

4-1-2015

Teachers' needs and preparation to use technology in the U.S. and Japan K-12: Learning from teachers

Svjetlana Curcic
University of Mississippi

Makito Yurita
Shimane University

Kathryn Young
Metropolitan State University of Denver

Lori Wolff
University of Mississippi

Ziazi Ziazi
National Louis University

See next page for additional authors

Follow this and additional works at: <https://egrove.olemiss.edu/jcre>



Part of the [Educational Technology Commons](#)

Recommended Citation

Curcic, Svjetlana; Yurita, Makito; Young, Kathryn; Wolff, Lori; Ziazi, Ziazi; and Garcia Ansani, Elena (2015) "Teachers' needs and preparation to use technology in the U.S. and Japan K-12: Learning from teachers," *Journal of Contemporary Research in Education*: Vol. 3 : No. 3 , Article 3.
Available at: <https://egrove.olemiss.edu/jcre/vol3/iss3/3>

This Article is brought to you for free and open access by the Education, School of at eGrove. It has been accepted for inclusion in Journal of Contemporary Research in Education by an authorized editor of eGrove. For more information, please contact egrove@olemiss.edu.

Teachers' needs and preparation to use technology in the U.S. and Japan K-12: Learning from teachers

Authors

Syjetlana Curcic, Makito Yurita, Kathryn Young, Lori Wolff, Ziazi Ziazi, and Elena Garcia Ansani

Svjetlana Curcic

University of Mississippi

Makito Yurita

Shimane University

Kathryn Young

Metropolitan State University of Denver

Lori Wolff

University of Mississippi

Zora Ziazi

National Louis University

Elena Garcia Ansani

Latino Resources

Abstract

A body of literature on the changing nature of knowledge acquisition, teaching, and learning with technology, has been rapidly growing within the last decade. In examining how teachers learn to use technology in the U. S. and Japan, it seems that those processes follow a similar pattern: to some extent, teacher preparation programs prepare future teachers in technology use. Frequently, however, many students learn how to use technology (e.g., various computing devices and software) on their own. Because technology is constantly evolving, it seems that those responsible for regular professional development, such as school districts (U.S.) and the Board for Education (Japan), should be much more engaged in providing up-to-date training in how to use technology, and more importantly, in – how to integrate technology into instruction across curriculum.

The U. S. National Educational Technological Plan 2010 calls for revising standards and learning objectives through incorporating technology across all content areas to improve learning (U. S. Department of Education, 2010). With more than 40 U.S. states implementing the Common Core State Standards (CCSS) in the 2014-2015 academic year, integrating technology is not a matter of choice, but part of a curriculum that starts in elementary school (National Governors Association & Council of Chief State School Officers, 2010). Students are expected to gather, assess, and apply information from both print and digital sources in conducting research, and combine information gathered from multiple sources, including videos, into their own texts or presentations (Graham, MacArthur, & Fitzgerald, 2013).

Integrating technology into K-12 schooling is not a novelty. Many teachers across the U.S. and Japan have been teaching their students with technology and how to use technology, including software, for a number of years. In the U.S. K-12 schools, there is an increased focus on providing access to the general education curriculum for all students, including special education students and English language learners, and designing instruction based on the principles of the Universal Design for Learning (UDL). Edyburn (2010) proposes that technology is essential for implementing UDL principles in instruction. Instruction based on the UDL principles implies technology considerations with adequately prepared teachers. As technology keeps advancing, the concept of “adequately prepared” teachers is hard to define. Studies reveal that teachers need to assume a dual role when it comes to

integrating technology into their classrooms: the role of a learner and that of an “instructional designer” (cf. Koehler & Mishra, 2008; Ronnkvist, Dexter, & Anderson, 2000, p. 26).

Since Cuban (2001) observed that a small number of teachers were serious computer users, less than 10% in his view at the time of his writing, a number of studies examined the use of technology in classrooms (e.g., Gray, Thomas, & Lewis, 2010; Hutchison, & Reinking, 2011). For example, based on the U.S. national survey, Gray, Thomas, and Lewis (2010) report that teachers or their students used computers in the classroom often (40 %) or sometimes (29 %). The teachers reported that K-12 students were involved in writing, creating or using graphic or visual displays, practicing basic skills, conducting research, corresponding with others, contributing to blogs or wikis, using social networking websites, solving problems, analyzing data, conducting experiments, developing multimedia presentations, creating art, music, movies, or webcasts, developing or running demonstrations, models or simulations, designing and producing a product. However, Gray et al. (2010) also noted that the coefficient variation was greater than 50% and, therefore, advised interpreting data with caution. Nonetheless, the spectrum of instructional activities with technology reported by Gray et al. (2010) is certainly much wider in scope than activities reported by Cuban (2001).

