with each subject adoption. The wireless technology infrastructure was constantly being updated and improved in preparation for District B's adoption of a 1:1 opportunity for students that began in the secondary schools with laptops and grew into the elementary schools with the adoption of 1:1 iPads. Teachers were no longer able to choose whether or not to interact with educational technology, it was fast becoming the standard way that schools operate. District technology and curricular standards were now supported entirely by specified district budget allocations. Building and district strategic plans continued to focus on integrating educational technology into the school day, making principals, teachers, parents, and students the primary stakeholders in the process. This led to the gradual implementation of a 1:1 initiative that would ensure equitable access to educational technology for all students.

District C

Before 1990, District C supplied educational technology in the form of typewriters, shop tools, film projectors, slide projectors in the classrooms. Staff were generally accepting of the implementation of these technologies that were supplied by the district.

Throughout the 1990's, most of the educational technology that was put into use were Apple and later Macintosh desktops in the libraries and computer labs that were mainly used for running the card catalog and running CD-ROM programs for doing research. These were well-received by the staff and were funded by district allocations. During this time, the installation of local and internet networking infrastructures would be instrumental in setting the stage for future educational technology adoptions.

From 2001 through 2010, Apple and Macintosh desktop and laptop computers could be found in the libraries, computer labs and classrooms. The main purpose of these devices was to run the library's card catalog, run CD-ROM research sources, integrate educational technology into existing curriculum, increase student engagement, improve student test scores, and provide internet access. Overall, staff were very receptive to using these devices in their classrooms. They were funded by specifically allocated district funds, outside grants and district or foundation grants. During this time, providing broadband internet to all district buildings was paramount to the success of the implementation of educational technology.

2011-2019 saw an increase in interest and use of educational technology. DOS/Windows, Apple, and Macintosh desktop computers continued to be used in the libraries, computer labs and classrooms. As they were developed, the use of

Chromebooks, tablets and iPads were also utilized. It was during this time that educational technology began to be included in their district and individual schools' strategic plans. As District C embraced a 1:1 program, Chromebooks were found not only in shared carts but as 1:1 devices as well. The devices were used to run libraries' card catalogs, provide internet access, integrate educational technology into existing curriculum, and to provide 1:1 opportunities for students. Staff were very receptive to using educational technology in many curricular areas, incorporating the technology into their daily routines, and replacing print textbooks with digital ones. The devices continue to be funded by specifically allocated district funds, outside grants, district or foundation grants, and most recently, e-rate (federal) funding.

District C's 1:1 program is popular with students and with staff. By establishing a 1:1 program, District C has ensured equitable access to all of its families, regardless of income levels.

District D

District D has supported educational technology both financially and philosophically since the turn of the century.

From 2001 through 2010, DOS and Apple desktop computers could be found in the libraries, computer labs and classrooms. The main purpose of these devices was to provide internet access, run the libraries' card catalogs, offer research sources on CD-ROM and to integrate educational technology into the existing curriculum. High school CAD classes used Windows-based computers. Overall, staff were receptive to using these devices in their classrooms. These devices were funded by specifically allocated district funds.

2011-2019 brought an increase in interest and use of educational technology. This was partially driven by the district's mission statement and strategic plan. DOS/Windows, Apple desktop computers and iPads continued to be used in the libraries, computer labs and classrooms. As District D embraced a 1:1 program in 2012, they partnered with Apple Computer to initiate a grades 7-12 program. Three years later, the program was expanded to include 1:1 iPads for kindergarten through 6th grade. The devices were used to run libraries' card catalogs, provide internet access, integrate educational technology into existing curriculum, and to provide 1:1 opportunities for students. Staff were very receptive to incorporating the technology into their daily routines. The devices continue to be funded by specifically allocated district funds.

District D's 1:1 iPad program is popular with students and with staff. Student equity to educational technology access is guaranteed in the district's strategic plan. District D now has a stock of 200 MacBooks that were funded by Facebook that are

available to high school students who have specific needs based on coursework that cannot be accomplished on an iPad.

District E

District E made a commitment very early on to support educational technology both financially and philosophically.

