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# Technology Use in Middle Grades Teacher Preparation Programs

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Technology Use in Middle Grades Teacher Preparation Programs

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Abstract

Changes in reading and reading comprehension precipitated by the emergence of the Internet and related to information and digital communication applications have been noted in the reading and literacy fields for some time now. Teacher education programs play a special role in preparing teachers for instruction that capitalizes on such changes. The purpose of this study was to explore the ways in which teacher education programs help teachers to embrace and critique technology, and literacies they engender, in teaching reading at the middle-school level. The study found the middle grades teacher education programs in this study to encourage the use of a range of technology tools. While traditional technology was viewed and used frequently for the purpose of teacher and student productivity (e.g., to record, display, or deliver information), information/communication as well as multimedia applications were viewed more often as sources of multimodal and interactive texts and as tools for meaning representation. Although the new generation web tools such blogs, Google tools, or webcasting applications were recognized as new types of texts, many of the multimodal texts and media that pre-service teachers were exposed to or explored for classroom use in this study were, however, older generation applications such as PowerPoint presentations, magazines, or environmental signs and symbols. Additionally, teacher educators' and their students' access to basic reading software, including

fluency and comprehension programs, was limited. Implications from these findings are further discussed.

Technology Use in Middle Grades Teacher Preparation Programs

Reading in today's digital information and communication age involves applying reading skills to a wide range of digital texts and genres, and online tools, including RSS feeds and search engines, blogs, wikis, podcasts, virtual reality, streaming video, among others (Doering, Beach, & O'Brien, 2007). Reading these new texts in multiple forms, media, and modalities, from signs, symbols, codes, audio, image and graphics, and/or any combination of these meaning-making tools, has evolved to include media and visual literacy (Kist, 2005), information literacy (Lankshear, 1997), and social literacy and discourse (Gee, 2004). Lankshear and Knobel (2003) stressed the importance of paying attention to the changing nature of the social practices around the new literacy texts and the ways of interpreting them such as "values and gestures, context and meaning, actions and objects, talk and interaction, tools and spaces (p.8)."

All of these changes to the reading process have prompted a call in the field for embracing new media, online literacies, and their related practices, as "literacy venues that have evolved concurrently with broadened definitions and understandings of terms such as *texts* and *reading* in the field of reading" (Hagood, 2003, pp. 387). This implies also rethinking reading instruction. Teacher education programs play a special role in preparing teachers for such instruction.

The purpose of this study was to explore the ways in which teacher education programs help teachers to embrace and critique technology, and literacies they engender, in teaching reading at the middle-school level.

### Teaching about Technology Integration in Reading/Literacy Methods Courses

Faculty teaching reading/literacy methods courses have made a consistent effort to use technology and model technology integration for their preservice teachers. For example, Schmidt, Merkley, and Fuhler (2004) developed a variety of literacy assignments and projects that encouraged technology infusion in instruction in the *Teaching and Reading of Language Arts in the Intermediate Grades* course. These assignments and activities included: WebCT discussions, literature circles, electronic mail and video conferencing, an internet scavenger hunt for literacy sites, literature webquests, poem picture books, digital book talks, handheld discussion, and virtual reality presentations.

Upon a cursory review of the descriptions of these assignments, we realized that preservice teachers' experiences with technology in this course were organized around certain technologies. The instructors of the course agreed with this analysis: "These examples illustrate how selected course experiences were redesigned to involve preservice teachers in meaningful learning tasks that utilize technology to teach literacy concepts" (p. 443). In other words, the curriculum in this course was modified to accommodate technology infusion.

Suzanne Miller (2007) adopted a different approach to technology instruction in her digital video composing course for English language arts (ELA) preservice and inservice teachers. In it, she introduced "learning digital video composing as a multimodal literacy practice" (p.65). Her goal was to expand her teachers' views of literacy "to include multimodal meaning-making beyond print only texts for all students" (p. 63). Many of her ELA teachers held "the traditional notion of reading and writing printed text as the only legitimate form of school literacy, the form that had brought them success in school" (p. 68). Citing Lankshear and Knobel (2003), Miller also tried to introduce her teachers to the concepts of knowing as "*performance*

*knowledge*- knowing how to find, gather, use, communicate and create new ways of envisioning assemblages of knowing” and designing. Designing involved “the orchestration of multiple modes” of representation to create meaning (p 64).