Cuban (2001) remained skeptical about the value of technology in the classroom because he observed that some teachers adopt new technologies, but sustain old practices in their teaching. Our own observations in the K-12 classrooms over the past decade across six U.S. states (California, Colorado, Illinois, Michigan, Mississippi, Texas) have not completely refuted Cuban’s claims. A number of schools have computers, connection to the Internet, LCD projectors, and, increasingly, iPads or other tablets. There are many forms of electronic books available that could make reading experiences interactive, engaging, and more individualized (Hutchison, Beschoner, & Schmidt-Crawford, 2012). There also are numerous websites and electronic texts that

bring history to life, or sites on which students can virtually dissect frogs (Okolo, 2005). However, we also have observed elementary classrooms in which each student is provided with a tablet and the teacher reading aloud a digital book presented in black letters on a white digital screen, the same way as the text would appear in a printed book.

Based on our observations across six U.S. states and teacher preparation programs in large metropolitan areas in the U.S. and in Japan, we observed and, also, learned from teachers and teacher candidates that: 1) not all classrooms are equipped with technology (beyond, e.g., one computer); or (2) technology is in place, but the teachers do not use it, or, (3) do not use it adequately for various reasons. This discrepancy between various reports and observations from the field prompted us to further investigate teachers’ preparation in technology use. The literature review by Hew and Brush (2006) is closer to our observations because they identify direct and indirect barriers to technology integration in K-12 instruction. The authors note that the direct barriers include: (a) teacher’s attitudes and beliefs related to technology use; (b) the teacher’s perceived knowledge and skills; (c) the influence of institution (e.g., internal policies to use technology within certain subject areas introduced top-down), and, (d) resources. The authors also suggest that there are indirect barriers such as departmental cultures and assessment (e.g., “the use of graphing calculators might be encouraged or not because they are prohibited in high-stakes testing”) (Hew & Brush, 2006, p. 232).

In considering what knowledge teachers bring to the K-12 classrooms in terms of technology and their preparedness to use it, a question worth pursuing is: How do teachers learn about technology to be used in K-12? We consider an answer to this question a missing “variable” in the model presented by Hew and Brush (2006) and aim to provide a more nuanced understanding about teachers’ preparation to use technology. To broaden our perspectives on teacher preparation, we collaborated with colleagues from Japan. Some

schools have been inspired by the lessons learned from Japan since the late 1990s. (e.g., Yoshida, 2001). To learn more about teacher preparation to integrate technology into instruction, we surveyed teachers in the U.S. and Japan.

Theoretical framework

A number of authors note that the epistemology of knowing in a digital age should be reconsidered in view of information-communication technology (ICT) in general, and the Internet, in particular (e.g., Coiro, Knobel, Lankshear, & Leu, 2008a). For example, Lankshear, Peters, and Knobel (2000) suggest that learning from an ICT perspective is not only about content mastery, but also about mastering and possessing skills necessary to perform certain activities; for example, how to create hyperlinks or make use of the links on the Web; how to use, learn, or program computer languages; or, how to select, evaluate, or use information sources. Lankshear et al. (2000) propose “performative epistemology” (after Wittgenstein) referring to understanding and knowing as “making, doing, and acting” (p. 21). Lemke (1998) suggests that information technologies make possible “new paradigms for education and learning” and allow a shift toward “interactive learning” (p. 287). Within the paradigm of interactive learning, a teacher’s task becomes helping children “learn how to learn” new technologies of literacy (Leu, 2002, p. 313). Spiro and Jehng (1990) use a metaphor of crisscrossing conceptual landscapes (also after Wittgenstein’s *Philosophical Investigations*) suggesting that knowledge that will be “used in many ways is taught in many ways” (p.171).

A common thread across the above accounts is the assumption that isolated pieces of information do not lead to the acquisition of knowledge and understanding. Within electronic environments, educational tasks assume new complexities. Some authors draw attention to instruction, especially literacy instruction broadly conceived - as inadequate (Leu, Kinzer, Coiro, & Cammack, 2004; Leu, Forzani, Rhoads, Maykel, Kennedy, & Timbrell, 2014). Leu and colleagues view ICT technologies,

particularly the Internet, as essential in preparing students for new literacies because new technologies are seen as central to the acquisition of knowledge. Some tasks, such as inquires on the Web, demand that students coordinate a number of activities that are more open in nature than reading informational text in a textbook followed by a specific set of questions. A Web-related task may start with an information search within hypertext, which is essentially an open-ended text structure with no particular middle or end point. Students are expected to design their own paths in constructing meaning. Therefore, reading in different media may involve different processes (e.g., Leu et al., 2014; Wyatt-Smith & Elkins, 2008).

The multimodal nature of online texts (e.g., texts with embedded hyperlinks, icons, buttons, text-to-speech function, etc.), along with a shift toward online assessment in the CCSS, necessitates teachers’ understanding of online skills. Yet, while teachers are able to refer to the curriculum standards, there is no instruction how to teach the standards (Calfee & Miller, 2013), including those related to online skills (online reading, comprehension, research, etc.). In considering the role of the teachers in the context of the Internet and other ICT technologies in the classroom, Leu et al. (2004) argue that the role of the teacher will increase, rather than decrease, in view of their central role in creating learning experiences for their students. Therefore, teachers’ preparation to use technology remains an important topic.

