School Children, Education, and the Digital Divide

Laura Scott

522: Information Access and Resources

Linda Marion, Instructor

March 18, 2010
Introduction

This bibliography covers empirical scholarly research on the topic of the digital divide related to primary and secondary education, in the United States and globally. It reflects the shift away from defining the digital divide in terms of mere Internet access (“haves” and “have nots”) and focuses on the more comprehensive issue of access and usage of information and communication technologies (ICT). Due to the rapid and constant advances in technology, currency of articles was an important factor for selection; articles were published between 2001 and 2010. Particular attention was paid to the instrumental role of teachers in narrowing the digital divide. Differences between school and home Internet access are also highlighted. The articles represent multiple developed and developing countries, including Scotland, Germany, Turkey, Australia, the Netherlands, Singapore, the Philippines, Nigeria, Chile, and the United States. Within the United States, Northern California’s Silicon Valley, California’s Latino populations, Oklahoma, and New York City are represented. All research was available in the English language. Together, these studies demonstrate that the digital divide exists globally, nationally, regionally, and even within individual classrooms.

Description

The digital divide describes the gap between those who have Internet access and those do not; more broadly speaking, it describes any disparity in information and communication technologies (ICT). Inequalities have always existed in education, within countries and globally. In the past two decades, ICT have developed rapidly and exponentially. Many developing countries look hopefully to ICT to narrow the divide and afford their people competitive educations to enter the global economy in meaningful ways. However, the reality is often that ICT only further the existing inequalities by providing the information “haves” with more
opportunities. Research is divided as to whether the digital divide has widened or narrowed since the advent of new ICT in the past twenty years. It is not enough to measure the digital divide only according to Internet access. Research has shown that access does not imply effective use of ICT. Attention must be given to the ability of schools and teachers to effectively utilize ICT in their classrooms. Attention must also be given to the ICT skills and usages of students, at home and school, which are determinants of academic achievement and future success. This is a growing body of literature that is evolving with technology developments; it must account for multiple variables, such as socio-economic status, gender, ethnicity, and location. More research is needed to study how these variables relate to students’ ICT skills, attitudes towards ICT, academic performance, and preferred uses of ICT. Longitudinal studies that follow children through their education and careers would be very beneficial to study the long-term effects of ICT access and use. This type of research does not currently exist, given the recent and rapid advances in ICT. Students’ involvement with ICT has been shown to be quite dependent on teachers’ skills, attitudes, and use of ICT in the classroom. Teachers are hard-pressed to effectively use ICT in the classroom and need more support from administrators; this is an area of the literature that has become increasingly prevalent in the past decade. There is a lot at stake with children’s education today, and the issue of the digital divide continues to increase in scope and application; it remains a topic that demands attention globally, within small communities, and everywhere in between.
Literature Review

Research on the digital divide in relation to elementary and secondary education covers a broad array of topics and touches on multiple issues. Inequalities in education, typically measured by ICT access and usage, are influenced by many compounding factors, ranging from a country’s developmental level to teachers’ attitudes towards ICT to the socio-economic status of individuals. Research studies have been constructed to both isolate these factors and combine them. Preferred methods of research tend towards interviews, questionnaires and surveys, and classroom observations; new research is often compared to existing statistics.

Many research studies examine differences that exist because of geographic location. At perhaps the broadest level, research studies have compared countries against one another. Rodrigo gathered her data on the status of ICT access and use in education in the Philippines in order to compare it against existing statistics of other developing countries (2005, p. 56). Gunduz (2010), Aduwa-Ogiegbe and Iyamu (2009), and Lim (2009) studied educational ICT inequalities across their respective countries, Turkey, Nigeria, and Singapore. Other researchers narrow their scope to cities. Huang and Russell (2006) looked at the Oklahoma public schools and Cuban, Kirkpatrick, and Peck (2001) concerned themselves with high schools in Northern California’s Silicon Valley.

