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The effects of Web 2.0 pedagogy on student engagement, collaboration, and achievement

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Abstract

This review explores various studies and articles on the effects of Web 2.0 pedagogy on student engagement, collaboration, and achievement in a K-undergraduate setting. A critical review of purposefully selected peer-reviewed journal articles highlight the relationship between Web 2.0 pedagogy and student engagement, collaboration, and achievement. This literature review provides an analysis for administrators and teachers when implementing Web 2.0 pedagogy. This review suggests that the implementation of Web 2.0 pedagogy increases student engagement, collaboration, and achievement.

The Effects of Web 2.0 Pedagogy on Student Engagement, Collaboration, and Achievement.

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Abstract

This review explores various studies and articles on the effects of Web 2.0 pedagogy on student engagement, collaboration, and achievement in a K-undergraduate setting. A critical review of purposefully selected peer-reviewed journal articles highlight the relationship between Web 2.0 pedagogy and student engagement, collaboration, and achievement. This literature review provides an analysis for administrators and teachers when implementing Web 2.0 pedagogy. This review suggests that the implementation of Web 2.0 pedagogy increases student engagement, collaboration, and achievement.

Keywords: Web 2.0, pedagogy, engagement, collaboration, achievement

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Web 2.0 on Engagement, Collaboration, and Achievement

Introduction

They get student attention. They encourage collaboration. They increase student achievement. And best of all? Many of them are free. They are Web 2.0 tools and using a Web 2.0 pedagogical approach to teaching is changing the face of education.

The purpose of this literature review is to identify the effects of Web 2.0 pedagogy on K-12 and undergraduate student collaboration, engagement, and achievement. Analyzing this topic is appropriate because it will help K-12 teachers determine if Web 2.0 pedagogy should be implemented into their teaching practice. "These technologies have continued to evolve rapidly, and unless researchers study their impact on learning, educators may not harness their benefits for diverse learners and utilize them successfully" (Capo, 2011, p. 236).

This review will analyze various Web 2.0 pedagogies, their effectiveness in fostering collaboration, engagement, and achievement; and make recommendations on the use of Web 2.0 pedagogy in a K-undergraduate classroom setting. This literature review will include results of the effectiveness of Web 2.0 pedagogy in kindergarten through undergraduate settings, as well as perceptions of high school teachers and Web 2.0 pedagogy. The results of this review can be applied to K-undergraduate classrooms and incorporated into teaching pedagogy.

This review will answer the following questions:

- What are the effects of Web 2.0 pedagogy on student engagement?

- What are the effects of Web 2.0 pedagogy on student collaboration?

- What are the effects of Web 2.0 pedagogy on student achievement?

Methodology

The databases used to locate resources for this literature review were *Google Scholar* and *University of Northern Iowa Rod Library One Search!*. These databases were selected because of the peer-reviewed resources available for research, their credibility among university courses, and their current resources. The descriptors used for research were *Web 2.0 pedagogy, collaboration, education, achievement, engagement,* and *Web 2.0 technology.*

The resources for this literature review were selected based on their date of publication (2004-2014), their relevance in answering the research questions, and their depth of information on their topic. Peer reviewed work was limited to the years 2004-2014. Galvan (2009) gives seven guidelines to follow when analyzing a literature review. These guidelines were also used when reviewing the various resources. The articles were scanned and their abstracts were read to check their relevance to the research question. If the articles seemed to relate to the research question, I then checked each guideline to determine if the research was adequate for the literature review.

When determining the reliability of the resources, criteria were based on the author of the published work, publishing in a reputable referred journal, or other article references.

Analysis and Discussion

Web 2.0 Pedagogy

Web 2.0 is one kind of online communication technology that creates new forms of literacy that allows users to produce and manipulate information. The term Web 2.0 describes cultural trends such as social networking, blogging, podcasting, streaming media, etc. Users have the ability to control their online experience and influence the experience of others. (King, 2011). The essence of Web 2.0, or the read/write Web, is participation in creating information dynamically, whereas the earlier phase of the Web, or the read/only Web, primarily focused on presenting information statistically, (Lou, 2009). "In theory, educational descriptions of Web 2.0 highlight a perceived shift from passive reception and consumption of information and knowledge to more creative, collaborative and convivial educational patterns," (Gouseti, 2013).

"Web 2.0 pedagogies are based on the premise that teachers are mediators who help students solve problems and find new solutions" (King, 2011, p. 28). Web 2.0 pedagogy can enhance a student's learning experience by facilitating deeper, richer learning experiences. King writes an article that reviews information literacy standards and the use of Web 2.0 as a tool used for instruction, especially in developing metacognitive skills that foster the use of Web 2.0 tools responsibly. In her article, King (2011) discusses the impact of Web 2.0 pedagogy on metacognition, or "the ability to transfer and build knowledge in other areas during the learning process" p. 24). According to King (2011), "The ultimate goal of Web 2.0-based education...is to influence students to become aware of their own learning styles and capabilities...and minimize their dependence of pedagogical mediation... and develop conscious strategies..." (p. 24). Compared to traditional teaching where students listen to a

lecture, conduct research, and are forced to memorize facts and information, Web 2.0 pedagogy encourages students to contribute to the web, engage in deep and meaningful conversations with others around the world, and become a part of the Internet, rather than just users.