The focus on teachers’ processes of learning and knowing is also important in the climate of ever-increasing discussions on how to best prepare our future teachers (Darling-Hammond & Bransford, 2005; National Research Council, 2010; Wilson, 2009). While the current discussions center on the role of teacher education programs as opposed to apprenticeship models where teachers learn as they teach (after a brief period of training), it seems important to understand teachers’ perspectives on their preparedness to integrate technology into their instruction, regardless of the way they came to join the profession. We,

therefore, set out to learn the ways in which: (1) teachers learned to use technology; (2) their perceptions about preparedness to use technology, and (3) their actual use of technology in the U.S. and Japanese K-12 classrooms.

Method

We examined teachers' perceptions of their preparedness to use technology, the actual use of technology in their classrooms, and the ways they learned about those technologies, through a semi-structured questionnaire.

Participants. Our participants were teachers in three metropolitan areas in Midwestern and Mountain states in the U.S. and in Japan. We purposefully selected schools situated in different neighborhoods of several large cities. We asked administrators (e.g., assistant superintendent, assistant principal, special education coordinator) to share the questionnaire with their teachers. The teachers were asked to anonymously complete the questionnaire and place it in a specified box at school. We concluded collecting the questionnaires once we reached the total of 117 responses of the U.S. sample (n=100 of experienced teachers), with a small number of preservice teachers (n=17) and 117 of the Japanese sample (n=71 of experienced teachers and n= 46 preservice teachers).

The U.S. sample comprises 91% Caucasian teachers, 3% African American teachers, 5% Hispanic teachers, and 1% "Other" teachers, in terms of ethnicity; (N=117, age $M=35$, $SD=10.41$), and gender: female = 82%, male = 18%. (Comparable to a national sample: females: 84%, males = 16%, with a slightly higher Caucasian percentage than nationally (Feistritzer, 2011). Due to "lost in translation" factors we do not have the same breakdown for the Japanese sample.

Instrument. A semi-structured questionnaire contained a set of closed questions and a set of open-ended questions. As Hew and Brush (2007) note, there is a lack of clear definition of technology integration, but there

are elements across a number of studies that together denote technology integration as various uses of computing devices in instruction and we framed the questions to reflect those uses.

The closed questions pertained to teacher demographic information and questions related to the sense of preparedness to use computer technology in the classroom (e.g., incorporate Internet resources, desktop applications such as PowerPoint, Excel, etc., and interactive boards – for example, Whiteboard/Smartboard, etc.), frequency of technology use in the classroom, and teachers' K-12 experiences with technology during their own K-12 schooling. Open-ended questions asked teachers to relate: (1) What technology (including software and Internet resources) they learned about in their teacher education programs?; (2) What technology they learned about outside teacher education programs?; (3) To share other experiences and thoughts related to computer technology, and, (4) Those who had experience with technology during their own K-12 schooling were asked to describe those experiences.

Two of the authors conducted qualitative analysis of the open-ended part of the questionnaire and coded the emerging themes. The interrater reliability conducted for 25% of the sample was high (98%), and the rest was resolved through discussion.

Results

We first report our findings based on the quantitative data analysis based on the closed-ended part of the questionnaire and then the qualitative data analysis based on the open-ended part of the questionnaire. Teachers' perceptions about preparedness to use technology and the actual use of technology in the U.S. and Japanese K-12 classrooms is discussed next. How, and what specific technologies teachers learned to use, we present in the section on Qualitative results.

Quantitative findings. There is a significant, small to medium association,

between the sense of preparedness to use technology and the frequency of using technology ($r = .30, p = .01$) for the U.S. sample. The Pearson correlation is stronger for those over 40 years of age ($r = .44, p = .035$). Similarly to the U.S., there is a significant association between the sense of being prepared to use of technology and the actual use of technology in the classroom ($r = .349, p = .003$) among the experienced teachers in Japan.

We differentiated some of the analyses based on whether the teachers were special education teachers versus general education teachers in the U.S. Our assumption was that the special education teachers might integrate technology into their teaching more often because of the nature of their teaching that is geared toward the special education population of students (e.g., some special education students require the use of assistive technology). Surprisingly, a larger percentage – 53% of general education teachers ($n=57$), had a higher sense of being prepared to use technology in the classroom as opposed to 28% of the special education teachers ($n=43$). Thirty-nine percent of the general education teachers reported that they actually used technology daily in the classrooms, while only 29% of the special education teachers reported that they used technology daily. Also, contrary to our expectations, 17% of the special education teachers reported that they hardly ever or never used technology in the classroom, while 11% of the general education teachers reported they hardly ever or never used technology in their classrooms.

Overall, the U.S. experienced teachers reported feeling more prepared than Japanese teachers to use technology ($\chi^2 = 64.987, p = .001$). The U.S. teachers also reported using technology more frequently in the classrooms ($\chi^2 = 69.012, p = .001$). Seventy-three percent of the U.S. teachers reported using technology daily or two-three times per week, while only 13% of experienced teachers in Japan reported using technology on a daily or weekly basis.