Another geographic distinction that is frequently made in the literature is whether or not a school is urban or rural. Particularly in developing countries, rural schools tend to be of lower socio-economic classes, and urban schools tend to be comparatively more privileged. Although all secondary schools in Southwestern Nigeria have inadequate access to computers, urban schools have received more funding and have more computer access than their rural counterparts; rural schools also have worse infrastructure. In fact, urban schools have higher
rates of every kind of computer use, be it e-mail, downloading, writing, programming, etc., than rural schools (Aduwa-Ogiebean & Iyamu, 2009, p. 81). Similarly, Salinas and Sanchez (2009) report that rural schools in Chile are particularly vulnerable to poor ICT access and use due to poverty and poor infrastructure (p. 573). In contrast, many U.S. urban areas have under-privileged schools and high poverty levels. Mouza’s article on laptops initiative is concerned exclusively with reducing ICT inequalities in New York City’s underserved schools (2008).

Regardless of geographic location, a child’s socio-economic status is one of the biggest determinants of ICT access and effective use. Rodrigo’s study of the Philippines paints a grim picture of an entire country that has low socio-economic status. “Filipino students cannot access, process, and contribute to digital content to the same extent as their counterparts in other countries. Therefore, they cannot participate fully in the digital world” (2005, p. 66). Gunduz finds that elementary school students in Turkey who are from low socio-economic backgrounds have lower average grades, which he attributes to a lack of Internet and computer access within the home (2010, p. 51). There is a significant amount of research that finds a similar correlation between low socio-economic status, a lack of home computer and Internet access, and educational disadvantages.

Although schools are excellent places for students to be exposed to and learn about ICT, home access is becomingly increasingly important. Henderson and Honan have found that teachers of students in low socio-economic communities tend to underestimate students’ use of computers outside the classroom and tend not to incorporate computers and the Internet into their teaching (2008, p. 93). It is generally accepted that students with home computers and home Internet access have an advantage over their peers who lack this (Gunduz, 2010; Huang & Russel, 2006; Salinas & Sanchez, 2009). In their study of two low socio-economic classrooms,
Henderson and Honan write that the divide may be shifting to be “between the rich literate practices used by young people in their homes and the narrow and restricted practices engaged in by schools and teachers” (2008, p. 86). Lebens, Graff, and Mayer make a similar discovery in their assessment of information-poor children’s attitudes towards computer and Internet use. They have found that students who experiment with their home computers advance well beyond students who only use computers at school (2009, p. 263). This creates feelings of inferiority in students who sense they are not as advanced as their peers; they also use school computers more cautiously and infrequently, furthering the existing divide (p. 264). A study of gender and ethnic differences in ICT use, access, and attitudes presents other determining factors beyond socio-economic status (Volman, van Eck, Heemskerk, & Kuiper, 2004). The digital divide cannot be reduced to a single factor. Lim’s study of young Singaporeans’ Internet access and use presents an interesting contrast to the existing data. Not all of the students in her study had home computers and Internet; those without home access, however, knew where they could go to get it, if they needed or wanted it (2009, 1228). Interestingly, those without home computers and Internet access were not necessarily of low socio-economic status. Lim’s study is somewhat of an exception in the literature and may be specific to Singapore, a country that has a 99.9% broadband Internet penetration rate (p. 1229).

Another interesting related research study is the Drumchapel Project (McLelland & Crawford, 2004). Students who lacked home Internet access were able to compensate for it through their schooling. This is uncommon in the research (Warschauer, Knobel, & Stone, 2004; Lebens et al., 2009; Volman et al., 2004) although not nonexistent. Successful implementation of ICT into classrooms has occurred and is very dependent on the teacher’s integration of ICT into their teaching. At Drumchapel, an underprivileged high school in Glasgow, for example, funding
was provided for the express purpose of improving ICT use in students’ education at school. The research found that teachers put the funding to good use; their expertise and awareness benefited the students’ learning (McLelland & Crawford, 2004, p. 65). Consequently, students from this deprived area tested at similar ICT skill levels as their more affluent peers and were deemed equally ready for postsecondary education.

