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The University of Southern Mississippi

WEB 2.0 AND SELF-REPORTED STUDENT PERFORMANCE AMONG HIGH
SCHOOL STUDENTS IN RURAL SCHOOLS

by

Joseph Carl Cash

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2010

ABSTRACT

WEB 2.0 AND SELF-REPORTED STUDENT PERFORMANCE AMONG HIGH SCHOOL STUDENTS IN RURAL SCHOOLS

by Joseph Carl Cash

May 2010

This research intends to contribute to the current literature available on the appropriate levels of utilizing Web 2.0 resources in the classroom, therefore, amicably submitting the study's results collaboration of a dynamic theoretical construct for pedagogy in the digital age. Educators must contend with and adapt to cognitive changes within their students. School leaders face existential questions regarding the role of the teacher, the role of the student, and the method by which these two partners interact. School administrators aware of the substantive challenge facing traditional methods of instruction should be able to provide professional development to teachers that would accurately identify the student of the 21st century as well as establish a framework from which to facilitate those pupils.

Based upon the social cognitive learning theory (Bandura, 1977, 1986, 1989, 1999, 2002) and upon the collaborative nature of Web 2.0 resources, the focus of this study was to determine whether there is a statistically significant relationship between level of Web 2.0 usage and self-reported student academic achievement among high school students. Participants included 291 Georgia high school students. The researcher developed and used a Web 2.0 and Student Achievement Questionnaire to gather data on an online site. The researcher obtained a response rate of 31%.

Regarding statistical findings, seven hypotheses were tested. Statistical significance was obtained pertaining to the amount of Web 2.0 usage and literature letter grade, and Web 2.0 usage and extracurricular activity participation. Ancillary findings suggested a stronger female use in Web 2.0 resources, as well as high extracurricular activity participation correlating with higher academic achievement.

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DEDICATION

I dedicate this manuscript to those whose influences have spilled onto these pages. To my mother, who awakened my soul to education, and to my father, who has always modeled persistence and personal sacrifice. To my wife Brandi, thank you for sharing in the risks and sacrifices required for this season. I cherish your grace and equanimity; you are my passion. To Raegan and Tanner, I pray you always find life and learning a delightful mystery. Fervently pursue Truth. “I thank God for you—the God I serve with a clear conscience, just as my ancestors did. Night and day I constantly remember you in my prayers (2 Timothy 1:3).”

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CHAPTER I

INTRODUCTION

On a nationwide survey given by the National School Boards Association (2007), students ages 9 to 17 reported spending almost as much time on online social networks and other web sites as on watching television, or about 9 hours online and 10 hours watching television a week. However, time spent on the computer may not be served passively absorbing Internet content. Current studies suggest that students are actively contributing their own online content (National School Boards Association, 2007).

Ninety-six percent of students surveyed said that they have used Web 2.0 or open source resources. Web 2.0 refers to the second generation of online utilization of the World Wide Web (DiNucci, 1999; O'Reilly, 2005). Web 2.0 represents a transition from fixed HTML web pages to user manipulated networks. Open source refers to any program or site that operates upon the principles and practices of free access and trade of information and collaborated knowledge (Madey, Freeh, & Tynan, 2002; Coppola & Neelley, 2004). These networks include blogs; online communities such as Twitter, MySpace, and Facebook; Wikipedia; Flickr; or even Google. Notable examples of open source software include Linux, OpenOffice, and SourceForge (Madey et al., 2002; Coppola & Neelley, 2004).

This transition toward more dynamic web usage rendered applications and software that was traditionally limited to one computer obsolete; if not cumbersome (O'Reilly, 2005). Web 2.0 resources are now hosted on the World Wide Web and accessible on any computer that has Internet connection. For example, Google Docs world processing application functions much like MicrosoftOffice Word on an operational level. However, Google's word processor is open source and web based

whereas Microsoft Word is only available through purchase of the software and only on the computer that the software is licensed to.

Students are beginning to recognize the availability of Web 2.0. Eighty-one percent of students report using these resources within the past 3 months and 71% report daily use (National School Boards Association, 2007). Surprisingly, 50% of these students say that they used Web 2.0 technology to help them with their homework. From 2002 to 2007, the percentage of students who post messages daily online has increased from 7% to 21% (National School Boards Association, 2007).

Well over three fourths of school district curriculum programs in the United States place a strong emphasis on collaborative learning in the classroom (National School Boards Association, 2007). Although just under one half of school administrators report a desire for students to express themselves more creatively and develop international relationships, almost one third of school leaders do not place a premium on integrating social networks, arguing that implementing such networks would not improve reading, writing, or expression (National School Boards Association, 2007). Conversely, 76% of parents believe that social networking helps to strengthen their children's reading, writing, and expression skills, as well as craft their social skills (National School Boards Association, 2007).

Collaboration is a key element to Web 2.0 technologies. The previously mentioned increase in Web 2.0 usage reflects a contemporary trend that is becoming a part of the social fabric of globalization (O'Reilly, 2005). Educators have been encouraged to develop ways to connect social networking and the open source phenomenon with student achievement, and school boards have been asked to adopt policies and practices in a similar manner that teachers had to implement computers into

classroom learning 3 decades ago (Christensen, 2009). In fact, many districts restricted Internet use or forbade its use in school altogether when the information juggernaut was first introduced to the public (National School Boards Association, 2007).

Prior to the gradual introduction of the Internet to the general public in the 1980s, the traditional methods of public education had been generally unaltered for almost 300 years (Dryden & Vos, 2005). However, the new availability of information for both teachers and students revolutionized how educators facilitated learning in their classrooms. As Dryden and Vos (2005) suggested, today's students must now possess not only fundamental factual knowledge in order to maintain an adequate level of academic performance, they must also have a comfortable operational understanding of the technological tools used to navigate themselves to the appropriate answers.

The first phase of online learning was unprecedented and revolutionary but considerably awkward as many educators did not fully comprehend the potential of what would become known as e-learning, or student created online content (eSchool News, 2006). Later, as web users became more comfortable with the functionality of the Internet, they began to offer free, user friendly information in an open source format. This rebirth of the Internet became known as Web 2.0, and its emergence demonstrated an anomaly of an infinitely expanding network synthesizing knowledge into easy to comprehend and manipulate units. This new blend of information and open source accessibility has spawned an entirely new reciprocity among those who create the information and those who use it. The structure and nature of open source online material allows for freedom of study, modification, and redistribution on an as needed basis (O'Reilly, 2005).

The world of mass innovation and an interactive community revolution have created new minimal cost collaborative infrastructures for social networking. Prior to this medium, users would never have had the tools or perhaps the desire to interact with one another online in such context, but now they can establish intimate friendships. Social networking sites such as MySpace and Facebook, as well as user-created content sites such as YouTube and Wikipedia, are the vehicles for this second phase of online education (Tapscott & Williams, 2006). Where Netscape guided users through the adolescent world of Web 1.0, Google now introduces web users to an endless spectrum of collaboration and network learning (O'Reilly, 2005). This evolution was the catalyst for the ultimate online paradigm shift (O'Reilly, 2005; eSchool News, 2006) User-generated, open source information bases have, therefore, created an upside-down revolution in which the public can now openly share information that was previously privatized or expensive (Torvalds & Diamond, 2001; Coppola & Neelley, 2004). Friedman (2005) suggested that, consequently, progressive society is currently experiencing not only an educational revolution, but also an economic, societal, and geopolitical metamorphosis as the literal breadth between any two points has been superseded by real time online interaction.

Prensky (2001) commended today's generation of "digital natives" and their ability to harness a cognitive skill set that is fundamentally different from their predecessors that he referred to as "digital immigrants." These native speakers' ability to converse in the digital language of the 21st century has even caused some cognitive scientists to suggest a physical difference in brain structure (Pensky, 2001). These native speakers are developing in an epoch often projected as the "singularity" or a point of rapidly accelerating use of technology and the maximum cognitive functionality of the

human brain (Venge, 1993). The communion of the arbitrary point of technological advancement and the quantitative mental capacity would potentially bring irreversible fundamental cultural, political, educational, and economic modifications and expectations (Freidman, 2005).

The current manifestation of this metamorphosis is the digital example of a gift economy. This new social online environment fosters a collaborative community that offers services, products, and computer systems free of charge. These services are usually attainable on Internet forums where suggestions and ideas are traded freely. In this model, users make what they are good at producing and then they give it away to those who may utilize it for free. Aside from the economic aspect, open source materials are usually user-friendly in that the user can manipulate the software to his or her personal needs. OpenOffice and OpenPowerPoint are examples of manipulative programs that can be adjusted by the user for his or her own personal needs. These products provide the same services as their Microsoft and Apple counterparts, but open source software does not carry the hefty price tag. The educational implications are notable considering that information technology directors and school software programmers can potentially work hand-in-hand with classroom teachers and students to collectively design classroom software specifically designed for the students with student input. Categorically crafted open source software would make online work more efficient, all the while saving the school district revenue that would otherwise be wastefully spent on expensive closed software programs.

In this new atmosphere of technological saturation, a healthy understanding of these resources is gradually becoming a cornerstone skill. However, many schools do not mandate online collaborative dexterity or even suggest that students galvanize open

source social network created information with their academics (Dryden & Vos, 2005). Such an oversight could potentially cause the most widely used methods of instruction to become obsolete and, at best, become disengaging to students.

Many students live a dual existence at home and at school. The average American student will spend about one hour a week with a computer at school (Dryden & Vos, 2005). In time outside of the classroom, however, students, as well as the rest of modern society, function in a “wireless” world. More than half of all school districts explicitly prohibit online social networking sites at school (National School Boards Association, 2007). Those schools that do not acclimate to a digitally ripening world will be operating with a pedagogical blind-spot, neglecting their students the opportunity of practical empiricism that they need in manipulating operational apparatuses (Dryden & Vos, 2005).

Students now come to school with different expectations regarding the pace of learning and the context therein (Christenson, 2009). Information was regarded as scarce in previous epochs, and consequently pupils would seek out the academy for knowledge. However, the online availability of content is beginning to provoke existential questions for the field of education. The exact role of the student and the teacher appears to be ambiguous in the school of the future if these functions are not seated in the conditions of the digital age.

The problem is not due to availability of resources however. The Department of Education reported an increase in overall school Internet connectivity from 35% in 1994 to 99% in 2001, with an 84% increase, 3% to 87%, in classroom connectivity (Noeth & Volkov, 2004). This increase was provided by an investment of \$40 billion in educational hardware and software for schools (Dickard, 2003). It appears that the missing element is

not in the resources, but in teachers establishing tangible connections between learning and the application of a digital skill set.

Dryden and Vos (2005) suggested that time spent online exercises the mind in a manner just as developmentally vital as traditional instructional methods. Dickard (2003) argued that the pedagogical advantages of purposefully technological planning and implementation into schools include leadership training, improved critical thinking and decision making skills, 21st century literacy, a broadened social awareness, increased student learning as measured by standardized test scores, increased student engagement due to relevance, and established communication skills and student economic viability upon graduation.

While time at school is directed at increasing a student's intelligence quotient, social interaction online builds a person's emotional quotient, or social intelligence. Social intelligence equips the brain with the tools needed to react and make decisions in any particular situation (Goleman, 2006). Therefore, the process of realization develops a schematic "file" that makes neurological processes in the brain more efficient in future situations. Residing in this line of logic, therefore, it is possible that students with a high social intelligence resulting from social networking could perform better on school exams. Furthermore, by accessing the global online community, students are actively investing in mutual successes through their collaborative efforts, all the while receiving synergetic peer support. Understandably, student discernment is vital. This, however, is an evaluatory skill that could become required standard. Even if a student or a teacher is able to gain information through collaborative processes, those individuals find difficulty in utilizing those same skills if they do not fit schematically with pre-existing pedagogical beliefs (Nave, 2008).

Information consumers maintain and operate with certain evaluative processes. Just as a classroom teacher would encourage students to evaluate primary sources' credibility, educators must encourage the same for students on Internet usage. Students who make use of open source social networks are exposed to a mélange of opinions and schemata which require them to differentiate degrees of importance and factuality. This process facilitates students in crafting a necessary decision-making tool which can consequently result in higher performing students and also high levels of self-efficacy among citizens.

Statement of the Problem

The premise of this study was to examine whether students who utilize Web 2.0 resources are able to use those skills to achieve higher academic performance. The quantitative correlational variables in this study are a diagnostic level of Web 2.0 usage and self-reported academic achievement. An additional diagnostic covariate in this study was a measure of extracurricular participation.

It was the intent of the researcher to record and evaluate the correlation between levels of Web 2.0 resource use and self-reported academic achievement among high school students enrolled in public schools served by Georgia's Pioneer Regional Education Service Agency (RESA). This study has intrinsic importance, potentially fostering reflection upon the learning theories and frameworks used to build local, state, and national curriculum guides. If a statistically significant positive relationship is found between students who utilize Web 2.0 resources and self-reported academic achievement, then those curricula should be adjusted to synthesize online collaborative learning systems with traditional classroom methods. Furthermore, it has been suggested that

students who create their own manipulatives perform better on summative assessments (Dryden & Vos, 2005).

Web 2.0 resources operate on a premise of free access. Therefore, schools that are fiscally conscious or schools that must abide by rigorous budgetary guidelines should pay close attention to the benefits of utilizing cost free, open source materials. The content can be just as credible as proprietary software, but without the cost and with the option of collaborative compilation. Aside from using open source software, social networking sites and tips on utilization in the classroom can be introduced to staff in a professional development format.

Upon any positive correlation, educators and curriculum directors would be called upon to consider significantly deviating from traditional modes of delivery if public education systems and curricula are not to become obsolete. Policy makers are encouraged to recognize the levels of application, analysis, synthesis, and evaluation present in student-created and collaborated online content and communications that exist via the mechanisms of open source social networks.

If a negative relationship or no relationship is found, educators still are called upon to explore creative ways to bridge instruction with new technologies as the need for quality instruction exists and the resources are available. As policies allowing for student choice and social justice continue to reflect upon pedagogical design, students and stakeholders will request to select their most optimal and customizable learning styles and assessment methods (Christensen, 2009). Consumption restrictions limit schools from a modular educational experience for every child under traditional instructional methods (Christensen). The demand exists even if web based collaborative learning is not

the resolution. Current instructional methods infused with piecemeal technology have not provided results.

Hypotheses

The purpose of this project was to examine the relationship of student use of Web 2.0 resources and self-reported academic achievement. The sample included students enrolled in North Georgia Appalachian public high schools, as identified by the Appalachian Regional Commission, within the same Regional Education Service Area (2009). The research was guided by the following questions:

1. Is there is a statistically significant positive relationship in degree of Web 2.0 technology usage and student reported academic achievement?
2. Is there a statistically significant positive relationship in degree of Web 2.0 technology usage and extracurricular activity participation?
3. Does Web 2.0 usage or extracurricular activity participation differ significantly by gender?

To that end, the following hypotheses were tested:

- H₁: There will be a significant relationship between degree of Web 2.0 usage and self-reported mathematics grade.
- H₂: There will be a significant relationship between degree of Web 2.0 usage and self-reported literature grade.
- H₃: There will be a significant relationship between degree of Web 2.0 usage and self-reported science grade.
- H₄: There will be a significant relationship between degree of Web 2.0 usage and self-reported social studies grade.

