

Innovations in Technology

Blog Enabled Peer-To-Peer Learning

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Introduction

Issues related to community oral health comprise about 12% of the content on the Dental Hygiene National Board Examination.¹ Of that content, a large portion of a student's understanding of community oral health issues centers on their ability to plan and evaluate a dental hygiene public health program. Given a community case history and/or specific instances of certain tasks, students are expected to identify the phase of service planning in which these tasks would be completed. The specific phases of community service planning include: Assessing a community oral health need, planning an oral health program to meet that need, implementing the program and evaluating the program for success.²⁻⁴ This process of planning a community dental hygiene service requires a student have an understanding of the developmental phases and knowledge to successfully complete each phase. This researcher's experience has been that community service planning and other oral health curriculum are traditionally taught in a classroom setting and assessed with multiple choice testing. However, to gain an in-depth understanding of a concept, educators must move beyond passive lectures and testing.⁵ Faculty members must explore instructional strategies and encourage hands-on learning and active engagement of students in construction of new knowledge.^{6,7} Unfortunately, these types of experiences can be challenging to implement given the time and physical constraints of traditional academic settings.⁶

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Abstract

Purpose: The purpose of this project was to simulate development of a community oral health plan using technology-based tools at the students' disposal. The specific research questions were: Will students use the Internet to identify community oral health issues and develop solutions to address the issues? Will blogs be a good tool to discuss and engage students in conversation with each other and to connect them with community oral health resources? How will blogging impact future academic and personal communications for the student?

Methods: Dental hygiene students (n=30) participated in a community oral health course for 7 weeks. Students were asked to create a blog on which they would post weekly assignments and respond to 2 of their peer's blogs each week. Methods for data collection were post-treatment survey (15 items) analyzed for descriptive statistics and an analysis of written blog content according to a counting and coding scheme.

Results/Conclusion: Students used the Internet to identify issues and problem solving scenarios. Blogs were a good tool to engage students in discussions on oral health issues and peer-to-peer learning. Qualitative discourse analysis revealed evidence of critical thought and discourse throughout blog posts. Students referenced the Internet in blogs, while specific instances of resource sharing and provision of solutions to peers were less common. Students felt blogging encouraged them to engage with one another. Twenty percent of participating students have extended their use of blogging for both academic and personal purposes.

Keywords: Blogging, Internet, computer-mediated communication, dental hygiene education

This study supports the NDHRA priority area, **Professional Education and Development:** Evaluate the extent to which current dental hygiene curricula prepare dental hygienists to meet the increasingly complex oral health needs of the public.

munity dental hygiene service utilizing computer technologies, such as sites and resources found on the Internet and online journaling (referred to as web logs, weblogs or blogs), as tools to go beyond the time and physical constraints of a 1 credit hour course in a classroom setting. Emergent computer technologies are also the best way to gain access

to information quickly and disseminate content uniformly. As a result, the overall goal for this project was to evaluate the students' use of Internet resources and blogs (for journaling) as they developed individual oral health promotion service plans for specific communities. The specific research questions were:

1. Will students use the Internet to identify community oral health issues and then develop solutions to address those issues?
2. Will blogs be a good tool to discuss and engage students in conversation with each other and to connect them with community oral health resources?
3. How will blogging impact future academic and personal communications for the student?

It was hypothesized that the use of emergent technologies would have a positive impact on student use of the Internet as a resource for oral health issues. The use of blogs would provide a venue for conversations to take place to enable peer-to-peer learning and resource sharing, and students would accept blogging as a valid tool to use for further academic and personal communications.

Review of the Literature

A blog is an online personal journal with reflections, comments and hyperlinks provided by the writer, and is generally written in an informal voice.⁸ Journal entries are often published in reverse chronological order so the most recent post appears first.⁸ Blogs allow people to engage in "knowledge sharing, reflection and debate," as well as draw people together who are interested in "constructing knowledge around a common topic."⁹⁻¹¹ Activities such as working with others, critical inquiry and reflection, communication and articulation of knowledge, understanding and skills, managing and how to learn and self and peer assessment are outcomes promoted by and referred to as peer-to-peer learning.¹²⁻¹⁴ Peer interactions are considered a pedagogical structure promoting independent and collaborative learning that will endorse high-level cognitive processes.¹²

Most blogging software (such as Blogger™, Movable Type® and LiveJournal™) automatically formats posts for writers, allows readers to comment on posts that they find interesting and provides archiving of old posts.¹⁵ The writer does not need computer-programming skills to publish online. This has enabled a flood of new voices contributing to discourse on a wide variety of topic.^{16,17}