Another success story, at the elementary school level, is a laptop initiative program implemented in an urban, under-privileged school. Teachers in the laptop program played a huge role in narrowing the divide, just as teachers at Drumchapel high school did. Teachers used laptops for project-based learning, knowledge sharing, and creativity which motivated students to work harder and built their self-confidence. Laptop initiates are recommended elsewhere in the literature as possible solutions to narrowing educational inequalities created by uneven ICT access and usage (Warschauer et al., 2004, p. 586). Teachers’ skill level, enthusiasm, and ability to integrate ICT into their teaching style is consistently mentioned in the literature as a way to reduce educational inequalities. This is no easy feat. Research indicates that teachers with low credentials and qualifications tend to teach in low socio-economic areas (Warschauer et al., 2004; Huang & Russell, 2006; Henderson & Honan, 2008). These schools also tend to have defective technologies (Cuban et al., 2001, p. 829). It is lacking in this literature, but school libraries represent another possible solution to problems of ICT access and use.

Throughout the literature there is an inter-play between ICT access and use. The digital divide in schools is no longer a matter of getting computer terminals into classrooms; it is about using all technologies effectively. Multiple barriers prevent this from happening. Teachers in California high schools report that their desire to integrate and teach ICT “loses out repeatedly to stronger pressures to raise the school’s overall Academic Performance Index” (Warschauer et al.,
Scott, 8

2004, p. 582). Huang and Russell report that within the Oklahoma public school system, ICT budgets cannot meet anything but the most basic needs (2006, p. 129). Another study examines why even schools with high access often have low use of technologies, finding that access alone is not sufficient. Schools need IT departments or at least support staff. Schools of higher socio-economic status are more likely to have these resources (Cuban et al., 2001, p. 817). Teachers need training to effectively use ICT. It is also recommended in one study that teachers approach ICT with sensitivities towards gender and ethnicity (Volman et al., 2005, p. 53).

Research on the digital divide in schools will continue to grow as new technologies emerge and countries push for better education for their children. Although significant research has been done, more is needed to better understand and eliminate inequalities in education, nationally and globally. More effective solutions are needed to narrow the ICT divide that exists among school children.
Annotated Bibliography

Entry 1:

Search strategy: This was one of my first searches in LISA, and I wanted to see what kinds of information might be available. I discovered that “digital divide” is a descriptor so I used this information to build a search.

Search method: Controlled vocabulary and keyword search

Database searched (if applicable): LISA

Search string (if applicable):
DE=(digital divide) and KW=schoo*

Date range: 2005-2010

Limit results to peer-reviewed journals (5 results)

Abstract: The purpose of this study was to determine the availability and use of classroom computers in urban and rural schools in Southwestern Nigeria. Data for the study was collected through a structured questionnaire which was administered to 540 (300 male and 240 female) teachers in the schools. The result indicated that the urban schools were better equipped with computers than the rural schools. Recommendations were made as to how the situation can be improved in terms of computer supply and usage in the schools. [Excerpt from published abstract.]

Annotation: The underlying assumption driving this research is that information and communication technologies (ICT) are transforming education, but teachers in developing
countries are not using ICT to educate school children. Digital divides exist within developing countries, in this case, Nigeria, based upon school location. The sample was quite representative, looking at 50 schools and 600 teachers (half rural, half urban). The questionnaires were comprehensive, asking subjective and objective questions; they are included with the article and could be used to study other developing countries. Research found that ICT was inadequate at rural and urban schools, but worse in rural schools. Judging Nigeria’s schools against one other, instead of against developed countries’ schools, is an effective way for rural schools to petition for more funding. However, the author’s assertion that more funding is needed is not a sufficient solution; support and teacher training are desperately needed to effectively use new technologies.

Entry 2:

Search strategy: I really liked Salinas and Sanchez’s article about Internet use in rural schools in Chile, so I searched for it in Web of Science and looked at its list of citations to find the body of research that they had read and deemed valuable.

Search method: Citation search

Database searched (if applicable): Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index)

Search string (if applicable): *Referenced in:*

I then searched Web of Science:

Author=Salinas, A*

Timespan: 2009

I then clicked on her references and scrolled through all 40, looking for any that might be applicable to this bibliography and found Cuban’s article.

