Describing Communication Technologies: The Onset Of Typed Note-Taking Practices

For Dr. Ernesto Peña, ETEC 540, By Cody Peters, Student no. 20668174

Introduction:

Written notes are a hallmark of education, wherein the ability to remember what is said or viewed within the context of a classroom or any other educational landscape at any specific point in time is a necessity. After all, “writing represents language, but it out-lasts the spoken word. The oldest examples of writing have lasted over five thousand years. Others will last only until I press my computer's delete key” (Gnanadesikan, 2011, p. 3). The ability to look back to a specific point in time during a lecture, or to revisit a slide from a classroom session, is a godsend to students within the educational systems of today's world, as it allows for the individual to refresh their own memory of events and topics of discussion, and affords the note-taker the ability to reevaluate, reinforce, and remember the important bits that may have slipped their mind.

What is happening, why is it happening, and who is instigating this change?

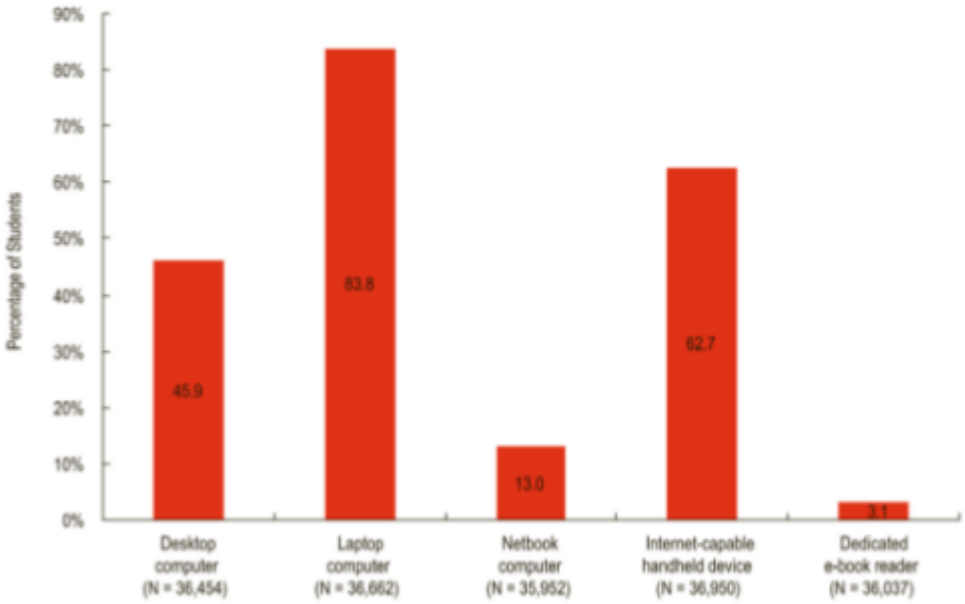
Around 1964, the first computer science departments began to appear in Canadian universities, and by 1989 about one third of Canadian professionals were utilizing computers in their workplace (Fisher, 2020). However, due to the immobile nature of these early machines, note taking in classroom settings was still being done utilizing pen and paper. With the onset of the popularity of portable laptop computers going into the 21st century, however, there began to be a shift away from the analog and over to the digital. This was evident even in the 1990’s, as data from an international comparative study of computers in education conducted by the International Association for the Evaluation of Educational Achievement indicated that almost all schools in industrialized nations incorporate activities within the classroom involving computers (Plomp, 1993). This increase in popularity of having computers within classroom settings brings up the question of if “the increasing use of computers in our schools reveals some indications of restructuring of [the school’s] functioning” (Plomp, 1993, p. 185). Coupled with this increase in use of personal computers within educational settings, it must also be noted that the infrastructure of schools has also shifted to accommodate this. This accommodation

Table 1
Percentage of schools with Internet and peripherals (DfES 2002)

	Primary	Secondary
Connected to the Internet	>99	>99
through a modem	9	-
through ISDN2	80	32
through ASDL	2	2
through broadband	9	66
Digital Cameras	90	99
Digital Projectors	41	78
Electronic interactive whiteboards	44	69
DVD	11	33
Schools with their own website	56	79

Selwyn, N. (2003). Exploring patterns of computer use in schools. *The Welsh Journal of Education*, *12*(1), 75-98.

typically takes the form of school-wide internet access, with the vast majority of primary and secondary institutions already having internet access all the way back in 2002, as seen in the above graph from a case study on patterns of computer use in UK schools by Neil Selwyn for Cardiff University. This apparent early acceptance of laptop use in school settings may be due to “educational innovators [having] touted technological advances in general and laptops with wireless connectivity more specifically as the next great educational innovations” (Fried, 2008, p. 906). The term “ubiquitous computing” comes up, and describes “a campus where all students and faculty have laptops and all buildings have access to wifi” (Fried, 2008, p. 906). While this is obviously not the case for every single school in the world, let alone in the country of Canada, the fact is that technological innovation is making its way into education, and “although new technologies may have different manifestations in educational and training settings, the computer is at present the dominant one in our regular schools and classrooms” (Plomp, 1993, p. 185), a sentiment that is verified and illustrated in the above figure taken from the ECAR Study of Undergraduate Students and Information Technology, a study of technological adoption in 127 U.S. and Canadian educational institutions (Smith, 2009).