Prior to 1990, students had access to typewriters, calculators, shop tools, film projectors, Apple IIe computers, Macs, DEC writers (a teletype/printer combination), overhead projectors, LCD panels to place on overhead projectors to display computer content, and a mobile bus of Apple IIe computers to go to district elementary buildings. These devices were used mainly with elementary students and staff and with secondary staff to teach introductory computer literacy, basic programming skills, and interaction with primitive simulation programs. Staff were generally receptive to these technologies. Funding came from specific budget allocations for educational technology at the district level.

Between 1991 and 2000, a mix of Apple, Macintosh, and DOS desktop models could be found in District E's schools. Integration of applications such as a computerized searchable library card catalog and research resources on CD Rom were used to increase student engagement, assist staff with differentiation of lessons, and assist with internet access to information to complete project-based exploration of specific topics. Applications were based on teacher interest to start. This simple action gave staff a more vested interest in working with the applications. Funding came from specific budget allocations for educational technology at the district level. In the late 1990's the invention of the laptop and Apple iMac was a "trigger point" for future educational technology decisions. It was during this time that district strategic plans began to include educational technology in District E.

During the years 2001 to 2010, District E schools continued to use a variety of operating systems in their classrooms, class labs, and libraries. Apples, Macintoshes, and DOS machines could be found in both desktop and laptop styles. In 2001, all high school teachers were issued a laptop. In 2004, laptops were issued to all high school students and all district teachers. Elementary students had access to carts of laptops during the school day. Integration of applications such as a computerized searchable library card catalog and research resources online and on CD Rom were continued to be used to increase student engagement, assist staff with differentiation of lessons, and assist with internet access to information. In addition to students completing project-based exploration of specific topics, these devices were being used throughout the curriculum in a variety of ways and by staff as well. District E continued their district level funding support of educational technology.

District E devised a one-to-one (1:1) plan to systematically provide a dedicated laptop or tablet/iPad for each K-12 student during the years 2011 through 2019. A 1:1 program was chosen over Bring Your Own Device – where students use personally-owned devices – to provide equity and level the playing field for all students to experience the power of educational technology. A paradigm shift was also made to utilize the Apple/Macintosh operating system in the majority of classrooms and in the library. DOS/Windows machines were found in classrooms where applications required that format. Integration of applications such as a computerized searchable library card catalog and research resources online were continued to be used to increase student engagement, assist staff with differentiation of lessons, and assist with internet access to information. In addition to students completing project-based exploration of specific

topics, the use of 1:1 devices made significant changes in how teachers and students interact with educational technology, not only as part of the curriculum, but as a part of their life as well. District E continues to support educational technology at the district level by including it in their building and district strategic plans and by providing funding at the district level.

At District E, “technology has been an essential tool in the lives of teachers and learners for a very long time,” said one technology specialist.

Trends Found in Data

There were definite trends that appeared in the data provided by the questionnaire. Within the four time periods included, implementation of technology, staff responses, choice of formats, and funding were analyzed to create a historical narrative. The final two questions of the questionnaire allowed the researcher to convey the mindset and driving force behind each districts' actions.

Overall, pre-1990 saw educational technology mainly used in school offices by secretaries and in high school business classes in the form of typewriters. Classroom technology consisted mainly of film projectors, overhead projectors, and libraries were switching from card catalogs to computerized, searchable catalogs. Desktop computers were in the beginning stages of implementation and were more likely to be found in labs or traveling carts. Very few districts had line items in their budgets for educational technology.

The decade between 1991 and 2000, desktop computer models began to appear in schools. For the most part, teachers were unsure of the educational value of computers in the classroom and how to best utilize them. School librarians began to encourage classroom teachers to embrace the incoming technology by leading by example through collaborating on lessons and providing support. Districts began to value the impact this new technology had on students' education and started providing financial support.

During 2001 through 2010, teachers and staff with the help of their school librarians and building technology support staff began to integrate educational technology into their daily routines. Many districts began to see the need for more technology in the schools and started investigating not only what devices would best serve the needs of

their students and staff but also how to provide those devices. Strategic plans were the guiding factor. Funding and technical support were provided at the district level.