Abstract: Most policy makers, corporate executives, practitioners, and parents assume that wiring schools, buying hardware and software, and distributing the equipment throughout will lead to abundant classroom use by teachers and students and improved teaching and learning. This article examines these assumptions in two high schools located in the heart of technological progress, Northern California's Silicon Valley. The qualitative methodology, included interviews with teachers, students, and administrators, classroom observations, review of school documents, and surveys of both teachers and students in the two high schools. We found that access to equipment and software seldom led to widespread teacher and student use. [Published abstract.]

Annotation: This research attempts to explain why schools that have access to the best technologies do not also have high usage rates. Two Northern California high schools with diverse student populations and many minorities participated in this study; however, contrary to much of the literature, race and socio-economic status did not seem to influence ICT access or use. This is an unexpected result that should be studied further. Teachers, who tended to use traditional instructional approaches, had a substantial influence on ICT usage. A lack of time to incorporate technology into teaching and defective technology prevented teachers from integrating ICT. This is a crucial finding that supports the argument for providing teachers with training and support to utilize technology. Access does not imply usage. Note that this study was conducted in 2001, so access and usage rates may have improved in the past ten years.
Entry 3:


**Search strategy:** Early in my research I found a literature review of the research conducted during the 1980s on ethnicity, gender, and socio-economic status in K-12 schools uses of computers. (I found this searching in ERIC, using the descriptors “academic achievement” and “computer uses in education” and the keyword “school”).


Although this research (1980s) did not fall within the scope of this bibliography, I thought that other researchers might have cited this review, so I used Web of Science to find who cited it.

**Search method:** Citation search

**Database searched (if applicable):** Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index)

**Search string (if applicable):**

I did a Cited Reference Search for:

Cited Author=(sutton, r*) AND Cited Year=(1991)

Then I limited to the Cited Work “Rev Educ Res” and found 67 results, which I scrolled through and found Gunduz’s article.

**Abstract:** Use of Information and Communication Technologies (ICT) in education has been an important concern in many countries. In this sense, the purpose of this research is to assess the digital divide conditions and the affects of on school rank and grades. This research was carried
out in 7 counties including Sakarya city center and 6 counties involving 375 elementary schools in Sakarya city center and 12 counties it has and 7 of them are private elementary schools. Data of the research have been collected via questionnaire prepared by the researcher. It is seen that while most of the students, who ranked in top ten in the Level Assessment Exam (STS), have computer and internet in their homes, those who ranked "last ten" do not have computer and internet in their homes. When it is examined thoroughly, there is a digital divide between primary school students. It is believed that, this situation goes in parallel with the socio-economic status of the families. [Excerpt from published abstract.]

**Annotation:** This research study demonstrated that a digital divide exists among primary school students in Turkey, based upon socio-economic status. This currency of this research is crucial, showing that the digital divide is not closed. Lack of home computers and Internet access are proven educational disadvantages, and it is the economically poorer students who lack these, reinforcing their existing low socio-economic status. Since children’s ICT access and usage affects their future employment and earnings, this study very aptly emphasizes that more be done to eliminate this ICT gap. The author suggests that technology should be financially available for all social classes, but does not suggest how this would be feasible. The author fails to recognize that technology alone is not the answer. The author also neglects to consider other factors that might influence ICT access and usage, accepting as causal a relationship that might be correlative.

**Entry 4:**


Search strategy: Since I had been having success searching ERIC (through Dialog) using controlled vocabulary descriptors, I took a closer look at other related articles in ERIC and selected appropriate descriptors. I have discovered that ERIC’s preferred term for “digital divide” is a combination of two other descriptors: “disadvantaged” and “access to computers.”

Search method: Controlled vocabulary

Database searched (if applicable): ERIC [Dialog File 1]

Search string (if applicable):
? s disadvantaged/de and access to computers/de and py=2005:2010 and foreign countries/de

Abstract: The teaching of digital literacies is regarded as an important facet of literacy teaching in the 21st century. [...] This article reports on an investigation into the usage of digital technologies in two middle-years classrooms in low socioeconomic suburbs in a regional Australian city. Using a range of ethnographic techniques, the study explored two teachers' approaches to teaching students how to use digital technologies in one school term. Through snapshots of digital practices in the two classrooms, three issues are considered: teachers' pedagogical approaches; students' access to digital technologies at home and at school; and the teachers' recognition of students' prior knowledge of digital technologies. [Excerpt from published abstract.]