H₅: There will be a significant relationship between degree of Web 2.0 usage and extracurricular participation.

H₆: There will be a statistically significant difference between males and females on the amount of Web 2.0 usage.

H₇: There will be a statistically significant difference between males and females on the amount of extracurricular activity participation.

Definition of Terms

The following terms were used throughout this study:

Blog – refers to a web site, or web log, containing personal reflections and comments in a journal format (Merriam-Webster, 2009).

Connectivism – refers to a digital age learning theory developed based on the assumed limitations of the “pre-Internet” learning theories of Behaviorism, Cognitivism, and Constructivism. Developed by George Siemens, Connectivism attempts to identify the impact of technology on human existence, stages of development, and communication. In this theory, learning, which may reside in non-human instruments, is a process of decision-making as one chooses what to learn while sifting through a surplus of opinions and facts. Therefore, the ability of the information user to draw connections and arrive at conclusions based on networks, information sets is critical (Siemens, 2004).

Currency – as defined by the researcher for the purposes of this study, refers to accurate, up-to-date information.

Facebook – refers to a social networking website that was created in 2004 by students from Harvard University. Users who have joined the network are able to select sub-networks based on schools, interests, or other characteristics. In July 2007, Facebook was ranked as the seventh most visited website in the United States (Hirschorn, 2007).

Gift economy – refers to the practice of giving information, products, and services free of charge to those who use them. For the purposes of this study, gift economy refers to unconditional online contributions.

Google – refers to the Web search engine that was created in 1995 by students from Stanford University. Google acts as a refining search tool, able to provide search queries with related Web sites (Google, 2009).

Instructional technology – refers to the implementation of technology and instructional strategies in order to arrive at answers to instructional problems (Creighton, 2003).

Internet – as defined by the researcher for the purposes of this study, refers to the electronic network of world wide linked computers that hosts and acts as the vehicle between information and information seeker.

MySpace – refers to a social networking website that maintains an interactive, user created content. MySpace includes personal profiles, blogs, photos, music, and videos. MySpace is currently the world's sixth most visited website, in any language, in the world, thus becoming an integral part of contemporary popular culture and interaction (QuantCast, 2007).

Online – as defined by the researcher for the purposes of this study, refers to the connection of one computer to an Internet network.

Open Source Software (OSS) – refers to software that is able to be accessed free of charge and often able to be edited or added to by user accounts (Kapoor, 2005).

Podcast – refers to a portmanteau of “iPod” and “broadcasting” allowing Internet users to publish and subscribe to files free of cost (McKinney, Dyck, & Lubert, 2008).

Proprietary software – refers to computer software that is the property of a company or an individual; the opposite of open source (Bitzer & Schröder, 2006).

Social Constructivist Learning Theory – refers to the learning philosophy that states that learning is constructed by the world that individuals live in. In this theory, learning is a process of categorizing experiences and generating mental models by which people operate later. The best learning environment, therefore, is one that fosters a dynamic interaction between instructors and learners. The importance of culture and the understanding of context are vital to this theory (Piaget, 1965; Vygotsky, 1977).

Social intelligence – refers to the ability to gather information from various stimuli and manipulate this information in order to maintain social order between one's self and those they come into contact with (Goleman, 2006).

Social networks – refers to groups of people who are associated by various characteristics. First coined by Barnes in 1950, a social network denotes a group of about 100 to 150 people. Online social networks are websites that host virtual communities allowing members to communicate via instant message, blogs, videoconference, or audio (Madey et al., 2002; Coppola & Neelley, 2004).

Twitter – refers to the micro blogging, social networking service that hosts text updates from users (Sagolla, 2009).

Web 1.0 – refers to the early stages of the World Wide Web. Web 1.0 is an internet server that supports formatted documents in hypertext markup language (O'Reilly, 2005).

Web 2.0 – refers to the ever-transitioning nature of the World Wide Web from a base selection of website to an organism that is ever-mutating and evolving on the premise of user-created content (O'Reilly, 2005).

Wiki – refers to an online resource that allows users to edit content in a collaborative process (Lamb & Johnson, 2007).

Wikipedia – refers to an open source online encyclopedia ranked as the eighth most visited site on the World Wide Web. Wikipedia was created in 2001 and operates on a collaborative effort of users. The term wiki comes from the Hawaiian word for “quick,” and the program enables any registered user to edit and check the encyclopedia content (Lih, 2009).

YouTube – refers to the user-created and collaborated video hosting website created in 2005 that allows contributors to upload personal videos for public viewing (Burgess & Green, 2009).

Zone of proximal development – refers to the idea by Vygotsky (1977) of the distance between what a learner can learn independently and what the learner can do with assistance.

Delimitations

The scope of this study was limited by the following factors:

1. Students were limited to those from the state of Georgia’s Appalachian Regional Commission identified counties public high schools within the Pioneer Regional Educational Service Agency with fewer than 6,000 students in the district. Therefore, the results of this study may not be generalized beyond this population.
2. This study was limited to self-reported academic achievement of students who choose to participate in this study.
3. This study was designed to identify a relationship. Therefore, this study cannot determine causality.

Assumptions

1. The researcher assumes that demographic data will be reported accurately.
2. The researcher assumes that levels of Web 2.0 usage will be reported accurately.
3. The researcher assumes that self-reported student academic achievement will be reported accurately.

Justification

Empirical studies on the pedagogical ramifications of the new nature of the World Wide Web in Web 2.0 upon students are still burgeoning almost as fast as a social networker can type his or her own blog. The researcher intended to contribute to the current literature available on the appropriate levels of utilizing open source software and social networks in the classroom, therefore, amicably submitting the study's results collaboration of a dynamic theoretical construct for pedagogy in the digital age. Educators must contend with and adapt to cognitive changes within their students. The manner in which students operate and process information is fundamentally changing. School leaders must face existential questions regarding the role of the teacher, the role of the student, and the method by which these two partners interact. School administrators aware of the substantive challenge facing traditional methods of instruction must be able to provide professional development to teachers that would accurately identify the student of the 21st century as well as establish a framework from which to facilitate those pupils. Furthermore, possibilities of economic liberation would alleviate struggling schools' focus on financial constraints and allow school administrators to refocus on strategies that are pedagogically sound and data based.

Summary

Chapter I discussed contemporary trends in student engagement. Also included was an introduction to the importance of Web 2.0 literacy. Chapter II contains an overview of the theoretical framework of social cognitive theory, connectivism, and the concept of collective intelligence, as well as a synopsis of extracurricular participation, millennial students, Web 2.0 Resources, and rural schools. Chapter III details the methodology that was utilized in this research process. Chapter IV discusses the data gathered in this study. Chapter V concludes this study with result analysis and thoughts on subsequent research.

CHAPTER II

LITERATURE REVIEW

Theoretical Framework

The nature of a study in open source software and social networks invokes an examination into the concept of collective intelligence. The learning theories that legitimize the pedagogical concept of collective intelligence are the constructivist and social cognitive theories (Siemens, 2004). Studies in student extracurricular participation exemplify the dynamic theories of social cognitive constructs. The increase in online connectivity has directed extracurricular participation in unorthodox directions. Through social network analysis, researchers can identify the traits that connect Internet users and, therefore, value the rate and credibility of those connections. Through this online interaction, users can improve upon their own levels of social intelligence as they interact with others (Kihlstrom & Cantor, 2000; Albrecht, 2006). This quotient of social awareness allows individuals the ability to evaluate information and people in order that to call upon schemata at appropriate times and settings (Kihlstrom & Cantor, 2000).

Examining social practices in an environment that encourages participant collaboration while maintaining continuous online interaction gives credence to the galvanizing concept of a collective intelligence under the vehicle of Web 2.0 resources (Siemens, 2004). These resources, free of operational or licensing costs, provide economic alternatives to costly software without sacrificing content legitimacy (Coppolla & Neelly, 2004). For rural schools, avoiding such costs while maintaining expectations for students to perform adequately on national technology standards would be a utopian solution. Rural schools contend with a unique set of challenges such as revenue levels below expenditure costs, even after Federal Title Funds, and low graduation rates. Rural

schools facing these challenges cannot logically maintain their current models of operation. Alternative methods of instruction may provide an economically and pedagogically sound response to the magnitude of indicators that would predict low achieving schools.

Because of the nature of this study, currency is an invaluable factor. Empirical studies are in their infancy in the areas of the potential educational gains using Web 2.0 resources. However, this research called upon a multi-epistemic inspection as the nature of collaborative online learning is conceptually stratified.

Social Constructivism

Dewey (1938) advocated that individuals construct meaning and purpose based upon hands-on experience. This experience, as he surmised, is categorically valued in terms of the quality of the experience. Therefore, as learners experience an isolated event in time, they place value upon that experience while defining its associated and appropriate schematic position. This concept is known as constructivist-based learning.

Piaget (1965) echoed Dewey's theory by arguing that social interaction consisting of cooperation and mutual respect was the necessary building block for cognitive development. In Piaget's theory of cognitive constructivism, essential to the learning process is cooperation between players. Piaget so fervently supported this concept that he held that high order cognitive development was not possible without the cooperation of equal partners (Matusov & Hayes, 2000). This interpersonal dynamic allows for simultaneous intrapersonal development and reflection used in metacognitive processes.

Vygotsky (1977) pioneered the learning theory of Social Cultural Constructivism by critiquing Piaget's theory of cognitive constructivism. In an attempt to establish the importance of culture and language in the context of knowledge, Vygotsky synthesized

Piaget's theory with the idea of a collaborated higher level of truth. Vygotsky held that learning was not to be interpreted through developmental periods. Instead, cognitive processes were dynamic and transcended Piaget's stages. In Vygotsky's theory, the social context of learning was the key, with language being the means of synthesizing individual thought and social context (Knight, 2008).

Vygotsky (1962, 1977) also outlined a synthesis of thought and language. Normal or external speech is internalized through socialization. Inner speech, which is much more compressed and might take more words to express the same concept in external speech, develops from external speech. Therefore, internal speech is a mature form of language that is unintelligible to anyone but the thinker. Concept formation is initiated in a child when he or she begins to place information in unorganized categories, or heaps, that adults would usually solve by forming a new concept. Children can then begin thinking on complexes as the second major phase in concept formation. Finally, children will begin to link these complexes together to form connected and manipulative ideas. Therefore, as a child's intellect develops, the known information is replaced by deeper and more complex understanding (Vygotsky, 1962, 1977).

Vygotsky (1962, 1977) emphasized the importance of social origins in child development and educational psychology. His deep pedagogical concerns were directed to the dimensions of the social organization and implications of instruction. The best and most unique form of interaction between an adult and child, according to Vygotsky, is the educational process.

Vygotsky (1962, 1977) crafted a highly mathematical contrast of inner and outer speech. Normal, or external, speech is contingent upon one's inner speech. Some teachers find that their students are increasingly having a difficult time expressing themselves, and

reflective writing is comparable to any list of painful acts. This phenomenon could be explained by a lack of personal time to develop internal speech. With excesses in stimuli, students are experiencing little time to reflect. Similar to the act of neglecting a muscle of exercise and then forcing performance, it becomes painful for the student when required to express outwardly what is void or very sparse within.

In his mission to address egocentrism in the area of speech, Vygotsky (1962) forged the domain of child cognitive development in relation to social interaction and culture. He conceptualized the constructivist theory of assisted learning, therefore acknowledging and esteeming children's cognitive abilities and their potential to higher functions of learning through education.

Vygotsky's (1962) analysis of thought is that autism, or only viewing one's own needs, as the most original form of thought, progresses to logic with egocentric thought as the link between the two. He does differ from Piaget's developmental psychology approach and to Watson's behaviorism, while synthesizing the points that he agreed with on thought and language. Instead of focusing on the structure of language, Vygotsky called for a functional analysis of language through observable behavior. These functions are interwoven into a sociological and cultural context with language playing the central role in cognitive development, and these processes are inseparable of the social context. Vygotsky's central theme is that thought and language develop in a manner that is both self-catalyzing and synchronous at different times. At times, thoughts and language develop separately, whereas, under different circumstances they need each other to act upon the other (Vygotsky, 1962).

Vygotsky (1962) theorized that through healthy communication and interaction between the learner and the instructor, or other peers, the learner could arrive at a higher

order of knowledge than was possible on an independent perusal. In fact, Vygotsky argued that how individuals utilize relationships and information from others is a greater measure of intellectual development than independent achievement (Vygotsky, 1963). Through his *zone of proximal development*, individuals could master concepts otherwise unobtainable using their own cognitive resources (Vygotsky, 1977). The zone referred to the distance between a learner's current cognitive development and the potential future cognitive development as only possible by the means of social interaction. Therefore, what is established is a construct of information created through active collaboration, not merely passive instruction.

In Vygotsky's learning theory, the most optimal learning environment, is an atmosphere of dynamic interaction such as an open source social network. One of the foundations of Social Constructivism is that knowledge is not passively received as if by a process of diffusion, but that an individual's understanding of any particular subject is actively built upon over time and interaction through social relationships (Ernest, 1998).

Applying Vygotsky's learning theory to contemporary modes of information and learning, it could be said that time spent online is not necessarily idle. Instead, by establishing a network of information and actively participating in a pool of knowledge, students are creating cognitive foundations for various information categories.

Social Cognitive Theory

Bandura (1977) formulated what he first referred to as social learning theory in response to his disagreement with popular psychological opinions on behaviorism. He did not agree that individuals operated solely on cognitive framework that was reactionary based upon consequence. He felt that behaviorism did not include social modeling into an equation of personal development. Instead, behaviorists suggested that an individual

operates upon a process of trial and error discovery. Bandura argued that modeling did not need behavior reinforcements such as reward and punishment, and instead functioned through attentional, representational, enactive translational, and motivational processes (Smith & Hitt, 2005). Perry, Baronowski, and Parcel (1997) supported Bandura's theory by addressing significant unnecessary expenditures of time and effort engaging in learning through trial and error when individuals can learn through modeling.

Bandura (1986, 1989, 2002) explained collective human interaction in terms of cognitive development with his social cognitive theory. Social cognitive theory identifies relationships between an individual's behavior, cognition, and environment. This triadic reciprocal causation represents a dynamic continuum of personal development (Bandura, 1989). Behavior factors are a collective set of actual behaviors, evaluations, and manifestations. Cognitive factors, also including personal factors, include components such as gender, age, race, schemata, personal beliefs, self-regulation, self-efficacy, expectations, and decision-making processes. The environmental factors are an expression of all extra-personal agents such as social situations involving other individuals or natural phenomenon. This triadic reciprocal causation model serves as an explanation of self-regulation as well as motivation in a social context. The dynamic partnership between this triad of behavioral, cognitive, and environmental components yields constructs such as emotional coping responses and vicarious learning (Bandura, 1989).

In a social cognitive framework, the desired conditions for learning involve the point at which an individual's environment collides with personal behavioral factors and interpersonal factors (Bandura, 1986). In the social cognitive model, it is possible for one factor to exert greater influence upon the developmental process. The influences are not

fixed at repeated degrees regardless of situation. Instead, whether an individual's behavior, cognition, or environment exerts the greatest influence, the other two components of the triad are reciprocally influenced yielding an overall developmental shift in the individual (Bandura, 1986). Therefore, an individual may regulate his or her own behavior.