Like Miller, Erica Boiling (2009) strived to help her preservice teachers to move away from the view of technology as a tool for “making schoolwork more efficient and productive” (p. 83) to the conception of it as a tool for student learning that can foster critical thinking and literacy development in her *Literacy and Technology* reading methods course. Many of her preservice teachers felt that using the Internet technology would compromise their time “to teach students more foundational literacy skills” (p. 84) or that “online activities did not support the reading and writing skills that teachers are expected to teach in schools” (p.85). Boiling attributed these views of her preservice teachers to the inability to see “the connection between literacy and technology” (p.85) in the literacy classroom. To provide them with “concrete examples” (p.85) of such connections, and in this way support their development of pedagogies for literacy advancement, she engaged them in a blogging experience. The second underlying goal that Boiling had for her preservice teachers through the blogging experience, after Koehler, Mishra, Yahya, and Yadav (2004), was to help them understand that developing technological pedagogical content knowledge in literacy instruction requires “go[ing] beyond learning how to use technology to understanding the relationship that exists between technology, pedagogy, and learning (p.76).

The English education program at the University of Minnesota adopted an approach that utilized the instructional technology component throughout the program, including literature, reading, composition and other content courses and practicum experiences. This approach encouraged an interdisciplinary collaboration between English and learning technologies faculty.

The emphasis in these courses was on “infusing multimodal tools and digital literacies into an English education program” (Doering, Beach, & O’Brien, 2007, p. 41). As Doering, Beach, and O’Brien explain, this approach was a response to the ways today’s adolescents use the interactive internet spaces to “communicate with each other through IM’ing, MySpace, Facebook, YouTube, Flickr, blogs, and other virtual interactive tools” (p.41), and accordingly, to the need for English teacher educators to “model the very tools use [they] want [their] preservice teachers to model for their students” (p. 42) in English language arts curriculum.

Recognizing the importance of technology and literacy connections in literacy development, the belief we share with teacher educators of the above-described courses, we wanted to learn about preservice teachers’ experiences with technology instruction for reading/literacy development in middle grades teacher education programs in our state (Our own educational backgrounds and research interests are in secondary teacher education and professional development). This study explores this area of interest through these questions:

- 1) What technology is being used in reading instruction in middle grades teacher education programs?
- 2) How is technology being used in reading instruction in middle grades teacher education programs?
- 3) What theory/thinking informs these uses- the why question?

#### Theoretical Framework

The research perspectives that served as a theoretical framework for data analysis in this study included work in new literacies (Knobel & Lankshear, 2007; Lankshear & Knobel, 2003), socio-cultural and critical literacy (Gee, 2004) and semiotic (Kress, 2003) theories. In brief, the new literacies perspective posits that the nature of reading and reading comprehension is rapidly

changing with the emergence of new technologies (Coiro, Knobel, Lankshear, & Leu, 2007). The social-cultural perspective views reading and reading comprehension as social practices, and examines the ways in which new technologies affect these social practices (Kress, 2000; Street, 1998). Critical literacy theory interrogates the hidden agendas of any text, including social, political, commercial, cultural, or personal interests (Davies & Merchant, 2007; New London Group, 2000). Semiotic theory examines the ways content creators utilize meaning making tools such as icons, images, signs, music, space or body movement for communication purposes (Albers, 2007; Emission & Smith, 2000; Kress, 2003).

The term *traditional technology* as it applies to this study is associated predominantly with technology that serves *instrumental* functions such as to deliver, to display, or to enable access to information and text. As such, the instrumental function of the technology in this work is seen not necessarily as applied to augment the reading skills or pedagogy but rather as to facilitate them, from an operational or a technical standpoint.

Information/communication tools, on the other hand, include such technologies as email, texting, or database searching (e.g., Googling). These technologies when used instrumentally, do not themselves transform the literacy of the user. Similarly, multimedia technologies, when used in an instrumental fashion, they, too, do not transform the literacy of either the reader or writer.

However, when information/communicative technologies are used in a transformative or “transactional” way (Bruce, 1997), they change the very way the technology is used – such changes then evolve with the participation of every new user. Examples include the much discussed “Web 2.0” technologies, such as Twitter, Flickr, blogs, vlogs (video blogs) wikis, virtual reality sites (e.g. Second Life) and the various social networking innovations. Such applications are remarkably fluid in their purposing, structure, application and end goals. They



encourage interaction with the authentic audience, social networking, community development, and collaborative authoring. These literacies and social practices are being continuously transformed by those who interact/transact with these applications.

## Methods

### Participants

The participants in this study represented a stratified random sample of 12 higher education institutions of five types (research, state, regional; public or private) in a large southern state in the U.S.A. These institutions had an approved middle grades education program by the Professional Standards Commission (the certifying body in the state) and included: 9 state universities, 10 public, 2 private colleges/universities, 2 regional institutions and 2 research universities. For the public institutions, the Board of Regent's designations for institutions were used. The Board of Regent's is a governing authority that oversees public higher education institutions (colleges and universities) in a state under study. A sample of private institutions was also added to have a representation of the types of programs that were delivered across institutions of varying types in a state under consideration. The list of 24 institutions eligible for the study was provided by the Professional Standards Commission website.

