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**EXPLORING THE INTERSECTION OF TEACHER PRACTICES, ONLINE LEARNING, AND
INFORMATION SECURITY**

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EXPLORING THE INTERSECTION OF TEACHER PRACTICES, ONLINE LEARNING, AND INFORMATION SECURITY

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Abstract. According to the Theoretical Models and Processes of Reading (Leu, et al., 2004), a scholarly compilation of literacy research, there is a lack of research about the intersections of technology, in particular the role of electronic communication, and literacy learning in K-12 curricula. Moreover, there are obvious ethical, rhetorical and philosophical issues to consider when students engage in electronic communication, which often are not considered by educators. As such, this project seeks to explore the following questions (1) The extent to which these electronic communication tools enhance (or hinder) the literacy learning of adolescents in multiple areas, as measured through standardized tests, (2) The level of familiarity or comfort felt by teachers when integrating such online applications into existing literacy curricula, and (3) What are teachers' knowledge and practices related to information assurance and security issues.

Background

We argue there is a critical need to study and understand the relationships among students, teachers and technology. We seek to explore both the educational implications of and teacher professional development needs for the consistent, safe use of synchronous and asynchronous electronic communication tools within secondary literacy curricula. We believe it is imperative that teachers develop the skills to engage productively in such instructional methodologies in order to effectively educate their students as mandated by state educational standards.

The newly released fifth edition of Theoretical Models and Processes of Reading (Leu, et al., 2004), a landmark publication for educators and educational researchers, emphasizes the need for research investigating the impact of technology on society's conception of literacy as well as its influence on literacy instruction. The new literacies of communication and multi-media technologies require their own theoretical framework in order for educators to embrace the role they should play in any literacy curriculum. "No single theoretical perspective has yet to explain the full range of the changes to literacy brought about by the Internet and other ICTs" (Leu, Kinzer, Coiro, and Cammack, 2004, pp. 1586-7). As educators begin to develop the means for understanding the ways in which students acquire multiple literacies, it will be teachers who "will increasingly need to orchestrate complex contexts for literacy and learning rather than simply dispense literacy skills, since they will no longer always be the most literate person in the classroom. . . . Students with teachers who make thoughtful decisions about what needs to be learned and how it should be learned in new literacies will be privileged; those with teachers who have not yet figured these things out will be disadvantaged, perhaps even more so than with foundational literacies" (Leu, Kinzer, Coiro, and Cammack, 2004, p. 1599). According to Donna Alvermann (2002) "it is easy to imagine a widening gap between youth who have ready access to digital technologies and those who must struggle to get a foot in the door" (p. viii).

Adolescents view asynchronous communication as a natural extension of peer socialization; systematically extending cooperative/collaborative learning to these types of media would provide teachers with additional means for motivating student inquiry as well as building fluency and confidence with reading and writing. Classroom strategies using Internet capabilities, including synchronous and asynchronous communications, show much promise in developing 6 -12 grade students' ability to read and write metacognitively. These strategies often emphasize inquiry-based, student-centered, and/or critical pedagogies through socially constructed, dialogic approaches. The students' engagement demonstrated the value of chat rooms as an enabling bridge between speaking and writing--one that has not previously been used in quite this way with young adolescent students. When researchers analyzed the factors that contributed to the effectiveness of the online chats and compared a sample of students' earlier and

later written work to identify the role of these activities and the teacher's support in developing the writers' capacity for argumentation, they identified key principles on which this dialogic approach was based and identify conditions that encouraged its success (Morgan and Beaumont, 2003).

What remains to be understood are the ways in which these principles inform the pedagogies of practicing teachers and teacher educators, whether the conditions for developing successful experiences with online communications are present in many literacy classrooms, and a statistical analysis of teachers who do or do not introduce such activities in their classrooms. If pedagogy and practice include integration of such technologies in classroom activities, is there a corresponding improvement in literate behaviors on the part of the students? If little integration is taking place, are there ideological, technological, or political barriers that make it difficult for teachers to include such activities in their instructional methods?