Shared knowledge is an emergent product of discourse among individuals engaged in joint activity.¹⁸ Educators who want to encourage learners to engage in collaborative discourse have seen how blogs can enrich the learning experience for students.⁹ With blogging, students are able to craft a thought and engage in discussion on topics in a way the traditional classroom setting does not allow.¹⁹

Activities, such as engaging, reflecting, solving problems and bringing learning to life, are activities of adult learning consistent with critical thinking, self-learning, self and social awareness, empathy and transformative learning.^{9-12,20} Transformational learning involves 3 phases: critical reflection of one's assumptions, discourse to validate the critically reflective insight and action to bring about change.^{18,19} Because the use of blogging has the potential to encourage activities described in those phases, it could be an environment where students can begin the process of transformative learning.²¹ Specifically, opportunities for critical thought and critical discourse are supported with blogging.²¹ Critical thought, as defined by Mezirow, is when new information is learned that causes the learner to challenge preconceived ideas.²⁰ Critical discourse occurs when that learner conscientiously alters their conceptual framework and voices their new ideas or reflective insight.^{13,20}

Previous research has been conducted on blogging for a community of learners. Barab et al designed an online architectural framework to support observations, discussions and reflections amongst peers.²² Their purpose was realized in a community of learners observing each other's practice through downloaded video, discussion of theory and ideas, with reflection on their practice. One caveat seemed crucial – the level of experience gained was directly related to the design of the community or network of commentary (blogs). Instructional design, recommendations, assignments, processes and interactions impact the success of educational application of blogging.

In a separate study, Bouldin, Holmes and Fortenberry used blogging to enable reflective learning on course concepts in a communications class.¹¹ Evidence suggested achievement of the educational objective, and students were expected to improve communication skills and attitudes. Through self-assessment and reflection in their blogging, students were able to identify areas for improvement and further development. Post-survey outcomes revealed blogging on course concepts allowed them to relate what they learned to real life situations, and that blogging has provided them with a higher level of retrieval of information learned.

The purpose of this project was to simulate development of a community oral health plan using technologic tools at the student's disposal. The specific research questions were: Will students use the Internet to identify community oral health issues and develop solutions to address the issues? Will blogs be a good tool to discuss and engage students in conversation with each other and to connect them with community oral health resources? How will blogging impact future academic and personal communications for the student?

Methods and Materials

Design of this project was intended to facilitate collaboration and sharing of online resources among students, encouraging epistemic shifts leading to action – an outcome of transformative learning. A convenience sample of junior dental hygiene students (n=30), enrolled in a 7 week course on community oral health concepts, participated as research subjects. Students signed participant consent forms and were told their grade would not be adversely affected if they did not consent to having their blog content analyzed. The research project did receive institutional board approval and was considered exempt. The subjects were predominantly female (90%), ranging between 20 to 32 years of age, with minimal experience with online technology. None of the students reported having experience setting up a blog or blogging.

The course design included the use of the Internet and online blogs. Students were directed to use the Internet to identify a community need and conceptualize a service project to address this need. After setting up their own blogs, students blogged on information learned via Internet research, their intended target population and community need, and outlined the service project that they conceptualized. Students engaged in conversations via blogs, which was meant to stimulate thinking and discussion on topics related to community oral health. Course requirements included posting assignments to personal blogs and commenting on peer's blogs. No guidelines were given for the content of a peer comment, just that each student had to comment on the posts of 2 peers each week.

Data Collection and Analysis

Research data were derived from a mixed quantitative/qualitative analysis of the posts and comments on the blogs and a post-survey of research participants. The post-survey was designed to assess the students' opinion regarding whether the blogging experience addressed the research questions. There were 15 items on the survey, 5 address-

ing each research question. Students answered on a Likert scale of strongly agree to strongly disagree. Questions receiving an average response of "agree" or "strongly agree" were said to indicate support for the research question.

Qualitative Analysis

A coding scheme was developed according to Herring's research on discourse analysis.^{16,17} Data were analyzed and counted for evidence of critical thought, critical discussion, epistemic shifts, evidence of peer-to-peer sharing of resources and solutions. A team of 3 researchers used a constant comparative approach to conduct the analysis of blog posts.²³ Each completed thought was either counted as critical thought, critical discussion, action, impact, epistemic shifts, a personal post or evidence of peer-to-peer sharing of resources and solutions. Each completed thought coded was done so exclusively, as an incidence of 1 node. Therefore, a single comment could not be an incidence of 2 or more nodes. A hash mark was entered onto a spreadsheet to indicate the frequency of the identified node. This process allowed researchers to identify important interactions and building of activity networks amongst peers.