Social cognitive theory operates on an agentic perspective that incorporates three types of human interactions (Smith & Hitt, 2005). These agents operate on a practice of intentionality in exerting influence upon one's own self-regulatory processes or external circumstances (Bandura, 2002). Therefore, human agents are grounded in sociostructural influences. The dynamic transactions between internal and external agents guide the decision making and communication processes (Bandura, 2002).

Bandura (2002) suggested human agency as an individual's intentional exertion of influence upon a situation. Therefore, individuals learn through processes of observation, reflection, and partial imitation. In his model, there are three types of human agents: personal, proxy, and collective. The personal agent regards an individual's own control over the learning process and associated tasks. This is the most fundamental piece to Bandura's model. The proxy agent refers to the social nexus between members with the goal of gaining and utilizing concepts or information piecemeal. The collaborative aspect of Bandura's model is the collective agent. This agent refers to a multi-member exercise wherein information, skill sets, or resources are shared. This mutual support allows the members to secure information or resources that would be unconquerable at an individual level (Bandura, 2002). With this interpretation, therefore, an individual can assume the role of an agent of change or under the influence of change.

According to Bandura (2002), observation and participation are integral to cognitive development. Psychologically modeling members of different levels of expertise fosters cognitive restructuring and hosts an arena of the interchange of ideas and resources.

Student collaboration has been positively correlated to the quality of the learning experience. As Azmitia (1988) found, pairing novices with experts yield much higher gains than pairing novices. Azmitia's research was also supported by Rogoff (1990) who found that "adult-child" pairing engages the child in the decision-making process while "child-child" pairing tended to show skilled children dominating the decision-making process. The social element of collaborative learning allows students to rehearse critical thinking and self-reflection (Chen, Gonyea, & Kuh, 2008).

Student Extracurricular Participation

With 75% of 14-year-old students participating in extracurricular activities, a large segment of the student population is engaging in situations of observation, participation, and reflection that Bandura proposed as imperative to cognitive development (Mahoney, Cairns, & Farmer, 2003). The National Center for Education Statistics (2003) further reported a 43% participation in athletics, 28% participation in the fine arts, 25% participation of high school seniors in academic clubs, 19% participation in yearbook, and 8% participation in cheerleading or drill team.

In regards to Bandura's model, students are actively accessing proxy and collective agents through social context. Some researchers suggest participation in extracurriculars allows students to better develop interpersonal understanding because of the intrapersonal context (Valentine, Cooper, Bettencourt, & DuBois, 2002).

The researcher was interested in obtaining preexisting levels of extracurricular participation as a covariate demographic item to measure corresponding Web 2.0 usage. Because participation in extracurriculars builds self-esteem and promotes self-disclosure among participants (Valentine et al., 2002), it is possible that students who exhibit higher levels of extracurricular participation also exhibit parallel levels of collaborative online interaction. The collective nature of Web 2.0 resources could be interpreted as a digital manifestation of extracurricular participation.

Connectivism

Constructivism has not been rendered obsolete due to the recent technological transformation of learning. In fact, social cognitive theory has served as the bridge from constructivist thought to collective learning through digital mediums. The medium of the computer hosts the continuum of Bandura's cognitive, behavioral, and environmental agents through the dynamic process of Vygotsky's social cultural constructivist model. This connection has assisted in the development of a new cognitive framework that accounts for the incredibly rapid "half-life" of knowledge. The half-life of knowledge refers to the amount of time that passes from when a bit of information is discovered to the point at which it is superseded, fundamentally edited, or shown to be untrue (Gonzales, 2004). Connectivity allows for immediate and constant fact checking, challenges, and inquiry.

The reorganization of society, the economy, education, and politics that resulted from the arrival of the digital age also suggested that learning theorists re-examine how individuals learn. The basic premises of constructivism are still valid in today's pursuit of information. Learning is a continual process of contributing, obtaining, and digesting

data. With the introduction of the Internet, this process has been supplemented with text, sounds, and graphics that establish connections previously unattainable (Marshall, 2002).

For example, use of online news sources has grown as consumer networking habits have grown more dynamic. Web 2.0 websites offer information through the mediums of text, video, and audio media (Veenstra, Sayre, Shah, & McLeod, 2008). The trend of Internet-based multimedia has penetrated major news corporations as well as independent distributors of content. Such a wealth of information invokes an inquiry of these technological effects, on an independent measure or in combination, upon cognitive development.

Veenstra et al. (2008) inquired as to whether contextual frame and technology cause a significant difference in levels of information recall. The researchers ran a factorial analysis of variance. Their findings illustrated a significant interaction between the factors of contextual frame and video; $F(1, 29) = 8.344, p < 0.001$, with video as a significant main effect; $F(1, 29) = 99.951, p < 0.001$ (Veenstra et al., 2008).

Salomon (1990) suggested that children are capable of computer-mediated learning, of which the cognitive skills involved directly result from the use of technology. Salomon suggested that while working with computers, users utilize a set of mental operations altogether unique when compared to those cognitive processes that would occur without the supplementary computer. Therefore, the cognitive changes are derivatives of the user/computer interaction. Carr, Morrison, Cox, and Deacon (2007) proposed that collaboration is a fundamental component of online learning and that an increasing number of higher educational institutions have begun to implement Internet mediated curricula.

Acting upon constructivism's theoretical mission, Siemens's (2004) learning theory of connectivism attempts to synthesize the principles of chaos, networks, complexity, and self-organization in order to amplify learning through an extended social network in which currency, or accurate and up-to-date information, is the ultimate goal. Siemens proposed that a byproduct of this integration is that information is given life and the individual no longer controls the learning process as it exists in a state of constant manipulation and change. Formal education, therefore, no longer dominates learning. Instead, much like a connected intelligence, the learning process is experienced through communities of practice, personal networks, and completing realistic tasks (Siemens, 2004). In practice, Siemens insisted that participants in the digital age no longer need to maintain systematic mental processes of knowledge acquisition, storage, and retrieval. Rather, participation in collective learning will provide individuals with information gathering, maintaining, and reclamation. Therefore, in Siemens's learning theory, the most productive learners are those who can manipulate online networks and process the copious amounts of information available into usable units.

An example of intermedia consumption is Holbert's (2005) empirical study of the 2000 United States presidential election data. Holbert studied the concept of intermedia mediation, or the resulting complexity of effects derivative of the relationships between various types of media use. This study demonstrated that participants exposed to a greater combination of television and newspaper resources increased candidate endorsement knowledge (Holbert, 2005).

Siemens (2002) explained his model of connectivism as a four-tiered matrix. This continuum includes communication, collaboration, cooperation, and community. Furthermore, connectivism holds that the capacity to know is more important than what

one knows, learning and knowledge are diverse and must be current, learning is a process of connecting information sources, and learning may reside in non-human appliances (Siemens, 2002). This interpretation of learning allows for comprehensive growth through collaboration by means of evaluation through online interaction.

In this synthesis between cognition and digital accessibility, learning is not necessarily the process that an individual goes through. Instead, learning is defined as the result of creating links between different sources of information. Connectivist theory argues that the existence of the pipe is more important than the content within the pipe. In other words, the capacity to increase individuals' knowledge base and the resources to do so are more important than what they already know individually (Siemens, 2004).

Connectivism holds that learning can occur in non-human appliances. An example of this concept in practice can be explained through a personalized feature on Amazon.com. After creating an account and purchasing products from this web store, the Amazon database creates a personalized profile based on pre-identified criteria. Therefore, the more that a user utilizes the website, the more the Amazon system "learns" about the user, thus giving the impression that the system is able to reason independently (Verhagen, 2006).

Some researchers have argued that connectivism is the learning theory that legitimizes the pedagogical concept of a collected intelligence (Verhagen, 2006). Kearsley (2000) supported this argument by suggesting that online learning is fundamentally a social activity as well as an individual skill. Palloff and Pratt (2005) identified the development of critical thinking skills, the co-creation of knowledge, and defining of meaning, reflection, transformative learning as the pedagogical benefits of collaborative learning. This is a legitimate connection as both ideas operate on a model of

group learning in which the process of learning among a group of connected people can learn a greater amount of information than an independent learner.

Practitioners are now discovering that a reflective dialogue through the means of technology among and between students supplements, and even accelerates, the learning process (Lemke, Coughlin, Thadani, & Martin, 2003). Students even demonstrate higher levels of motivation and curiosity through computer-mediated collaborative learning (Lemke, Coughlin, Thadani, & Martin, 2003).

With the new opportunities that technology brings, such as the speed of processing new information through online communities, an individual's zone of proximal development can be exponentially increased. The possibility between what one can accomplish individually and what a network can manifest has been multiplied because of online collaboration. Not only have the numbers of members involved in collaboration potentially increased, but also the 24-hour nature of the Internet allows for constant interchange and development.

Social Intelligence

Combining elements from constructivism and connectivism, as well as galvanizing these concepts with Howard Gardner's theory of multiple intelligences, researchers are beginning to see intellectual gains in those persons who utilize open source social networks (National School Boards Association, 2007). Certainly, one's intelligence quotient does measure his or her ability to evaluate pieces of information. However, one's ability to process and evaluate the source of those pieces of information can be as vitally important as an Intelligence Quotient. This is especially true in a learning atmosphere where information is omnipresent, but not always factual. Albrecht (2006) identified this quotient of information evaluation as *social intelligence*. In his five part

model, social intelligence includes situational awareness, presence, authenticity, clarity, and empathy.

Even before Albrecht's presentation of his findings to the business world, Columbia University psychologist Thorndike (1920) had pioneered a psychometric strain of social intelligence study. In his model, Thorndike suggested that it was difficult to construct a test to accurately measure social intelligence in a person; however, examples of social intelligence are abundant in all facets of life as humans adapt and respond to each other. Unfortunately, Thorndike's research was dismissed, and social intelligence was widely considered to be general intelligence utilized in social situations, but not a separate intelligence.

In the same strand as Thorndike (1920) and Albrecht (2006), Goleman (2006) presented his own deductions on social neuroscience research which held that social intelligence is a product of both social awareness and social facility. In his model, social awareness includes Albrecht's components of empathy, authority, and awareness; but Goleman's social faculty component added synchrony and self-presentation. Goleman suggested that through the modification of patterns of social intelligence, problems in interpersonal relations will begin to diminish. Therefore, social intelligence (SI) could be defined as a basic understanding of people and their emotions, as well as the possession of the skills necessary to engage and interact successfully.

What is desired is a healthy high level of SI. The "toxic" low extreme causes others to feel devalued, frustrated, or even intimidated. A nourishing, or socially aware, degree of SI encourages others to feel capable and welcomed. Education often reflects this desire to develop social intelligence through collaborative assignments.

What researchers are beginning to agree upon is that general intelligence is not sufficient. Therefore, social intelligence exists as distinctly “other” when compared to general intelligence (Goleman, 2006). Just as Thorndike suggested over 20 years ago, current researchers like Goleman agree that measuring a social intelligence quotient is very difficult. Tests that do exist measure what is *known* about social intelligence, not how one operates with that information in social interactions. Currently, it is very difficult to measure the quality of the neurological circuits that navigate individuals through their every social interaction. The presence of these “mirror” neurons allows individuals to catch one another’s emotions and react in a socially intelligent manner.

A digital application of this theory is that if collaboration increases one’s social intelligence, participation in open source social networks should be a potential medium for growth. Acting upon this premise, students who regularly use open source networks would not only be developing their own intellect, but also learning socially acceptable measures of interaction through a collaborative medium on line. Furthermore, by establishing the processes needed to place values on online information, learners become more discriminating consumers of information. This ability to differentiate is a skill that educators are currently encouraged to develop in their students.

Stemming from the topic of social intelligence, and perhaps an exponential representation of social cognitive interaction, is the concept of a collective intelligence. Collective intelligence can be defined as a degree of knowledge that exists as a direct result of collaboration and cooperation between many members in a group. The knowledge dynamics of any interaction between individuals or sets of people demonstrate that any one person’s knowledge is a representation or interpretation of his

or her domain. Therefore, learning through this model can be defined as the altering of one's interpretation of knowledge (Chan, 1991).

As far as the knowledge that is gained through engaging on open source social networks, this level of learning is not a result of artificial intelligence molding the learner. Instead, the collective group of users builds upon each other's understandings to create the phenomenon of a collective intelligence over time (Crook, 1994). According to Taylor, O'Shea, Scanlon, Sellman, Clark, and O'Malley (1990), collaborative learning is appropriate in any domain. From a social psychological perspective, collective intelligence is possible through the interactional theory of collective analysis and decision making that argues that groups perform better than individuals simply because more resources are available to the group. This availability stimulates action, creativity, and the correction of errors (Steinbrock, Kaplan, Rodriguez, Diaz, Der, and Garcia, 2002).

Dillenbourg, Baker, Blaye, and O'Malley (1996) found that collaborative learning on computers without set parameters yields neither efficient nor inefficient results among students. However, Blaye et al. (1991) did find that children who work in pairs do perform better than children working individually. Dillenbourg et al. (1996) specified that group heterogeneity, individual developmental levels, and the degree of interaction all act as variables that increase or decreased efficiency. Taking 11 individuals and 22 pairs of students ages 13 to 14 years old, Issroff, Scanlon, and Jones (1997) gave these students the task of completing a chemistry worksheet pre- and post-test while using a computer. Interactions were videotaped and analyzed, and the results found no benefit from collaborative working on the pre- and post-test. However, there were significant gains in regards to on-task performance for those students who were in pairs. Similarly, Steinbock, Kaplan, Rodriguez, Diaz, Der, and Garcia (2002) found that group solution

quality is higher than that of an individual, and group solution rates of superiority over individuals are greater on more difficult problems among 57 undergraduate and graduate students performing a series of eight puzzle problems.

In the same strand, Chan (1991) conducted research on the premise that a computer may be considered a collaborative partner in the learning process. The learning companion system that he studied was called Integration-Kid. Integration-Kid operated on a “three agent” model where the student interacted with a simulated tutor and a simulated companion student. Therefore, both the real student and the simulated student were learning together. Chan’s research showed positive gains in student performance and motivation as the companion’s level of expertise was raised, thus attesting to a performance-based increase resulting from a collective intelligence.

Millennial Students

The history of American public education demonstrates a shift from colonial customization to industrial standardization (Christenson, 2009). Individually tailored instruction and assignments surrendered to progressive standardization and interdependence. Monolithic instructional practices largely ignored cognitive differences. However, disruptive research by Garner in the 1980s revolutionized instructional practices as educators became more aware of multiple intelligences (Christenson, 2009). It was in this pedagogical and psychological environment that the millennial student was born.

In their foundational research, Strauss and Howe (1997) established four archetypal generations: *prophets*, *nomads*, *artists*, and *heroes*. A generation is categorized according to key lifetime events in time that establish subsequent impressions on the following generation. According to this model, prophets are spawned in an atmosphere of an

emotional high, nomads are born amidst a cultural awakening, heroes are born during an unraveling, and artists are born during a crisis. These archetypes are reoccurring and causal. Therefore, circumstances of history and events are manifested within generational identities. These identities reciprocate in making history themselves that the next generation is subject to (Strauss & Howe, 1991, 1997).