Teachers should find ways to introduce Web 2.0 technologies into their curriculum to enhance their students' learning experience. With Web 2.0 technologies, teachers can create experiences for students that are individualized and support the needs for every learner. Teachers can create individual learning experiences for every student to meet the needs of the learner, giving them a more individualized education to promote student success.

"Information literacy has been described as a broad range of information processing skills," (King , 2011, p. 25). King highlights the components of information literacy, including a student's ability to determine the amount of information needed, gathering information quickly and efficiently, evaluating that information, adding the new information in a student's own knowledge, using the information for a purpose, and understanding the legalities and ethics when using that information. Through the use of Web 2.0 pedagogy, teachers can introduce students to a plethora of new information that students can then use to master their information literacy skills and communicate their new knowledge with others locally, nationally, or globally.

Similarly, Lou (2009) conducted a study related to Web 2.0 pedagogy and information literacy amongst librarians. The purpose of the study was to examine the adoption of Web 2.0 technologies in information literacy instruction and its effect on teaching and learning. Lou used a 'judgmental sampling' technique to select subjects for the study where subjects were included based on the researcher's judgment on which subjects

would be most useful or representative for the study. The researcher used surveys and phone interviews to collect data. The survey questionnaire the researcher used sought to answer the research question, 'How are Web 2.0 tools used by ILI librarians, both in teaching the content and in organizing/delivering the content?' and 'How effective are the tools?' (Lou, 2009).

Fifty responses were received and eight follow-up interviews were conducted. Most of the participants were academic librarians working in college or university libraries. The researcher found that the subjects used various Web 2.0 pedagogies in their teaching, including blogs, wikis, social bookmarking sites, and YouTube. The study concluded that, "Web 2.0 offers an effective platform for librarians to organize and manage course material, to enhance interaction and collaboration in class, and to help students master IL concepts and skills" (Lou, 2009). The researcher found that 38% of librarians used Web 2.0 technology to complete coursework collaboratively or enhance instruction and 84% of librarians used Web 2.0 technology to facilitate the delivery of content to students. The researcher suggested that future research should focus on assessment and the effectiveness of Web 2.0 pedagogy on student achievement and learning outcomes.

The two aforementioned studies provide valid research on the uses and benefits of Web 2.0 pedagogy within education. Both focus on information literacy and provide examples on how Web 2.0 pedagogy is and can be used within education.

Web 2.0 Pedagogy and Engagement

According to Merriam-Webster, engagement can be defined as an "emotional involvement or commitment" (Merriam-Webster, 2014). Through Web 2.0 pedagogy, teachers have the ability to engage their students like never before. "The 'read-write' Web

allows both students and teachers to publish their work to far reaching audiences while also promoting collaboration and engagement in online discussions and interactions that go well beyond the classroom" (Holcolm & Beal, 2010, p. 29). "Technology in and of itself does not create engaged students, but using web applications that allow students to create new content does engage students in learning" (Byrne, 2009, p. 52).

In 2011, Lan, Hung, and Hsu conducted a study of 66 sixth-grade students in Taiwan to determine differences in writing performance between three different strategies in guided writing to increase student collaboration. The students had similar educational backgrounds and were selected at random. The experiment lasted twelve weeks and found that a rich media-guided writing environment had the highest mean in terms of motivation and enjoyment. The media-rich environment was viewed through personal computers and consisted of immediate feedback through various technological forms, multiple cues via multimedia, language variety via multimedia, and a personal focus where the media is tailored to affect feelings, emotions, and needs of the viewer.

"As a result, …teachers must create a classroom atmosphere to encourage learner engagement in collaborative learning, which will in turn enhance students' enjoyment of learning," (Lan, Hung, & Hsu, 2011, p. 151). Additionally, "a web-based learning environment with multimedia learning materials could provide various interactions and presentations of media types (such as picture, animation and audio) as a guided writing strategy to enhance students' motivation and enjoyment and further reduce their writing anxiety," (Lan, Hung, & Hsu, 2011, p. 160). This study suggests that a learning environment with rich media allows students to view writing more positively in terms of motivation, enjoyment, and anxiety.

Certain limitations of the study necessitate future research. The learning style and self-efficacies of the students were not measured, and neither were the student products. The authors suggest future research should focus on evaluating the content on students' learning outcomes, "which may help teachers better understand the effectiveness of the used strategies" (Lan, Hung, & Hsu, 2011, p. 161).

In another study on the effects of Web 2.0 pedagogy and engagement, Wang, Lin, Wu, and Yu (2013) studied the effects of Facebook on undergraduate student engagement. Facebook was created in 2004 by Mark Zuckerberg and is currently the most popular social networking site on the Internet. Through Facebook, users are able to interact with people they already know, met, or to meet new people. Users share social interactions, emotions, and resources with others who live, study, or work around them. "Facebook serves as a means for instructors to connect, befriend and communicate with students to extend the communicative activities of the traditional physical classroom to a virtual form. Through Facebook, information can be exchanged," (Wang, et. al., 2013, p. 305).

