Southern Illinois University Carbondale
OpenSIUC

Publications | Division of Public Health Education

Fall 11-30-2009

The Future of Technology in Health Education: Challenging the Traditional Delivery Dogma

Mark J. Kittleson
Southern Illinois University Carbondale, kittle@siu.edu

Follow this and additional works at: http://opensiuc.lib.siu.edu/phe_pubs

Recommended Citation
Kittleson, Mark J., "The Future of Technology in Health Education: Challenging the Traditional Delivery Dogma" (2009). *Publications.* Paper 1.
http://opensiuc.lib.siu.edu/phe_pubs/1

This Article is brought to you for free and open access by the Division of Public Health Education at OpenSIUC. It has been accepted for inclusion in Publications by an authorized administrator of OpenSIUC. For more information, please contact opensiuc@lib.siu.edu.

The Future of Technology in Health Education: Challenging the Traditional Delivery Dogma

Mark J. Kittleson

I am fully cognizant of my strengths and weaknesses as both a person and professional. To consider my work comparable to the likes of the previous scholars is a mistake. I don't have the research skills of an Elbert Glover. I don't have the statistical understanding of person like Mohammad Torabi. I don't have the grant procurement history like Randy Black. I don't have speaking skills like those of Buzz Pruitt and Skip Valois. I don't have the writing skills of Robert McDermott. I don't have the technology skills of a person like Robert Gold. I don't have the skills to take research into practice like a Jim Eddy. So why was I selected?

I've been blessed with an opportunity to contribute to the profession via a technology that 20 years ago did not exist. The HEDIR catapulted me into the national limelight. As most know, I created the HEDIR in 1992–the profession's first email directory and listserv. The profession has found the HEDIR to be an exceptional tool to communicate thoughts, solicit ideas, and to share information. Currently the HEDIR has over 1,700 participants and has sent over 22,000 messages in its history. There are many other lists that people subscribe to, or use technologies that are way more interactive, expansive and creative. Yet, the HEDIR continues to survive.

I think the HEDIR did (and still does) three things: (1) It allows an individual to not feel so isolated. Jim Girvan told me that at one time he was the only health educator in Idaho–the HEDIR gave him an opportunity to communicate with others and he felt less alienated; (2) The HEDIR allows everyone an equal voice. Where national conferences tend to be overrepresented by college faculty, the HEDIR allows the teacher and the public health educator an opportunity to be part of the profession and to have an equal voice; (3) the HEDIR introduced people to the use of technology when technology was in its infancy. For many health educators (especially of my generation) we were thrown into technology. I believe the HEDIR helped with that transition.[1]

TECHNOLOGY

Figure 1 shows a graph that was created by Rogers.[2] If we review this in terms of the profession of health education and technology, we have those early innovators like Robert Gold, early adopters like Alyson Taub, early majority like myself, late majority like Elbert Glover and the laggards…well, we all know who those people are, right?

I can't speak for everybody in my age group, but I'm constantly amazed at the technological advances that are being made. For those of us over 50, we remember sitting in front of a TV in the summer of 1969 watching Neil Armstrong take the first step on the moon. It was an incredible experience. Yet, today, my smart phone has more computer capability than that Apollo system had.[3,4]

Morris Massey, the University of Colorado human relations expert, stated early in his career that people tend to NOT value things if they've always had them.[5] For my generation, we think it's normal to have electricity—because we've always had it. What does the younger generation think is normal? We now see young children with their own cell phones. They always had access to them, and they think that this is normal. Mention to them the concept of a party-line telephone system and they'll look at you like you're a space alien.

Students entering college today have always had access to email, the Web, cell phones, text messaging, and all other sorts of gizmos. To them, these are normal. Plus, it's normal for them to see technology constantly changing. Four-out-of-five teens now own a cell phone.[6] Cell phones are the second leading item for a teen's social status (clothing is still ranked number one) and 42 % of teens indicate they could text blind-folded.[7] In a broader sense, the U.S. saw 14.3 billion searches (via Google and

Mark J. Kittleson is a professor of public health education, Southern Illinois University, Carbondale, IL 62901; E-mail: kittle@siu.edu