Represented in the 20th century, and beginning the 21st, Strauss and Howe (1991) identified five generations: G.I.s 1901-1924, Silent 1925-1942, Boomers 1943-1960, 13ers 1961-1981, and Millennials 1982-post 2000. Classified as civic oriented, adaptive, and idealist, respectively, the G.I., Silent, and Boomers generations experienced a world and educational experience largely unaltered and spanning more than a half-century where instruction was characterized as formal through listening, writing, and remembering (Strauss & Howe, 1991; Dryden & Vos, 2005). In those ages of information scarcity, students were defined by informational retention and capacity. With the arrival of the 13ers, teachers were confronted with a reactive student body that signaled a cultural awakening and amplified aesthetic expectations in regard to the classroom. These students represented a more recalcitrant generation that cynically questioned institutional beliefs and procedures (Strauss & Howe, 1991).

Thereafter, as pertaining to Howe and Strauss's (2003) generational-historical reciprocity, the millennial generation took the cynical query that saturated the 13er generation and transformed it into substantive inquiry. According to Strauss and Howe's archetype, the Millennial generation, as represented by the *hero* archetype, is characterized as energetic but hubristic and institutionally driven, extremely focused on performance and grades, and very involved in extracurricular activities (Howe & Strauss 2003). Millennial students have grown up in an environment immersed with instant

digital connection, Internet-based communities, and wireless ease (Howe & Strauss, 2003). In the age of the Millennials, information is abundant and the learning process expands out from the traditional spectator experience to an engaging, evaluative, and constructive process. Howe and Strauss identified seven qualifiers for this generation:

1. **Special:** Qualitatively unique as a result of adult praise and marketing strategies.
2. **Sheltered:** Parental filtering with the intent to protect children from the realities of the modern world. This has ushered expectations of highly structured environments and activities.
3. **Confident:** By establishing reward and recognition reflexes early in child development, Millennials possess high expectations of accomplishment and success. This has generated a causality in which motivation exists with the expectation of recognition.
4. **Team-Oriented:** Intense activity structuring has grouped students together. This social connectivity has conditioned students to an understanding that communal participation is benevolent and positive for all members.
5. **Achieving:** Millennials demonstrate comfortableness with objective assessments that define expectations. This allows students to identify a goal and target behavior accordingly.
6. **Pressured:** The synthesis of a highly structured environment and expectations of high achievement has resulted in feelings of angst and anxiety.
7. **Conventional:** When compared to previous generations, Millennials demonstrate greater attitudes of compliance. Ideas of conformity might result from high saturation in collective reasoning.

The emersion of millennial students in omnipresent connectivity has established an expectation that information is readily available and freely accessible in an environment of accountability, transparency, and choice (Howe & Strauss, 2003; Yahoo! & Carat Institute, 2003). Today's millennial students have the skill set to email, use wikis, post blogs, or access podcasts as if it were second nature. Warlick (2005) even suggested that blogging is the leading resource for developing literacy in the 21st century.

The North Central Regional Educational Laboratory (NCREL) (2002) has acknowledged the revolutionary skill set of millennial students by identifying them as 21st century skills. These skills include digital age literacy, inventive thinking, effective communication, and high productivity.

In 2007, the International Society for Technology in Education (ISTE) released a revision of student technology standards and performance indicators that also reflect a curricular recognition of a millennial skill set. These standards (ISTE, 2007) include:

1. Creativity and Innovation
2. Communication and Collaboration
3. Research and Information Fluency
4. Critical Thinking, Problem Solving, and Decision Making
5. Digital Citizenship
6. Technology Operation and Standards. (p. 5)

These standards and the applied student performance indicators encourage communication and collaborative learning through student-created artifacts by means of digital media. Through this interaction, students are encouraged to not only produce their own original artifacts but to also assist in solving group problems by using digital tools to

gather information, evaluate the validity of that information, and then through a process of collaborative synthesizing and analyzing arrive at the solution of a problem. Not only do these standards require students to utilize digital tools when defining the authentic problem, but to select the appropriate resources as necessary to complete an assigned task.

The ISTE standards also require students to develop digital empathy through acknowledging ethical, cultural, and societal factors that relate to technology use. The goal of the Society is to foster lifelong learning and personal responsibility among students in the digital age, or what the ISTE defines as “digital citizenship” (ITSE, 2007)

Christendon (2009) recommended that with this generation, education must shift from standardization back to customization. Modularity, he contended, would allow for greater student-centered learning. This customization of the educational process would redefine the role of the teacher as more of a “content architect” and guide than the prime character in the process. Traditional educational resources are not structured to allow such customized sequencing of cognitive development, but Web 2.0 resources might provide a virile option.

Web 2.0

Within a decade of its introduction to the general public in 1993, the Mosaic web browser had become a paramount tool of research, communication, and artifact creation, as well as the instrument which made information less scarce and privileged (O’Reilly, 2005). As more user-friendly resources were developed and resource accessibility grew, individuals were able to create their own online content. These new resources not only

opened wide doors previously closed to the general public, but also encouraged creativity and higher order thinking (Johnston & Cooley, 2001).

Web 2.0 resources allowed users a customizable, modular experience that broke from the standardized use of the previous generation of World Wide Web usage. Programmed with Asynchronous JavaScript and XML (AJAX), Web 2.0 resources exponentially increased the speed of usage and the ability to maintain and access large amounts of data (Solomon & Schrum, 2007). This interface also allowed the programmers and users to interact regardless of geographic proximity, so long as Internet connection was available. What followed thereafter was a dichotomous phenomenon between Web 1.0 and Web 2.0 usage. Generally, Web 1.0 resources such as traditional Internet resources not developed for user interaction were used in the classroom, and Web 2.0 resources were used in the political and business world (Dryden & Vos, 2005). These two categories are not mutually exclusive, however, as only a difference in complexity and collaborative allowances separates them.

It is important to recognize that technological infusion into schools is not independently indicative of learning. The sole existence of computers in the classroom has not increased student performance. On average, American public schools in 1995 had 72 computers which increased to 136 in 2003 (Christensen, 2009). This meant that in 1998 there was an average of 12 students per computer and, in 2003 there were four students per computer (Christensen, 2009). However, this ubiquity of technology in the classroom has not correlated with increased test scores; in fact, they have remained roughly the same. Perhaps this disconnect is on the level of application. Students demonstrate incredible capacity in manipulating these resources on a leisure basis, but

these millennial skill sets are not adequately synthesized with curriculum standards and performance indicators.

Open Source Software

The phenomenon of an interface operated and regulated free of financial ties has encouraged further online development. Open source software (OSS) can refer to any type of software that can be operated along with the source code, thus allowing for adaptation with the open permission of the software's creator (Coppola & Neelley, 2004). Even broader, open source resources can be software or Web sites that are openly hosted for all users to personify and manipulate. This blessing of modification and redistribution is built upon the collective desire to actively pursue a communal product that meets all of its users' needs. As Coppola and Neelley (2004) suggested, though OSS does distribute source codes for free, the true benefits come in the benefits of OSS rather than just the minimal cost. Madey, Freech, and Tynan (2002) suggested that OSS derives from the "hacker culture" where programmer share and produce voluntarily with no monetary compensation. With the time constraints and pressures of obsolescence of any type of proprietary software potentially looming just 24 hours ahead, OSS allows for an organic model that can mutate at a user's whim. This presumption was substantiated by Madey et al.'s research over a 14-month period observing the open source network SourceForge in which they concluded that open source networks are self-organizing and collaborative.

Using the specific capabilities of open source software, Lin and Zini's (2006) qualitative study of Istituto Statale di Istruzione Superiore J.M. Keynes in Bologna, Italy demonstrated an evolving role between the users and developers of the free/libre open source software, or FLOSS. With student and teacher input, the Keynes school

technology specialists were able to customize the software used in the classroom. Though Lin and Zini's study focused on the cost-saving and customizable aspects of open source software, the construction of a technological artifact (an Italian Open Office Thesaurus) in which the students were responsible for its inspiration and creation, drew the students into the learning process. Software such as Open Office and Open PowerPoint allows for specific customization by the user, which simplifies access and usability.

Social Networks

Social networking sites are also referred to as open source because there is no proprietary ownership (Coppola & Neelley, 2004). These sites, such as MySpace, Facebook, EduSpaces, and Classmates.com, are hosted online for free use. The sites are customizable, just as open source software, to the desires of the user.

In a scientific regard, social network analysis pilots the theory of connectivism. A social network is a group of people who are connected by one or more degrees of relations (Krebs, 2008). Analysis of social networks investigates these relationships between the nodes, or individuals in the network, and their ties, or their relationships. Inspection of these nodes and ties helps explain social phenomenon such as societal cause and effect (Breiger, 2004). Radcliffe-Brown (1940) observed that human socialization is made possible by complex networks of relations. Moreno is credited as the "creator" of social network analysis, coining the phrase in 1934 (Freeman, 1996).

The operational tendencies of social network analysis are that there is no assumption that identified groups are the building blocks of society and instead of focusing on the nodes independently, research should examine how the structure of the ties affects the nodes (Krebs, 2008). Social networks in this sense could be better referred

to as collaborative social networks because the relationships between nodes are based upon collaboration.

In the digital age, social networks have taken the form of online arenas of interaction. Utilization of the message boards or inbuilt email services allows for communication between various site members. Furthermore, these web sites serve as a platform for students to create personal virtual and visual objects, participate collaboratively in a wide variety of challenges, submit articles to web sites, or even create their own evaluation tools such as polls and surveys. The psychosocial benefits of these sites include social support as well as a medium that encourages creativity and identity exploration (Tynes, 2007).

Blogs

This interconnectivity has allowed users to engage in a shared reflection process. Blogs, short for web logs, allow users to digitally publish personal compositions and share them with an online community. These reflects are subject to various degrees of reinforcement or criticism. Warlick (2005) argued that blogging is the primary vehicle for 21st century literacy.

Marc Anreessen is credited with the first blog in 1993 (Blood, 2002). As a student at the University of Illinois at Urbana, Champaign, Anreessen created Mosaic's What's New Page in order for users to link together from other web pages. The term blog was originated by John Barger in 1997 (Blood, 2000).

This new phenomenon gave all users an equal voice in contributing their own reflections and opinions, thus creating a digital democracy (Richardson, 2006). A pedagogically sound and contextually appropriate use of student self-disclosure can be a

deeply intimate and practical resource that projects the inner thoughts and experiences of otherwise reclusive or hesitant students. Literature and research have suggested that self-disclosure fosters intimacy and progress in relationships (Altman & Taylor, 1973). The socio-psychological partnership between the teacher and student has begun to shift according to a digital dynamic.

Researchers Vernon B. Harper, Jr. from Christopher Newport University and Erika J. Harper from Regent University conducted research on 15 willing students out of a class of 32 from an upperclassmen course at a small liberal arts university in the Mid-Atlantic United States. The research was carried out over 9 semester weeks, and students were required to view and post a unique response to at least four other student blogs over the course of the semester. A blog format was selected for this study due to the free nature of the medium and the absence of long message boards that other web linked courses offer. Blog topics were used as a supplement to face-to-face instructional activities.

Participating students were divided into four focus groups over the course of one week at the end of the semester so that the researchers could conduct recorded interviews inquiring upon the students' experiences with course blogs. In the process of interpreting the data, the researchers attempted to utilize both the numeric quantity of students' blogs and the textual quality. They soon found that the quantity did not yield higher levels of student self-disclosure. In fact, many of the larger blogs consisted of students restating questions.

Students did, however, comment that the classroom blog gave them more time to reflect upon classroom material and other students' thoughts, thus exponentially

developing individual revelations at the end of the course. Furthermore, many students found the optional level of anonymity liberating and felt more comfortable identifying themselves posting blog comments later in the course.

Many students indicated that they were more likely to respond in disagreement or in a negative fashion through the new medium. Some students even disclosed that the blog format allowed them the opportunity to disagree with the professor. One student in a focus group revealed that “it was possible for me to say hey, I don’t agree with you. And I felt like I was ok to do that in the blog, and it wasn’t like I was restrained from disagreeing.”

In the focus groups, students responded to questions regarding the expression of personal information about themselves that they would not be willing to reveal in a traditional classroom setting, or if there were any topics that they might not have commented on in a traditional classroom setting. Students were also asked if they made judgments more often based on what other students wrote and if the blog improved any aspect of their learning.

Harper and Harper (2006) found that students were comfortable with using the blog format as a supplement to the traditional classroom meetings. Students identified a degree of liberation in self-disclosure due to the medium of blogging and found that their own reactions were built upon the reflections of other students. This collaboration between students and professors created an atmosphere that welcomed student expression.

This study did have considerable limitations, however. Although the researchers used a chi square test to establish a more robust sampling, the very use of convenience

sampling in their methodology introduces a measure of bias. Furthermore, using classroom credit as a motivator also calls into suspect the altruistic nature of pure self-disclosure. It is, therefore, difficult to state that blogging independently stands as a method of increasing student self-disclosure aside from earning classroom credit. A general initiator was probably necessary because the chance of a low leadership quotient at the classroom level would have made for a very sluggish class and poor experiment.

Perhaps most pivotal to the study was the basis on the assumption that student self-disclosure was beneficial to the overall classroom experience. This assumption was established prior to the outset of the experiment, and the researchers agreed that self-disclosure was a positive component in the classroom even under traditional methods of assessment.

This medium did benefit students in harvesting information during a “zone of reflection” that is often missed in face-to-face instruction (Harper & Harper, 2006). What the researchers concluded was that content in which students disclose personal information and reactions, such as blogging, should be supplemental to and integrated with face-to-face classroom instruction. Operating on the theory of reciprocity of information, wherefore student disclosure increases as others disclose information, Harper and Harper (2006) established a valid case for using blogging as healthy, user friendly technique.

Wikis

Taken from the Hawaiian word for quick, wikis are communal collaborated resources that can be edited by individual users (Lamb & Johnson, 2007). The content of wikis is referred by the user community. Members of the wiki have license to contribute

content to the collection of web pages, edit other members' content, or publish their own revisions to their previously submitted content. This constructivist process of creating a communal artifact of knowledge is infinitely organic in that the artifact can potentially continue to be edited. This process gives great autonomy to the users, and Achterman (2006) warranted that research regarding the use of wikis as instructional tools is still in its infancy. However, a constant process of critical reading does require a process of evaluative processing and higher order thinking.

The first wiki was created by Ward Cunningham in 1994 as an online discussion resource (Leuf & Cunningham, 2001). The contextual advantages of using a wiki include an organic process of content evaluation and collaboration, the ability to supplement text with animations, audio and video files (referred to as multiple modalities) and other non-textual graphics, and an easy open-editing environment (Lamb & Johnson, 2007; Engstrom & Jewett, 2005).

Research conducted by Engstrom and Jewett (2005) investigated supplementing wikis with classroom instruction. Over 400 students were broken into groups of four to six and given classroom assignments. Classroom teachers noted that students demonstrated higher levels of efficacy in directing their own research (Engstrom & Jewett, 2005). Similar research at Deakin University in Australia asked students to answer 15 questions of various student interests (Augar, Raiman, & Zhou, 2004). In a 2-week period, students created and edited over 1,000 wiki pages.