For this study, convenient purposeful sampling was used and participants included 130 students from two university classes in an Advanced English Course. The average age of the participants was twenty-two years old. Students were added to a closed Facebook group for the course where the instructor posted class-related content where students read, watched, or listened to the content provided and then 'liked' or commented on the instructor's post or other student postings. "Students actively participated in building dialogue and commenting on each other's postings during the study period... The most commonly used feature was the comment feature (87% of all content), which allows active participation in group discussion among the students and between students and instructors," (Wang, et. al., 2013, p. 310).

The engagement of students was determined based on seven categories from the National Survey of Student Engagement (NSSE). The categories included teacher caring qualities, teacher trustworthiness, teacher and student relationship, cooperative student learning, active learning, student and student relationship, and student and institution relationship. Results of the study indicate Facebook-based instruction and learning engagement can be integrated to encourage students to be more engaged in their learning. Facebook also helps students merge their social and academic lives. Finally, the students in the study were highly engaged and were satisfied with their instructors, peers, and institution (Wang, et. al., 2013).

Implications and recommendations by Wang suggest, "The connection between Facebook-based instruction and learning engagement that was revealed in this study suggests that Facebook can be integrated into instruction to encourage students to engage in ways that are important for their academic outcomes and learning engagement" (Wang, et. al., 2013, p. 316). Limitations of the study were also present. First, there was a possible sampling bias because all students in the study took the same classes. Second, the reliability and validity variables to measure engagement had limitations. The authors suggest that further research should be conducted on alternative techniques when assessing learner engagement, i.e., in-class observation and interviews with students and faculty.

In another study on the effects of Web 2.0 pedagogy and engagement, Roskos, Burstein, and You (2012) conducted a study on the effects of children's engagement with e-books. According to Roskos, Burstein, and You (2012), an e-book "represents a technological advance in the book from a two-dimensional to a three-dimensional information tool, replacing the page with the screen and enlivening text with rich imagery,

sound, and animation" (p. 61). Forty children at the pre-school age, between three and four years old, participated in a two-phase experiment. In phase one, the authors used current research and videotaped observations to for observing children's engagement with e-books. In phase two, the authors applied the typology as an analytic framework for teacher- and student-led e-book readings on the touch screen device. The observations lasted for eight weeks.

Three categories were used to determine the results of the study: control, multisensory behaviors, and communication. Results indicate that teachers led the touch screen a majority of the e-book reading time at 79%. As far as multisensory behaviors, results indicate that looking, touching, listening, moving, and gesturing increase as students gain more control of a device. Finally, communication results show a higher incidence of facial expressions and noises when children gain more control of the devices and language decreases. To conclude, the authors found that "iPod and iPad devices offered a protected reading environment that strongly supported children's engagement with e-books," (Roskos, Burstein, & You, 2012, p. 60).

The authors also mention some limitations to their study. First, the scientifically-based literacy curriculum focused on skills that may have had an influence on reading behaviors and expectations. Second, the study was based on convenience samples of small sizes. Third, video capture in phase one was an issue because the research team was implementing observation settings. Additionally, relevant video data may have been lost. The researchers suggest "Further studies are needed to corroborate these descriptive observations and to improve the typology as a tool for more rigorous examination of children's engagement with e-books in the preschool classroom," (Roskos, Burstein, and You, 2012, p.

61).

The studies previously discussed take a close look at the effects of Web 2.0 pedagogy on student engagement in pre-school, sixth grade, and undergraduate students. Each of the studies mentioned find a positive correlation between various Web 2.0 pedagogies and student engagement, whether through e-books, Facebook, or a rich-media guided writing environment.

Web 2.0 Pedagogy and Collaboration

According to Popescu (2012), collaborative learning includes, "a variety of educational practices in which interactions among peers constitute the most important factor in learning, although without excluding other factors such as the learning material and interactions with teachers. In collaborative learning, students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product" (p. 200). Through collaboration, students have the ability to make connections and further their learning experiences through others, allowing them to deepen their understanding of new knowledge and gain perspectives of others. "Social media are considered Web 2.0 applications, which are an array of online tools and services that are web-based and dynamic in nature. They are user-centered and encourage interaction, collaboration, and democracy" (Joosten, 2012, p. 6, 7). When students are given the chance to collaborate, participation is usually greater, as well as interactions amongst the collaboration team and the facilitator are more frequent. "Together, individuals generate and discuss ideas, eliciting thinking that surpasses individual effort. Together and privately, they express different perspectives, agree and disagree, point out and resolve discrepancies, and weigh alternatives" (Meredith & Steele, 2011, p. 85).

Students in the Net Generation, ages eleven to thirty-one, are already collaborating with each other outside of work and school. "Today, youth collaborate on Facebook, play multiuser video games; text each other incessantly; and share files for school, work, or just for fun...They also engage in relationship-oriented purchasing" (Tapscott, 2009, p. 76). Tapscott (2009) goes on to state that nine of the ten young people they interviewed stated they would buy a product solely because their friend recommended it. Web 2.0 collaboration is already occurring outside of school, so it is time educators brought it within their academic walls.