Deans of the Colleges of Education at targeted institutions were contacted via email with an invitation to the study. With permission of the deans, program directors of the teacher preparation program(s) at their institutions were invited to the study through a written consent form and were asked to provide documents that were pertinent to the study. Program contacts and faculty teaching selected courses were also asked to complete the follow-up survey and to participate in the interview. This allowed gathering additional information not clearly detailed in course syllabi and program documents.

### Data Collection and Analysis

The data gathered included: a) documents such as course syllabi of reading/literacy courses; course syllabi of methods or practicum courses in any related area of reading/literacy; b) a follow-up survey, and c) interviews with faculty from the institutions that provided program documents. Altogether, the data in the study consisted of 46 artifacts, 7 follow-up survey responses and 7 approximately one hour-long interviews with the faculty participating in the study.

The data analysis process was conducted in two phases. In phase one, the analysis focused on examining the program documents to determine the types of technologies (the “what” question in the study) and their uses (the “how” question in the study), in middle grades teacher education programs. Initial speculations about the underlying philosophies behind these uses (the “why” question in the study) began to emerge. In phase two, the survey and the interview data were collected (see Appendix A for the survey and Appendix B for the interview guide). These additional instruments helped gather information that was either missing or unclear in the documents provided for the study. These additional data sets served thus as member checking (Bogdan & Biklen, 1992) of the initial themes of technology types and uses in middle grades teacher preparation programs at each institution. More importantly, the analysis of the survey and interview transcriptions allowed the researchers to uncover the underlying philosophies informing both the choice and the manner of use of technologies in this study. The latter analysis drew heavily from the perspectives on technology, reading, and literacy instruction described in the theoretical framework in this work. Additionally, the analysis of faculty conceptions of text, reading, and reading instruction from the interviews provided a larger context for situating their

underlying philosophies of technology integration in middle grades reading instruction in the field of reading and literacy.

Throughout the data analysis process a qualitative approach was applied, which involved open coding and axial coding (Strauss & Corbin, 1998). This coding technique led to the development of clusters of codes that shared a topic or category related to the three research foci in this study (the what, how, and why questions about technology integration in middle grades teacher preparation reading instruction) within an individual institution and across institutions (Bogdan & Biklen, 1992).

Both open and axial coding representing technology types, technology uses, and the rationales (underlying philosophies) behind these choices in all data sets used in this study led to recursive revisions of initial coding, resulting in adding new codes and clusters of codes or modifying the existing codes or clusters of topical codes. From this analysis, the themes related to the central research questions in this study emerged (see Table 1 for a summary of these themes). They are reported in this work.

[Insert here Table 1]

#### The Limitations of this Research

Even though there was an attempt made to use the interviews and follow-up surveys for member checking in this study, a few factors need to be considered in reviewing the findings from this work. First, the researchers of this work did not have access to logistical information such as hardware and software resources and access to and location of these resources in the institutions under study. Second, we did not have access to pedagogical provisions such as the actual practices used in and outside the formal curriculum provided to pre-service teachers in the teacher education institutions participating in the study. Our study either relied on the

information provided in syllabi and program documents or on accounts of practices provided by faculty themselves in survey and interviews. Observations in faculty classrooms would have yielded richer data on classroom practices with technology in specific reading courses under review. Third, future research may also benefit from pre-service teachers' perspectives on their program experiences with learning to teach middle grades reading in their methods courses.

### Findings

The main research questions served as an organizing framework for the discussion of the findings in this work. Answers to these questions follow.

#### What Technology is Being Used in Reading Instruction in Middle Grades Teacher Education Programs?

The technologies used in middle grades initial teacher preparation programs in this study fell into three broad categories: (a) traditional technology, (b) information and communication technology, and (c) multimedia technology.

Traditional technology included hardware such as a computer, tape recorder, video player, scanner, or supplies such as a 3- ring binder or a notebook. Although traditional display equipment used in classrooms such as television monitors or overhead projectors were not referenced in the syllabi, some faculty reported the use of electronic whiteboards (smart boards). Lab and media centers were also referenced. Since such infrastructure facilitates technology operation and is common in schools, they were treated as traditional technology in this study.

Information and communication technologies covered hardware such as pagers and cell phones, network systems like livetext or WebCT (course management systems), communication tools such as email, a bulletin discussion board, chat room, or blog, and data collection applications such as the Internet, Google tools, and other search engines.