We also were interested whether there would be any difference in the feeling of

preparedness to use technology if teachers experienced the use of technology during their own K-12 schooling or not. There was no significant difference in the sense of preparedness between those who experienced technology in K-12 classrooms during their own schooling and those who did not ($t = 1.658, p = .101$) for the U.S. sample. Also, there was no significant differences between the actual use of technology in instruction and those who experienced during their own K-12 instruction with technology or not ($t = .873, p = .385$). Because of the limited number of the U. S. preservice teachers, we did not include the analysis for that group.

Among Japanese experienced teachers, there was a significant difference in the sense of preparedness to use technology between those who experienced technology in K-12 classrooms during their own schooling and those who did not ($t = 2.303, p = .024$). Those who experienced technology integration within their own K-12 schooling had a higher sense of preparedness, although a limited number of Japanese teachers reported that they experienced instruction with technology during their own schooling (22%). The analysis for the Japanese experienced teachers related to their actual use of technology and the independent variable related to whether they experienced instruction with technology during their own schooling or not, revealed no significant relationship ($t = .649, p = .519$) as was the case with the U.S. experienced teachers. For the preservice Japanese teachers, there was no significant difference in their plans to use technology in K-12 and their own experience during their K-12 schooling in terms of whether they had some experience in K-12 schooling with technology or not ($t = .289, p = .776$).

Qualitative findings. We report here the training in technology based on the analysis of where the teachers reported to have developed the knowledge across hardware/software. We coded the categories that emerged based on our analysis (as reported by the teachers) under: desktop applications (Table 1), Web Applications, Digital Photo and Manipulation Software (Table 2), Learning Technology and Software (including mobile) (Table 3), Social

Media/Media Aggregator (Table 4), Web design software (Table 5), Internet sites/portals/data bases (Table 6), and Special education (Table 7) for the U.S. sample. The tables also present the findings related to how teachers learned about certain technology or applications under: Teacher education programs, District training, and Self-instruction. Table 8 summarizes specific technology that Japanese teachers learned through their Teacher education programs, seminars offered by the Board of Education, and Self-instruction.

Table 1
Desktop applications

	Teacher education	District training	Self-taught
Microsoft Office	X		X
Word	X		X
PowerPoint	X	X	X
Publisher			X
Print Shop			X
Excel	X	X	X

Table 2
Web Applications, Digital Photo and Manipulation Software

		Teacher education	District training	Self-taught
Web Applications	Animoto			X
	Comic life		X	
	iPhoto			X

	Photo Story		X	
	Photo bucket (Big Bang Photos)			X
	Picture It		X	X
Interactive electronic boards/camera	Smart Board	X	X	X
	White board	X	X	X
	ELMO	X	X	X
Electronic texts	Audio/Video books			X
Graphic design software	Adobe illustrator			X

Table 3
Learning Technology and Software (including mobile)

		Teacher education	District training	Self-taught
Mobile Device	Electronic Braille Note Taker	X	X	
	iPad			X
	iPod			X
	Smart Phone			X
Pod casting, audio capture and editing software	Podcasts	X		X
	Audio interviews	X		
	Garage Band			X
Flip camera			X	X
Clickers			X	

Table 4

Social Media/Media Aggregator

Social media/media aggregator	Teacher education	District training	Self-taught
Blogs	X	X	X
Facebook			X
Skype			X
VoiceThread		X	
YouTube	X		

Table 5
Web Design Software

Web Design	Teacher Education	District Training	Self-taught
Build a Webpage	X		X
Dreamweaver			X
Frontpage			X
HTML			X

Table 6
Internet sites/portals/data bases

Internet	Teacher Education	District Training	Self-taught
ERIC database	X		
Wikis	X	X	
Web pages (in general)	X		X

(Web sites - specific):			
Brain pop	X		X
CEC	X		X (also NCTM, NSTA)
Aleks.com		X	
Rio Curriculum	X		
enVisionMath	X		
wrightslaw	X		
flocabulary	X		
starfall.com	X	X	X
trackstar4teachers.com	X		
Web quests	X	X	X
read.write.think	X		
thinkfinity			X
Graphing globes			X
Resources for Planning	X		X
Games for students	X		
Moodle	X	X	
Google docs, sites, wikis, calendar	X	X	X (also, gmail)
Google Earth	X	X	
WisWeb (Java applets for math)	X	X	
Geometers Sketchpad	X	X	X
Online math manipulatives	X		
Survey monkey	X		
Geogebra	X		

Infinite campus (grades), teacher portal for data, School Center, Reading 180		X	X (Infinite campus, teacher portal for data)
---	--	---	--

Table 7
Special Education technology/software

Special education		Teacher education programs	District training	Self-taught including friends /colleagues
Special Education software	Easy IEP		X	
	Special Educ. Automation software (SEAS)			X
Speech recognition	Text-to-Speech	X		X
	Screen Reader	X		
	Dragon Speak Natural	X		
Eye tracking technology	Eyegaze Edge	X		
Picture Communicate Software	Board maker	X	X	X

Various issues were identified as important in integrating technology into instruction. The most frequent responses related to: (1) training; (2) access (to hardware in schools); (3) positive responses related to technology; but also, (4) responses that could be qualified as negative or skeptical; followed by (5) technology referred by some teachers in the future tense; and, (6) some special education teachers mentioned that they used computers predominantly to develop Individualized Education Programs (IEPs, which we presented

under a specific use of technology. We further elaborate on these points:

1. Training. The following response best exemplifies a dozen of the responses that focused on training that is viewed as important and that also should be ongoing: “Tech training should be an on-going thing since there are always new programs and/or programs to manage daily responsibilities as well as learning how to incorporate it into lessons for students.”