The final decade of this study, 2011 through 2019, found the districts using many means to determine that a 1:1 initiative was best for staff and students alike, thereby providing equity in access to educational technology. Again, school librarians and building technology support staff were key players in this endeavor.

As a whole, teaching staff were receptive to incorporating the existing educational technology into their classrooms in the early years. As technology developed and improved, teachers embraced it into their daily routine and curriculum. This is in contrast to what Keating and Evans (2001) found; that while preservice teachers were comfortable using technology for their own schoolwork and personal needs, they felt unsure of how to incorporate it into their classrooms. I attribute this difference to the "Computer Cheerleader" attitudes and enthusiasm of the Librarians and their staff's trust in them. Classroom staff became part of a team that successfully integrated an influx of viable educational technology into their existing curriculum.

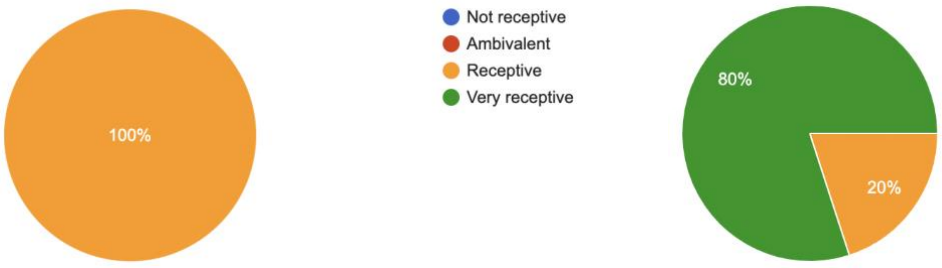


Figure 12: Staff Acceptance Pre 1990 compared to Staff Acceptance 2010-2019

Another data trend that arose across the districts was how educational technology was funded. Most districts grew from originally doing fund raisers and allowing donations of money and hardware to employing external grants and putting educational technology funding as a line item in each district's budgets.