The multimedia technologies included both the hardware (such as scanners, digital and video cameras, or multimedia players such as iTunes) and software, including presentation programs (PowerPoint, Inspiration) as well as games and audio and video applications. Concept mapping and graphing software were other examples of presentation programs. Additionally, the products that were pertinent to the category of multimedia technologies were mass media, popular culture, and literary works such as film, graphic novel, collage, or magazine. These latter works represented audio and motion picture, print and digital, paper and electronic technologies. We categorized reading software as multimedia technology since it may include audio and visual applications (e.g. voiceover and/or animation) along with traditional text. Table 2 shows the breakdowns of technology in each main category in this study.

Insert Table 2 here

How is Technology Being Used in Reading Instruction in Middle Grades Teacher Education Programs?

Traditional technologies were typically used as a tool for information recording and/or storing [e.g. word processing], or information delivery [e.g., projector screen display]. Video and audio recording equipment was used for capturing student teacher's own teaching, for example, in the field placement, and to reflect on it critically. Alternatively, some pre-service teachers videotaped someone else's teaching and critiqued it, as per these directions: **“During Practicum video tape and audio tape a science lesson** [emphasis in original]. You will share **ten to 15 minutes** of the video with the instructor and turn in your written analysis.” Still cameras were used to record classroom activities in an electronic portfolio, or to document an event, as in this assignment that asks pre-service teachers to develop a brochure documenting a field trip:

You each will visit a site, photograph yourself at that site and develop a brochure including your pictures...Design your own pamphlet using a digital camera and computer. You must appear in one of the pictures taken at the field trip site.

A three ring binder notebook served as the storing/delivery tool too. One such binder, called the Reading Resource Notebook, for instance, housed the resources for the reading pre-service teachers who were asked to explore “the reading needs of a diverse classroom of students” and to document their journey in the notebook. The notebook included: student information, professional readings, student text sets, technology resources, and pre-service teacher reflections.

Information and communication technologies such as email or discussion bulletin boards were typically used for daily communication between the instructor and the student and peer-to-peer communication, submission of assignments, posting announcements, and class participation (discussion of readings and providing and receiving feedback to student responses to them).

These common applications are described in this syllabus excerpt:

Students are expected to check their ASU Campus Pipeline Account on a regular basis. Messages will be forwarded from your instructor. This will be especially important during lab. The bulletin board feature will also be available for student use during this class. You may be asked to post responses to the bulletin board that will count toward class participation.

Email was also utilized for communication on a regular basis with the supervisor in practicum settings: “Student must be in **contact with supervisor** twice during internship **via e-mail**” [emphasis in original], or to provide updates: “Send a weekly progress update via email to your Supervisor.” Email was also used for reflection and communication not only with the

supervisor but also with peers and professors in methods courses, as illustrated in these directions provided in one syllabus:

E-mail one of your classmates currently enrolled in this course sharing one of your observations or concerns related to management/behavior – what is their response to it?

E-mail the course professor once during this practicum to share one of your observations or concerns you may have relating to discipline or management. Include your e-mails and responses as a part of this assignment.

At the end of the semester, the student teachers in this course were asked to “Write Final Reflection Paper,” based on observations, reflections, and insights gained through a semester-long email exchanges and reflections.

Comprehensive course management systems such as WebCT/LiveText served at times as warehouses for course materials, online learning modules, or other resources. In this example, a course management system had a very specific purpose, “Each student will put together an electronic toolbox (within Livetext) that reflects knowledge gained and resources related to the Georgia Performance Standards and literacy instruction.” At other times, course management systems served as large mailboxes for assignment submissions. Alternatively, they worked as assessment databases for student teachers. This latter goal is described in this excerpt from a syllabus:

- **Students’ survey results of your teaching must be graphed and analyzed.**

(Candidate evaluation by students) [emphasis in original]. The analysis must be in the form of a narrative with strengths and areas needing improvement from the students’ point of view. (must be entered into LiveText)

- If collection portfolio is turned in late, 5 points a day will be deducted from portfolio score.

Research information and communication tools such as webquests, the Internet, Google Tools, and search engines such as “Inference Find, Metacrawler, Dogpile, MetaFind, Yahoo!, Infoseek, Alta Vista, and Northern Light, searchengines.com, beaucoup.com,” supported inquiry leading to the development of content knowledge and teaching expertise in various areas of reading and literacy instruction. Example assignments in this category were the “Article Review” the “Web Search Report,” which are outlined, respectively, here:

We will find and write four reviews of articles on reading strategies. I will help you find sources which are abundant and easily accessible on-line. Reviews will be word-processed using a size ten for your font. Reviews will consist of a summary of the website/article/strategy and an analysis.