Liu, Liu, Chen, and Liu (2010) researched the effects of collaborative storytelling with linear and nonlinear approaches. Linear stories are structured with a more traditional format with one beginning, one middle, and one end. No other story branches develop. In contrast, nonlinear stories allow students to create new beginnings, middles, or ends to other student's work. Nonlinear stories "enable children to link and orchestrate different ideas...As an increasing number of technologies employ non-traditional, non-linear environments, work in this area is important and timely" (Liu, et. al., 2010, p. 4788).

Liu, et. al. (2010) conducted an empirical study of 57 third grade students from two classes in Taiwan. They sought to find out if nonlinear storytelling improved children's perception of support in collaborative storytelling and if it improves the storytelling experience.

The two classes participating in the study were assigned and treated as the linear or nonlinear group. The study took place over an eight-week period and each group worked on their stories for forty minutes a week. In this study, Web 2.0 applications were implemented to allow children to design and remix (adding personal interpretations to the story) animated

picture books. "The purpose of applying multimedia elements in storytelling are: 1) increase children's engagement, emotion, and motivation; and 2) encourage children to remix different specialties" (Liu et. al., 2010, p. 4789). Within the first four weeks, students created and developed their own stories, and in the remaining four weeks students worked with peers on other's stories. Finally, students completed a questionnaire to determine their perception of the collaborative storytelling process.

Results of the study indicate children in the nonlinear group performed superior to the children in the linear group for four different reasons. First, the students were more motivated to branch off each other's ideas. Second, children in the nonlinear group were better able to manage and remix stories. Third, students in the nonlinear group created stories of their own, which provided feelings of ownership. Finally, children in the nonlinear group tended to improve other's narratives, which children in the linear group concentrated more on their own stories. The researchers indicate that further research should focus on evaluating and assessing the linear and nonlinear approaches.

In another study that focuses on collaboration done by Arancibia, Oliva, and Valdivia (2013), researchers investigated the effects of Information Communication Technologies (ICT) on collaboration via social networking. According to Wang, et. al, (2013), social networking sites can be defined as, "Web-based services that allow individuals to:

- Construct a public or semi-public profile within a bounded system,

- Articulate a list of other users with whom they share a connection and,

- View and travers their list of connections and those made by others within the system" (p. 303).

The subjects of the study included teachers and students from 7th to 10th grade at various schools using the Kelluwen project in 2010-2011. The Kelluwen project implements Collaborative Didactic Design (CDD) using Web 2.0 resources. "This didactic-methodological proposal encourages classroom work with tools from the Social Web and a virtual platform," (Arancibia, et. al., 2013, p. 77). The individual CDD Web 2.0 tools are then put into the Kelluwen platform for students to access. "The strategies for the generation of information contemplated in-depth interviews with teachers and focus groups with students from the schools in the project" (Arancibia, et. al., 2013, p. 78).

The study concluded that a digital platform highly motivated students, and CDD favors collaborative interaction amongst students and their peers. One limitation of the study was to "...clarify that Kelluwen is an experience that is part of an overall approach to ICT-mediated collaborative learning," (Arancibia, et. al., 2013, p. 84).

In 2012, Singh, Harun, and Fareed conducted a study on the effects of Wikispaces and collaborative learning and managing knowledge. "A wiki, namely, Wikispaces is a component of Web 2.0 technology tools. A wiki is a web-based publishing tool that offers learners and teachers editable virtual space for sharing information and knowledge," (Zorko, 2009, p. 645). The researchers asked, "How do the affordances of Wikispaces encourage collaborative learning and knowledge management in correcting errors in students' essays?" (Singh, Harun, & Fareed, 2012, 81). The study was intended to explore how Wikispaces could be used by teachers and students during collaborative peer-editing activities. The participants included twenty-five Form Four students aged sixteen years old who resided in Malaysia. The students were chosen based on whether or not they had intermediate language

proficiency and if they were computer literate. The students were divided into five groups and the study lasted for five weeks.

The five weeks were divided into three phases. In Phase 1, students attended three workshops on the Introduction to Wikispaces, Wikispaces Tutorial, and Effective Peer Editing. During Phase 2, students wrote descriptive essays on an embarrassing experience they've had and their favorite day of the week. Finally, Phase 3 required students to submit feedback on the use of peer editing via Wikispaces. "As for peer editing activities, five types of common errors found in students' writings were the focus of the investigation, which are grammar, spelling, word choice, punctuation, and sentence structure," (Singh, Harun, & Fareed, 2012, p. 84). Data was collected via student essays, field notes, questionnaires, research diaries, and a feedback form.

Results of the study showed that Wikispaces supported student-centered learning environments and teaching purposes. Field notes revealed that Wikispaces supports collaborative learning among students and stimulate student participation and meaningful learning. Regarding pedagogy, "…Wikispaces allows the teacher who plays the role of administrator, moderator and facilitator to manage students' data and keep track of their learning process via history logs," (Singh, Harun, & Fareed, 2012, p. 88). The researchers conclude that Wikispaces allows teachers to give feedback on wrongly edited and unidentified errors. Thusly, the feedback from teachers helped students reduce writing errors and improve accuracy. "The findings of using Wikispaces as a peer editing platform together with its affordances confirmed that Wikispaces facilitates collaborative learning and knowledge management; in terms of knowledge building and knowledge sharing aspects," (Singh, Harun, & Fareed, 2012, p. 94).