Coding Scheme and Nodes Defined

Critical thought was identified when new information gained by the student was discussed, and there was evidence of assimilating the new knowledge with the student's personal understanding, or schema model.²⁰ Additionally, critical discussion took place when these new ideas were put into words and discussed on individual blogs. A hash mark for action would be made if a student commented on action they would take as a result of the information gained in this research process. Impact and epistemic shift had to do with comments demonstrating an influence on the student while utilizing emergent technologies (impact) and shift in personal paradigms as a result of this influence (epistemic shift). Incidences of when students posted personal information were tracked, as where any time students provided hyperlinks to Internet Web sites or helpful resources or solutions.

Calibration

Researchers were calibrated before they analyzed journal content. Calibration methods included the provision of literature, which explained and supported the coding scheme and the spreadsheet, as well as definitions of each identified node, and a calibration session, where researchers worked together to identify examples of textual incidences of

all nodes to be recorded on the spreadsheet. Additionally, examples of critical thought, critical discussion and epistemic shifts from student blogs that corresponded with nodes were identified. A second calibration session was held once again during the data collection process. During the analysis of content, each blog post was read twice, once by 2 evaluators. The evaluators critiqued the posts without the knowledge of the other evaluator's opinion. If the 2 evaluators' opinion of the content and categorized nodes did not match, a third evaluator would assess the post. This process ensured inter-rater reliability, plus an inter-rater reliability analysis using Cronbach's alpha was performed to determine consistency among raters.

Results

Post-Survey Responses

There were a total of 15 Likert statements, 5 for each research question, asking students to agree, strongly agree, neutral, disagree or strongly disagree with each statement. The results of each category of survey statements are combined to show percentage outcomes per research question. For research question 1, student response indicated that 56% agreed or strongly agreed that they used the Internet to identify community oral health issues and develop solutions to address the issues. Seventy-eight percent agreed or strongly agreed blogs were a good tool to discuss and engage students in conversation with each other and to connect them with community oral health resources. For research question 3, 58% agreed or strongly agreed blogging will impact future academic and personal communication.

Qualitative Findings

A constant comparative approach to conduct the analysis of blog posts was used.²³ The Cronbach's alpha reliability coefficient was found to be 0.872, which indicates good internal consistency. Thoughtful incidences (n=620) were categorized accordingly: critical thought (17%), critical discussion (18%), personal posts (18%), action (12%), impact statements (8%) and other dialogue (19%), with epistemic shifts occurring 5% of the time (Figure 1).

Excerpts from student blogs have been included to demonstrate nodes researchers were looking for in blog posts. The following excerpt is an example of critical thought where Holly (student names have been changed to protect anonymity) is attempting to incorporate new information with her personal paradigm. Also indicative in this post is the

student's lack of writing skills and difficulty putting their thoughts into words:

"Narrowing my target population was necessary in order to truly focus on the needs of these select individuals. I chose these individuals because I believe they will have a more optimistic outlook as what is going on in their lives. Many of the individuals that I have met who still live at home, are of course receiving aid from either family, friends or the community; but they still have that determination to be independent and remain vital productive human beings. The reality of my decision boiled down to this: I did not want to focus my attention on those whose perception of life was negative..."

This excerpt indicated Megan's action that she would take to address a perceived oral health need:

"As prompted, I began to analyze the manner in which I could inform, meet, and educate such a population in any community. My first thought was, why not tag along with the "Meals on Wheels" crew. They meet people everyday that are at home doing what they can to be happy and vital. If they are receiving meals, than they still must have some decent chompers that are in good or semi-good working order. And even better, they would be more apt to want to retain their teeth by having qualified dental practitioners providing free dental care."

The following excerpt demonstrates that Ashley was impacted by a discussion that took place on peer blogs regarding fluoride that resulted in an epistemic shift:

"You might be surprised to hear that I am undecided on the issue of fluoridation in drinking water. To clear this up in the very beginning, I am not against fluoride. However, since I was undecided on this hot topic, I decided to come into this with an open mind, which is hard to do if you already have your mind made up. So I did some research on it. Why not fix the problem where it starts, which is what we put into our mouths. We also need to remember to respect other peoples' opinions on this issue, not to mention other issues. When reading my other classmate's blogs, I couldn't help but notice that everyone got so angry about people who were against fluoride in the water! I know we will face patients whose views differ from ours and from what we are taught and THAT IS OKAY! We can do our part and try to educate them for the better and they have the choice to listen or not. We need to be tolerant and respectful of others opinions."