Annotation: The pedagogy of teachers is an important aspect of the digital divide to consider when assessing students’ use of computers at schools. Although the sample size of this research was small (two classrooms, 50 students), the sample was carefully chosen to represent the lowest socio-economic areas in suburban Australia. Three significant discoveries were made about teachers in these schools. They underestimated students’ knowledge of technologies, failed to validate uses of technologies employed outside of school, and struggled to incorporate ICT usage
into their classes. More research is needed to confirm that these findings are representative. Nevertheless, this study reinforces how crucial teachers’ attitudes and practices with ICT are in shaping children’s education. The article suggests that teachers need to work harder to understand the home/school technology connection better but fails to make practical suggestions. The authors provide an excellent list of references for further study into this topic.

Entry 5:

**Search strategy:** I did a basic keyword search, limiting by date range and publication type to narrow my results and also get an understanding of what kind of research was available and what preferred terms were. This was one of my initial searches.

**Search method:** Keyword search

**Database searched (if applicable):** LISA

**Search string (if applicable):**

KW=(digital divide) and KW=school*

Date range=2005-2010

Then I limited by publication type: Peer-reviewed journals. (This gave me 24 results.)

**Abstract:** This paper aims to find out the degrees of students' access to computers and the Internet, and to explore the relationship between technology accessibility and academic achievement. The research, conducted through questionnaires, focuses on fifth-grade students in the Oklahoma City metropolitan area because state-mandated test results for core subjects are available at the state Department of Education web site. Thus, it allows the researchers to collect
data on both technology accessibility and academic achievement. The findings show that the
digital divide still exists, cutting through various socioeconomic factors; and that the relationship
between technology accessibility and academic achievement may also exist, although it is very
much complicated by other compounding factors, such as the subjects of learning, the uses of
technology, and socioeconomic conditions [Excerpt from published author abstract.]

**Annotation:** The goal of this research was to find out if socio-economic factors still affected
academic achievement; the authors compared new empirical research against existing state
testing data. A direct relationship was found between technology accessibility/use and math,
reading, and science scores. Socio-economic status often determines accessibility/use, making it
an enduring factor; however, the authors readily admit that other factors are involved. They
present their findings clearly and honestly, utilizing numerous tables. Based on their research,
they make many practical suggestions, a very important contribution. They suggest that schools
write grants to increase their ICT budget and that school systems provide training for teachers to
help them integrate technology in their classes. Huang has published several articles on different
aspects of the digital divide, all of which are cited by multiple other research studies.

**Entry 6:**
attitudes towards computers in a technology-rich environment. *Educational Media
International, 46*(3), 255-266.

**Search strategy:** Since my topic is the digital divide as it relates to education, I have found
ERIC to be an excellent resource. I decided to search for very recent articles looking for
keywords in abstracts. My search string (below) yielded just three results.
**Search method:** Keyword search

**Database searched (if applicable):** ERIC [Dialog File 1]

**Search string (if applicable):**

s py=2009:2010 and dt=journal articles and (digital(divide)/ab and (child or children)/ab

**Abstract:** Given that children in Germany with a lower socio-economic status (SES) are over-represented at general secondary schools, the present study aimed to examine the impact of children's SES on attitudes towards computers. The results suggest that compared to average SES students, children from deprived socio-economic backgrounds perceive the computer as important but remain generally more cautious towards computers, despite being exposed to a "technologically rich environment", where computer-based instruction is part of the curriculum and ensures frequent access to high quality ICT devices. The findings add further support to the notion that the mere provision of ICT access is not sufficient to close the digital divide. [Excerpt from published abstract.]

**Annotation:** This study sought to determine attitudes of children from low socio-economic backgrounds towards ICT in Germany. Findings indicate that even when ICT access at school is equal, students from low socio-economic status backgrounds are less confident and less skilled in utilizing school computers and Internet access than students from high socio-economic backgrounds. These students are often embarrassed, shying away from using ICT, further exasperating the divide. This study adds a very human element to the equation by considering how children’s feelings can hinder their learning. This research proves that digital divides exist even within classrooms. The authors are right to recommend that supportive school environments, remedial classes, and other techniques are needed to encourage all students to try
their hand at ICT. This article is highly recommended because it personalizes the digital divide, a topic easily reduced to numbers and statistics.