For teachers planning to use Wikispaces in group settings, the researchers recommend small groups that are sized from three to four students. The researchers also recommend teachers allow students to peer edit in Wikispaces at their own pace, give feedback to students using the comments feature in Wikispaces, integrate synchronous and asynchronous communication, and use Wikispaces as a collaborative learning platform for peer editing, e-portfolios, digital storytelling, school pages, reflections, and more.

In 2012, Popescu used an eMUSE platform to integrate various Web 2.0 tools within a 4th year undergraduate course at the University of Craiova, Romania. eMUSE is a portal that allows students to access many Web 2.0 tools selected by the instructor and view their course involvement and scores. Popescu (2012) decided to use the eMUSE platform because "The majority of the experiments reported so far involve a single social media tool and were realized in an ad-hoc manner. However, using a combination of these tools could be more adequate for some learning scenarios," (p. 200). To validate the experiment, eMUSE was used as a communication and collaboration support tool in a project-based learning (PBL) scenario. "PBL is a student-centered instructional approach, in which learning is organized around projects. These projects involve complex, challenging and authentic tasks, in which students work relatively autonomously and over extended periods of time," (Popescu, 2012, p. 205).

The undergraduate students involved in the study were participating in a *Web Applications Design* course. Students already had previous experience with other various programming courses and thusly had the knowledge and experience necessary for the experiment. The students were put into teams of four to five students with the roles of system analyst, database specialist, interface designer, application architect, programmer, tester,

project manager, etc. Students participated in the project for one semester and were evaluated based on their final project and their collaboration with one another. Via eMUSE students used the Web 2.0 tools of Blogger, MediaWiki, Delicious, and Twitter.

A post-study questionnaire was administered to students, and the results found that students had increased motivation, thought it was advantageous to monitor their own progress and compare it to others, and found it easier to manage Web 2.0 tools. The experimental settings did not involve a control group, so a comparative assessment could not be provided. However, the course instructors noticed a high level of interest and involvement in the project, and above-average applications were present at the end of the semester. In the future, the researcher plans to add an annotation mechanism to the platform and "perform more in-depth analyses of the recorded student actions, by applying statistical methods, educational data mining algorithms or social network analysis," (Popescu, 2012, p. 210).

Using the same problem-based learning format, Tambouris, E., Panopoulou, E., Tarabanis, K., Ryberg, T., Buus, L., Peristeras, V., Lee, D., & Porwol, L. (2012) conducted a mixed method of quantitative and qualitative evaluation on a PBL 2.0 framework with university students. As previously stated, problem-based learning (PBL) is an instructional approach where students work collaboratively to create challenging projects. PBL, combined with Web 2.0, allows students to work on a challenging project using various tools that foster creativity, communication, and collaboration. The PBL 2.0 framework was designed to enable teachers to reflect on their own pedagogical design and allow room for flexibility within PBL and 2.0, rather than worrying if their approach was 'real' PBL or 'true' 2.0. The authors created a platform to fit their study's needs that consisted of *My Desk, Group Desk, Class Desk,* and *Back Office*. These four workspaces were designed to integrate Web 2.0

tools with existing standards, divide collaborative spaces into three scopes, organize resources, improve identification and searchability of resources, and support the teacher/facilitator role.

The pilot study was administered in the spring of 2010 at the University of Macedonia to students who were IT literate and in their early twenties with no previous real-world working experience. The study found that 71% of students thought the platform provided functionality in the learning environment. Additionally, students had a positive opinion on the collaboration functions when completing meeting for discussions, completing assignments, and working on group projects.

One limitation of the study was that the full potential of the PBL 2.0 may not have been reached because of students' lack of use of opportunities in a learner-centered environment. "The overall conclusion is that PBL practices may be enhanced by the usage of Web 2.0 tools," (Tambouris, et. al., 2012, p. 249). In the future, Tambouris, et. al. plan to add new features to the Web 2.0 platform and apply the PBL 2.0 framework in different learning contexts.

"Web 2.0 tools—online platforms that allow nonprogrammers to contribute to the World Wide Web—are transforming our society" (Reich, Murnane, and Willett, 2012, p. 7). Through the use of Web 2.0 pedagogy, I believe students have the ability to increase collaboration with teachers, peers, and audiences on a national and global level. "With the emergence of Web 2.0, students now have the ability to not only access and research information from existing Web resources, but they can collaborate and create new information on the Web," (Holcomb & Beal, 2010, p. 28). Web 2.0 pedagogy provides a

positive effect on student collaboration allowing students to work together to achieve a desired result, make connections with others, and gain a deeper level of understanding.