In a study in which students were able to access wikis for classroom discussion and complete classroom assignments through network collaboration, students unanimously reported favorably to the introduction of social networks into the traditional

classroom (Cash, 2009). When asked whether communicating online with their teachers was helpful, the reason most often cited was that such interaction helps in clarification of material and teacher expectations. Students reported that collaborating with their peers and teachers online assisted them in formatting their own thoughts and responses. A few students even commented that the asynchronous collaborative format allowed for greater preparation which increased student confidence. Students also expressed that social network collaboration allowed them to feel more open in expression while infusing their answers with their personalities. The networks and wikis used in class allowed students the freedom to ask questions in an environment that was considered less hostile than the traditional classroom

Podcasts

According to the survey by the National School Boards Association (2007), 32% of students openly share music by uploads or podcasts (12% weekly), 30% share online videos, 24% share photos, 25% update their webpage weekly (compared to 12% in 2002), 17% post blogs weekly, and 16% create their own art, musical compositions, or stories. The availability of web space for individuals to publish their own audio and video content has introduced the era of asynchronous education.

Researchers at the University of New York at Fredonia found significant differences in student performance between a control group with no podcasts and a group that had access to the resource. Both groups were given PowerPoint lecture notes from a college professor, but those students who were given access to lecture podcasts demonstrated higher test scores than the control group. Students in the experimental

group cited that though the PowerPoint lecture notes were useful, podcasts allowed them to review the lecture verbatim as often as desired (McKinney, Dyck, & Luber, 2008).

Legal Considerations

The pressure today for administrators is to maintain “world-class schools” in a “flat-world economy” (Friedman, 2005). However, virtual communities that allow for students to engage and interact with each other and the outside world via the Internet potentially open unsolicited doors as well.

The National School Boards Association's annual Technology + Learning (T+L) Conference in 2007 revealed that 35% reported that their districts had policies to address the use of social-networking sites by their students, 50 % said their districts had no policies, and 15 % were not sure (eSchool News, 2007). The most common school policies use a firewall/filtering software or they require students to sign an acceptable-use policy to block students' access to these sites while at school. The National School Board Association's executive director, Anne Bryant, stated that blocking student access to Web 2.0 resources is not the optimal answer (eSchool News, 2007). The dangers are notable; however, therein lies a potential for learning and access of information that traditional classroom methods cannot replicate (Dickard, 2003).

Schools are limited in their ability to take actions against student social networking behavior at home, however some teachers have successfully filed individual lawsuits. Due to the novel nature of this topic, courts are still establishing legal precedents. Schools are held accountable by a few federal statutes such as Section 512 of the Digital Millennium Copyright Act (1998) which limits liability relating to copy-

written material online, and Section 230 of the Communications Act (1996) which provides protection to minors for private blocking and screening of offensive material.

Case law is still in its infancy, however. In *A.B. v. State* (2007), students who posted obscene comments on a fake MySpace page were not found guilty of harassment due to protected political speech. Similarly, in *Beussink v. Woodland* (1998), the court ruled that the administrator had violated a student's rights by suspending him after making a website critical to the school. However, in *J.S. v. Blue Mountain School District* (2007) and *Layshock v. Hermitage School District* (2006), principals were protected in suspending students who had posted obscene fake MySpace page in the principals' names.

Proposed federal statutes such as the Deleting Online Predators Act of 2007 would require schools/libraries receiving federal funds to block minors' unrestricted access to social networking sites and chat-rooms, and the KIDS Act of 2007 would require sexual predators to register their email addresses and screen names and enable social networking sites to access those electronic identifiers. Sexual predators can be blocked from registering with social networking sites.

Online social networking is a cultural phenomenon that is not likely to be extinguished by school prohibition. Students have far surpassed the National Education Technology Standards of 1997 and are looking for new ways to express their creativity and discover the world around them (McLester, 2007). Educators can take measures to provide information for students in regards to appropriate online usage, etiquette, and how to implement alternative strategies for keeping teens safe while on the Internet in order to build technological awareness and sophistication (Tynes, 2007). Most

commentaries are quick to identify the educational benefits of social networking online (Kollie, 2007). Globalization and convergence are the new educational catch-phrases and social networks happen to be the highways that make such interactions not only available but also inexpensive (Canton, 2006; Friedman, 2005; Tapscott & Williams, 2006). Furthermore, some administrators, educators, and librarians are beginning to see the communication opportunities that social networks provide (Carnigo & Barnett-Ellis, 2007).

Often, viability and security issues associated with online social networking are not even considered in schools, as many schools view the Internet as it performed over 3 years ago -- a library. Therefore, due to lack of understanding and fears of exposure, valuable publishing, information gathering, and communication tools are being neglected (Borja, 2006). A considerable degree of confusion does exist in terms of what is pedagogically sound for students and what is legal for students and teachers (eSchool News, 2007). Twenty-first century literacy requires students to possess the prudence to individually navigate though legal and ethical technology related issues. Educators are beginning to introduce competent discretionary practices to students in order for them to comprehend and distinguish between appropriate and inappropriate technology usage (Poole, 2006).

The ultimate legal questions that researchers encourage educators to ask are is the activity disruptive in the classroom, is it even legal, and does it violate the school's acceptable use policy (Poole, 2006)? Social networking sites should be treated the same as any other issue that might potentially cause a distraction to student achievement. Use should be monitored and focused. Exclusively keeping students away from social

networking sites does not teach them how to conduct themselves appropriately online. Students deserve for their teachers to explain dangers and opportunities as well as answer any questions about unclear areas. College admissions and the future employment of students could be impeded if social networking is abused. Educators must also recognize that though there is nothing fundamentally negligent or immoral about teachers or administrators using social networking sites, the content that they publish could have potentially negative consequences. Districts are encouraged to preemptively establish specialized acceptable Internet use policies that are posted in the school buildings and discussed with the students and teachers.

Rural Schools

The utilization of Web 2.0 in a rural setting is the unique factor of this research. In a 2007 study by the Rural School and Community Trust, research suggested that rural schools' effectiveness in meeting state mandated standards could be maximized through the use of data based technology educational strategies (Johnson & Strange, 2007). This study defined rural schools by a matrix of 23 indicators including percentage of students eligible for free or reduced meals, median household income, percentage of adults with high school diploma, instructional expenditures per pupil, and state reading and math scores. Correlational results identified that the more rural the state, the more severe the socioeconomic challenges, the poorer a state's rural population is, the worse the rural education outcomes and the worse the educational policy context is. The study also found that rural instructional expenditures per pupil are the lowest in Southern states, and these populations are least able to meet the costs of delivering an adequate education to every student served (Johnson & Strange, 2007).

The Rural School and Community Trust study suggested distance learning as one alternative instructional method that has been proven to deliver appropriate curricula while responsibly managing expenditures in rural communities. This method has been most successful in clusters of rural schools (Johnson & Strange, 2007).

Educational trends in the Appalachian region over the past half century have demonstrated slight seasonal gains in literacy and graduation. In 1990, 77% of people ages 18 to 24 in the Appalachian region reported attending 12 or more years of school (Appalachian Regional Commission, 2009).

However, a 2009 report from the Jobs for the Future advocacy group and the Everyone Graduates Center at Johns Hopkins University suggests that low high school graduation rates have reached a crisis level. Among 17 other states, Georgia is identified in a category with the lowest graduation rates in the nation (Balfanz, Almeida, Steinberg, Santos, & Hornig Fox, 2009). Because no universal instrument exists to measure graduation rates across all states, these critical states were identified by using the measure of Promoting Power in which the total number of students enrolled in the 9th grade is compared to the number enrolled in the 12th grade 3 years later. Those schools reporting a 40% or greater decrease in enrollment after the 3-year period are identified as schools with weak “promoting power” because of graduation rates around 60%. After disaggregating the Georgia state data, the researchers found that one-third of the 130 Georgia high schools have low graduation rates with rural schools accounting for the greatest discrepancy (Balfanz et al., 2009).

After the end of the 1980s economic boom, many schools began to suffer financially in the early 1990s (Appalachian Regional Commission, 2009). This decrease

in available revenue correlated with a decrease in graduation. In the Appalachians, graduation dropped to 68.4% in 2000 (ARC). State education departments have implemented piecemeal programs in attempts to improve, if not maintain, current graduation rates (Christnesen, 2009).

A current denominator in programs that have yielded successful results has been degree of Internet use. These studies illustrate strong correlations between Internet use and student achievement across all demographic groups (Dickard, 2003). Financially disadvantaged students are achieving despite socioeconomic and cultural obstacles when paired with research-based technological interventions at school. However, only 25% of the poorest households have Internet connection in the United States compared to 80% of households earning \$75,000 or greater (Dickard, 2003).

Summary

This chapter has provided an overview of the social cultural and social cognitive theories as a theoretical framework for this study. Web 2.0 resources including open source software, social networks, blogs, wikis, and podcasts have been defined as well as manifestations of those resources. Social and collective intelligences have also been established as measures of cognitive progression. This chapter also defined rural Appalachian communities, the state of education in those areas, as well as specific challenges to students and educators.

This research built upon previous research on the application of online collective intelligence by investigating the quantitative variables of Web 2.0 usage and self-reported student academic achievement. Additional variables investigated included participants' gender, grade, and measures of extracurricular activity participation.

CHAPTER III

METHODOLOGY

Introduction

This chapter provides a description of the methodology used in this study. It includes the research questions and hypotheses, information related to the participants, the instrument used to measure student use of Web 2.0 resources and self-reported academic achievement by grade. This study investigated student usage of Web 2.0 resources and self-reported grade based upon research that suggests that students who create their own manipulatives perform better on summative assessments (Dryden & Vos, 2005). In addition, demographic information was analyzed to determine if any statistically significant relationships existed between the Web 2.0 usage and selected variables.

Hypotheses

This study addressed the following research hypotheses:

- H₁: There will be a significant relationship between degree of reported Web 2.0 usage and mathematics grade.
- H₂: There will be a significant relationship between degree of reported Web 2.0 usage and literature grade.
- H₃: There will be a significant relationship between degree of reported Web 2.0 usage and science grade.
- H₄: There will be a significant relationship between degree of reported Web 2.0 usage and social studies grade.
- H₅: There will be a significant relationship between degree of Web 2.0 usage and extracurricular participation.

H₆: There will be a statistically significant difference between males and females on the amount of Web 2.0 usage.

H₇: There will be a statistically significant difference between males and females on the amount of extracurricular activity participation.

Research Design

The design of this research was correlational with two primary variables. The quantitative dependent variable was academic performance in terms of grade, and the quantitative independent variable was the level of open source social networking engagement. The researcher also gathered two demographic items, gender and grade level, as well as level of extracurricular involvement to run possible future multi-linear regressions.

Participants

Participants for this study included public high school students in Georgia's Pioneer Regional Education Service Agency (RESA). All 12 counties in this RESA were identified as Appalachian counties by the Appalachian Regional Commission. Of these school districts, high schools in districts with fewer than 6,000 students were chosen to maintain a rural qualifier. This process retained 10 of the original 12 school districts. A total of 9,317 students were identified and selected using the more recent FTE data provided by the Georgia Department of Education.

Selection of Participants

To the end that an appropriate sample size of 292 students was collected; a sufficient statistical power as validated using a-priori power analysis conducted using the statistical software G*Power 3.0.8. This software assigned the appropriate sample size at the most conservative analysis to detect a medium effect size for a regression given the

parameters identified, tested at $\alpha = .05$. The analysis identifies the necessary sample size suggested as approximately 134 participants.

Instrumentation

A Web 2.0 and Student Performance questionnaire designed by the researcher was used to measure the presence of correlations between student achievement and open source utilization. The questionnaire contained 46 questions, and all questions were assigned under one of five categories: demographic information, social networking, academic performance, and extracurricular activity. Three sets of five-point scales were used to identify daily hours spent on a computer and use of various open source social networks. The validity of the instrument was established through a focus group of experts consisting of three school media specialists, four general classroom teachers, one undergraduate student, one graduate student, three high school principals, one school district technology director, one technology integration specialist, and one high school student. For further establishing the statistical conclusion, internal, and construct validity of the instrument, factor analysis was also conducted to express the relationship among the items.

Students at a North Georgia Appalachian high school were used as a pilot study testing the validity and reliability of the instrument (Appendix A). Prior to collecting data for the pilot study, the researcher applied to The University of Southern Mississippi Institutional Research Board (IRB) for approval of the study. Following receipt of approval from IRB, the researcher conducted the research and the data were kept for later factor analysis.

In order to further establish the validity and reliability of the questionnaire, Cronbach's alpha was conducted using SPSS, Statistical Package for Social Sciences.

Questions 2-35, the questions directly related to this study, were found to have a Cronbach's alpha of .895, demonstrating that the questions strongly measure the same construct.

Sample

Participants for the pilot study were 272 high school students. The students ranged in age from 13 to 15 years. Descriptives were run on questions 1-35 to determine how many students answered all questions. All 272 students answered every question. According to the descriptive means, the data appear normally distributed.

Web 2.0 Usage

The Web 2.0 Usage battery (Appendix B) was created to assess degree of use regarding various social networking, podcasting, video uploading, wiki, and open source resources. These questions were selected regarding specific Web 2.0 resources available to any individual with Internet access (O'Reilly, 2005). The Web 2.0 Usage pilot questionnaire consisted of 35 questions. Question 1 was on a verbal frequency scale ranging from 1 to 5, where 1 is *None*, 2 is *Yearly*, 3 is *Monthly*, 4 is *Weekly*, and 5 is *Daily*. Questions 2 through 25 asked the students to report frequencies of Web 2.0 resource use on a verbal frequency scale ranging from 1 to 5, where 1 is *Never*, 2 is *Yearly*, 3 is *1 Hour or Less a Day*, 4 is *2 to 5 Hours a Day*, 4 is *6 to 10 Hours a Day*, and 5 is *11 or More Hours a Day*. Questions 26, 27, 32, 33, 34, and 35, regarded extracurricular participation and were on a verbal frequency scale ranging from 1 to 5, where 1 is *Never*, 2 is *Yearly*, 3 is *1 Hour or Less per Day*, 4 is *2 to 5 Hours a Day*, 5 is *6 to 10 Hours a Day*, and 6 is *11 or More Hours a Day*.

Self-Reported Student Academic Achievement

On questions 28 through 31, students reported average grades in the subjects of Literature (28), Social Studies (29), Mathematics (30), and Science (31) on an ordinal scale from 1 to 4 where 1 is *F*, 2 is *C*, 3 is *B*, and 4 is *A*. For each subject, there was also an associated question regarding student performance in that subject as 1 as *Far Below Average*, 2 as *Below Average*, 3 as *Average*, 4 as *Above Average*, and 5 as *Far Above Average*.

Extracurricular Participation

The third component to the Web 2.0 & Student Performance questionnaire was a measure of extracurricular activity. Questions 36 through 42 were on a verbal frequency scale ranging from 1 to 5, where 1 is *Never*, 2 is *Yearly*, 3 is *1 Hour or Less per Day*, 4 is *2 to 5 Hours a Day*, 5 is *6 to 10 Hours a Day*, and 6 is *11 or More Hours a Day*. These questions gathered covariate information regarding non-computer based extracurricular activities such as participation in chorus, band, quiz bowl, and other clubs.

Demographics

A demographic component to the Web 2.0 & Student Performance questionnaire obtained descriptive information about the participants. This section consisted of 2 questions concerning age and current grade level.