A quantitative analysis of student posts indicat-

Figure 1: Breakdown of incidences of nodes identified in coding scheme.

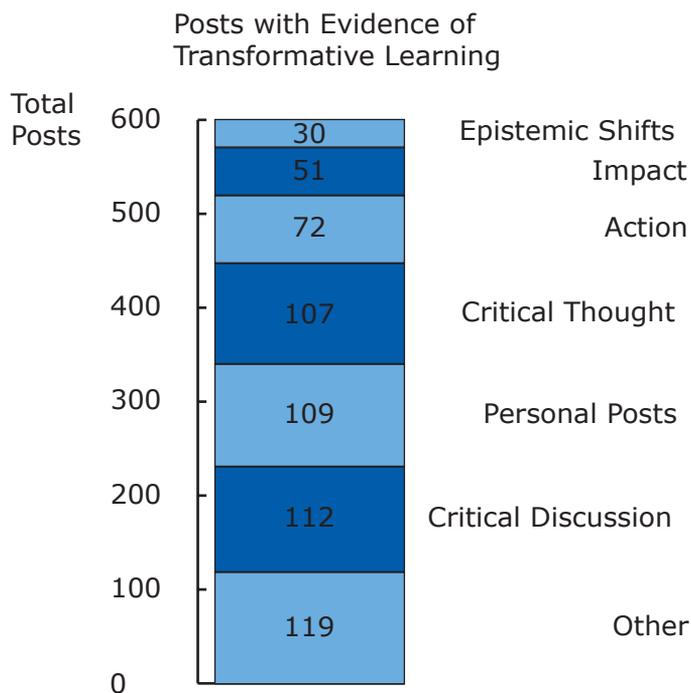
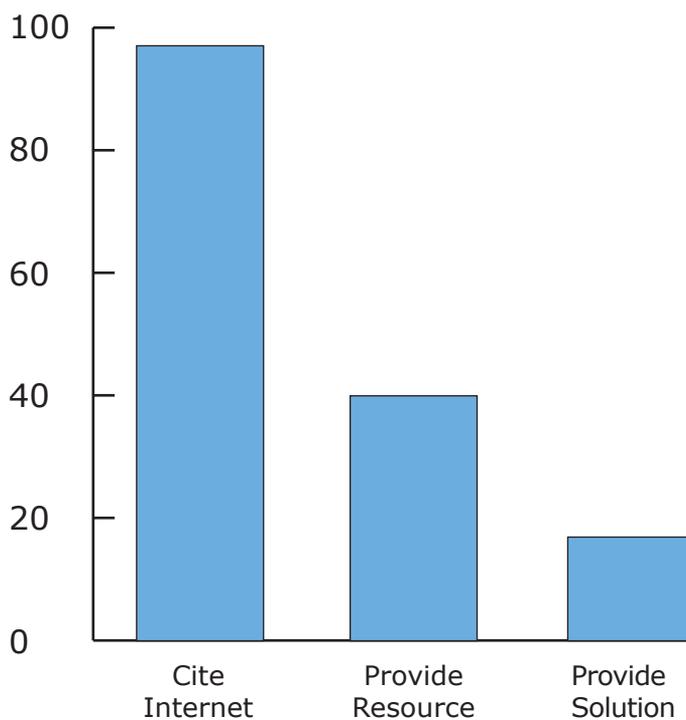


Figure 2: Qualitative analysis of student posts (# of posts)



ed some students were referencing the Internet by providing hyperlinks in their discussions with one another. Specific instances of resource-sharing and provision of solutions to peers were less common, but present. For example, Megan found a Web site that would help Ashley in the development of her community project, so she provided a hyperlink to that site for her on a blog comment. Students cited the Internet and shared resources and solutions with peers in one quarter of all blog posts (Figure 2).

Students were asked an open-ended question about what they liked or disliked about using the Internet and blogs in a community oral health class. Students liked learning about blogs as a new tool for interacting with others online and liked the plethora of resources and Web sites that were available online. However, some did not like the inconvenience of blogging if they were not technologically savvy, and felt it pressured them to go outside their comfort zone (Table I).