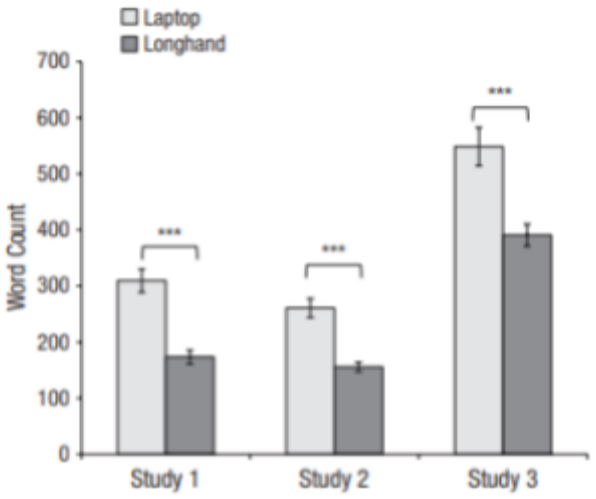


Smith, S. D., Salaway, G., Caruso, J. B., & Katz, R. N. (2009). The ECAR study of undergraduate students and information technology, 2009.

As to who is instigating this change, the balance of supply and demand is difficult to parse when considering the case of personal computer use. That being said, there is real evidence that this change in technological adoption started within the schools themselves, and was adopted from there:

> In compulsory education, it is perhaps unsurprising to discover that [...] schools are now spending more money on computers than ever before. It may also be unsurprising to discover that, as a result, schools have more computers for students and teachers to use.
> (Selwyn, 2003, p. 76).

This is also combined with the fact that for many users, typing on a computer tends to be a more efficient form of note-taking within a classroom setting over using the traditional pen and paper. It has gone so far as to be shown that "research has compared typing speed to writing speed and found that many individuals can type faster and more efficiently than they can hand write" (Bui, 2013, p.299). This is plainly evident when considering the data derived from a 2014 series of studies conducted by Pam A. Mueller and Daniel M. Oppenheimer, wherein they explore the benefits and downsides of digital note-taking compared to hand-written note taking practices. They found that while there are several negative effects, such as an overabundance of notes taken verbatim on a computer versus longhand (Mueller, 2014), it did show that students who typed their notes did so more efficiently and could write more words in the same amount of time, as seen in the adjacent figure.



Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological science*, *25*(6), 1159-1168.

There are a multitude of factors that apply when considering as to why this shift away from longhand or hand-written notes in an educational setting to the use of digital note-taking utilizing a computer, but one of the most documented reasons relates to economics. Schools are spending more and more money on integrating computers into their infrastructure. Relating back to the case study on patterns of computer use in UK schools by Neil Selwyn for Cardiff University, they recorded the amount of monetary expenditure that UK schools were utilizing for Information and Communications Technology, or ICT, between the years of 1986 to 2002, and the graphed figures shown adjacent illustrate that more and more money is being spent to incorporate ICT into

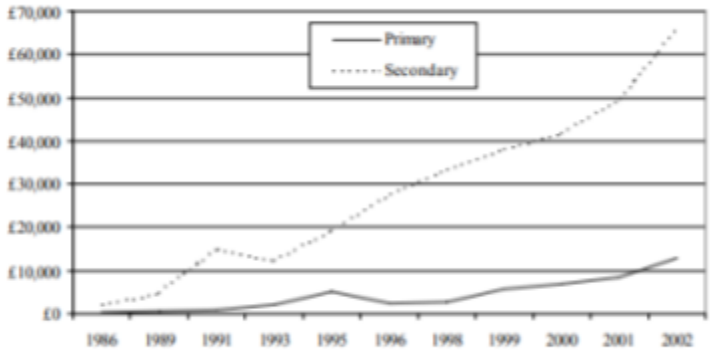


Figure 1
Average expenditure on ICT (excluding administration from 1993 onwards) by school sector (1986–2002)

Selwyn, N. (2003). Exploring patterns of computer use in schools. *The Welsh Journal of Education*, *12*(1), 75-98.

classrooms. Additionally to this expenditure on computers, there is the increased expenditure on the periphery of this technology as well, as illustrated previously in the figures shown in table 1. This includes the implementation of wifi connectivity, digital projectors that are able to be used in conjunction with computers, and other electronic paraphernalia such as cameras and digital whiteboards. The economic expenditure in order to acquire and integrate these resources function as a justification for the use of digital or electronic mediums within a classroom setting, and as such the use of personal computers as note-taking devices increases as well. The school has paid to have internet access in every classroom, so why not utilize it for in-class purposes?