Web 2.0 Pedagogy and Achievement

Prior to using Web 2.0 tools, students were merely consumers of information. Through Web 2.0 pedagogy, students are now producers and distributors of information who are not limited to only locating information, as they were in the past, but are also synthesizers and evaluators of information. A student's role in the classroom has progressed from simply passive learners who reflect on their instructor's knowledge to evaluators of knowledge who reflect on the knowledge they have attained through their own curiosity and the insights of others. "This ownership of knowledge pushes learners to think and create at a much higher and more critical level about authentic source content," (Malhiwsky, 2010, p. 25). Through Web 2.0 pedagogy, "...learners have significantly increased access to produce, publish, receive, and give feedback on content they produce themselves using Web 2.0 technologies because of the virtually limitless amount of space, storage and accessibility of the Internet," (Malhiwsky, 2010, p. 26). Web 2.0 pedagogy has allowed students to take charge of their own learning, which leads to greater achievements in the classroom.

In 2012, Spires, Hervey, Morris, and Stelpflug created a classroom pilot project to facilitate a learner-centric approach to learning through the creation of digital videos. They called this project Cinema Veriteen, which means 'truthful cinema.' This filmmaking process was introduced in the 1950s that focused more on content rather than production. "Cinema Veriteen is a project-based inquiry process that uses students' growing interest in grassroots video and marries that interest with educational goals that are aligned with state and national curricular standards," (Spires, et. al., 2012, p. 485).

Through Cinema Veriteen, students collaborated to create a five-minute video to demonstrate their learning. Five phases took place throughout the project: 1) Ask a compelling question, 2) Gather and analyze information, 3) Creatively synthesize information, 4) Critically evaluate and revise, and 5) Publish, share, and act. The project focused on multimodal literacy, which can be defined as 'the capacity to make meaning through many representational modes, often in a simultaneous fashion,' (Spires, Hervey, Morris, and Stelpflug, 2012, p. 484). The modes represented often include print, video, still images, audio, music, etc. The researchers worked with an eighth grade teacher and her students. The project lasted for six weeks. Twice a week, the researchers provided mini-lessons to teach the five-phase process. Students worked collaboratively in dyads within and outside the classroom to finalize their videos. Students used various Web 2.0 tools such as wikis, Movie Maker, iMovie, etc. and the combination of Web 2.0 tools within the teacher's practice created Web 2.0 pedagogy.

Students began the process in phase one, requiring them to ask a compelling question. The question had to meet three criteria: 1) Students had to be curious and motivated about the answer to their question, 2) the question was socially important, and 3) the question aligned with the standards of the course. "Sample questions included, 'What impact does global warming have on our planet and what can we do about it?'" (Spires, Hervey, Morris, and Stelpflug, 2012, p. 486). Dyads were then given a toolkit that was made up of a Flip camera, a small flexible tripod, a flash drive, and headphones. Once students completed phase one, they then began phase two which required them to gather and analyze information related to their question. "Students used a wiki as a collaborative writing space to collect information and begin making decisions about the digital story that they wanted to tell to answer their

question," (Spires, Hervey, Morris, and Stelpflug, 2012, p. 487). Students were provided with minilessons on Boolean search techniques, evaluating a website for accuracy and relevancy, and the differences between domain names. In addition to gathering and analyzing information, students also began collecting pertinent images from Flickr and Google Images, as well as created short video clips using their Flip cameras. Students were also required to find one print text to read that related to their topic, as well as one outside expert to consult to provide more information on their topic. The dyads participated in online discussions through their wiki, as well as face-to-face discussions when deliberating the content of their print text and the information they gained from the outside expert in relation to their topic.

Next, students began phase 3, where they were required to creatively synthesize information. "To arrive at a creative synthesis, students engaged in an iterative design and development process that resulted in representing their research results in a new and original way. The process required them to demonstrate multimodal literacies and complex thinking with their content by integrating information across print and digital texts, drawing inferences, summarizing, and making novel connections for their video product," (Spires, Hervey, Morris, and Stelpflug, 2012, p. 487). Additionally, students gathered music, narrations, and images to support their video. To produce the video, students used Movie Maker or iMovie.

When videos were complete, students were evaluated using a three-level process: self-evaluation, peer evaluation, and outside expert evaluation. Finally in phase five, students shared their videos with class members as well as on the Internet.

Based on the assessment rubric, students created exceptional products and observations suggested that students were engaged in the video-creating process. Students

also expressed an appreciation for the process in which they were evaluated and enjoyed collaborating with an outside expert.

Hew and Cheung (2013) researched twenty-seven different articles on evidence-based pedagogical approaches that related to Web 2.0 technologies in K-12 and higher settings. Most studies that were reviewed lasted one semester or less. Their review included five types of Web 2.0 technologies: blogs, wikis, podcasts, Twitter, and 3-D immersive virtual worlds. Each of these technologies was reviewed to discover their effects on student achievement.

To begin, we should clarify the functions of each of these Web 2.0 technologies. According to Hew and Cheung (2013), a blog allows students to easily publish their experiences and thoughts online and operate in much the same way as an online diary, mostly used in reflective thinking, (p. 48). Twitter is commonly known as a micro-blog and is a platform for sharing and publishing short messages, (p. 49). A podcast is an audio recording that can be downloaded by others, (p. 49). Finally, 3-D virtual environments "are online interactive environments which are accessible by many users simultaneously," (Hew and Cheung, 2013, p. 49). 3-D virtual worlds share the illusion of a 3-D space, include avatars that are virtual representations of the user, and other tools such as interactive chat.