Factor Analysis

A principal component analysis was conducted to explore factor analysis. The item correlations range was from .001 to .663. The Kaiser-Meyer-Olken (KMO) measure of sampling adequacy was .874 which was above the minimum statistic needed to continue with the analysis. This statistic reflected the degree to which it was likely that common factors explain the observed correlation between variables. Bartlett's was statistically

significant at $p < .001$. Two criteria were used to determine how many factors should be extracted. After running the analysis on this population, the data illustrated that the relationship between open source social network utilization and academic achievement was not statistically significant among this population: $r (N=273) = .111, p = .068$ (Cash, 2008). However, the students did demonstrate use of social network and open source software usage as the data approached a significant value.

A factor analysis was run in order to identify factors within the instrument (Appendix B). The first criterion of an eigenvalue greater than one suggested that eight factors should be considered. Eight factors accounted 61.6% of the variance. Factor one accounted for 26.6% variance, factor two accounted for 7.7% variance, factor three accounted for 6.3% variance, factor four accounted for 4.6% variance, factor five accounted for 4.3% variance, factor six accounted for 4.1% variance, factor seven accounted for 4.0% variance, and factor eight accounted for 3.7% variance..

The second criterion utilized to establish the number of factors to be extracted was the examination of the scree plot. After drawing a straight line, the scree plot suggested seven or eight factors. Eight factors were kept because when four were run, the variance decreased to less than 60%. The factors were rotated using the Direct Oblimin Factor Analysis. Together with eigenvalues after rotation and coefficients were greater than .40 to suppress lower absolute values. Questions 22 and 23 were taken out due to double loading in the uncorrelated matrix. Appendix B illustrates correlated variance.

Factors

The eight factors yielded in this survey were identified as User Contributions I (Factor 1), User Contributions II (Factor 2), Skill Learning (Factor 3), School Related (Factor 4), Information Resources (Factor 5), Share/Non-User Created (Factor 6),

General Internet Usage (Factor 7), and Virtual Reality (Factor 8). The User Contributions I factor consisted of items 3, 7, 8, 9, 18, and 33. The User Contributions II factor contained items 12, 15, 21, and 24. The Skill Learning factor included items 26, 27, and 32. The School Related factor included items 14 and 25. The Information Resources factor accounted for items 4, 6, 11, and 17. The Share/Non-User Created factor accounted for items 19 and 20. General Internet Usage accounted for items 1, 2, and 5. The VR factor accounted for items 13 and 16.

Reliability

A Cronbach's alpha was run to determine reliability. The alpha coefficient value for the factor of User Contributions I (Questions 3, 7, 8, 9, 18, and 33) was .866. This number would not increase if any cases were deleted. The alpha coefficient value for the factor of User Contributions II (Questions 12, 15, 21, and 24) was .726. The alpha coefficient value for the factor of Skill Learning factor (Questions 26, 27, and 32) was .625. The alpha coefficient value for the factor of School Related (Questions 14 and 25) was .469. The alpha coefficient value for the factor of Information Resources (Questions 4, 6, 11, and 17) was .664. The alpha coefficient value for the factor of Share/Non-User Created (Questions 19 and 20) was .558. The alpha coefficient value for the factor of General Interest (Questions 1, 2, and 5) was .438. The alpha coefficient value for the factor of VR (Questions 13 and 16) was .460.

These factors do not appear to require to be separated; therefore, the researcher selected to propose one factor for the instrument.

Procedures

Prior to collecting data, the researcher applied to The University of Southern Mississippi Institutional Research Board (IRB) (Appendix C) for approval of the study. Following receipt of approval from IRB, the researcher began the data collection process. All participating school administrators were sent an information letter requesting participation (Appendix D) as well as student assent and parental permission forms (Appendix E).

All students were given parental permission forms one week prior to the day of questionnaire administration (Appendix E). Participating schools all used online grading programs that allowed parents to follow their child's academic progress. Each parent is given a password protected account that is different from the students; username and password, and students are not given access to their parents' usernames or passwords. Using the survey function of the online program, parents were asked if their child had permission to participate in an online questionnaire regarding Web 2.0 usage and academic performance. Upon selecting "yes" for providing consent, parents then typed in their child's name.

On the day of administration of the instrument, the researcher gathered the names of students who had been given consent to participate in the research. These students were brought to a school computer lab during and following school hours. The researcher provided each student with a participant assent form (Appendix F). All students participating were then given the online questionnaire *uniform resource locator (URL)* through SurveyMonkey and allowed approximately 20 minutes to complete the questionnaire. As previously mentioned as one of the delimitations, the researcher

assumed that the students surveyed answered the questions thoughtfully and truthfully. All students not participating during school hours remained in their classrooms and worked on non-research related assignments subject to the teachers' discretion. After collecting all questionnaires, each anonymous survey was given a number as an identifier that was used for data processing purposes. The researcher then entered the data to test the presence or absence of correlations using SPSS.

The researcher's instrument surveyed the degree of reported Web 2.0 use as well as self-reported academic achievement by letter grade in the subject areas of Literature, Social Studies, Science, and Mathematics. The questionnaire was used to determine whether or not there was a statistically significant positive relationship between students who use Web 2.0 resources and academic performance.

After the researcher tallied the surveys and assigned each questionnaire a number one to 291 used for participant identification. The researcher selected to use the method of additive composite scores to analyze the data. Thereafter, the researcher grouped the 29 social networking questions together allowing for a maximum possible score of 145. A score of 145 was possible if a student selected the ordinal scale choice of "5" for all 29 *Social Networking* questions. The same structure was used for the five "*Grade Point Average*" questions with a maximum possible score of 25, and seven *Extracurricular Activity* questions with a maximum possible score of 35. With this clean data set, the researcher was able to evaluate the research variables. All student data were password protected online, and parental consent forms were saved on a password protected online spreadsheet.

Each overall score was created by calculating an additive composite score from the items on the survey. The web usage variable consisted of 33 items. Each item had a possible range of 1 to 5. Thus, the possible range for the web usage additive composite score was 33 to 165, with higher numbers representing more web usage. The extracurricular activity variable consisted of 7 items. Each item had a possible range of 1 to 5. Thus, the possible range for the extracurricular activity additive composite score was 7 to 35, with higher numbers representing more extracurricular activity participation.

Approximately 18% of the participants were removed from the research due to incomplete answers. The researcher selected not to use mean replacement due to the number of questions on the instrument. It was possible for a participant to reply to all items in one larger section and answer few items of another section and still have a low percentage of missing data. However, all instrument categories were imperative for the study. Therefore, the researcher selected to use list wise deletion for missing data. This process resulted in 239 complete participant responses.

Limitations

The study was conducted with the following limitations:

1. The results were limited by the self disclosure of student participants.
2. The results were limited by the appropriate student recognition of the types of Web 2.0 resources measured.

Data Analysis

All data were generated using SPSS to test the presence or absence of correlations. The analysis of these data utilized descriptive statistics. Spearman correlations were used for hypotheses 1 through 4 to measure the correlation between the numerical values of

collective level of student Web 2.0 usage and ordinal values of self-reported academic achievement by letter grade. A two-tailed test assessed the hypotheses with a .05 level of significance. No *a priori* planned comparisons were generated. For hypothesis 5, an additional Spearman correlation was conducted to determine whether there was a correlation between self-reported academic achievement and pre-existing levels of extracurricular activity participation. The researcher also conducted two supplementary Mann-Whitney tests due to the non-parametric nature of the data. The researcher used a gender dichotomy to analyze possible statistical significant differences between males and females upon Web 2.0 usage levels and extracurricular participation.

Summary

This study was based on the theoretical foundations of social constructivism, social cognitive theory, and connectivism. These theories suggest that individual learning is a dynamic process with necessary social components (Vygotsky, 1977; Bandura, 2002). The second generation of Internet browsing has established a phenomenon of member contribution and collaboration. This interchange has offered services and products with little or no proprietary expectations. The supplementation of Internet-based learning has yielded student improvement in all demographic areas, particularly in rural populations. Chapter III provided the researcher's methodology used to measure student Web 2.0 use and self-reported academic achievement.

CHAPTER IV

ANALYSIS OF DATA

Introduction

This chapter provides the descriptive and statistical data of the research questions and hypotheses. The purpose of this study was to determine if there were statistically significant relationships between reported Web 2.0 usage levels and self-reported grade in the content areas of Mathematics, Literature, Science, and Social Studies. In addition, demographic information was analyzed to determine if any significant relationships existed between the Web 2.0 usage levels, extracurricular participation levels, and selected variables.

Description of Sample

The participants were 291 high school students. The descriptive statistics for the participants' demographics are listed in Table 1. One-hundred fifty-four (53.1%) of the participants were male and 136 (46.9%) were female. A majority (184, 63.4%) of the participants were in the 9th grade. The participants were asked to respond to a number of items pertaining to their use of the computer and internet. Approximately half (139, 48.3%) of the participants reported using the computer between 1 and 5 hours per day. Only 7 (2.4%) of the participants reported no daily computer use. A majority (175, 62.0%) of the students indicated that they had access to the internet at least 6 hours per day. The participants were asked to describe their level of computer/internet restrictions. The responses were as follows: 95 (33.1%) no restrictions, 103 (35.9%) not much restricted, 69 (24.0%) moderately restricted, 16 (5.6%) almost completely restricted, and 4 (1.4%) completely restricted. Table 2 displays the descriptive statistics for the

locations where participants were able to access a computer with internet. School (287, 98.6%), home (272, 93.5%), and the library (215, 73.9%) were the most common places for these students to find accessible computers with internet access. Approximately half (140, 48.1%) of the participants reported being able to access the internet on their cell phones.

The students were also asked about their level of achievement in several academic areas and how they compare relative to their peers in these academic areas. The descriptive statistics for these responses are listed in Tables 3 and 4, respectively. A large majority of the participants reported being A or B students for all four subject areas. The breakdown of the participants' achievement comparison with their peers is generally representative of the distributions found with the self-reported grades.

Table 1

Descriptive Statistics for the Participants' Demographics

Variable	n	%
Gender		
Female	136	46.9
Male	154	53.1
Grade		
9 th	184	63.4
10 th	35	12.1
11 th	56	19.3
12 th	15	5.2
Daily Hours on Computer		
None	7	2.4
Less than 1	120	41.7
1 to 5	139	48.3
6 – 10	17	5.9
11 or More	5	1.7
Daily Hours with Internet Access		
None	9	3.2
Less than 1	28	9.9
1 to 5	70	24.8
6 – 10	43	15.2
11 or More	132	46.8
Internet Restrictions		
None	95	33.1
Not Much	103	35.9
Moderately Restricted	69	24.0
Almost Completely Restricted	16	5.6
Completely Restricted	4	1.4

N=291

Table 2

Descriptive Statistics for Locations with Computer/Internet Access

Location	Yes		No	
	N	%	n	%
Home	272	93.5	19	6.5
School	287	98.6	4	1.4
Library	215	73.9	76	26.1
Church/Synagogue/ Mosque/Temple	44	15.1	247	84.9
Work	31	10.7	260	89.3
Restaurant	38	13.1	253	86.9
Cell Phone	140	48.1	151	51.9

Table 3

Descriptive Statistics for Students' Self-Reported Grades

Subject Area	n	%
Literature/Language Arts		
A	150	51.9
B	117	40.5
C	19	6.6
F	3	1.0
Science		
A	151	52.2
B	100	34.6
C	35	12.1
F	3	1.0
Social Studies		
A	128	44.3
B	122	42.2
C	39	13.5
F	0	
Math		
A	114	39.4
B	117	40.5
C	53	18.3
F	5	1.7

Table 4

Descriptive Statistics for Students' Grade Comparison

Subject Area	n	%
Literature/Language Arts		
Far Below Average	4	1.4
Below Average	10	3.4
Average	154	52.9
Above Average	89	30.6
Far Above Average	34	11.7
Science		
Far Below Average	2	0.7
Below Average	20	6.9
Average	155	53.6
Above Average	85	29.4
Far Above Average	27	9.3
Social Studies		
Far Below Average	5	1.7
Below Average	26	9.0
Average	155	53.6
Above Average	77	26.6
Far Above Average	26	9.0
Math		
Far Below Average	6	2.1
Below Average	40	13.9
Average	143	49.8
Above Average	71	24.7
Far Above Average	27	9.4

Web Usage and Extracurricular Activity Participation

The participants responded to more specific questions pertaining to their use of computer technology and the internet. In addition, the participants were asked to respond to several items pertaining to their involvement in extracurricular activities. The descriptive statistics for the participants' responses to the individual computer and extracurricular activity items are listed in appendices H, I, and J, respectively.

The items from the survey were combined to create an overall web usage and extracurricular activity participation score for each person. Each overall score was created by calculating an additive composite score from the relevant items. The web usage variable consisted of 33 items. Each item had a possible range of 1 to 5. Thus, the possible range for the web usage additive composite score was 33 to 165 with higher numbers representing more web usage. The researcher selected to use an additive composite score instead of a mean score in order to maintain a complete Web 2.0 resources concept. While a mean for individuals might allow an easier interpretation (ie, the mean was somewhere in between once a day and twice a week), the mean is not inherently meaningful with this type scale. The data cannot be treated as a scale (interval) variable as the distance between points on the scale are far from equidistant. The additive composite scores are therefore ordinal in nature. Because the researcher was interpreting ordinal data, non-parametric measures were used subsequently in the analysis.

The extracurricular activity variable consisted of 7 items. Each item had a possible range of 1 to 5. Thus, the possible range for the extracurricular activity additive composite score was 7 to 35 with higher numbers representing more extracurricular activity participation. The descriptive statistics for these 2 constructs are listed in Table 5.

Table 5

Descriptive Statistics for Web 2.0 Use & Extracurricular Activity Participation

Variable	N	Min.	Max.
Web Usage	239	34.00	149.00
Ext. Act. Part.	267	7.00	33.00

Test of Hypotheses

Research Question 1. Is there a statistically significant relationship between Web 2.0 composite usage and mathematics letter grades?

H₁: There will be a statistically significant relationship between Web 2.0 composite usage and mathematics letter grades.

Research Question 2. Is there a statistically significant relationship between Web 2.0 composite usage and literature letter grades?

H₂: There will be a statistically significant relationship between Web 2.0 composite usage and literature letter grades.

Research Question 3. Is there a statistically significant relationship between Web 2.0 composite usage and science letter grades?

H₃: There will be a statistically significant relationship between Web 2.0 composite usage and science letter grades.

Research Question 4. Is there a statistically significant relationship between Web 2.0 composite usage and social studies letter grades?

H₄: There will be a statistically significant relationship between Web 2.0 composite usage and social studies letter grades.

Results

Research questions 1–4 were tested with a series of bivariate Spearman correlations. The bivariate Spearman correlation is the non-parametric equivalent of the bivariate Pearson correlation. The Spearman correlation is appropriate when investigating the relationship between ordinal scaled variables. The correlation matrix is presented in Table 6. The correlations revealed that there was a significant positive relationship between web usage and literature letter grades, $r_s(x) = .15, p = .021$. This indicates that literature letter grades increased with increasing levels of web usage. Web usage was not significantly related to letter grades in science, social studies or math.