**Entry 7:**


**Search strategy:** Since I had already searched the relevant databases available through Hagerty and Dialog, I decided to try Google Scholar to see if their search engine retrieved any new results.

**Search method:** Advanced Google Scholar search (Keyword search)

**Database searched (if applicable):** n/a

**Search string (if applicable):**

I am including a screenshot because it is difficult to explain the search done in Google scholar:
Abstract: This paper studied uneven Internet access amongst young people in Singapore. The study finds that young Singaporeans access the Internet mainly through home, school, borrowed, public, and mobile sources, with different implications for each type of Internet access. [...] The study also finds that although systematic incorporation of IT into the national curriculum can encourage parity in basic exposure to online skills, developing greater Internet proficiency is more likely with home Internet access. [Excerpt from published abstract.]

Annotation: This article is unique in that it examines uneven Internet access in a country that has affordable and pervasive broadband Internet access, as well as a national curriculum that incorporates Internet use into education. Surprisingly, not all students had home Internet access, although accessing it nearby was easy. Many relied on school computers and associated Internet use more with education than entertainment or communication. The study also found that home use was more likely to help students develop advanced skills than school use. This is a very important discovery because many government policies focus their attention on ICT in schools. It should be noted that this situation may be unique to Singapore, and that if the schools incorporated ICT better, they might be more beneficial to students. One limit of this study is that is does not take non-users into account, looking exclusively at habits of users.

Entry 8:


Search strategy: I used ERIC’s online Thesaurus to find the preferred terms to use for “digital divide” and discovered it was a combination of terms: “disadvantaged” and “access to
Scott, 20

computers”. I then used these terms to search ERIC on Dialog. I selected what sounded like the best references from Dialog and searched them in ERIC to determine which fitted my topic best.

**Search method:** Controlled vocabulary

**Database searched (if applicable):** ERIC [Dialog File 1]

**Search string (if applicable):**

s dt=research and disadvantaged/de and access to computers/de and py=2000:2010

**Abstract:** Drumchapel High School is a secondary school in a deprived area of Glasgow. The initial aim of the study was to explore ICT skill levels among the school pupils. Focus groups of pupils and questionnaires, administered to both students and staff, were used. The questionnaires were also administered to staff and students in a school in a more affluent area of Glasgow for comparative purposes (Hyndland Secondary School). Home computer ownership was found to be higher than expected and ICT skills levels were comparable to Hyndland pupils. Drumchapel High School was found to be where pupils learned most of their skills. […] The need for an integrated information literacy/ICT skills training strategy linking secondary and tertiary education was the main finding. [Excerpt from published abstract.]

**Annotation:** This study investigated and compared the ICT skills and Internet access of high school students in a deprived area of Glasgow (Drumchapel) with high school students in an affluent area of Glasgow. Qualitative studies revealed that, although Drumchapel students had fewer home computers and Internet access, they were equally prepared with the ICT skills needed to succeed in postsecondary education. This may be due to the fact that two years prior to this research, Drumchapel received funding to improve its ICT. However, this study does not report data prior to Drumchapel receiving funding; this is a major weakness. We can only infer that funding helped alleviate disparities. This study did demonstrate that teachers’ attitudes and
knowledge of ICT have huge impacts on ICT use in both schools. As other research indicates, funding alone does not bridge digital divides – teachers and schools who put the funding to work do.

**Entry 9:**


**Search strategy:** I used Dialog to search ERIC because ERIC contains a wealth of information related to education. I searched ERIC’s online Thesaurus to find descriptors. I limited my search using document type, publication years, and descriptors. I accessed ERIC through Hagerty’s website to find the full text article.