Eight of their studies examined the use of a podcast and found that students took notes and listened to the podcast multiple times, which contributed to higher exam scores. In relation to wikis, five studies were examined and four reported significant positive impacts on students in writing intensive disciplines, such as history and language.

Six studies were examined on student blog use. Three of those studies focused on blog use in language learning and of the three, two reported positive gains. One blog focused on critical thinking related to social studies, and this study also reported a positive gain with

blog use. The final two studies focused on blog use in dental studies, and one of these studies found positive gains in blog use as well. The researchers concluded that blog use appeared to have a positive effect on student writing and critical thinking.

The researchers reviewed one study on Twitter and found that the semester GPAs were significantly higher for the students who used Twitter compared to the control group who did not. This increase was attributed to Twitter allowing more conversations to occur between students and students or students and faculty.

Finally, the researchers reviewed studies on the effects of virtual worlds and student achievement. Seven studies were investigated and particularly focused on biology, computer graphics, and environmental health. Of the seven studies reviewed, five reported a significant positive impact on student learning, while two studies reported no difference. The studies reporting a positive impact found that virtual worlds support a constructivist or co-constructivist learning environment where students are able to create and sculpt shapes and show their work to others for review.

The authors conclude that, through their review of twenty-seven studies, "…the use of Web 2.0 technologies does appear to have a general positive impact on student achievement" (Hew & Cheung, 2013, p. 57).

The researchers reported some limitations of their reviewed studies. Concerning the studies on blog use, two of the studies had a weak experimental design that had no comparison or treatment group. Similarly, two studies on 3-D virtual worlds also didn't have a control group. The researchers suggest that future research should examine the effects of mobile devices and Web 2.0 technologies on student achievement, as well as exploring Web 3.0, which allows computers to communicate with each other.

In another study on the effects of Web 2.0 pedagogy on achievement, O'Bannon and Britt (2012) examined the effectiveness of creating, developing, and using a wiki to increase knowledge of Web 2.0 tools for preservice teachers. In addition, they studied the preservice teacher's perceptions on increased knowledge through the use of Web 2.0 tools; how frequently those tools were used; and how the teachers communicated during the activity.

One hundred and three preservice teachers participated in the study and data was collected using a mixed method approach, which allowed for a comprehensive view of the data. The data was collected through pre- and post-surveys and focus-group interviews for the duration of one semester.

The students began by participating in a wiki assignment prior to beginning their project to help them gain familiarity with the Web 2.0 tool. Students then worked with a partner to choose a Web 2.0 tool they would research and create a study guide for within the class wiki. The student-created study guides would include an overview of the tool, directions for using the tool, how the tool could be used in a classroom, an artifact that was created by the tool, and any images or instructional videos that may further explain the tool.

Results of the study indicate that the preservice teachers believe the wiki was effective in increasing their knowledge of Web 2.0 tools. Furthermore, the average perceptions of the teachers indicated that creating the wikis, presenting their wikis, and the hands-on practice through the wikis all increase their knowledge.

The authors indicate some limitations to their study. The sample of students was of convenience rather than a random sample and the findings do not include a K-12 setting. Additionally, the study was limited to one semester.

As far as implications and recommendations are concerned, the authors suggest

educators plan learning activities to help students ease their way into the projects they'll be completing and closely monitor that progress. In the future, the authors suggest adding to the knowledge base regarding wikis and student learning and stretch that knowledge base to various content areas, levels of education, and different age levels.

In conclusion, Web 2.0 pedagogy has shown to have a positive effect on student achievement (Spires, et. al., 2012; Hew & Cheung, 2013; O'Bannon & Britt, 2012). Through various Web 2.0 tools, students were able to participate in various learning activities that were a perfect combination of technology, content, and pedagogy, which resulted in higher student achievement.

Conclusions and Recommendations

The purpose of this literature review was to study the effects of Web 2.0 pedagogy on engagement, collaboration, and achievement in students ranging from kindergarten to undergraduate students, as well as the perceptions of teachers. In short, this review was intended to provide research for teachers and administrators to discover if there was support for applying Web 2.0 pedagogy frameworks, tools, and strategies in a classroom setting.

This literature review centered around three questions. These questions will be used to organize this author's conclusions from this review.

What are the Effects of Web 2.0 Pedagogy on Engagement?

Students today are of the Net Generation and are surrounded by technology. Through using Web 2.0 pedagogy, I believe students will be more engaged in their learning. When teachers combine effective teaching strategies and integrate technology into the content they intend to teach, students will be more involved in the learning process and will find a greater emotional connection with the content rather than relying on an external motivator.

Teachers today have the ability to choose from thousands of various Web 2.0 tools to meet their students' needs. One of the beautiful aspects of these Web 2.0 tools is how they provide learners with the ability to share information with others. "…Web 2.0 provides a personal learning space filled with other student's work that is publicly available to other people," (Park, 2013, p. 49). The notion that students will be sharing their thoughts, ideas, and completed work with others gives students another reason to be engaged and involved in their learning.