Some teachers advocated for technology training to be offered every year by the district: “The teachers should be paid to take these training classes if they’re required to use it in their classes. Technology classes should be offered every year by the district.” Or, “Teachers should be taught how to incorporate computers into their classrooms - could be just professional development.” Some teachers simply wished for “more training” or for “teacher ed programs to do a better job”.

2. Access. The following response illustrates some of the frustration related to access to technology: “Would like to see access to technology grow – at times limited access in schools can make technology difficult to use”. Also, there is a sense of frustration with “laptops that do not stay charged”, “urban schools that don’t have access to technology”, minimal access to Smartboards, document cameras, computers (e.g., “It can be very hard to schedule computer lab in a school with 480 students - elementary”); “I have only one computer in my classroom”), and finally: “I think that computer technology is a very needed skill that today’s student needs to engage in. However, I worked at a school that had an ‘unsatisfactory’ rating from the state. Therefore, all of our attention was constantly focused on teaching as much material as needed before the test, and computer training and exploration was never anything we could really indulge in with our students. When we could access computers, many were old and broken, and though our principal made a great effort to replace them last year, there were usually only enough for one class at a time to be in our computer lab.”

3. Positive views related to technology.

Some of the most positive views on integrating technology into classrooms were related to the engagement of the students and the possibility to enhance their learning. For example: “Using technology engages and enhances the learning of our students, and as educators – isn’t that our goal?; “... a great way to engage kids, especially those who are harder to engage”; “There are WONDERFUL resources available on the Internet, both free and by subscription. Simulations can provide visuals for students that are not available otherwise”.

In addition, some teachers noted that technology is a way to prepare students for the “real world”. For example: “The more we can incorporate computer technology into the classroom – the more our students will be prepared for the ‘real world’ (e.g., completing online applications, paying bills online, etc.).

Some teachers sounded truly enthusiastic, for example: “I love technology. I think possibilities are endless and progress is amazing. I like Smart Boards, etc. CIT can give voice to those who can’t speak, read out loud to those who can’t read, provide individual assessment, etc.” Specifically, from a perspective of a special education teacher: “Technology for my special needs students has been a huge help – is allowing them to successfully assist their learning, such as writing programs and reading programs.” And, from a general education teacher: “...the Smartboard and having kids draw on it in order to assess student learning has been a revolutionary tool in my U.S. history class”.

4. Negative/skeptical views. The first response reflects several teachers’ responses that did not seem to value the use of technology because in their views the use of technology does not necessarily translate into either learning or engagement of the students. For example, “I do not want to use technology just for the sake of using it. If it does not translate into student learning or increased engagement (which always leads to increased learning) I shouldn’t do it.” Or: “I think our students process information faster, but they do not retain it”.

Several teachers noted that teaching and learning content is more important than integrating technology into instruction, especially because according to some of those teachers, students learn about technology outside their classrooms. For example: “Computer technology is great, but should not overtake everything schools are doing. The kids learn a lot of those skills on their own outside of school.” Or: “I don’t use a lot of computer-related activities with 3, 4, and 5-year olds. There are other content areas that are more important to me to teach. I know kids are spending lots of time at home in front of a computer. I believe that all kids, but especially my students, need to learn how to play w/each other, not a machine!”

There are some concerns that technology companies are driving our “consumer/innovation happy classrooms”, that computers “do have a lot of pros, but they are also taking away from our ability to relate to each other on a human level”, and finally, unlike those teachers who complain about the lack of access to technology, some reported that technology is to a certain extent effective, but as it “becomes overwhelmingly redundant in our classrooms, the kids become as numb to the ‘top-rate’ technology as they would be using a chalkboard”.

Several responses specifically addressed time as an issue. For example, “Technology should not be used if it takes way too much time to prepare something that lasts a very short time (e.g., clickers)”; “Not enough time to transfer lesson to technology devices”, “Not enough time to learn about it”, etc. Finally, one previous Computer Science major expressed his frustration with low standards and dated educational technology teacher preparation courses.

5. Technology in the future/present.

Although not too many teachers responded to this theme, it is interesting to observe the ambivalence in the responses as it is not clear whether some of the teachers have decided that technology is a wave of the future or the present. For example: “It is the future and the more we

learn the better...Students naturally gravitate toward computer tech, and we teachers should attempt to service this need”; “Technology – the wave of the future and the present”; “Computer technology is the most important and least utilized. It is changing our world and has already changed the brains of our students. It makes all learning more engaging and relevant. It is not in the future, it is NOW.”