Table 6

Bivariate Spearman Correlations for Research Questions 1-4

	Web Usage (1)	Lit. Grade (2)	Science Grade (3)	S.S. Grade (4)	Math Grade (5)
Web Usage (1)	---	.15*	-.01	.07	.09
Literature Grades (2)		---	.36**	.53**	.44**
Science Grades (3)			---	.52**	.45**
Social Studies Grades (4)				---	.54**
Math Grades (5)					---

Note. * $p < .05$, ** $p < .01$

Research Question 5. Are there statistically significant relationships between extracurricular activity participation, Web 2.0 composite usage, and letter grades in literature, science, social studies and math?

H₅: There will be a significant relationship between degree of Web 2.0 composite usage and extracurricular participation.

Research question 5 was tested with several bivariate Spearman correlations because of the ordinal scale of measurement. The correlation matrix is presented in Table 7. Interestingly, there were significant positive relationships among extracurricular activity participation and letter grades in literature, science, social studies, and math.

This indicates that these letter grades increased with increasing participation in extracurricular activities. Extracurricular activity participation had its highest relationship with social studies letter grades, $r_s = .39, p = .001$. Extracurricular activity participation was also positively related to web usage, $r_s = .30, p = .001$.

Table 7

Bivariate Spearman Correlations for Research Question 5: Extracurricular Activity Correlations upon Web 2.0 composite score and Self-Reported Grades

	Ext.	Lit.	Science	S.S.	Math	Web
	Act.	Grades (2)	Grades	Grades	Grades	Usage
	(1)		(3)	(4)	(5)	(6)
Extracurricular Activities (1)	---	.23**	.23**	.39**	.29**	.30**
Literature Grades (2)		---	.36**	.53**	.44**	.15*
Science Grades (3)			---	.52**	.45**	-.01
Social Studies Grades (4)				---	.54**	.07
Math Grades (5)					---	.09
Web Usage (6)						---

Note. * $p < .05$, ** $p < .01$

Research Question 6. Is there a statistically significant difference between males and females on the amount of Web 2.0 composite usage?

H₆: There will be a statistically significant difference between males and females on the amount of Web 2.0 composite usage.

A Mann-Whitney test was utilized to determine if males and females significantly differed on web usage. The descriptive statistics for both groups are listed in Table 8. The Mann-Whitney test failed to reveal a significant difference between the males and females on the amount of web usage, $U = 6,980.00$, $p = .844$.

Table 8

Descriptive Statistics of Web 2.0 Use by Gender

Gender	N	Mean Rank	Sum of Ranks
Male	130	119.19	15,495.00
Female	109	120.96	13,185.00

Research Question 7. Is there a statistically significant difference between males and females on the amount of extracurricular activity participation?

H₇: There will be a statistically significant difference between males and females on the amount of extracurricular activity participation.

A Mann-Whitney test was utilized to determine if males and females significantly differed on extracurricular activity participation. The descriptive statistics for both groups are listed in Table 9. The Mann-Whitney test revealed that the females participated in significantly more extracurricular activities than the males, $U = 7,417.50$, $p = .023$.

Table 9

Descriptive Statistics of Extracurricular Participation by Gender

Gender	N	Mean Rank	Sum of Ranks
Male	136	123.04	16,733.50
Female	130	144.44	18,777.50

This design had a total of 15 related analyses used for hypotheses testing, so that after correcting for a possibly inflated alpha level, the relationship between Web 2.0 composite usage and literature grade is no longer significant, nor is gender and extracurricular participation.

Ancillary Findings

Regarding access levels for research participants, the researcher found Internet access as a point of notice. Approximately half of all participants responded to having Internet accessibility on their phones. This certainly marks a generational change, but also a behavioral shift from even 5 to 10 years ago.

This research yielded many “A’s” regarding the reported grade for four content areas. Self-reported letter grade was a limitation of the research; however, ordinal grade reporting might provide a more clear representation of student achievement than if the researcher had requested specific number grade or perhaps grade point average.

The researcher also ran an additional Spearman correlation (correlation matrix in Table 10) to find whether levels of extracurricular activity participation had a relationship with reported letter grade in Mathematics, Literature, Science, and Social Studies. All subject areas demonstrate a significant positive correlation, indicating that these letter grades increased with increasing participation in extracurricular activities.

Table 10

Bivariate Spearman Correlations for Ancillary Findings

	Ext. Act (1)	Lit. Grades (2)	Science Grades (3)	S.S. Grades (4)	Math Grades (5)
Extracurricular Activities (1)	---	.23**	.23**	.39**	.29**
Literature Grades (2)		---	.36**	.53**	.44**
Science Grades (3)			---	.52**	.45**
Social Studies Grades (4)				---	.54**
Math Grades (5)					---

Note. * $p < .05$, ** $p < .01$

Summary

Chapter IV reported participant demographic data as well as participant responses to Web 2.0 usage, academic achievement by letter grade in Mathematics, Literature, Science, and Social Studies, as well as extracurricular participation. The statistical analyses of this study were reported. Chapter V will discuss the implications of these findings.

CHAPTER V

CONCLUSIONS AND DISCUSSION

Introduction

In Chapter V the researcher provides the analysis and offers implications of those findings. This study's limitations are discussed as well as recommendations for future research and implications for policy and practice.

This study examined correlations between Web 2.0 usage and self-reported student academic achievement among high school students enrolled in public schools served by Georgia's Pioneer Regional Education Service Agency (RESA). This study has intrinsic importance, potentially fostering reflection upon the learning theories and frameworks used to build local, state, and national curriculum guides. Furthermore, it has been suggested that students who create their own manipulatives perform better on summative assessments (Dryden & Vos, 2005). Empirical studies on the pedagogical ramifications of the new nature of the World Wide Web in Web 2.0 are in their infancy, however this research suggests provocative didactic correlations.

The researcher's intent was to contribute to the current literature available on the appropriate levels of utilizing identified Web 2.0 resources in the classroom, therefore amicably submitting the study's results collaboration of a dynamic theoretical construct for pedagogy in the digital age. Educators must contend with and adapt to cognitive changes within their students. The manner in which students operate and process information is fundamentally changing. School leaders must face existential questions regarding the role of the teacher, the role of the student, and the method by which these two partners interact. School administrators aware of the substantive challenge facing

traditional methods of instruction must be able to provide professional development to teachers that would accurately identify the student of the 21st century as well as establish a framework from which to facilitate those pupils. To that end, this study examined correlations between the variables of Web 2.0 usage and academic achievement.

Based upon the social cognitive learning theory (Bandura, 1977, 1986, 1989, 2002) and upon collaborative nature of Web 2.0 resources, this research inquired as to possible correlations between online collaboration and academic achievement. Decisions regarding types of Web 2.0 resources used and categories of extracurricular activities were predicated upon goal of identifying and analyzing both positive and negative correlations. Students levels of Web 2.0 usage and their self-reported academic achievement were measured in order to expose any statistically significant correlations among the indicators.

Interpretation of Findings

Two hundred ninety-one high school students from Georgia Appalachian schools participated in this study. One-hundred fifty-four (53.1%) of the participants were male and 136 (46.9%) were female. The participants' grade level was reported as follows: 15 (5.2%) seniors, 56 (19.3%) juniors, 35 (12.1%) sophomores, and 184 (63.4%) freshmen.

A total of 9,317 students were identified and selected using the most recent full-time equivalent (FTE) data provided by the Georgia Department of Education. It should be noted that an email was sent to all school principals identified as candidates for this research pertaining to classification as a rural Appalachian high school in Georgia's Pioneer Regional Education Service Agency. Considering this information, the response rate was approximately 32%.

Hypotheses 1, 3, and 4 pertained to Mathematics, Science, and Social Studies letter grades, respectively, as correlated with Web 2.0 usage. The coefficients indicated that Web 2.0 usage level did not have a significant relationship with student letter grade in these content areas.

Hypothesis 2 pertained to Literature letter grade as correlated with Web 2.0 usage level. The coefficient indicated that Web 2.0 usage level does have a significant relationship with literature letter grade.

Hypothesis 5 pertained to the relationship between degree of Web 2.0 usage and extracurricular participation. The coefficients indicated that Web 2.0 usage level did have a significant relationship with extracurricular participation levels.

Hypothesis 6 questioned whether there was a difference between males and females in regard to Web 2.0 usage. The coefficient indicated that gender did not have a significant relationship with Web 2.0 usage.

Hypothesis 7 questioned whether there was a difference between males and females in regard to extracurricular activity participation. The coefficient indicated that females do participate in extracurricular activities slightly more than males.

Anecdotal Reflections

This study provides support for the literature that suggests that collaborative learning yields a deeper understanding of content (Bandura, 2002). Reflecting upon the levels of Web 2.0 usage that students reported, teachers should note that students might respond well to technological underpinnings in all subjects. Furthermore, the composite Web 2.0 usage scores represented in this study supports that students are not interested in

anonymous freedom but in establishing intimate and critical peer networks (Howe & Strauss, 2003).

Limitations

The following are limitations as identified by the researcher:

1. A possible threat to internal validity is self-reported usage and academic performance. There is a possible difference between actual preference and declared preference among participants. Due to this limitation, it would be inappropriate to generalize beyond a similar sample.
2. This was not an experimental study and any correlations could be coincidental, not suggesting causation.
3. It is possible that in the scenarios of significant correlations, either variable in the study can be dependent upon the other. Furthermore, the correlations could be the result of a confounding third variable.

Recommendations for Practice

Appalachian Communities and Literacy

Finding a statistically significant positive correlation between Web 2.0 usage levels and literature grade poses interesting implications for rural communities such as the Appalachian demographic of this study. In geographic regions where standardized tests reinforce stereotypes regarding poor literacy, practical Web 2.0 exposure might offer students a method in which to develop and build literary skills. Many schools that demonstrate low literacy scores also apply for Title I programs due to the economic status of the student body (Payne, 2005). A portion of these Title I monies can be appropriated

for the computer hardware and framework. With Internet accessible computers in place, students would then have the resources available for collaborative literary involvement.

As mentioned in the limitations of this study, however, it is inappropriate to suggest causality from Web 2.0 usage level to literature grade. It is possible that the correlation is significant because Web 2.0 allows students to practice literacy and grammatical skills, thus improving literature grades at school. However, it is also possible that students who have higher literature grades at school find practical use of literary skills enjoyable in leisure on Web 2.0 resources. This significance does support the researcher's findings in a previous research design when students demonstrated high levels of self-disclosure and reported to enjoy literature classes more when Web 2.0 resources were involved (Cash, 2008).

Furthermore, possibilities of economic liberation would alleviate struggling schools' focus on financial constrains and allow school administrators to refocus on strategies that are pedagogically sound and data based. In rural communities such as the Appalachian demographic of this study, the challenges that educators face in rural schools are significant. It was significant, however, in this research that 94% of the students reported home Internet access. Therefore, many of the avenues for Web 2.0 usage are already in place.

Along with resources, technology leadership and expertise is scarce. A new focus on the appropriateness of Web 2.0 in rural classrooms could educate teachers on what resources might supplement or guide their curriculum delivery. After capital expenses, however, such as the computer hardware and bandwidth, Web 2.0 resources have few if

any further costs. Manipulatives are designed for the needs of the user, and if something is not acclimated appropriately, some other manipulative can be created.

For many demographic categories, this user specificity could open doors that have long held back students due to socioeconomic status. Misunderstood subcultures such as Appalachian students can now interact with the outside world through composition and syntheses of their own schemata compared to the world abroad.

Social Justice

The conceptual catalyst for Web 2.0 revolves around what the individual creates and how he or she evaluate, utilizes, or synthesizes other information to construct his or her new product. Such specificity compliments proponents of individualized education for students. Millenials' K-12 experience, founded in the policies of No Child Left Behind (2003), has established an assumption that the presentation of subject matter is directly proportional to each student's ability (Howe & Strauss, 2003). For that matter, Web 2.0 learning communities can possibly provide a balance for social justice. By removing barriers of access and by the nature of manipulative and user-driven functionality, Web 2.0 resources might revolutionize instructional modifications and accommodations for our students, thus adhering to the American with Disabilities Act.

Ethical Considerations

Certainly there are ethical considerations regarding collaborative assessment. In such a connected environment, cheating might not be as clear. Howe and Strauss (2003) suggested a change in pedagogy due to practice quizzes, collaborative work, and open-ended assessments. Emerging technologies do complicate procedures. However, preemptively establishing procedures cognizant of a world saturated in Web 2.0 ideology

will assist schools in reaping the benefits instead of being overwhelmed and possibly philosophically unsound due to reactive policies (Ableson, 2008).

Therapeutic Release

The collaborative nature of Web 2.0 resources allows for users both cathartic personal expression and solidarity (Creighton, 2003). Considering the pressures of post graduate status contingent upon standardized assessment success and extracurricular involvement for Millennials, Web 2.0 provides a threshold for therapeutic release and reflection.

Recommendations for Policy

Collaborative design requires a collaborative policy for supervisory and instructional administrators. Honig (2003) contended that collaborative educational policy design calls for administrators to forge partnerships with community agencies, create measurable goals and associated strategies for meeting those goals through collaborative partnerships, and also requires central office administrators to support the implementation of those strategies. It is important for schools to be prepared for policy changes in the realm of Web 2.0 learning. These schools must have a warrant for change and a stable intentionality in promoting both first order changes that are consistent with prevailing values as well as initiating second order changes that invoke epistemic shifts.

Policy makers are encouraged to recognize the levels of application, analysis, synthesis, and evaluation present in student-created and collaborative online content and communications that exist via the mechanisms of Web 2.0 resources. As policies allowing for students choice and social justice continue to lean upon pedagogical design, students and stakeholders will request to select their most optimal and customizable

learning styles and assessment methods (Christensen, 2009). The demand exists even if web based collaborative learning is not the solution. Current instructional methods infused with piecemeal technology have not provided positive results. The possibilities for assertive teacher professional development can be exciting and school site specific oriented.

Educational Leadership

Many critics suggest that appropriate and efficient technology use in today's schools has not yet moved from promise to practice (Cuban, 2001). It is therefore the call of the educational leader to galvanize and exhibit the sound connection between the theoretical and practical sound use of instructional technology. Principals must acknowledge the operose responsibility of being the instructional leader in technological content, methods, budget, and foresight. Instructional technology spending must be more than a fiscal line item, and computers must be much more than bureaucratic décor that otherwise sits dormant until deemed obsolete after cycles of exponential technological development. The more technology is used, the more individuals learn about themselves and the more they discover ways in which technology can assist them in their pursuits.

Educational administrators have the greatest influence in radically engaging students and adjusting unsuccessful teaching strategies. An inappropriate focus or uninformed perspective might cause principals to perpetuate traditional instruction instead of encouraging innovation and hold a complicitous role in what might be pedagogical malpractice. Such an uninformed perspective will support the premise that it is not the technology in and of itself that enhances the educational experience.

Educational leaders must acknowledge that technology does possess the potential to drag the field into a regressive pattern of instruction. Possibly most detrimental would be forcing a synthesis between learning strategies that have been ineffective with a technological “facelift.” Web 2.0 is not to be an extension of the traditional classroom, similar but merely opposite in a few regards. Web 2.0 technologies should not be used simply for repeated drill of concepts, but for knowledge collaboration, creation, and social discourse (Creighton, 2003). The realm of Web 2.0 is fertile for improving teacher-student dialogue, giving students power and responsibility, and engaging students in tangible critical thinking and authentic practical assessments. However, if teacher leaders do not guide the inevitable fusion between Web 2.0 and the classroom, students will be marginalized, lost, and ill-equipped for the modern informational and social economy (Creighton, 2003).