Web Search Report with handouts: Students will be assigned a particular area in English to search for valuable websites, which will provide helpful information for future English teachers. You will receive a form with specifics in class. (Forms available on Livetext Forms/Documents tab)

Software reviews were also recommended to pre-service teachers as tools “to plan, teach, or reinforce reading and writing skills in the content areas.” The webquest assignment had a similar role, as noted in this expectation, “**Design a WebQuest which can be used in your content area**” [emphasis in original].



The use of phones and pagers was discussed and was often presented as part of classroom management rules and regulations and of ethical code, as illustrated in this excerpt from one syllabus:

**Cell phones and pagers should be set to take your messages silently while you are in class** [emphasis in original]. If you are in an emergency that requires you to be accessible by phone during class, please alert me to this at the beginning of the class period so that I will be aware that you may be leaving the class to take a phone call.

Webcasting, using iTunes software, and blogging, or, as one faculty member called this group of applications, “second generation web tools,” were considered in a few interviews as new possibilities for student engagement in the classroom, however, they were not represented in the reading materials provided for this study.

The multimedia technologies that faculty in this study wanted middle grades pre-service teachers to use in reading instruction included Inspiration, PowerPoint, “smart” board and video.

Within the group of multimedia technologies, presentation programs such as Inspiration or PowerPoint were used to “enhance learning” through the use of “audio-visual sources.” These applications were often seen as opportunities for interactive and multimodal learning, as exemplified in this assignment:

**Presentation (25 points):**

Traditionally, students have responded to reading via tests and book reports. For this assignment, you (small groups of 2-3) will construct a visual representation for a selected required reading. You should incorporate the internet or computer software (e.g. PowerPoint) into this project.... Criteria for evaluating this activity include quality of the product, how well it represents the chosen text, and oral communication skills.

Some pre-service teachers were asked to share the results from an inquiry about a chosen student as a reader in “in a 5 minute power point report” at the end of the field placement experience. In one such instance, the report was to include the following information:

- Child’s nick name, age, grade level,
- Any important information and/or history which helped you understand your child.
- Finish the eight statements telling about what you have learned about your student and give a plan to help correct his/her reading difficulty.

In another example, pre-service teachers were asked to develop oral presentations of current daily events in the content area-reading course. The emphasis in this assignment was not only on providing the necessary background information on a given event but also on developing an instructional engagement around a specific text (e.g., a magazine article) as appropriate for a specific content area subject matter:

**PRESENTATION:**

You will make a **five** minute oral presentation with Power Point presentation (about 5 slides using maps, import an image or photo, a graph or chart, etc.) to the class about a current events article you have read from a **news magazine** (no Internet news magazines). The article cannot be from a magazine more than two weeks prior to your presentation. You should have a three-minute summary of the article and two-minute application of content for middle grades classroom.

This last excerpt also illustrates the use of concept mapping and graphing software in teaching and learning in this study.

In a similar fashion, faculty in this study used the PowerPoint tool to instruct about certain concepts and skills in the methods courses. For example, one instructor developed a

series of presentations on common reading intervention strategies and encouraged her pre-service teachers to “use one of the strategies shown in the Power Point for each of the 8 modules” in their own content area teaching. The teachers in this professor’s course were expected to make the necessary modifications to fit the needs of their individual content area and educational context, based on the relevant data they were asked to collect on their students. This expectation was communicated to these students in this manner:

Your lesson should be directed toward helping Student X with the concepts in the text that you and your partner teacher identified for the pretest/posttest. [Note: The text used in your lesson plan does not need to be the same text as the text used to design the pretest, but the concepts should be the same.]

As mentioned earlier, pre-service teachers were also expected to use video or digital cameras to capture and critique a literacy-related or technology- connected literacy lesson in the field or in the methods course. They were also invited to use these tools for documenting a field trip experience.

Although faculty in this study encouraged pre-service teachers to examine software appropriate for teaching reading in their content areas for their specific grade level, with the exception of the Lexile program no other software was recommended in the documents provided for the study. In interviews, most faculty expressed, however, their dissatisfaction with the inability to expose students to reading software in their methods courses, due to a lack of access to such programs.

Media rich texts such as film, graphic novel, collage, film, or rap music were used as course content, as was the case in the Reading and Young Adult Literature course, or a means to present or review a topic in a specific content area. An example of a latter application is the

collage assignment in the Integrated Reading to Learn: Reading Pedagogy Across Content Area course. This assignment is explained in this excerpt from one syllabus: “Make a collage out of magazines of Benjamin Franklin. Include pictures of things that Franklin was interested in.” This collage composition is an example of a classroom application that pre-service teachers were asked to develop after they had reviewed and critiqued a chosen trade book of relevance for middle grades students.