6. *Specific use of technology.* Some special education teachers specifically mentioned the use of technology to complete IEP documents. For example: “Use computer more for IEP than students”; “I have to do all of my paperwork for IEP meetings on the computer”, “IEP document online”, and had district related training in that respect.

Table 8 summarizes specific technology that Japanese teachers learned through their teacher education programs, seminars offered by the Board of Education, and self-instruction.

Table 8
Desktop applications, software, Internet (Japanese sample)

	Teacher education	Board of Education	Self-taught
Microsoft Office		X	X
Word		X	X
PowerPoint		X	X
Excel		X	X
Scrivener software			X
Photoshop			X
Movie/photo editing	X		X
Smart board			X
Programming	X		X
Statistical analysis	X		X
Math software	X		
Geometry modeling	X		
Geo- mapping	X		X
Internet research	X		X
Computer hardware	X		

I-pod			X
Web-publishing	X		
Blind Touch	X		
MS Paint	X		

The second author, our colleague from Japan, noted that what these (Japanese) students and teachers witnessed was teachers’ use of computer technology for simply substituting what has long been a part of instructional technologies in the classroom. For example, many respondents noted that their teachers used computer technology in place of a projector, a photo-slide, and/or video players. PowerPoint is the most frequently mentioned software used in their classroom learning experience with computer technology, and Word processing and spreadsheet software follow on the list. A few preservice respondents mentioned that they have used MS Paint and other graphic software to draw on a computer screen in their K-12 education. Only a few preservice teachers had some experiences in learning in a classroom where teachers used computer technology to assist transmitting complex ideas, such as modeling formulas of mathematics and/or simulating experiments in physics.

Second, the qualitative analysis of the semi-structured questionnaire (Japanese sample) reveals that the Teacher education courses were not a substantial resource in preparation and use of the computer technology in K-12. Some participants have learned to use Word-processing, Excel, and presentation software in the process of completing their course requirements. Only a handful have learned Web publishing and the use of Internet as a part of their research tools. Three preservice teachers responded that they have learned computer mechanism, but the course syllabus (and an interview with one of three) revealed that they in fact studied a history of computers as a part of general education courses. The overwhelming focus on office software, however, shows that Teacher education courses generally ignore the use of computer technology as a tool for classroom instruction. Instead, Teacher education courses assume the use of computer technology in the classroom is for classroom

management and other administrative lines of work in schools—grading, composing newsletters, drafting letters, creating quizzes, and so on. Some participants responded that they have attained some computer skills at work or at volunteer sites, but those skills again were limited to classroom management and administrative side of the job.

Finally, our colleague from Japan, just as the U. S. colleagues, recommends integrating technology across university courses. In both samples, teachers seem to be learning about technology in some Teacher education courses, with many teachers simply learning a lot on their own. Based on our findings of both quantitative and qualitative data, we next discuss our findings related to teacher preparation to use technology.

Discussion

A body of literature on the changing nature of knowledge acquisition, teaching and learning with technology, and the changing nature of literacy, has been rapidly growing within the last decade (Coiro, Knobel, Lankshear, & Leu, 2008b; Kuiper, Volman, & Terwel, 2005; Leu, Zawilinski, Castek, Banerjee, Housand, Liu, & O’Neil, 2007; Leu et al., 2014). Our understanding of teacher preparation as it relates to teachers’ practices in the use of technologies in their K-12 classrooms has been less progressive. Since Cuban (2001) reported that there was no clear evidence between the student achievement and use of technology, there still seems to be no overwhelming advantage reported on the use of technology and student performance (e.g., Coiro et al., 2008b). However, there is an increased recognition of the role technology plays in the acquisition of knowledge, changes taking place in workplaces, and the role technology plays and occupies in students’ lives outside the schools (e.g., Ito, Horst, Bittanti, Boyd, Herr-Stephenson, Lange, Pascoe & Robinson, 2008; Partnership for 21st Century Skills, 2006).

In examining how teachers learn to use technology in the U. S. and Japan, it seems that those processes follow a similar pattern: to some

extent, teacher preparation programs prepare future teachers in technology use. Frequently, however, many students learn how to use technology (various computing devices and software) on their own. While neither of the two findings seem particularly surprising, it is surprising that schools districts (in the U.S.) and Board of Education (in Japan), seem to offer a limited number of seminars and training sessions related to technology integration into K-12 instruction. Because technology is best mastered through hands-on experience and because technology is constantly evolving, it seems that those responsible for regular professional development should be much more engaged in providing up-to-date training.

Our qualitative data reveal that teachers would welcome more training in technology and, specifically, on the ways to integrate technology into their instruction. Some studies suggest that, indeed, well-trained teachers successfully integrate technology into their instruction (e.g., Hsu, 2010). Perhaps, a lesson to be learned from the U.S. and Japan is: Many teachers seem to be willing to learn, but we are not providing adequate education or professional development opportunities. There are exceptional teachers: for example, one experienced Japanese teacher designed software to teach mathematics and also a lesson to use that software. Although the U.S. teachers provide more and varied examples of technology use, there is no example of such an engagement that would reflect both developing a specific software and using that software within a content area (math, in this example).