One study indicates that web logs can provide a means to help struggling students authentically engage with text by providing a multi-genre, multi-media reading and writing space (Kajder and Bull, 2003). The authors argue that blogs encourage creativity by providing the means of entry into work with visual and print text, indicating that their work "is just a start at defining best practice [and] a glimpse of the possibilities and an invitation for [educators] to examine, invent, reinvent, and ultimately join in the conversation" (p.35). Another study focused specifically on Instant Messaging, in particular AOL Buddy Chat, finding that engaging in such technologies enables students to express with immediacy something they have to say that they feel is worth hearing. This is, of course, predicated on the impression they have just read something worth reading. According to Richard Beach and Bertram C. Bruce (2002), chat rooms and IM require cognitive processes that are consistent with Dewey's definition of the four primary interests of a learner in an inquiry-based learning environment: investigation, communication, construction, and expression. Internet-based communication "create contexts that allow participants to share their opinions, beliefs, and ideas" and experiment with different voices and audiences (p. 150-1). This allows students to position themselves to authentically construct meaning from various textual situations with an authority and prior knowledge base than they might with traditional texts. "The ability to frame or contextualize topics or issues in terms of different components operating in social worlds or systems is central to inquiry learning" (Beach and Bruce, p. 157). Educators, particularly those charged with developing literacy instruction for adolescents, can capitalize on adolescent engagement with and knowledge of literate behaviors in these contexts; "framing instruction in this manner mirrors adolescents' attempts to cope with the complex, ill-defined problems, issues, and dilemmas in their everyday lives" (Beach and Bruce, p. 155).

However, these preliminary studies are just the beginning; this is an area of teaching and learning that is underserved and largely unexamined, particularly in the study of such discourse in specific content areas. To help teachers prepare learning experiences to include such literacies, and maintain equitable experience with the multiple literacies that are essential in modern society, professional development and teacher education programs must be informed by additional research. To this end, research agendas and professional development programs should address the needs, skills, and strategies required to teach, learn, and function in a technological environment.

Information security is a growing concern for K-12 schools, since most schools now use information technology for organizing and accessing data as well as to facilitate learning. Information security incidents are pervasive; according to the 2003 CSI/FBI Computer Crime and Security Survey, 56% of the respondents detected unauthorized use within one year's time (Computer Security Institute, 2003). Information security incidents affect society on the individual, organizational, national, and global levels. Security incidents adversely affect individuals, who lose valuable, sensitive information and services; these incidents affect organizations, who spend valuable resources preventing, detecting, and responding to incidents, and who suffer lost revenue and opportunity. Information security incidents also have the potential to affect the nation's security, whose critical infrastructure depends on telecommunications and the Internet for core business and functional services. Therefore, "the security of cyberspace rests on the security of all its components" (President's Critical Infrastructure Protection Board, 2002).

Unfortunately, K-12 students, educators and support staff are largely information security illiterate; that is, they are unaware of the threats, vulnerabilities, and issues associated with the information systems they use. The Center for Education and Research in Information Security (CERIAS) conducted a pilot study of vulnerabilities in K-12 systems in the state of Indiana. This study showed that the IT systems of K-12 schools are vulnerable; for example, 40% of the participating schools were easily penetrated from the Internet, 100% of the schools' CIPA protection measures were easily circumvented using basic tools and techniques well within the grasp of an average student, and

payroll and grade systems were relatively easily penetrated in 90% of the participants (CERIAS K-12 Outreach Program, 2003, p. 3). These vulnerabilities have potential downstream implications for misuse of data, misuse of system services, personal safety, crimes against children, and public embarrassment to schools. For example, confidential and sensitive information can be stolen, lost, and exposed to the public. The threats and vulnerabilities associated with school information systems are especially pertinent to K-12 educators and support staff, who are obligated to protect sensitive information such as assessment data under the Family Educational Rights and Privacy Act, or FERPA, one of the nation's strongest privacy protection laws.