The literature reviewed in this paper provided many examples of how Web 2.0 pedagogy can have a positive effect on student engagement. Lan, Hung, and Hsu (2011)

found that a rich media-guided writing approach encouraged learner engagement and enhanced student enjoyment of learning. Similarly, Wang, et. al. (2013) found that Facebook encourages engagement in academic outcomes and students were highly engaged when using Facebook. Finally, Roskos, Burstein, and You (2013) also found that ebooks support reading engagement. Each of these studies focus on the correlation between Web 2.0 pedagogy and engagement, and all found an increase in student engagement when Web 2.0 pedagogy was present.

Teachers are trying to find ways to connect their students' learning to the world around them, and through Web 2.0 pedagogy students are able to make those connections through their innate drive to learn more. As stated before, bringing in technology itself does not enhance the learning experience, but if teachers are able to find adequate tools to implement into their teaching, students will be more engaged in the learning process.

What are the Effects of Web 2.0 Pedagogy on Collaboration?

Collaboration can have a great impact on the learning process. Through collaboration, "...students are actively engaged in the process, by discussing with peers, exchanging viewpoints, questioning beliefs and providing feedback. The inherently social nature of learning bears on the intellectual synergy of several minds reflecting on a problem" (Popescu, 2012, p. 200). Using online tools, the aforementioned studies showed teachers were able to successfully implement Web 2.0 pedagogy into the learning environment and found an increase in student collaboration.

In relation to Web 2.0 platforms, Tambouris, et. al., (2012), Popescu (2012), Singh, Harun, and Fareed (2013), and Liu, et. al. (2010) all discovered that using Web 2.0 platforms in an educational setting created an increase in collaboration. Through Web 2.0 platforms,

students were able to access a multitude of Web 2.0 tools that allowed students and teachers to interact with one another and increase learning through shared interactions. With the addition of wikis, Blogger, Delicious, Twitter, YouTube, Picasa, and other Web 2.0 tools, students were able to experience a Web 2.0 pedagogy that combined new Web 2.0 tools with collaborative teaching strategies that resulted in increased interactions among students, allowing for higher learning achievements.

Tambouris (2012) and Popescu (2012) also integrated Web 2.0 pedagogy into problem-based learning practices. The Web 2.0 tools used in these two studies not only increased collaboration amongst students, but also allowed students to partake in a learning experience that related to their real world and could be applied in their lives. Additionally, Arancibia, Oliva, and Paiva (2013) also found in their study that the use of Web 2.0 pedagogy increased student collaboration through the use of Web 2.0 tools.

This literature review showcased multiple examples of increased student collaboration when using various Web 2.0 tools, whether through digital storytelling, social networking, using a wiki, an online platform, or through problem-based learning. Through these various media, students had the opportunity to gain feedback from their teacher and peers, ask and answer thought-provoking questions that enhanced their learning, and reflect on what they had just learned. Web 2.0 pedagogy provides a collaborative workspace for students that allow the learning outcomes to extend much further than when working as an individual.

What are the Effects of Web 2.0 Pedagogy on Achievement?

Teachers are constantly seeking ways to increase student achievement. When teachers implement Web 2.0 pedagogies into their classroom, student achievement increases. This literature review analyzed various social media used in a Web 2.0 pedagogical setting and found that including Web 2.0 pedagogies increased student achievement.

Students in our present classrooms have the ability to make greater achievements than students before them, while also increasing collaboration and engagement when the learning framework is designed around Web 2.0 pedagogy. Students are now producers of information when interacting with the internet, rather than sole consumers. They are able to synthesize and evaluate the information they seek, rather than just locate. This new ownership of knowledge requires students to think and create at a much higher level.

Within this literature review, various studies were evaluated on Web 2.0 pedagogy and its effect on student achievement. Spires, Hervey, Morris, and Stelpflug (2012) found that creating digital videos increased student achievement and engagement, and therefore exceptional products were created. Hew and Cheung (2013) also reviewed the effects of various Web 2.0 tools on student achievement and found that Twitter, podcasts, blogs, and virtual worlds each had a positive impact on student achievement. Finally, O'Bannon and Britt (2012) found that wiki use increased student knowledge of Web 2.0 tools and overall learning, thus increasing student achievement.

Recommendations

This review has found a need for more research on the effects of Web 2.0 pedagogies at the elementary level. The majority of the research that was found for this literature review focused on the secondary and undergraduate level. Students at the elementary age already

begin school with a large range of technological skills. These skills should be fostered by teachers and used to enhance the learning experience for students. An increase of research at the elementary level would promote the use of Web 2.0 pedagogy in an elementary classroom setting.

This review also found a need for more research for pre-service teachers with a focus on how Web 2.0 pedagogies can be implemented into a classroom. Pre-service teachers today are easily able to navigate various technologies and Web 2.0 tools, but the process of implementing these tools into a classroom can be much more difficult than expected. The research should focus on helping teachers formulate ways to identify which Web 2.0 tools are best for their lesson and students, especially at an elementary level.

In conclusion, I believe the literature in this review supports implementing Web 2.0 pedagogy to increase student engagement, collaboration, and achievement. When students are internally motivated and engaged in their learning, combined with the collaboration of others to gain a deeper level of understanding, student achievements will be greater than ever before.

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