Recommendations for Future Research

Based upon the findings of this study, the following are the researcher’s recommendations for future research:

1. In a 2002 Hart-Teeter poll, students demonstrated an increasing trend in students expressing interests in pursuing public service vocations from 35% to 40% since 1997 (Howe & Strauss, 2003). Some researchers have suggested that social networks and online connectivity are reinventing perceptions of civic responsibility, order, and free speech (Howe & Strauss, 2003). Future research should be conducted to measure student beliefs and attitudes regarding civic responsibility and how this is displayed, maintained, and expressed online.

2. Implementing a longitudinal study regarding the use of an instructional methodology encompassing a few specific Web 2.0 resources might demonstrate whether resolution and utilization of resources over time suggest academic gains. The researcher speculates that some students were not able to associate their Web 2.0 collaborative behaviors with an educational benefit. This might be a skill set that must be taught in order to be grafted into student behavior.
3. Following, or simultaneous to a longitudinal study, the field would benefit from a qualitative understanding of connection of Web 2.0 and student achievement. Student and teacher interviews evaluating the use and appropriateness of certain Web 2.0 resources in regard to education would assist in clarifying relationships among variables, or even suggest that any relationships are capricious. A qualitative design would also assist in examining student ideas on how to utilize Web 2.0 resources.
4. Student attitudes regarding online learning and collaborating are largely not assessed, as well are levels of motivation controlling for various demographic categories such as gender, age, and race. Such an investigation would contribute valid information to the field.
5. Related to the finding a strong correlation between social studies grade and extracurricular activity participation, future research should investigate teacher roles and student performance. Do students who take classes under their club sponsor or coach perform differently than those students who do not?

6. A plethora of practical possibilities lie dormant for educators to infuse into in the mediums of classroom content, supplements to traditional instruction, and student portfolios. Future research should examine which Web 2.0 resources yield the highest gains in literacy or other areas of academic performance.

Summary

The purpose of this project was to examine the relationship between student use of Web 2.0 resources and student reported academic achievement among Appalachian high school students. Interpretation of findings, implications of findings, recommendations for policy and practice, limitations, and recommendations were reviewed. It is the conclusion of the researcher that there is a correlation between the level of Web 2.0 resource usage and literature grade.

APPENDIX A

PILOT STUDY IRB



THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
 Hattiesburg, MS 39406-0001
 Tel: 601.266.6820
 Fax: 601.266.5509
 www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 28030409

PROJECT TITLE: Interpreting the Educational Outcomes of High School Students Utilizing Open Source Social Networks Upon Academic Performance

PROPOSED PROJECT DATES: 11/01/07 to 05/31/08

PROJECT TYPE: New Project

PRINCIPAL INVESTIGATORS: Joseph Carl Cash

COLLEGE/DIVISION: College of Education & Psychology

DEPARTMENT: Educational Leadership & Research

FUNDING AGENCY: N/A

HSPRC COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 03/04/08 to 03/03/09

Lawrence A. Hosman
 Lawrence A. Hosman, Ph.D.
 HSPRC Chair

3-10-08
 Date

APPENDIX B
FACTOR ANALYSIS PATTERN MATRIX

Pattern Matrix ^a								
	Component							
	1	2	3	4	5	6	7	8
question1							.617	
question2							.617	
question3	.773							
question4					.478			
question5							.430	
question6					.757			
question7	.676							
question8	.797							
question9	.783							
question10								
question11					.710			
question12		.483						
question13								.468
question14								
question15		.713						
question17						.513		

question18	.614		
question19			.532
question20			.708
question21		.768	
question24		.728	
question25			-.756
question26		.684	
question27		.694	
question32		.773	
question33	.496		
question16			.787

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 24 iterations.

APPENDIX C

IRB APPROVAL FORM



THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
 Hattiesburg, MS 39406-0001
 Tel: 601.266.6820
 Fax: 601.266.3309
 www.usm.edu/irb

**HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
 NOTICE OF COMMITTEE ACTION**

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26.111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
 Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 29-102212

PROJECT TITLE: Web 2.0 and Self-Reported Student Performance Among High School Students in Rural Schools

PROPOSED PROJECT DATES: 09/23/09 to 09/22/10

PROJECT TYPE: Dissertation or Thesis

PRINCIPAL INVESTIGATORS: Joseph Carl Cash

COLLEGE/DIVISION: College of Education & Psychology

DEPARTMENT: Educational Leadership & Research

FUNDING AGENCY: N/A

HSPRC COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 10/22/09 to 10/21/10

Lawrence A. Hosman

 Lawrence A. Hosman, Ph.D.
 HSPRC Chair

10-29-09

 Date

APPENDIX D

PRINCIPAL PERMISSION LETTER

December 11 2007

Dear [REDACTED] Principal, [REDACTED],

I am a research student at The University of Southern Mississippi and a teacher at the [REDACTED]. I am seeking your consent to allow your students to participate in a research study that I plan to conduct in the spring of 2008. Participation in the study is completely voluntary and would not involve any student's instructional time during the school day. The research examines the relationship between student utilization of open source social networking and student achievement.

The purpose of this study is to record and analyze the academic achievement of [REDACTED] networking students who were exposed to open source social networks. This study has an intrinsic importance, potentially altering the learning theories and frameworks used to build local, state, and national curriculum guides. If a statistically significant positive relationship is found between students who utilize OSS and social networks and high academic performance, then those curricula should be adjusted to synthesize online collaborative learning systems with traditional classroom methods.

Information will be obtained from one source: The Open Source Social Networking Questionnaire.

Confidentiality will be maintained and protected at all times. The data collected will be used solely for the study that is being conducted and not shared with anyone. After the research is completed, the consent forms, and test scores will be shredded and disposed of. Anonymity will be protected. At no time will the students surveyed be identified in the study findings. All student data will be kept in a locked filing cabinet in the researcher's locked classroom closet and will be shredded at the end of the school year.

The benefits of this study can have a positive impact on classroom instructional methods. The field of education can benefit from the results of this study in determining whether there is a demonstrable positive statistical relationship between students that utilize open source social networks and academic performance.

There are no perceivable possibilities for harm to participants in this study. No students are placed at risk and the right to observation is part of the terms of enrollment of any student at the White County Ninth Grade Academy.

Confidentiality is addressed, though parents, upon enrolling their students into White County Ninth Grade Academy, yield all of the custodial rights over the children to the

school in the context of consent forms, it is still outside the bounds of ethical research to allow that particular identities of subjects of the research problem to become exposed.

If you have any questions related to the study, please call Joseph C. Cash at (706)865-0727. This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820."

Sincerely,

Joseph C. Cash
USM Research Student

_____ I agree to allow the  students to participate in this study

_____ I do not wish to participate in the study at this time.

Principal's Signature _____ Date _____

APPENDIX E
PARENTAL/GUARDIAN PERMISSION FORM

THE UNIVERSITY OF SOUTHERN MISSISSIPPI
AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT

Participant's Name _____

Consent is hereby given to participate in the research project entitled
Interpreting the Educational Correlations of Open Source Social Network Usage
Levels Upon Academic Performance Among Ninth Grade Students. All procedures
and/or investigations to be followed and their purpose, including any experimental
procedures, were explained by Joseph C. Cash. Information was given about all benefits,
risks, inconveniences, or discomforts that might be expected.

The opportunity to ask questions regarding the research and procedures was given.
Participation in the project is completely voluntary, and participants may withdraw at any
time without penalty, prejudice, or loss of benefits. All personal information is strictly
confidential, and no names will be disclosed. Any new information that develops during
the project will be provided if that information may affect the willingness to continue
participation in the project.

Questions concerning the research, at any time during or after the project, should
be directed to Joseph C. Cash at 706.865.0727. This project and this consent form have
been reviewed by the Human Subjects Protection Review Committee, which ensures that
research projects involving human subjects follow federal regulations. Any questions or

concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.

A copy of this form will be given to the participant.

Signature of participant

Date

Signature of person explaining the study

Date

APPENDIX F
PARTICIPANT ASSENT FORM

I freely and voluntarily, without coercion, consent to be a participant in the Web 2.0 and Student Performance Questionnaire. I understand that this study will gather data about student levels of Web 2.0 resource use, academic performance, and extracurricular participation.

I understand that my response to items on an online questionnaire is voluntary and that I have the option to cease participation in the questionnaire at any time. I also understand that no computer IP addresses will be collected and that I will remain anonymous during this research and that my responses will remain confidential. My name will not be used in any data reports or analysis used during the research. Group findings will be available upon request. I understand there are potential benefits from the study including greater understanding in regard to connecting student behavior and learning styles with school curriculum.

I understand that I can contact the researcher if I have questions or concerns regarding the research or about my rights as a participant. I have read and understand this assent form, and I give my consent to participate in this research study.

Student Name _____ Date _____

APPENDIX G

WEB 2.0 & STUDENT ACHIEVEMENT QUESTIONNAIRE

Web 2.0 and Academic Achievement**1. Default Section****1. Gender**

- Male
 Female

2. Grade

- 9th
 10th
 11th
 12th

3. How many hours per day do you...

- | | None | Less than 1 | 1 to 5 | 6 to 10 | 11 or more |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| spend on a computer? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| have access to a computer with Internet? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Web 2.0 and Academic Achievement

4. How often do you...

	Never	Yearly	Monthly	Weekly	Daily
use OpenOffice, Linux, or other types of open source software?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use Twitter, MySpace, The Facebook, WAYN, or any other social networking sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use Wikipedia, About.org, or other collaborative information sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use Xanga, LiveJournal, or other blogging sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use Google.com?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
update your profile on your own webpage?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
post bulletins on your personal webpage?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
create your own art or music on your own webpage?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
visit user contributed video sites such as YouTube or Metacafe?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
create your own videos to post on these type of websites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
post messages on other social networking sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
mention school related work on social networking sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
contribute to content on wiki sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
interact through your own avatar on virtual reality sites?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
check your email?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
post on other people's message boards?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
share audio that you did not create?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
download audio files from iTunes or other types of audio ?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
download podcasts?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
share videos that you did not create?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
rate or review online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Web 2.0 and Academic Achievement

8. Computer Restrictions

	Completely Restricted	Almost Completely Restricted	Moderately	Not Much	None
How much would you say that you are restricted on your Internet usage?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. How often do you...

	Never	Seldom	Sometimes	Often	Always
use the Internet to learn new things or learn in a better way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use the Internet to make new friends or to socialize with current friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use the Internet to showcase or demonstrate my talents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use the Internet to express my own opinions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in athletic extracurricular activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in choral extracurricular activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in the school band?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in non-school related musical activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in academic extracurricular activities (Quiz Bowl, Chess Club, FBLA competitions)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in school club events?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
participate in other extracurricular events not mentioned above?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Web 2.0 and Academic Achievement

10. Where do you have access to a computer with Internet? (Select all that apply)

- Home
- School
- Library
- Church/Synagogue/Mosque/Temple
- Work
- Restaurant
- Cell phone

APPENDIX H

DESCRIPTIVE STATISTICS FOR SITES USED

Table A1

Descriptive Statistics for Web Usage Items

Item	N	Min.	Max.	M	SD
<i>How often do you...</i>					
Use OpenOffice, Linux, or other types of open source software?	289	1.00	5.00	1.95	1.33
Use Twitter, MySpace, The Facebook, WAYN, or any other social networking sites?	290	1.00	.00	.92	1.48
Use Wikipedia, About.org, or other collaborative information sites?	290	.00	.00	.06	1.32
Use Xanga, LiveJournal, or other blogging sites?	286	1.00	5.00	1.38	0.91
Use Google.com?	289	1.00	5.00	4.57	0.69
Update your profile on your own webpage?	287	1.00	5.00	2.65	1.41
Post bulletins on your personal webpage?	289	1.00	5.00	2.42	1.51
Create your own art of music on your own webpage?	289	1.00	5.00	1.87	1.28
Visit user contributed video sites such as YouTube or Metacafe?	290	1.00	5.00	3.88	1.18
Create your own videos to post on those types of websites?	288	1.00	5.00	1.67	1.03
Post messages on other social networking sites?	289	1.00	5.00	2.57	1.60
Mention school related work on social networking sites?	285	1.00	5.00	2.36	1.46
Contribute to content on wiki sites?	289	1.00	5.00	1.69	1.12
Interact through your own avatar on virtual reality sites?	291	.1.00	5.00	1.63	1.19
Check your email?	290	1.00	5.00	3.53	1.38
Post on other people's message boards?	284	1.00	5.00	2.99	1.52
Share audio that you did not create?	290	1.00	5.00	2.38	1.54
Download audio files from iTunes or other types of audio?	290	1.00	5.00	3.33	1.37
Download podcasts?	289	1.00	5.00	1.72	1.23
Share videos that you did not create?	287	1.00	5.00	2.33	1.49

Table A1 (continued).

Item	N	Min.	Max.	M	SD
How often do you...					
Rate online content?	286	1.00	5.00	2.33	1.45
Use a webcam?	288	1.00	5.00	1.51	1.01
Spend time on social networks or other open source websites do you use for school related content?	290	1.00	5.00	2.50	1.45
Use the Internet to learn new things or learn in a better way?	289	1.00	5.00	3.31	1.10
Use the Internet to make new friends or to socialize with current friends?	291	1.00	5.00	3.34	1.34
Use the Internet to showcase or demonstrate my talents?	290	1.00	5.00	2.24	1.28
Use the Internet to express my own opinions?	290	1.00	5.00	2.86	1.42

APPENDIX I

DESCRIPTIVE STATISTICS FOR CONDITIONS OF WEB USAGE

Table A2

Descriptive Statistics for Web Usage Items

Item	N	Min.	Max.	M	SD
<i>Do you feel that...</i>					
Collaborating with others online helps you arrive at school related answers?	290	1.00	5.00	2.47	1.17
Open source software helps you finish school assignments in ways that traditional research cannot?	287	1.00	5.00	3.17	1.24
Open source software helps you learn new things or learn in a better way?	288	1.00	5.00	3.19	1.17
Open source software helps you make new friends or to socialize with current friends?	288	1.00	5.00	3.08	1.31
Open source software helps you showcase or demonstrate your talents?	289	1.00	5.00	2.59	1.23
Open source software helps you express your own opinions?	287	1.00	5.00	3.14	1.38

APPENDIX J

DESCRIPTIVE STATISTICS FOR EXTRACURRICULAR PARTICIPATION

Table A3

Descriptive Statistics for Extracurricular Activity Participation Items

Item		Min.	Max.	M	SD
<i>How often do you...</i>					
Participate in athletic extracurricular activities?	288	1.00	5.00	3.20	1.56
Participate in choral extracurricular activities?	288	1.00	5.00	1.81	1.27
Participate in the school band?	280	1.00	5.00	2.01	1.63
Participate in non-school related musical activities?	289	1.00	5.00	2.34	1.55
Participate in academic extracurricular activities (Quiz Bowl, Chess Club, FBLA competitions?)	291	1.00	5.00	2.11	1.46
Participate in school club events?	287	1.00	5.00	2.68	1.44
Participate in other extracurricular events not mentioned above?	290	1.00	5.00	2.76	1.49

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