Teenagers are especially susceptible to the ethical dilemmas presented by networked communications. While teenagers are generally more knowledgeable and comfortable in cyberspace than their adult counterparts, they are not necessarily equipped with the ethical frameworks for safely navigating through this virtual world (Johnson, 2003). Teenagers are less likely to see the similarities between online and offline behavior, as is evident from the rampant file sharing that is currently taking place. A teenager confronted with the question, "Is stealing a CD from a music store unethical?" is more likely to answer "yes" than to a question involving file sharing and mp3 files, even though the underlying principles are the same. In fact, a recent study by the CERIAS outreach program revealed that 55% of students ages 11 – 16 have used a file sharing program to download music files from the Internet; 45% of those students saw nothing wrong with downloading music, videos, or programs for free without permission (CERIAS, 2002).

We seek to investigate the impacts of readily available information technologies on the complex networks of communication and socialization within educational institutions. A prevalent misconception concerning information security is that threats and vulnerabilities are generally best-addressed with technical solutions. Many factors affect information security in an organization, and not all of them concern the technical aspects of computers and networks. In fact, the practice of information security transcends many aspects of computers and networks and is actually one of the most critical policy and structure decisions in any organization, including school systems. Therefore, administrators, technology staff, and teachers have the same responsibility to ensure the security of a school's information systems, including data, equipment, and services, and even the users of these systems. Likewise, school employees have the responsibility of transferring information security literacy to their students so that they become knowledgeable, fluent, and safe users of information technology.

Methods

Overview

Using a "mixed method" framework, quantitative and qualitative data were gathered to explore teachers' perceptions of and experiences with technology in the classroom. More specifically, data was collected that relates to English Educator's teaching practices and uses of online learning activities and communications, as well as their knowledge of security issues. Teachers from the Midwest region of the United States were surveyed about these practices and a sample were then interviewed to gather additional information. Moreover, teachers from Australia and New Zealand were interviewed in an attempt to better understand how these practices were being dealt with in other regions of the world.

Australia and New Zealand were chosen as international research sites because they are currently engaging in exciting distance communication applications to extend and enhance literacy pedagogies throughout their respective curricula (Muspratt & Luke and Freebody, 1997). We believe these initiatives contribute significantly to the success of literacy instruction in both countries, as evinced by the high rankings of Australia and New Zealand in the four areas of literacy measured by the Program for International Student Assessment (PISA) of 15-Year-Olds in Reading, Mathematics, and Science Literacy. The results of this study, which was conducted by the Organization for Economic Cooperation and Development (OECD), an intergovernmental organization of 30 industrialized nations, are published in the *National Center for Education Statistics Analysis Report* (2001) and indicate that New Zealand students in particular continually out-performed U.S. students in all areas of literacy (<http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003073>).

Role of the Researchers

The study was designed by a group of researchers from a large Mid-western university in the United States. The researchers represented the areas of educational technology, English Education, and the Center for Information Assurance and Security (CERIAS), which specializes in issues related to information security such as privacy. The research team worked collaboratively to identify the specific research focus, create interview and survey protocols and coding schemes. Each member took responsibility for collecting and analyzing the data.

Description of Participants

Data was analyzed only from those participants who completed both parts of the two part survey, n=55. Age groups were represented as follows: 20% from ages 20-29, 18% from ages 30-39, 17% from ages 40-49, and 45% indicated they were 50 years of age or older. The age levels that teachers the English Educators taught were represented by 76% of participants indicating that they taught at the Middle school level and 85% at the high school level; as can be evidenced by these percents, many teachers taught at both levels. Overall, 18% of participants indicated that they have been teaching for 1-4 years, 25% have been teaching for 5 to 9 years, 9% have been teaching for 10 to 14 years, and 31% have been teaching for 15 or more years. In terms of school settings, 22% of participants reported teaching in an urban setting, 49% in a suburban setting, and 29% in a rural school setting.

Data Collection and Analysis

Survey data served as the primary data source. Researchers created and distributed an electronic survey via email asking questions in the following general areas: background information, “technology in general,” “online technologies,” and “information assurance and security issues.” These surveys were distributed electronically to participants who were either secondary English language arts or reading teachers or English teacher educators in the US states of Indiana and Michigan. The survey results were analyzed quantitatively and qualitatively, as some of the questions required narrative answers.