In addition, student blogs were monitored after the community class ended to see how many continued posting to their blogs. Institutional review board approval was granted for this monitoring, although it was for a larger research project extending past the community course on electronic journaling and critical reflection. Twenty percent (n=6) of students involved in the project have extended their use of blogging for both academic and personal purposes.

Due to the novelty of blogging at the time of this research and the initial resistance to the idea, extended use of blogging, even for 6 students, was perceived as noteworthy.

Discussion

There was weak support for research question 1 (Will students use the Internet to identify community oral health issues and then develop solutions to address those issues?). Over half of survey respondents agreed they used the Internet in their search for community oral health issues and potential solutions. However, support for this question is strengthened by the frequency with which students cited the Internet as a reference or resource on their blog posts. The strongest support was for research question 2 (Will blogs be a good tool to discuss and engage students in conversation with each other and to connect them with community oral health resources?). The use of blogging as a tool for student engagement was also evident in the amount of critical discussion that occurred through blog commenting. Moderate support was present for research question 3 (How will blogging impact future academic and personal communications for the student?). While only 6 students continued their blogs after the course had ended, they posted often and convinced their peers to write or comment on blogs. Further research could more accurately de-

Table I: Student comments on use of the Internet and Blogs

What did you like?	What did you dislike?
<ul style="list-style-type: none"> • I was able to post my own opinion on topics that otherwise I would probably keep to myself. • I became more aware of information that is accessible. Sharing views and work with classmates. Learned what blogging is and how blogging works for a possible use for future. • Access to multiple resources. New way to interact. • I found a lot of good info on the Internet. It was interesting to see what my classmates thought about different issues. • I had a really bad attitude about blogging but I have come to think that it is OK and was a good way to communicate with the class. 	<ul style="list-style-type: none"> • It was new and somewhat awkward for me, a pretty strong introvert, to get used to. • Sometimes it is hard to put all of our opinions in writing. For the most part it wasn't too bad. • I disliked having to blog as an assignment. We should just be able to blog for fun. • It took time to research other's blogs and to comment on their blogs. I got too caught up in it sometimes and it was too time consuming. • I have a hard time with things that I can't actually hand in. I wasn't sure if my blog posts/comments actually published or not. • Very time consuming. Sometimes I had a hard time finding what I needed on the Internet. I don't always know where to look.

termine the impact of the blogging experience on the future academic and personal communication for these students.

Research outcomes suggest blogging provides opportunities for critical reflection of one's assumptions, and textual discourse to validate the critically reflective insight. Incidents of critical discussion and thought were common among blog posts. However, posts indicating epistemological shifts were rare, possibly due to the difficulty in describing a shift for novice writers.

While epistemological shifts were rare, this outcome was not discounted as irrelevant. Any shift in an individual's paradigm is considered meaningful and is not a cognitive process that occurs often in the learning process. Researchers were encouraged with this outcome and feel the use of blogs for student interaction was constructive in the educational process.

Student comments on the use of the Internet and blogs were informative and led the researchers to consider the following recommendations for future research. The use of emergent technologies, such as the Internet and blogging, should be incorporated into other dental hygiene course curriculums to familiarize students to their use. In addition, it is postulated that a student blog will become more personal and meaningful as a student develops their own voice and style of writing over a longer period of time (this research project took place in the span of just 7 weeks). Practice in writing and participating in critical discourse enhances a student's meta-

cognition, which may lead to strengthening of the dental hygiene profession.

Limitations of this study included the lack of more male participants (only 2 men participated in this project). Replicated studies with a predominantly male sample and an evenly mixed male/female sample would provide additional insight regarding potential gender interaction with the variables measured. In addition, it is recommended that 2 evaluators review each qualitative piece of data for future research. While 3 researchers performing the qualitative analysis were calibrated, it was seen as a flaw that only 1 evaluator viewed each incidence of discourse. The validity of qualitative assessment could be strengthened by a higher degree of agreement between researchers.

Conclusion

The qualitative data suggests the use of technologies, such as the Internet and blogging, are a way to support peer-to-peer learning and foster critical discussion. However, students need a longer period of time to become familiar with these tools, such as blogging. Technologies allowing students to engage with course concepts and personal paradigms, as well as with peers and other online communities of practice, could greatly enhance the way dental hygiene is learned and practiced in the future. Therefore, continued investigation into the concepts presented in this article is encouraged.

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