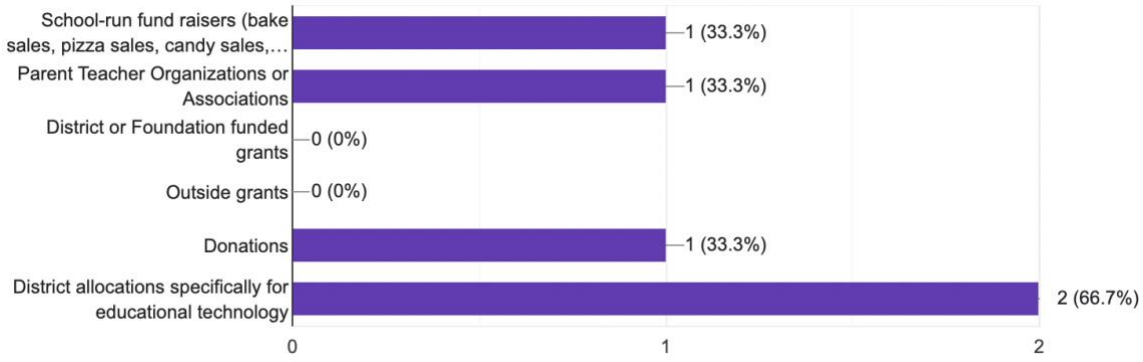


Figure 13: Funding Sources Pre1990

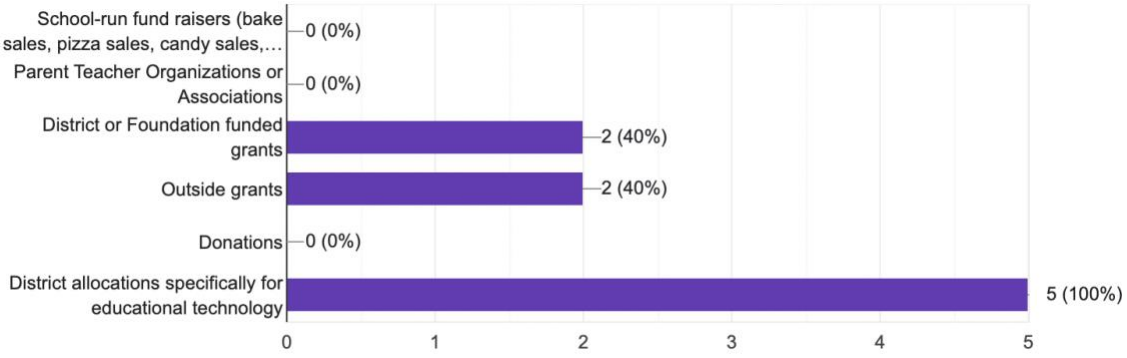
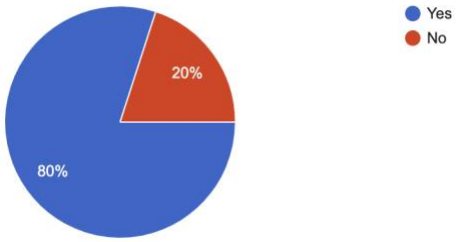


Figure 14: Funding Sources 2010-2019

The majority of the districts included the addition of educational technology in their district and/or individual school buildings' strategic plans according to the questionnaire results.

Figure 15: Was Educational Technology Built into Strategic Plans?



When asked the question "In the choice between Bring Your Own Technology and district funded 1:1 devices, how did your district come to a viable decision?" every district that responded came to the same conclusion and gave the same answer. Equity. A 1:1 program with devices supplied and managed by the district assured that every student was given the opportunity to be successful in their education and as a responsible 21st century digital citizen. District responses spoke to the issues of staff having to troubleshoot problems on only one type of device, the inequities of household socioeconomics and leveling the playing ground for best practices in student learning. While some districts across the country did opt for a BYOT program, this aligned closely with information on districts from other areas choosing a 1:1 program that was shared in the literature review in Chapter Two. Almost every district chose the program that was best for their students.

Leading Educational Technology Change

The technology-positive attitudes and enthusiasm of the Librarians and district-level Technology Support Staff helped classroom teachers and other staff deal with the speed at which educational technology was changing education. In talking with other Librarians and Technology Leaders, it became evident that in every district there was a

tendency in classroom teachers to fit into one of four distinct categories where educational technology was concerned.

	Possess Skills to Integrate Educational Technology into Curriculum	Do Not Possess Skills to Integrate Educational Technology into Curriculum
Possess Desire to Integrate Educational Technology into Curriculum	Early Adaptor	Collaborator
Do Not Possess Desire to Integrate Educational Technology into Curriculum	Lone Wolf	Resistor

Figure 16: Four Types of Educators based on the work by Wagner

There were those staff who openly embraced the surge of educational technology into their classrooms. These "Early Adaptors" quickly moved from how they did routine classroom tasks, gaining the skills and having the desire to redefine and transform their teaching, to creating 21st Century Learners in their classes.

"Collaborators" want to incorporate technology into their classes but lack the skills to move beyond the Augmentations/Enhancement stage of the SAMR model of teaching. These "Collaborators" willingly partner with the "Early Adopters" to ensure that their students gain 21st Century Skills. Through this partnership, they acquire the skills to move their own knowledge and teaching skills forward.

There are some staff who possess technology skills and utilize them in their own lives but have no desire to integrate them into their teaching. The "Lone Wolf" resists the addition of educational technology in their classrooms and continues teaching without it. 21st Century Skills for students are never addressed.

"Resistors" lack computer skills and have no desire to integrate educational technology into their teaching. Nor do they desire to collaborate with "Early Adaptors" to gain skills or knowledge. Students in these classrooms have no opportunity to master 21st Century Skills.

Summary

In this chapter the researcher shared the information gathered from interviews and the completed questionnaires. Information was presented in a non-biased format; no comparisons were made between districts, however trends were noted and explored.

Individuals interviewed were not identified by name and districts responding were assigned a random title to ensure anonymity.