Additionally, the survey asked responders to indicate if they were willing to participate in an interview, conducted either by telephone or in person by a member of the research team. Additionally, international visits allowed many opportunities for interviews with educators at these sites. As a result, ten interviews were conducted both in the US and abroad and analyzed qualitatively, as reoccurring themes or concepts were noted leading to general categories of thematic importance. This qualitative analysis resulting in thematic codes was triangulated with the statistical data, thereby informing the results.

Limitations

Limitations of this exploratory research project are related mostly to the participants. For example, the respondents are all self-selected as participation was voluntary. Along these lines, it was noticed by the researchers that approximately 20 additional participants completed only a portion of the survey and were therefore not included in our findings here. The interesting thing to note was that the majority of this group of participants stopped responding once the survey began to ask about online technologies and information assurance and security issues. This particular discovery has made the researchers wonder if there lack of completion may have something more to do with a lack of knowledge about those areas rather than the typical finding in a case like this were participants stop completing a survey due to time constraints or lack of interest.

It is also important to note that the survey was targeted to the Mid-west region of the United States, thereby limiting the findings at some level due to the lack of geographic diversity; findings may be different among other states, regions, or even countries depending upon initiatives that may exist related to the issues being studied here. Moreover, information on race and gender was not collected, but given the teaching populations of the Midwest region, a majority of participants are believed to be Caucasian females.

Results

Technology Use in General

Participants were asked to determine their comfort level with technology in the classroom in general as a way to gauge their general perception of and relationship to technology (n=55). 79% indicated that they were either comfortable or very comfortable using technology in the classroom, while 18% were somewhat comfortable, 4% were a little uncomfortable and none indicated that they were not comfortable at all.

When asked about the integration of specific technologies, most (n=55) of the participants indicated that they used word processing, software, CD-ROMs, and the Internet in their classrooms. Specifically, 91% of participants indicated that they integrated word processing into the classroom, with 36% doing so at least once per week, 56% indicated that they integrated software and/or CD-ROMs into the classroom, with 24% of those respondents indicating that they did so at least once per week, and an impressive 96% indicated that they integrated the use of the Internet into their classroom, with 26% of those respondents indicating that this occurred on at least a weekly basis. Other technologies did not fare so well. Only 13% indicated that they integrated spreadsheets, but even among those it only occurred several times per month or year, and 15% indicated that they integrated the building of web pages into their classroom, with the majority of those respondents indicating this generally occurred several times per year.

Participants were also asked several open-ended questions, including how they learned to use and integrate technology into their classrooms and how they determined when they had integrated technology well. While many gave several responses to how they learned to use and integrate technology, 20 participants stated they learned through college courses or programs, 20 through professional development and in-service workshops, and 16 stated that they were self taught. Fifteen indicated they had no formal training.

Participants (n=55) provided a variety of criteria for how they knew when they integrated technology effectively. More than half stated that they looked to students, either through their motivation levels, engagement with the material at hand, or direct student feedback. For example, "The students are engaged and they demonstrate a depth of understanding" or "student motivation is raised". Another respondent stated, "The best tools I have found are student reactions and feedback..." while another wrote, "I use students' reactions. I ask students to fill out a short evaluation ...". Several also indicated they knew they were effective when their students didn't have to help them, for example, "If the students don't have to correct me, then I know I've done it correctly!"

Almost one half of respondents also included criteria that focused on the ease of technology use and/or the need for less direction when using technology, such comments include "student independent use of technology" or "when students are able to satisfactorily use technology themselves". Approximately one-third of respondents looked to whether objectives for assignments or curriculum were met, including state standards. For example, "I follow the Indiana State Standards and also the local standards of our corporation. I require some projects to be done using technology, in accordance with those standards" and "Students are able to produce the kind and quality of product that I have envisioned. On rubrics I have prepared, they will score well."