**Search method:** Controlled vocabulary

**Database searched (if applicable):** ERIC [Dialog File 1]

**Search string (if applicable):**

? s dt=research and py=2005:2010 and (disadvantaged schools)/de and (academic achievement)/de

**Abstract:** This study examined the implementation and outcomes of a laptop program initiative in a predominantly low-income, minority school. Both quantitative and qualitative data were collected, analyzed, and compared with students in non-laptop classrooms within the same school. Results of the study revealed that in the hands of well-prepared teachers, laptops enabled disadvantaged students to engage in powerful learning experiences. [Q]ualitative data indicated that laptop integration created enhanced motivation and engagement with schoolwork, influenced classroom interactions, and empowered students. [Excerpt from published abstract.]
Annotation: Laptop initiatives are increasingly popular among low socio-economic school systems; however, helping teachers integrate laptops and ICT into classrooms is a huge challenge. This study is unique because the teachers used laptops for project-based learning, knowledge sharing, and creativity (not rote drills and word processing). The laptop students were more motivated and interested in their schoolwork than their non-laptop peers. Laptop use facilitated collaboration, boosted student confidence, and improved writing and math skills. This study makes as strong argument for adopting laptop initiatives to bridge digital and didactic divides. Much of the success of this laptop initiative should be credited to the outstanding teachers. This study had several limitations: it focused on one school, lacked data prior to the study, and did not employ teachers uninterested in ICT. Nevertheless, it is important because it demonstrates a repeatable initiative in bridging the digital divide and proves how influential teachers are.

Entry 10:

Search strategy: I have found a number of great articles using Web of Science, so I decided to use it to find more of my final articles. I searched under topics using keywords that had been called out in other articles.

Search method: Keyword search

Database searched (if applicable): Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index)
Search string (if applicable):

Topic=(digital divide) AND Topic=(school*) AND Topic=(developing countr*)

Refined by: Document Type=(ARTICLE)

Timespan=2000-2010.

Abstract: The researcher quantified the digital divide that existed between schools in Metro Manila, Philippines and schools in countries surveyed by the International Association for the Evaluation of Educational Achievement. The researcher determined that unlike students in other countries, students in Metro Manila schools had limited access to computers, software, and the Internet. This implies that Metro Manila students are among the digital poor, with fewer opportunities to access, process, and contribute to digital content. [Abstract from publisher.]

Note that the researcher used the same methodologies (mail-in questionnaires) as the IEA used as her research method for the Metro Manila schools and then compared the results of both studies to draw her conclusions. IEA did not include the Philippines in their research.

Annotation: This is an excellent study of the digital divide affecting Philippine schools; it gathered empirical data (otherwise unavailable) and then compared it to data on other developing countries. The sample was huge, representing all public and private elementary and secondary schools in the city of Metro Manila. The study finds that students in the Philippines are among the global digital poor, unable to participate in the digital world in a meaningful way. This study confirms many of the same problems that other literature asserts: inadequate infrastructure, high ratio of students to computers, poor Internet access, fewer opportunities to engage ICTs, little use of ICT in education even when available. This research discredits any theorists who claim the
digital divide is a thing of the past. It also stands as a stark comparison to the state of the information poor in the developed world.

Entry 11:

Search strategy: I used Dialog to search ERIC because ERIC contains a wealth of information related to education. I limited my search using document type, publication years, descriptors, and a keyword search for “digital divide” since it is not a descriptor. Then I accessed ERIC through Hagerty’s website to find the full text article.

Search method: Controlled vocabulary

Database searched (if applicable): ERIC [Dialog File 1]

Search string (if applicable):
s dt=research and education/de and digital(divide) and py=2009:2010

Abstract: This paper analyzes the teacher’s contribution to improving digital inclusion in Chilean rural schools, using a multidimensional definition of the digital divide. Data was obtained from interviews and surveys applied to teachers and students from 145 rural schools. Results show that teachers function as gatekeepers. They do not teach students how to use ICT explicitly, but when teachers have high expectations, skills and technology access, this leads to conditions for students learning how to use ICT. Finally, the data contributes to a better understanding of the new role that teachers and schools play in rural areas in terms of social and symbolic integration. [Published abstract.]
Annotation: This study examines how teachers might help bridge the digital divide among students in rural schools in Chile. 145 rural schools were sampled, making this fairly representative; however, the authors welcome more research into the examination of the role of teachers. Findings indicate that teachers are “gatekeepers” of ICT – they do not teach students how to use ICT, but they expect students to use ICT to improve their education and socio-economic status in life. Since teachers do influence students’ success with ICT, school administration and government should encourage and enable teachers to incorporate ICT into their curricula. The teachers in Chile have a huge room for improvement for engaging ICT. This article makes a strong case for providing teachers with the training they need to be effective in the classroom. Excellent references are included.