We hope to have contributed to a dialogue about the need for reforming teacher education programs that would reflect the ICT performative framework across the coursework offered by universities. The question about how to prepare teachers to integrate technology into teaching and learning processes is especially important in the era of high stakes testing and the focus on online assessment. This is an urgent task in view of the fact that many teachers express concerns that the focus on testing restricts their considerations of integrating technology into their instruction in the present and other studies (e.g., Lipscomb & Doppen,

2005; McGrail, 2006). At the same time, Leu and colleagues (2014) warn that because skills related to online research and reading comprehension were not explicitly addressed within the CCSS, it is possible that the achievement gap not only in literacy, but also across various content areas, might increase rather than decrease the achievement gap among students. Their argument is based on their observation that those districts that are economically challenged are often times also lower in performing and might focus on explicit standards, interpret them in the offline context, and fail to incorporate the online skills into instruction. Consequently, Leu et al. (2014) advocate for a thoughtful integration of teaching online skills into instruction.

A very limited number of teachers in our study noted a specific content area in which they actually integrate technology into their instruction (e.g., math, history, special education). Therefore, we advocate for education and training beyond instruction in specific computing devices and software to include focus on instruction in how to integrate technology in different content areas for secondary teachers, and across the curriculum in elementary grades. While there are calls for teacher education programs to better prepare teachers in technology integration into instruction (e.g., Lipscomb & Doppen, 2005), our study indicates that perhaps even more attention to technology integration should be provided by the school districts/Board of Education and specific contexts in which teachers educate their students.

Limitations

International comparisons have some inherent difficulties as some variables get “lost in translation” - to name only one - but pertinent to our study. As a result, we do not have the comparable information related to the demographics of our samples. In addition, due to anonymous nature of the survey, we do not have a response rate for the teachers who participated in the survey and those who did not. Inherent in a survey design is a problem associated with self-reported data that may overestimate or

underestimate teachers’ perceptions of their ability to use technology and the actual use of technology in the classrooms, although some studies show that there is a high positive correlation between teachers’ self-perceived ability to integrate technology into instruction and their frequency of technology integration (e.g., Hsu, 2010).

References

- Becker, H. J., & Ravitz, J. L. (2001, March). Computer use by teachers: Are Cuban’s predictions correct? Paper presented at the annual meeting of *American Educational Research Association*. Seattle, WA.
- Calfee, R. C., & Miller, R. G. (2013). Best practices in writing assessment for instruction. In S. Graham, C. A. MacArthur, and J. Fitzgerald (Eds.), *Best practices in writing instruction*, (pp. 351-377). New York, NY: Guilford.
- Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (2008a). Central issues in new literacies and new literacies research. In J. Coiro, M. Knobel, C. Lankshear, and D. J. Leu (Eds.), *Handbook of research on new literacies*, (pp. 1-21). Mahwah, NJ: Erlbaum.
- Coiro, J., Knobel, M., Lankshear, C., and Leu, D. J. (Eds.). (2008b). *Handbook of research on new literacies*. Mahwah, NJ: Erlbaum.
- Cuban, L. (2001). *Oversold and underused: Reforming schools through technology, 1980-2000*. Cambridge, MA: Harvard University Press.
- Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing Teachers for a Changing World. Report of the Committee on Teacher Education of the National Academy of Education*. San Francisco, CA: Jossey Bass.
- Edyburn, D. (2010). Would you recognize universal design for learning if you saw it? Ten propositions for new directions

- for the second decade of UDL. *Learning Disability Quarterly*, 33, 33 - 41.
- Feistritzer, E. C. (2011). (2011). *The Profile of Teachers in the U.S. 2011*. Washington, D.C.: National Center for Education Information (NCEI).
- Graham, S., MacArthur, C. A., & Fitzgerald, J. (Eds.). (2013). *Best practices in writing instruction*. New York: Guilford.
- Gray, L., Thomas, N., & Lewis, L. (2010). *Teachers' use of educational technology in U.S. public schools: 2009*, (NCES 2010-040). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, D C.
- Hew, K. & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55, 223-252. DOI:10.1007/s11423-006-9022-5
- Hsu, S. (2010). The relationship between teachers' technology integration ability and usage. *Journal of Educational Computing Research*, 43 (3), 309-328.
- Hutchison, A., Beschoner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad for literacy learning. *The Reading Teacher*, 66 (1), 15-23.
- Hutchison, A., & Reinking, D. (2011). Teachers' perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly*, 46 (4), 312 -333. DOI: 10.1002/RRQ.002
- Ito, M., Horst, H. A., Bittanti, M., Boyd, D., Herr-Stephenson, B., Lange, P. G., Pascoe, C. J., & Robinson, L.(2008). *Living and learning with new media: Summary of findings from the Digital Youth Project*. The John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning. Retrieved from <http://digitalyouth.ischool.berkeley.edu/report>
- Koehler, M. J., & Mishra, P. (2008). Introducing technological pedagogical content knowledge. In AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge for educators*, (pp. 3-29). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kuiper, E., Volman, M., Terwel, J. (2005). The Web as an information resource in K-12 education: Strategies for supporting students in researching and processing information. *Review of Educational Research*, 75(3), 285-329.
- Lemke, J. L. (1998). Metamedia Literacy: Transforming meanings and media. In D. Reinking, M. C. McKenna, L. D. Labbo, and R. D. Kieffer (Eds.). *Handbook of literacy and technology*, (pp. 283-303). Mahwah, NJ: Erlbaum.
- Leu, D. J. (2002). The new literacies: Research on reading instruction with the Internet. In A. E. Farstrup & S.J. Samuels, (Eds.), *What research has to say about reading instruction* (4th ed., pp. 310-336). Newark, DE: International Reading Association.
- Leu, D. J., Forzani, E., Rhoads, C., Maykel, C., Kennedy, C., & Timbrell, N. (2014). The New Literacies of online research and comprehension: Rethinking the reading achievement gap. *Reading Research Quarterly*. DOI:[10.1002/rrq.85](https://doi.org/10.1002/rrq.85)
- Leu, D. J, Kinzer, C.K., Coiro, J., & Cammack, D.W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. In R.B. Ruddell, and N. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1570-