Looking yet from another perspective, the faculty members in this study drew from different approaches to communicate and model the above discussed technology tools and their applications for reading instruction. They also provided the rationales behind these approaches. One approach was simply the “Do as we do is the model.” In a similar fashion, pre-service teachers were directed by their instructors to “use whatever they are presented with” at their schools, which often meant traditional technologies. Another approach engaged pre-service teachers in observing the teachers who were “exemplary in technology use and application in their classroom.” The faculty who adopted the latter model also invited “knowledgeable guest speakers” to her college classroom to provide them with the opportunities of “hands-on and practical experiences of technologies as [these teachers] did with their own students.” The overall goal for this instructor was to help her pre-service teachers develop a mindset for adopting constantly evolving technologies for their effective use in reading instruction, which reflects a content-driven approach to technology infusion in teacher education (Harris, Mishra, & Koehler, 2009). Critical to this approach were these questions: “What technology is useful, and why? Which technology works?” Additionally, many instructors in this study used resources by other scholars in the areas of critical thinking and constructivist theory influenced by work of Bakhtin (1975) and Vygotsky (1978) and perspectives such as new literacies (Alvermann, 2004)

and multiple literacies (Hull, 2005), discourse theory (Gee, 2004), semiotics (Kress, 2000; 2003), motivation theory (Powell, McIntyre, & Rightmyer, 2006), and the National Reading Panel (2007) findings on reading and reading instruction. Most faculty members strived to provide students with knowledge about multiliteracies and newer literacies theories (Coiro, et al., 2007) along with instruction in traditional literacies. This faculty member explains the rationale for this latter approach:

However, we must also understand the classroom realities where the students need to be exposed to Standard English on CRCT for example. So while we are making sure that the students are exposed to and use multiple symbols to think in critical and complex ways, we are also making sure that they keep touch with the basic literacy skills they need in their academic endeavors.

Interestingly, the least used technology applications in this study were technology-mediated reading programs. For example, only one faculty member mentioned the Lexile reading program in her instruction. As noted earlier, others' non-use of reading programs was due to lack of access to such programs, which caused a great deal of concern to the faculty participating in the study. Another faculty member speaks to this concern: "We do not have any fluency and testing or assessment software. The case of fluency software is particularly of a great concern for me."

Table 2 lists the technology uses above-mentioned.

Insert Table 2 here

What Theory/Thinking Informs These Uses- The Why Question?

The use of traditional technologies in this study reflected an instrumental view of technology (in that this technology was used primarily as a tool for information recording and/or storing [e.g. word processing, video or audio tape recording], or information delivery [e.g.,

overhead projector or TV screen]). As such, the function of the traditional technology was not so much to help develop the reading skills or pedagogy. Rather, it served “to increase student and teacher productivity, to add a visual aspect to information delivery, and to create a permanent record of either teacher candidates’ teaching or student learning on either video or audio tapes” (Author, et al., 2007, p.10). Harris, Mishra, and Koehler (2009) describe such uses as technology- oriented, rather than content and pedagogy- based models for technology integration.

Through multimedia applications (e.g., presentation software, digital camera, or film, mass media and popular culture texts), these faculty members tried to model to pre-service teachers ways they could help their students “understand ideas in a variety of ways,” or, as another faculty member put it, “to allow experiencing some content[s] vividly.” The views that informed these approaches were rooted in new literacy (Knobel & Lankshear, 2007) and multiple literacies theories (New London Group, 2000). These theories posit that, as one faculty member explained, “literacy is not solely text-bound, but also visually driven;” and that “literacy instruction in today’s society draws on multiple sources.” In support of these theoretical frameworks, faculty members referenced Kress’s (2003) work on meaning representation through multimodal and multiple symbols. As yet another faculty member noted, “text is any graphic representation to communicate knowledge. This can be pictures like McDonalds’ sign or words.” The latter faculty member reported having used environmental texts with her students to illustrate ways to communicate meanings and knowledge. Another faculty member agreed: “As far as text is concerned, it is anything you can make meaning from. It can be images, environment, print.” Like these faculty members, this professor believed that integrating multiple texts and teaching multiple literacies they engender was the hallmark of effective instruction.

The faculty explained, “Effective instruction develops students’ abilities to comprehend, discuss, study, and write about multiple forms of text, print, visual, and oral, by taking into account what they are capable of doing as everyday users of language and literacy.”

Although these multimedia tools provide the means for creating multimodal and multi-symbol meanings and knowledge representations, as reflected in the new literacy and multimodality theories (Coiro, et al., 2007; Emission & Smith, 2000; Kress, 2003), faculty members interviewed tended to refer to these technologies more often as a resource to deliver or access multimodal and multimedia texts than as a means to “represent the content area information.” In other words, the multimedia technologies tended to be seen more as tools to deliver than to construct self-directed multimedia and multi-symbol texts and meanings (Coiro & Dobler, 2007).