Chapter 5

Conclusions and Future Research

Introduction

In this chapter I will share my personal learnings from this research. I will also share conclusions drawn from the collected data and will suggest future research topics related to this study.

My Learnings

When choosing a philosophical stance for this research, a constructivist grounded theory fit my research question, "What process did Kindergarten through 12th grade metropolitan Omaha area school districts use to determine that deploying devices 1:1 was the best fit for their students?" In the philosophical tradition of constructivism, "reality and knowledge reside in the minds of individuals. Knowledge may be uncovered by unpacking individual experiences" (Savin-Baden, 2013. p. 56). An ethnohistorical case study is a "hybrid diachronic strategy that must analyze cases from the distant past to the present, using eclectic data sources, in order to produce both idiographic and nomothetic knowledge" (Widdersheim, 2007, abstract).

These definitions led me to create an online questionnaire to ask specific questions that would allow each respondent to provide his/her ontological views to convey the story of each district's adoption of a 1:1 program. It was sent to selected district staff that had personal experience of the program adoption process. A grounded theory approach allowed me to acknowledge various interpretations of the data collected. Having personally experienced my own district's adoption of a 1:1 program, I found

instances when my personal experiences aligned with the results of the questionnaires and instances when there were significant differences.

In maintaining a historical view of the data collected, that data was reported by individual districts in chronological order to inhibit possible bias on my part. Regaling individual technology-related anecdotes separate from historical information gathered via the questionnaire also helped reduce a chance of bias and helped convey each districts' emerging cultural paradigm shifts.

Conclusions

One thing I learned was that there is no one right way to provide students and staff with the educational technology they need to become successful learners. Leading change by the implementation of 1:1 initiatives in the participating school districts was a carefully thought-out process and a research-backed mindful decision made over time. Each school district made decisions based on the individual needs of students and staff; programs had financial support at the district level, and key staff had to be included. Device choices were based upon availability and instructional intent which made personalized technology in the classroom desirable. Before 2000, educators were unsure if the existing technology tools were student and education friendly. By 2001, one district was an early 1:1 adopter, citing broadband internet connections and educational technology becoming more robust, as it permeated throughout the curriculum. One Librarian shared, "This is the time-period in which schools and districts began to purchase online educational subscription-based software and systems for classroom management…attendance, grades, lunchrooms, etc. This happened as a result of

infrastructure and hardware deployment. One responder said, “Technology is here to stay! Get over it!” The final decade of this study saw districts undergo a paradigm shift, changing the use of educational technology from word processing and skill and drill programs to becoming an integrated part of the staff and student day, The creation of the SAMR Model, ISTE Standards, and the creation of 21st Century Skills gave teachers direction. By engaging parental support, creating specific budget allocations for educational technology, and creating partnerships with companies such as FaceBook and Apple, more districts were able to support 1:1 initiatives. Educational technology components became the norm when various curricular areas come up for review and adoption.

This study embodies the paradigm shift that educational technology brought to the world of education. Staff, students, and educational leaders quickly adapted and met the challenges presented to them. As staff and students were exposed to the rush of newer and more sophisticated educational technology, the more they embraced new ways of collaborating, creating, communicating, thinking, and learning all while becoming responsible digital citizens.

What started as librarians holding bake sales to buy computers, this movement evolved into an educational technological revolution with student success at the center of it all.

Future Research

This research ends with information on 1:1 programs in 2019, before the COVID-19 pandemic forced schools to close and to continue in an online only format. Some additional related studies could discover:

How did the unforeseen forced closings of schools affect the number of schools that already provided 1:1 devices?

Did the pandemic force schools to make decisions concerning 1:1 programs?

How schools that were not already 1:1 acquired enough devices for their students?

Were teachers prepared to offer online curriculum to their students?

Did the sudden influx of online classes affect the infrastructure at the school, local, state, and national levels?

Has the pandemic changed the way teachers deliver instruction?

Did the pandemic affect teacher retention?

Did the pandemic affect the way students learn?

Did the pandemic affect the attitudes and skills of students?

What changes were made when students returned to face-to-face instruction in school?

Did the pandemic affect teacher recruitment?