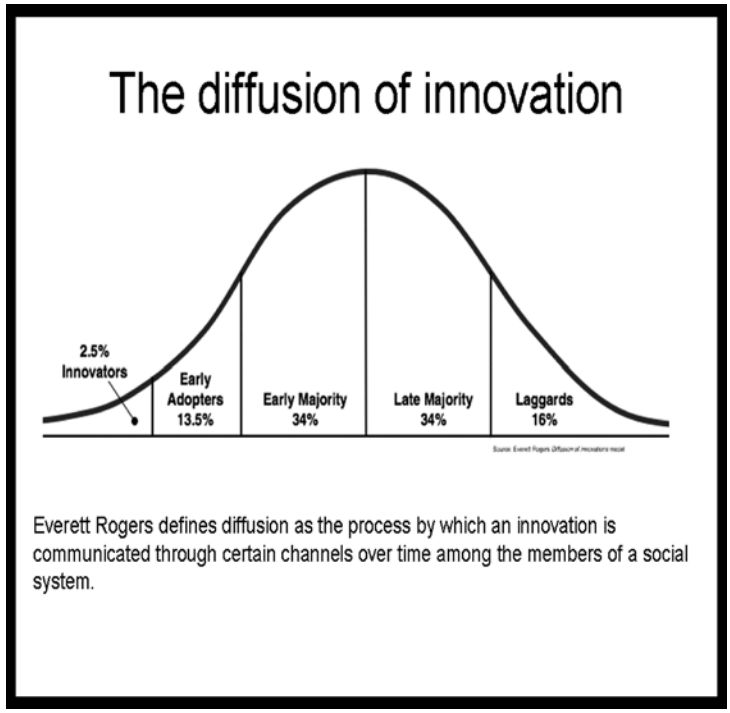
Yahoo) in April 2009.[8] It was estimated that in August 2008, over 210 billion emails were sent daily,[9] and an estimated 2.3 trillion text messages will be sent in 2010.[10]

We now have many technology options. Some include an expansive Web; social networking sites (MySpace, Facebook, Twitter); blogs; real-time mapping, such as Google Earth; podcasting (Apple has sold over 200 million iPods);[11] user-generated media, such as YouTube; gaming devices, such as Wii; and educational virtual reality software, such as Second Life©. All are worth additional consideration; however, for the purpose of this article we will focus on the use of technology in delivering health education programs.

A few years ago an AAHE Scholar[12] talked about the Swiss and their watchmaking status. Prior to 1970, the Swiss were THE watch makers of the world. When the first digital watches were introduced by the Japanese, the Swiss ignored them. They thought that the quality wasn't as good, and that nobody would want them. Over the 20 years between 1970 and 1990, the Swiss' control of watches dropped from 75% to less than 15%, with tens of thousands losing their jobs. The Swiss were unable, or perhaps unwilling, to admit that there were other options that were as good or desired by the population.

Over the past 10 years we have seen an enormous growth in distance education and Web-based programs. Slowly, such programs have been accepted, but are still viewed with a critical eye. Robert Gold quoted Abraham Lincoln in his 1987 AAHE Scholar presentation; that one 'can predict the future by creating it'.[13] There is no question that the future of health education (or probably any profession) lies in its ability to survive in the technology world. It's going to happen whether we want it to or not; we might as well be active in its development and implementation.

Figure 1. Diffusion of Innovation



THE IMPACT OF QUALITY

It can be assumed that we all want to do a "quality" job, whether it is planning a program, hosting a meeting, evaluating results of a project, or the teaching of a course. Interestingly, whenever distance learning or Web-based education is discussed the first issue that is discussed is the 'quality' of such an effort. I think we assume that face-to-face interaction is the best way to achieve quality in most activities, especially teaching. I want to challenge that belief with two examples.

I remember taking a PhD course at the University of Akron in the early 1980s on Tuesday evenings from 7:00 to 10:15. In this class 75% of the people smoked (including the instructor). At that time smoking was permitted not only on campus but also in the classroom. Smoking took place throughout the entire three hours of class. Although the instructor gave a wonderful lecture, there was little interaction with him or other students. Was that quality? I'm not sure. If I had a chance to sit in the comfort of my own smoke-free home and listen to his lecture via video cam, I would have had a better experience. Even better, had it been recorded I could have listened to it several times at my leisure.

The second example is a more recent experience. A colleague was sharing with me that his 18-year-old daughter was attending a Big Ten university where she was enrolled in a personal nutrition course. The course was a face-to-face lecture course that had over 700 students enrolled. The room was so large that one could hardly see the instructor. There was no interaction with the instructor; or with any other students. Now, I believe this is not unusual. We see these large lecture-based courses throughout the country (perhaps not always with 700 students) that limit interaction with the instructor. It's done for a number of reasons, such as being an easy way to generate credit hours, interest of the faculty, or perhaps more importantly, the lack of interest of the faculty to look at other ways to deliver the course materials.