Some participants also mentioned that they were successful when the students focused on the material being learned instead of the technology itself. For example, "I know I've integrated technology well when students and I see it as a tool to attain or reading, writing, thinking, listening, speaking objectives rather than an end in itself" and "When the focus of my use for the students remains on the material to be learned or the skills that are to be mastered, not the 'bells and whistles' of the technology."

Online Communication Technologies

Very few participants (4%) indicated that they had used online communications as a means of delivering instruction in their classroom, while 75% responded that they had used online communication as a classroom activity, which could include among other activities contacting an expert, communicating with other students for educational purposes and online discussions. Major reasons indicated by participants for including online communications as a means of delivering instruction or as an activity were (1) as a research methodology (n=9), (2) as a tool for students to find materials or information, such as communicating with experts (n=8), (3) as a means for students to engage in

different types of literacy activities, such as reading, writing, use of technology, etc (n=4), and (4) to encourage students to communicate with individuals from diverse geographic of cultural backgrounds (n=3).

When asked specifically about the use of synchronous methods of communication (e.g. chat rooms, MOO) for the classroom(n=50), 84% indicated they had not used synchronous methods, while 12% had utilized synchronous communication from 1-4 times; only 1 participant had used it more than 10 times in their classroom. One participant stated that he/she used synchronous communications to connect with authors, poets, musicians and theatrical groups among other experts. The responses were similar for the asynchronous methods of communication (e.g. email, threaded discussions, weblogs, Web Quests) (n=48), with 83% indicating they had never utilized asynchronous activities, 7% having utilized asynchronous activities from 1-4 times, and 7% indicating 5-8 times; only 2 participants indicated they had used asynchronous activities more than 10 times.

As anticipated, the majority of participants indicated that they did not include either synchronous or asynchronous activities in their classrooms, and participants were prompted to indicate why this was the case (n=39). Many participants cited a lack of time to include these activities (43%), as well as issues related to monitoring students (43%). Some participants (33%) indicated that their school does not have the equipment to support such activities, or a lack of familiarity with such technologies (33%). Others stated that their administration has indicated that students are not allowed to engage in such activities (31%), while others stated they were not comfortable using online communications with students in their class (18%). Finally, 15% stated that they felt comfortable with the technologies but did not feel it belonged in their classroom.

Information Assurance and Security Issues

A majority of participants (n=55), indicated that they were aware of information security and privacy issues related to online technologies (65%), while 35% were unsure or not aware of these issues, leaving much room for speculation as to their depth of knowledge. Of all participants, 60% stated that they talked with their students about these issues, but when queried about students' awareness of online threats to privacy and personal safety in relation to online communication tools, the responses, although varied, generally demonstrated that the teachers are unsure about the extent of their students knowledge or awareness in this area. For example, statements from teachers indicated that they assumed students were aware, or that they thought they were aware but did not take it seriously. Also, many of the teachers explained that their school had an Internet Acceptable Use Policy in effect, but that students often signed the related form(s) without a discussion, making it difficult to gauge the quality or depth of their awareness. Overall (n=55), 78% indicated that their school did have an acceptable use policy in place, while 22% were unsure or stated that their school did not have such a policy.

Participants (n=55) were asked if their knowledge of information security and privacy issues influenced their use of online communication tools in the classroom; 45% indicated that it did. Of those participants, (n=25) 88% stated that this knowledge inhibited their use of online communication technologies versus the 12% that stated it encouraged their use of online technologies. More specifically, when participants were asked about the role of acceptable use policies and their potential influence on the use of online technologies (n=43), 47% indicated the policies inhibited their use, 28% indicated that the policies had no effect on their use, and only 5% indicated the policies encouraged their use of online technologies.

Finally, participants (n=55) were asked about students' transfer of ethical behavior to the online environment. Only 27% indicated that they thought students did transfer that ethical behavior, while 47% were unsure and 25% indicated they did not believe this to be the case. Of those that responded "no", the barriers they perceived to this transfer of ethical behavior included students' perception of their own anonymity while online, students failure to recognize traditional social constructs while using online technologies, students' lack of responsibility for their actions while using online technologies, and students' lack of experience with online technologies.