Another factor that contributes to the use of digital note-taking replacing hand-written notes is the cultural implications of needing to integrate with technological advances in order to remain successful in the 21st century. This can be seen even in governmental policy, as illustrated by the British Columbian Government's implementation of a digital literacy framework for BC schools. The BC government stipulates that digital literacy characteristics are necessary, and that "these characteristics are based on the National Educations Technology Standards for Students (NETS•S) standards developed by the International Society for Technology in Education (ISTE) and encompass the types of knowledge and skills learners need to be successful in the 21st century" (BC Gov, n.d., p. 1). The characteristics inquisition relate to the use of digital tools to gather, evaluate, and use information, to construct knowledge, to demonstrate understanding of technological concepts, systems, operations, and use digital media and environments to communicate and contribute to individual learning (BC Gov, n.d). They also specifically note that "A digitally literate person uses technology to improve his/her ability to gather, organize, analyze and judge the relevance and purpose of digital information" (BC Gov, n.d., p.2), illustrating the need to understand how to utilize digital note-taking to its fullest extent and benefits.

Lastly, there is the factor of use and usability in pushing individuals in the education sectors toward eschewing hand-written note taking practices for digital note-taking. As we progress into the 21st century, computers are becoming more and more commonplace, as "print now depends on the electronic too, in the sense that printed materials find it necessary to compete against digital technologies in order to hold their readers" (Bolter, 2001, p. 46). As illustrated by the data shown in the Selwyn article and graphics discussed above, schools are spending more money to put more computers into more classrooms. As such, more tasks are being relegated to an online medium in educational settings; course home pages, assignment drop boxes, online discussion forums, internet-based research portals, and of course, the requirement to submit assignments in a typed, and often digital, format. As Woolgar mentions in their article on Configuring the User, "user configuration involves boundary work. The user's character and capacity, [their] possible future actions are structured and defined in relation to the machine" (Woolgar, 1990, p. 89). As even the Government of British Columbia, Canada recognizes, today we live in a technology based world (BC Gov, n.d.), and having technology-based skills are the skills that "learners need to be successful in the 21st century" (BC Gov, n.d., p.1). This increase in focused usability is not without merit; as shown in the words per minute graphic from the 2014 Mueller article discussed above, individuals who find

themselves in technology-rich environments, such as schools, are often more competent at typing than they are at longform handwriting. It becomes a case of users reconfiguring their environment and their use, and in turn being reconfigured themselves as well. As an aside, in my own personal experience in education, specifically whilst completing my undergraduate degree, if a student struggled with hand dexterity or hand mobility, they would invariably favor utilizing a computer to perform their note-taking, and were even given affordances to do so in classes where computers were otherwise forbidden. An even further testament to the use and usability power of digital note-taking, these individuals would be allowed to write in-class exams and activities using a digital medium, despite the fact that these activities are typically the last hold-out against digital writing practices in a classroom setting. This highlights the obvious use and usability of a laptop computer in a note-taking role, as they are accepted affordances for individuals who would have otherwise struggled to maintain the same level of ability as their peers. As Issa & Isaias point out in their article on Usability and Human Computer Interaction, usability is “needed in any design, including sustainable design to recognize the new smart technology and portable device needs from designers and users perspective” (Issa, 2015, p. 35). The use of digital note-taking fits the mold of usability when considering the economic, cultural, and usability based factors that surround education and note-taking practices.

References

BC Government. (n.d.). *Digital Literacy.* Government of British Columbia. https://www2.gov.bc.ca/gov/content/education-training/k-12/teach/resources-for-teachers/digital-literacy

Bolter, J. D. (2001). *Writing space: Computers, hypertext, and the remediation of print*. (Chapter 3). Lawrence Erlbaum Associates.

Bui, D. C. (2013). *Note-taking with computers: Exploring alternative strategies for improved recall.* American Psychological Association. doi:10.1037/a0030367

Fisher, S., & Sim, S. (2020). Computers and Canadian Society. In *The Canadian Encyclopedia*. Retrieved from https://www.thecanadianencyclopedia.ca/en/article/computers-and-society

Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers & Education, 50*(3), 906-914. 10.1016/j.compedu.2006.09.006

Gnanadesikan, A.E. (2011). The first IT revolution. In *The writing revolution: Cuneiform to the Internet* (pp. 1-12). John Wiley & Sons

Issa, T., & Isaias, P. (2015). Usability and human computer interaction (HCI). In *Sustainable Design* (pp. 19-35). Springer.

Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological science*, *25*(6), 1159-1168.

Plomp, T., & Pelgrum, W. J. (1993). Restructuring of schools as a consequence of computer use? International Journal of Educational Research, 19(2), 185–195. https://doi.org/10.1016/0883-0355(93)90027-H

Selwyn, N. (2003). Exploring patterns of computer use in schools. *The Welsh Journal of Education*, *12*(1), 75-98.

Smith, S. D., Salaway, G., Caruso, J. B., & Katz, R. N. (2009). The ECAR study of undergraduate students and information technology, 2009.

Woolgar, S. (1990). Configuring the user: The case of usability trials. *The Sociological Review*, *38*(1, Suppl.), S58-S99.