The rationale for the use of information technology tools such as the webquest or Internet workshops in reading instruction varied, too. Some faculty members saw them as “resources such as children’s literature in order to facilitate the literacy instruction” or as a way to “motivate students, especially in content areas.” Most often, information and communication technologies were interpreted by faculty as texts, “print-mediated, such as textbooks and literacy-related materials like magazines, newspapers” and “different media.” One faculty explained, “Some people think that technology challenges definitions of traditional texts. I think that it merely extends them and provides alternative options and opportunities to read and write.” Like others, this faculty member saw such technology-mediated texts and their production as communication. Reflecting the new literacy research (Coiro, et al., 2007), most faculty members in this study agreed that online interactive texts have certain characteristics that call for certain reading skills. This is how one faculty member elaborated on this point:

For example, when you are online, elements such as hypertexts are telling you something. When you go to a website, the banner gives you instructions on procedures, all that is part of the message. Graphics and even short versions of everything are part of what you have to comprehend.

Drawing from the socio-cultural perspective (Gee, 2004; Knobel & Lankshear, 2007), the same faculty member noted that certain technology-mediated texts invite new kinds of texts and social practices. An example of such a new social practice that the faculty provided was texting. In recalling it, the faculty mentioned that her students “refer[ed] to text messaging as LOL [Laughing Out Loud -or- Lots of Love].”

Like Alvermann and Hagood (2000), several faculty members emphasized the importance of teaching students how to read online texts critically and how to “use critically online resources” as well as helping them to “learn how to capture the dynamic nature of technologies and use them effectively as they are evolving.” Influenced by the thinking of Gee (2004), Luke (2000), Yagelski (2005) and Johnson-Eilola (1997), these faculty members saw these literacies in the larger context of global economy and future societal functioning and interacting: “We are preparing students not only for global economy. But also, we are preparing them to learn the various literacy discourses they are likely to encounter.”

#### Discussion and Implications

It appears that the middle grades teacher education programs in this study encouraged the use of a range of technology tools, from traditional through information/communication to multimedia applications. While traditional technology was viewed and used frequently for the purpose of teacher and student productivity (e.g., to record, display, or deliver information), information/communication as well as multimedia applications were viewed more often as



sources of multimodal and interactive texts and as tools for meaning representation. These conceptions of these multimodal and multimedia applications are reflective of the multiple literacies and multimodal perspectives in the reading field (Hull, 2005; Kress, 2000; 2003; New London Group, 2000). Although the new generation web tools such as blogs, Google tools, or webcasting applications were recognized in this study as new types of texts, many of the multimodal texts and media that pre-service teachers were exposed to or explored for classroom use in teacher education programs in this study were, however, older generation applications such as PowerPoint presentations, magazines, or environmental signs and symbols. These older applications naturally tended to present more traditional texts and genres. Teacher education programs need to provide more opportunities for pre-service teachers to explore and critique the new generation technology tools as texts, particularly those that have features unique to their genre, such as blogs, podcasts, or wikis.

Like, Miller (2007), Boiling (2009), and Doering, Beach, and O'Brien (2007), teacher educators in the programs in this study aimed to help pre-service teachers develop a conception of literacy that includes multimodality, media, technology-mediated texts, and a consideration of social practices that new texts and technologies invite. A discussion of online reading skills required for new texts such as Google tools or hypertext was evident in these programs. There was also an attempt made to situate technology in the larger context of global economy and the discourses that it will require from media-savvy students in the future. The importance of teaching students to read online texts and resources critically was brought to pre-service teachers' attention, too. The programs varied, however, in the degrees of focus on new technology genres, new literacy reading skills, and their attendant new social practices. Since the future world is likely to continue to be highly interactive and visually sophisticated in terms of

information and communication tools and texts (Miller, 2007), teacher education programs must lay more emphasis in their curriculum on helping pre-service teachers develop deep understanding of the rhetorical composition of new technology-mediated texts, and of the reading processes required for both accessing and producing such texts. Teacher education programs should also provide pre-service teachers with access to cutting edge educational reading software that not only embraces interactive, multimodal and multimedia mediated digital texts available in the contemporary information/communication world, but also provides professional readings, instruction about its design, and the prior reading knowledge required of users of such texts. In this study, teacher educators' and their students' access to basic reading software, including fluency and comprehension programs, was limited. The reading software that we propose in this work would have enabled frequent modeling of interactive, multimodal, and multimedia rich reading instruction, the pedagogy that these faculty recognized, valued, and wished for their pre-service teachers to embrace.