Entry 12:

Search strategy: I searched the Web of Science hoping to find articles that would have been cited many times or have great references. You can see my general search terms below; I browsed through many results to get an idea of what type of research was available, to better focus my search as my research progressed.

Search method: Keyword search and Browsing

Database searched (if applicable): Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index)

Search string (if applicable):
Topic=(ICT) AND Topic=(primary or secondary) AND Topic=(education)

Time span=2005-2010.

Abstract: This paper investigates the accessibility and attractiveness of different types of ICT applications in education for girls and boys and for pupils from families with an ethnic minority background and from the majority population in the Netherlands. A study was conducted in seven schools (primary and secondary). Data were collected on participation, ICT skills and learning results, ICT attitudes and the learning approach of pupils. A total of 213 pupils completed a questionnaire and interviews were held with 48 pupils and 12 teachers. Gender differences, especially in primary education, appeared to be small. In secondary education, the computer attitude of girls seems to be less positive than that of boys. […] Pupils from an ethnic-minority background in both primary and secondary education appear to consider themselves to be less skilled ICT users than pupils from the majority population. […] Differences between pupils from an ethnic-minority background and from the majority population in access to certain forms of ICT use out of school are confirmed at school instead of being compensated for. The paper concludes with some recommendations on a diversity-oriented ICT policy at school level.

[Excerpt from published abstract.]

Annotation: Rather than focusing on socio-economic status as the major factor influencing ICT use and access, this study looks at gender and ethnicity in primary and secondary schools. It is also unique in that it compares the results of the two school levels, which could indicate that age is a factor. The authors present a very thorough, organized, well written explanation of their methods; their research warrants further investigation. They relate ICT use with gender and ethnicity in a variety of ways. Many of their results could serve as starting points for other research projects. One very significant finding is that schools are not compensating for ICT
inequalities outside of school; instead they are reinforcing the existing divides. The authors make a strong case for building gender and cultural sensitivities in education policy and teaching methods.

**Entry 13:**


**Search strategy:** I have been checking the references at the end of each article to see what other authors used in their research. I found an article that looked particularly appropriate to my topic so I hunted it down using Web of Science.

**Search method:** Footnote chasing and author search

**Database searched (if applicable):** Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index)

**Search string (if applicable): Referenced in:**


I then searched Web of Science:

Author=Warschauer, M*

Timespan: 2004

**Abstract:** This qualitative study compared the availability of access to, and use of new technologies in a group of low- and high socioeconomic status (SES) California high schools. Although student-computer ratios in the schools were similar the social contexts of computer use differed, with low-SES schools affected by uneven human support networks, irregular home
access to computers by students, and pressure to raise school test scores while addressing the needs of large numbers of English learners. These differences were expressed within three main patterns of technology access and use, labeled performativity, workability, and complexity, each of which shaped schools' efforts to deploy new technologies for academic preparation.

[Published abstract.]

**Annotation:** Although this is an older article, it presents some of the most thorough and pointed research on the digital divide in U.S. schools. It was designed to be larger in scale and broader in scope than existing research. It studies eight high schools in California; half of low socio-economic status with large Latino immigrant populations and half of high socio-economic status. Both sets of schools encountered similar ICT-related problems, but schools from high socio-economic status had the resources and funding to solve the problems whereas the low socio-economic schools did not. This makes a strong case that schools need credentialed and qualified teachers, IT support, reliable networks, and adequate funding – in addition to ICT access. It also found that teachers do not have time to build better learning environments using ICT because they are pressured to meet API goals, and, in low socio-economic communities, spend a substantial amount of time on remedial skills with immigrant populations. Data is presented in table format, as well as text, making it very accessible.