Establishing Relationships among the Variables

In an effort to determine if there were any underlying relationships among the variables being examined, correlations were run on several of the demographic items (years teaching, age, school setting) against factors uncovered in several of the driving questions of the study, namely, comfort level with technology, Internet integration, use of online communication in instruction, number of times asynchronous activities were incorporated

into the classroom, and awareness of online security and privacy issues. In addition, correlations were conducted for the school setting variable (e.g. urban, suburban, or rural) with (1) comfort level for technology, (2) Internet integration in the classroom, (3) online communication in instruction, (4) online communication activities, (5) number of time asynchronous activities were incorporated, and (6) awareness of online security and privacy issues. Similarly, correlations were conducted for the variable comfort level with technology and (1) Internet integration in the classroom, (2) online communication in instruction, (3) online communication activities, (4) number of times asynchronous activities were incorporated, and (5) awareness of online security and privacy issues. Spearman's rho was used to perform the nonparametric correlations given the ordinal nature of the data coding system that stemmed from the survey format and the exploratory research design.

Surprisingly, for all of the correlations performed, none were found to be significant. However, generally speaking it can be inferred from the data that years of teaching experience did have an effect on the whether the internet was incorporated into the classroom, with teachers having 15 or more years of experience showing more likelihood of doing so. Also, participants from urban school settings were less likely to integrate the Internet. Finally, comfort level could be inferred to have an impact on awareness of security and privacy issues, with participants at the comfortable or very comfortable with technology levels tending to be more aware of these issues.

Discussion

Perhaps the most salient finding of this exploratory project is the overall lack of use of online communication technologies in the classrooms of the secondary English language arts teachers we surveyed, particularly synchronous tools. This result, while perhaps not surprising, essentially hindered our ability to address our first research question: What is the extent to which electronic communication tools enhance (or hinder) the literacy learning of adolescents in multiple areas, as measured through standardized tests? Since very few communication tools were being integrated in secondary literacy pedagogy, it was impossible to evaluate their effect on learning.

However, extrapolating from this result, we hypothesize that in-service workshops or professional development institutes for teachers in our area addressing online communication in the classroom may be desirable. Supporting this hypothesis was what we learned about the centrality of professional development and “on the job training” to teachers. While some more recent university graduates had some university technology coursework, the majority of the respondents had no such training and relied upon their school districts or corporations to provide education or sought out knowledge independently. The reliance on professional development, and the description of such workshops in predominately positive terms, demonstrates their potential power in reaching teachers and instructing them about educational technology.

Additionally, the findings about information assurance and security were equally enlightening. The teachers’ connection of security knowledge and policies with “inhibited” online technology use indicates a need for additional education (perhaps again through in-service workshops) in the area of technology ethics and security. In the day and age of Internet “nannies” and filters, it’s understandable that most respondents would see security as a sort of “big brother” tracking students’ online behavior. However, teachers’ understandings of security issues seemed confined to asking students to sign Internet contracts or expressing fears of plagiarism. We argue there’s much more for teachers to consider, including the ethical issues inherent in online communities and personas, privacy, computer hacking and identity theft, and copyright concerns.

In conclusion, our exploratory research has revealed a need for additional professional development for teachers in the areas of online communication and information assurance and security as related to literacy teaching and learning.

Future Research

Future issues that merit continued study include an exploration of how secondary school students are engaging with online learning activities (both in and out of school settings) and online communication and how this engagement may be influenced by their knowledge and perception of security practices. It could be pedagogically powerful for teachers to understand the prior experience and preconceived understandings of their students toward online

technologies before implementing them in formal learning environments to teach literary skills. Additionally, it would be valuable to explore if there is a significant difference in these understandings and perceptions among students who have varying levels of access to technology (i.e., exploring the significance of the “digital divide”). Finally, the researchers would like to see more research done in the area of student engagement with online activities and communication as they relate to education, particularly literacy education, such as whether or not these activities increase student engagement with the curriculum or improve student performance.

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