The teacher education programs in this study provided pre-service teachers with opportunities to learn about multiple literacies and the reading skills such literacies engender. The sources used to forward this goal were most often the professional literature, quest-speaker presentations, classroom observations, and participation in technologically based environments (e.g., webquests). Pre-service teachers seemed to have fewer opportunities to create multiple literacy texts for themselves with newer technologies (e.g., podcasts of a read aloud, a multigenre video-based reflection on a reading practice, a reading lesson simulation in virtual reality) and in this way to learn about reading and reading instruction that such texts would require from their readers. Teacher education programs should infuse into their curricula more of such first-hand experiences of learning about multiple literacy texts, especially the texts generated by the second

generation of web tools such as blogs, podcasts, or streamlined video. As Cervetti, Damico, and Pearson (2006) observed, such first-hand experiences will help pre-service teachers to acquire both the knowledge of the literacy tools of their students, and the reading skills they require. Such experiences are also critical for developing a deep understanding of the relationships between Content (CK), Pedagogy (PK), and Technology (TK) in ways that are relevant to reading/literacy instruction and that are situated in teachers' individual educational contexts (Koehler & Mishra, 2008).

Appendix A

The Survey

1. What technologies do you want pre-service middle-grades teachers to use in teaching about reading and reading instruction? How?
2. What view do you model to your pre-service middle-grades teachers with respect to the use of technology in reading and reading instruction? What research and theory inform this view?
3. What is your own definition of concepts such as text, reading and reading instruction? How does technology support or challenge these definitions and conceptions?

Appendix B

Interview Guide

What technologies do you want middle grades pre-service teachers to use in reading and reading instruction and how?

What views of technologies do you model to these pre-service teachers?

What kinds of research, theories, and approaches inform those models?

What is your definition of texts, reading, and reading instruction?

How then does technology support or challenge those understandings of texts, reading, and reading instruction?

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Table 1. Coding Scheme for Technology Use in Middle Grades Teacher Education

Programs

Main Category	Related Categories
Technology Types	Traditional Information and Communication Multimedia
Technology Uses	Instrumental Transactional/transformational Models
Underlying Philosophies/Perspectives	Print-based/Traditional Newer literacies Socio-cultural influences
Conceptions of text, reading, & reading instruction	Traditional, print-based as legitimate texts Expanded- inclusive of multimodal and media texts

Table 2. Technology Types

Technology Type	Technology
Traditional	scanner 3-ring binder computer tape recorder video player electronic whiteboard (smart board) Livetext (portfolio) lab/media center (facilities)
Information and Communication	email Livetext (discussion board) internet (research) Google tools webquest online account network course management system electronic discussion bulletin board chat room blog webcasting pagers and cell phones
Multimedia	PowerPoint/other presentation software games iTunes scanner digital still camera digital video camera concept mapping/graphing software computer software (reading) film graphic novel mass media (e.g., magazines, papers, blogs) rap music brochure collage

Table 3. Technology Uses

Technology Type	Technology	Use
Traditional	scanner 3-ring binder computer tape recorder video player electronic whiteboard (smart board) Livetext (portfolio) lab/media center (facilities)	To scan images for lessons/demonstration To store reading sources/readings/lesson plans To access the Internet & to word process To play back audio material To play back video/films To record/display information/directions  To store lesson plans/resources/ assessments To access the Internet, texts, and media
Information & Communication	email  Livetext (discussion board)  Internet (research)  Google tools  webquest online account course management system electronic bulletin board chat room blog webcasting pagers and cell phones	To communicate with instructors/supervisors/peers; share updates To reflect on readings/student teaching; deliver a visual representation of the reading To find resources for teaching, websites to enhance reading & writing; critique websites; To find resources for teaching, websites to enhance reading & writing; critique websites; To design an inquiry for a content area class To enable communication with instructors/peers To share online modules/provide other resources To reflect on readings with others To reflect on readings with others To reflect on readings with others To illustrate/retrieve multimedia communication To teach classroom management & ethics
Multimedia Technologies	PowerPoint/other presentation software games iTunes scanner digital still camera digital video camera  concept mapping software  computer software (reading) film graphic novel mass media (e.g., magazines, papers, blogs) rap music brochure collage	To share lesson strategies; report from the project  To review vocabulary To store/retrieve media resources To save & share visual information To document activities in the field To tape teaching- reflect on strengths & weaknesses To visualize/synthesize ideas/reading assessment data To critique reading programs as educational tools To teach/illustrate multimodal texts To teach/illustrate multimodal texts To teach information and critical literacy skills  To provide/review alternative/multimodal texts To document a field trip/present a book critique To report learning through multimodal texts