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Appendix A

Questionnaire

AN ETHNOHISTORICAL EXPLORATION OF EDUCATIONAL TECHNOLOGY IMPLEMENTATION IN METROPOLITAN OMAHA AREA PUBLIC SCHOOLS

This survey should take between 15 and 30 minutes to complete.

1. Email

2. Please select your school district. *Mark only one oval.*

- ◯ Bellevue Public Schools
- ◯ Bennington Public Schools
- ◯ Elkhorn Public Schools
- ◯ Gretna Public Schools
- ◯ Millard Public Schools
- ◯ Omaha Public Schools
- ◯ Papillion LaVista Community Schools
- ◯ Ralston Public Schools
- ◯ Springfield Platteview Community Schools
- ◯ Westside 66 Community Schools

Educational Technology in Schools Prior to 1990

3. What educational technology was available to your students at school prior to 1990? (Include typewriters, calculators, shop tools, film projectors, etc.)

4. What was the purpose of making this educational technology available to students?

5. How was the educational technology actually used?

6. How receptive were staff to the appearance of this educational technology in the school? *Mark only one oval.*

- ◯ Not receptive
- ◯ Ambivalent
- ◯ Receptive
- ◯ Very receptive

7. How was this educational technology funded? *Check all that apply.*

- ☐ School-run fund raisers (bake sales, pizza sales, candy sales, book fairs, etc.)
- ☐ Parent Teacher Organizations or Associations
- ☐ District or Foundation funded grants
- ☐ Outside grants
- ☐ Donations
- ☐ District allocations specifically for educational technology

Educational Technology in Schools 1991-2000

8. Between 1991 and 2000, what educational technology was available to your students at school? *Check all that apply.*

- ☐ Apple desktops in library/lab
- ☐ Macintosh desktops in library/lab
- ☐ DOS desktops in library/lab
- ☐ Apple desktops in classrooms
- ☐ Macintosh desktops in classrooms
- ☐ DOS desktops in classrooms

Other:

9. What was the purpose of making this educational technology available to students? *Check all that apply.*

- ☐ Run the library's card catalog

- [ ] Offer research sources on CD-ROM
- [ ] Improve test scores
- [ ] Increase student engagement
- [ ] Differentiate lessons
- [ ] Integrate educational technology into existing curriculum
- [ ] Provide internet access

10. How was the educational technology actually used?

11. How receptive were staff to the appearance of this educational technology in the school? *Mark only one oval.*

- ◯ Not receptive
- ◯ Ambivalent
- ◯ Receptive
- ◯ Very receptive

12. How was the educational technology funded? *Check all that apply.*

- [ ] School-run fund raisers (bake sales, pizza sales, candy sales, book fairs, etc.)
- [ ] Parent Teacher Organizations or Associations
- [ ] District or Foundation funded grants
- [ ] Outside grants
- [ ] Donations
- [ ] District allocations specifically for educational technology

13. Was there a particular event that was a "game changer" for your students using educational technology?

14. Between 2001 and 2010, what educational technology was available to your students at school? *Check all that apply.*

- [ ] Apple desktops in library/lab
- [ ] Macintosh desktops in library/lab
- [ ] DOS desktops in library/lab
- [ ] Apple desktops in classrooms
- [ ] Macintosh desktops in classrooms
- [ ] DOS desktops in classrooms
- [ ] Apple laptops in library/lab/classrooms
- [ ] Macintosh laptops in library/lab/classrooms
- [ ] DOS/Windows laptops in library/lab/classrooms

15. What was the purpose of making this educational technology available to students? *Check all that apply.*

- [ ] Run the library's card catalog
- [ ] Offer research sources on CD-
- [ ] ROM Improve test scores
- [ ] Increase student engagement
- [ ] Differentiate lessons
- [ ] Integrate educational technology into existing curriculum
- [ ] Provide internet access

16. How was the educational technology actually used?

17. How receptive were staff to the appearance of this educational technology in the school? *Mark only one oval.*

- ◯ Not receptive
- ◯ Ambivalent
- ◯ Receptive

Very receptive

18. How was the educational technology funded? *Check all that apply.*

- School-run fund raisers (bake sales, pizza sales, candy sales, book fairs, etc.)
- Parent Teacher Organizations or Associations
- District or Foundation funded grants
- Outside grants
- Donations
- District allocations specifically for educational technology