- 1613). Newark, DE: International Reading Association.
- Leu, D. J., Zawilinski, L., Castek, J., Banerjee, M., Housand, B., Liu, Y., & O'Neil, M. (2007). What is new about the new literacies of online reading comprehension? In A. Berger, L. Rush, & J. Eakle (Eds.) *Secondary school reading and writing: What research reveals for classroom practices* (pp. 37-68). NCTE/NCRL: Chicago, IL.
- Lipscomb, G. B., & Doppen, F. H. (2005). Climbing the stairs: Pre-service social studies teachers' perceptions of technology integration. *International Journal of Social Education*, 19 (2), 70-82.
- McGrail, E. (2006). "It's a double-edged sword, this technology business": Secondary English teachers' perspectives on a schoolwide laptop technology initiative. Retrieved from <http://www.tcrecord.org/PrintContent.asp?ContentID=12517>
- National Governors Association and Council of Chief State School Officers. (2010). *Common Core State Standards for English language arts & literacy in history/social studies, science, and technical subjects*. Washington, DC: Authors. Retrieved from www.corestandards.org
- National Research Council (2010). *Preparing Teachers: Building Evidence for Sound Policy*. Washington, DC: Committee on the Study of Teacher Preparation Programs in the United States, Center for Education/Division of Behavioral and Social Sciences and Education, National Academies Press.
- Okolo, C. M. (2005). Interactive technologies and social studies instruction for students with mild disabilities. In D. Edyburn, K. Higgins, and R. Boone. (Eds.), *Handbook of special education technology research and practice* (pp. 623 - 642). Whitefish Bay, WI: Knowledge by Design.
- Partnership for 21st Century Skills. (2006). *Are they really ready to work?: Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U. S. workforce*. Retrieved from <http://www.21stcenturyskills.org>
- Ronnkvist, A. M., Dexter, S. L., & Anderson, R. E. (2000). Technology support: Its depth, breadth and impact in America's schools. *Teaching, Learning, and Computing: 1998 National Survey Report #5*. Center for Research on Information Technology and Organizations, Irvine, CA, and University of Minnesota.
- Spiro, R. & Jehng, J-C. (1990). Cognitive Flexibility and hypertext: Theory and subject matter. In Don Nix and Rand Spiro (Eds.). *Cognition, education, multimedia: Exploring ideas and high technology*, (pp. 163-205). Hillsdale, N. J.: Lawrence Erlbaum Associates.
- U. S. Department of Education, Office of Technology. (2010). Transforming American education: Learning powered by technology. National Educational Technology Plan 2010. Retrieved from <http://www.ed.gov/sites/default/files/NE TP- 2010-final-report.pdf>
- Wilson, S. (2009). *Teacher Quality: Education Policy White Paper*. Washington, DC: National Academy of Education.
- Wyatt-Smith, C., & Elkins, J. (2008). Multimodal reading and comprehension in online environments. In J. Coiro, M. Knobel, C. Lankshear, and D. J. Leu (Eds.), *Handbook of research on new literacies*, (pp. 899-940). Mahwah, NJ: Erlbaum.
- Yoshida, M. (2001). American educators' interest and hopes for lesson study (jogyokenkyu) in the U.S. and what it means for teachers in Japan. *Journal of Japan Society of Mathematical Education*, 83 (4), 24-34.

***Syjetlana Curcic, Ph.D.**
University of Mississippi
Email: scurcic@olemiss.edu

Makito Yurita, Ph.D.
Shimane University
Email: yurita@edu.shimane-u.ac.jp

Kathryn Young, Ph.D.
Metropolitan State University of Denver
Email: kyoung42@msudenver.edu

Lori Wolff, Ph.D.
University of Mississippi
Email: lawolff@olemiss.edu

Zora Ziazi, Ph.D.
National Louis University
Email: Zora.Ziazi@nl.edu

Elena Garcia Ansani, Ed.D.
Latino Resources
Email: elenagarcia@latinoresources.org

***corresponding author**