But before I beat up our profession too much, I should mention that in a national study of over 10,000 faculty that was released in spring 2009, nearly 70% felt that the online format was INFERIOR to the traditional face-to-face model.[14] It's important to remember that number–70%.

THE GENERATIONAL GAP

I believe we have a huge generational gap in the use of technology in the health education profession. Last fall, I performed a brief survey among members of the HEDIR (I recognize the limitations of the use of this population). One of the questions on the survey asked whether the individual had a MySpace/Facebook page. Figure 2 shows the results. Approximately 15% of those over 50 did; 50% between 30 and 40 did; and 92% of those under 30 did. My generation (those over 50) just don't get it…why have one? The bottom line is that most people under 30 have a MySpace/Facebook page. I think it's important for our profession to recognize that regardless of what one's thoughts are, people are using these social networks. Let's figure out a way that we can use them to promote health. But, in practice, little has been done.

Besides seeking their use of MySpace/Facebook, this survey also sought out the profession's opinions about various delivery modes. In that survey I asked individuals to identify issues that they had with distance learning, Web-based instruction, hybrid instruction and face-to-face instruction. The following definitions were used:

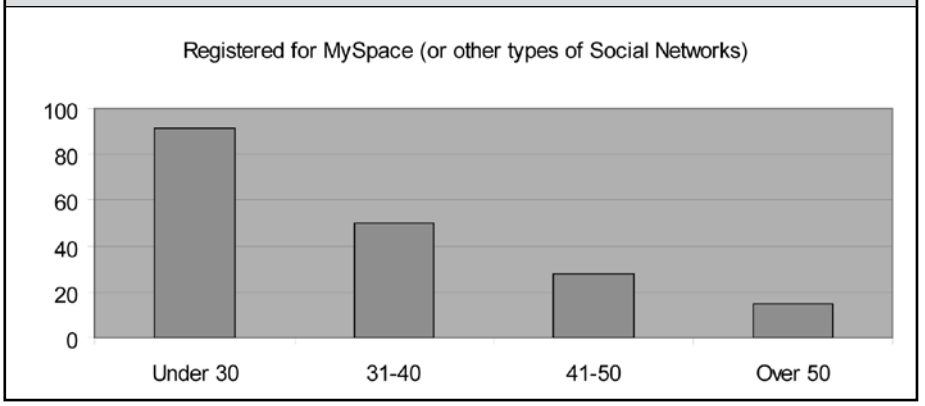
• Face-to-Face Instruction: The traditional mode of teaching/lecturing in which students and teacher are together for a concurrent experience.

• Hybrid Instruction: The combination of technology-based materials and face-to-face sessions used to deliver instruction.

• Online Instruction: Delivery of a course where all interactions between students and instructors are conducted online, and can be synchronous (occurring at same time) or asynchronous (not occurring at the same time).

• Distance Learning: Planned learning that normally occurs in a different place from teaching. This delivery may be synchronous, occurring at same time, or asynchronous, not occurring at the same time. (The author is grateful to Don Chaney, Beth Chaney, Mark Tomita, Michael Olpin and Priya Banerjee for their assistance in the development of these definitions.)

Figure 2. Results of Survey Regarding Use of Social Networks



Based on results, concerns were broken into the following categories:

• Quality/Rigor

• Cheating Issues

• Technical Issues

• Instructional Techniques

• Relationships (student-student; teacher-student) Issues

• Communication Issues

• Miscellaneous (The author appreciates the assistance of Priya Banerjee and Maureen Johnson for their review of the content.)

Each of those concerns warrant specific discussion. However, this particular paper will only focus on the quality/rigor issue. As one might expect, distance learning, Web-based instruction and hybrid instruction all had major quality/rigor concerns listed. Interestingly, there was NOT ONE PERSON who indicated a concern about quality/rigor for face-to-face classes. Do we dare challenge whether quality is a concern in the earlier example about the freshman enrolled in a personal nutrition class of 700 students?

The question is; what do we mean by quality/rigor? For the sake of argument, I will state that the following issues are associated with quality/rigor:

1. Knowledge improvement (in other words does the student learn the content in a similar fashion);

2. Skill development (can students learn skills unique to their professional preparation);

3. Disposition traits (these are the dominant quality or qualities distinguishing a person or group).

So let's see what the literature has to say, and does it support the concerns of our professionals regarding issues associated with knowledge improvement, skill development and the transformation of disposition traits.