19. Was there a particular event that was a "game changer" for your students using educational technology?

Educational Technology in Schools 2001-2010

20. Between 2001 and 2010, what educational technology was available to your students at school? *Check all that apply.*

- Apple desktops in library/lab
- Macintosh desktops in library/lab
- DOS desktops in library/lab
- Apple desktops in classrooms
- Macintosh desktops in classrooms
- DOS desktops in classrooms
- Apple laptops in library/lab/classrooms
- Macintosh laptops in library/lab/classrooms
- DOS/Windows laptops in library/lab/classroom

21. What was the purpose of making this educational technology available to your students at school? *Check all that apply.*

- Run the library's card catalog

- [ ] Offer research sources on CD-ROM
- [ ] Improve test scores
- [ ] Increase student engagement
- [ ] Differentiate lessons
- [ ] Integrate educational technology into existing curriculum
- [ ] Provide internet access

22. How was the educational technology actually used?

23. How receptive were staff to the appearance of this educational technology in the school? *Mark only one oval.*

- ◯ Not receptive
- ◯ Ambivalent
- ◯ Receptive
- ◯ Very receptive

24. How was the educational technology funded? *Check all that apply.*

- [ ] School-run fund raisers (bake sales, pizza sales, candy sales, book fairs, etc.)
- [ ] Parent Teacher Organizations or Associations
- [ ] District or Foundation funded grants
- [ ] Outside grants
- [ ] Donations
- [ ] District allocations specifically for educational technology

25. Was there a particular "game changer" for your students using educational technology?

Educational Technology in Schools 2011-2019

26. Between 2011 and 2019, what educational technology was available to your students at school? *Check all that apply.*

- [ ] Apple desktops in library/lab
- [ ] Macintosh desktops in library/lab
- [ ] DOS/Windows desktops in library/lab
- [ ] Apple desktops in classrooms
- [ ] Macintosh desktops in classrooms
- [ ] DOS/Windows desktops in classrooms
- [ ] Apple laptops in library/lab
- [ ] Macintosh laptops in library/lab
- [ ] DOS/Windows laptops in library/lab
- [ ] Apple laptops in classrooms
- [ ] Macintosh laptops in classrooms
- [ ] DOS/Windows laptops in classrooms
- [ ] Tablets/iPads in library/lab
- [ ] Tablets/iPads in classrooms
- [ ] Other:

27. What was the purpose of making this educational technology available to students? *Check all that apply.*

- [ ] Run the library's card catalog
- [ ] Offer research sources on CD-ROM
- [ ] Improve test scores
- [ ] Increase student engagement
- [ ] Differentiate lessons
- [ ] Integrate educational technology into existing curriculum
- [ ] Provide internet access
- [ ] Provide 1:1 opportunity

28. How was the educational technology actually used?

29. How receptive were staff to the appearance of educational technology in the school? *Mark only one oval.*

- Not receptive
- Ambivalent
- Receptive
- Very receptive

30. How was the educational technology funded? *Check all that apply.*

- School-run fund raisers (bake sales, pizza sales, candy sales, book fairs, etc.)
- Parent Teacher Organizations or Associations
- District or Foundation funded grants
- Outside grants
- Donations
- District allocations specifically for educational technology

31. Was there a particular event that was a "game-changer" for your students?

District Actions

32. Was educational technology implementation included in your district or school strategic plan? *Mark only one oval.*

Yes No

33. If the previous answer was yes, what year did it first appear in the plan?

34. Did the inclusion in the strategic plan change the way educational technology funded? *Mark only one oval.*

Yes No

35. How was funding changed?

36. In the choice between Bring Your Own Technology and district funded 1:1 devices, how did your district come to a viable decision?

37. Please include any other information you feel is important.

Appendix B

Informed Consent

AN ETHNOHISTORICAL EXPLORATION OF EDUCATIONAL TECHNOLOGY IMPLEMENTATION IN METROPOLITAN OMAHA AREA PUBLIC SCHOOLS

Purpose Statement:

The purpose of this constructivist historical case study is to explore the implementation of instructional technologies in metropolitan Omaha area public school districts. Four distinct time periods will be explored, pre-1990, 1991-2000, 2001-2010, and 2011-2019. Within these four time periods, implementation of technology, staff responses, choice of formats, and funding will be analyzed to create a historical narrative. Currently, there is no specific history of the process recorded for any of the included districts.

Procedures:

Electronic questionnaires will be sent to technology leaders in ten metropolitan Omaha area school districts: Bellevue Public Schools, Bennington Public Schools, Elkhorn Public Schools, Gretna Public Schools, Millard Public Schools, Omaha Public Schools, Papillion LaVista Community Schools, Ralston Public Schools, Springfield Platteview Community Schools, and Westside 66 Community Schools. These electronically delivered questionnaires will be completed by faculty knowledgeable in technology in each district. The questionnaire was created in Google Forms and the results will be stored in the Cloud. Any clarification of responses will be handled through emails and those responses will also be stored in the Cloud.

Risks:

There are no known risks or discomforts associated with this research.

Benefits:

Participants in this study do not receive individual benefit. However, participants do indirectly accrue professional benefit in that participation in this research study will help construct a historical recording of paradigm-changing decisions that will provide future generations an understanding of why and how those ideas and trends were pursued.

Confidentiality:

Your participation and responses to the survey questions and all notes are confidential. Data used in this research will be presented in a manner that prevents identification of individuals and school district names will be coded.

Compensation:

No monetary compensation will be provided to participants of this study.

Opportunity to Ask Questions:

You are encouraged to ask questions concerning this research before or after agreeing to participate in this research study. Please contact us at lward@mpsomaha.org or (402) 515-2778, or my advisor, Dr. Jeanne Surface at jsurface@unomaha.edu or (402) 554-4014.

Freedom to Withdraw:

Your participation in this study is voluntary. You are free to decide not to participate in this study or to withdraw from this study at any time without adversely impacting your relationship with your district, the researcher, or the University of Nebraska at Omaha. Your decision will not result in any loss of benefits to which you are otherwise entitled.

Consent, Right to Receive a Copy:

You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

Please accept our sincere thanks for your help with this important project.

I agree to participate in the electronic survey and provide any clarifying remarks via email.

Signature of Participant:

_____ Date: _____

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Appendix C

Invitation Email

IRB#: 0720-21-EX

Dear _____,

My name is Linda Ward, and I am a doctoral candidate in the Educational Leadership program at the University of Nebraska at Omaha. I will be conducting a research study with the purpose of creating a Historical Exploration of Educational Technology Implementation in Metropolitan Omaha Area Public Schools. I am interested in publishing a non-biased history of how each school district has embraced educational technology, beginning with pre-1990 information and ending with pre-pandemic 2019. My goal is that each district's information will be presented in its own chapter; there will be no comparisons on my part between districts.

Attached is a link to a questionnaire that will take anywhere from 25 to 35 minutes to complete, depending upon the amount of detail that is entered in the open-ended questions.
If the person completing the questionnaire has experience with educational technology in more than one district, I would greatly appreciate it if they would complete a separate questionnaire for each district's information.

Why this topic? In doing some basic research on technology integration in local school districts, I could find very little documentation. After much digging, I could find school board minutes where technology was discussed and usually approved, but it was very general. A couple of districts' websites mentioned the current status of educational technology in classrooms but offered very little detail as to how it all came to be. As technology transforms education, I feel it is so very important to document where we were, why certain decisions were made, and how we have come to be where we are. By publishing a non-biased documentary of the journey each district has made, I hope to give future educational leaders the background they will need to make informed decisions for the future.

Please do not hesitate to contact me with questions. I greatly appreciate your consideration in participating in this research study.

Sincerely,

Linda Ward
Doctoral Candidate at University of Nebraska at Omaha
402.515.2778
lward@mpsomaha.org