Before we begin, I have to admit that I was very disappointed in the lack of research publications among health education projects. There were plenty of articles in our journals that sought out attitudes about technology, but there were very few studies that compared face-to-face instruction to that of online or distance learning. I am hoping that this article will spur a new enthusiasm to complete such studies.

KNOWLEDGE IMPROVEMENT

Online

When determining the impact of online courses in knowledge, there were *no* studies that found online courses were inferior to face-to-face. Most studies found no difference; many *did* find a significant difference in favor of online at being superior at departing knowledge.

Some examples that found no difference between online and face-to-face instruction included courses in teacher preparation;[15] a course in environmental protection;[16] a technology course;[17] a gerontology course (with dental hygienists),[18] and a pharmacology course for students in a graduate nursing program.[19] Furthermore, researchers at the

Department of Defense's Advanced Distribute Learning Initiative at the University of Tulsa conducted a meta-analysis of 96 previously conducted studies that compared the effects of Web-based and classroom instruction. Their conclusion was that learning was the same as well as satisfaction of delivery.[20]

Numerous studies did find significant differences between online and face-to-face instruction (too numerous to list here). Public health officials found that the Web was an effective mechanism to utilize their pictorial diet history questionnaire.[21]A study among graduate nursing students in the instruction of research methods found that the online format had higher scores.[22] A study comparing face-to-face instruction versus Web instruction was conducted with doctoral students in pharmacy.[23] I would like to think that these are incredibly important professionals in our society…they better be taught well. Results showed that the participants in the Web-based course scored significantly higher. Furthermore, students in a psychology course were also found to gain more knowledge when completing a course online.[24] Finally, a study of medical students taught via the Web far exceeded scores gained than with those students who participated in the face-to-face course.[25]

Distance Learning

When assessing the impact of distance learning, two powerful studies show the value that distance learning has on improving knowledge. First, a meta analysis comparing face-to-face and distance education academic performances was completed in 2003. Eighty-six studies, with over 15,000 students met all criteria. Fifty of these studies focused on undergraduate courses and the remaining 36 were graduate level.[26] Of the 86, two-thirds of the studies showed that distance learning outperformed face-to-face in the objective measures (such as exams). The remainder saw no difference.

The second involved another meta-analysis in 2006, specifically focusing among Allied Health Science programs. This found that distance learning saw small, but positive gains in achievement scores compared to the face-to-face students. In addition, they found that working professionals significantly outperformed graduate and undergraduates in all aspects of learning.[27]

Taking into consideration the literature review, the pioneering studies of Kraiger and Stewart, [20] Schahar and Newman,[26] and Williams[27] it is apparent that the research contradicts the attitude that university faculty have regarding the quality of such instruction. Remember, 70% of the faculty surveyed in the spring 2009 study indicated they felt that the use of online or distance education courses were inferior.[14]

SKILLS

As indicated earlier, knowledge is only ONE of the key components to quality instruction. We also know that the teachings of skills are also critical. There may be some that say that our skills in health education are unique and demand a person to person involvement. Of course, no studies were found in the health education literature to support or deny this. However, several other disciplines have done extensive studies to see the success that distance learning or the Web has on the teaching of specific skills.

A meta-analysis on the role of the Web to decrease alcohol consumption was conducted. Consistent results showed that an interactive Website, with personalized feedback to help minimize binge drinking/high risk drinking, was just as effective as the face-to-face counseling.[28] It would also be considerably less expensive.

A study was conducted to compare performance of students in online and hybrid classes of a Geographic Information Systems (GIS) course. GIS is a fairly complex, highly important skill necessary among community planners, geographers and other individuals. The results showed that the online cohorts significantly outperformed the face-to-face cohort in skill development; this was earned without any exposure to a face-to-face lecture or lab time. [29]

Finally, another study (and one of the most interesting I read) sought to determine whether critical thinking skills could be effectively taught using the Web. Three groups were part of the study: Group 1 was a face-to-face class; Group 2 included regular face-to-face meetings, along with a series of critical thinking questions located online; and Group 3 had class lectures, readings and assignments via online only—no face-to-face contact. Results showed that the two online groups had significantly higher scores in critical thinking skills, and that in comparing Groups 2 and 3, Group 3, with an entirely online format, had higher achievement.[30]

DISPOSITIONS

I don't necessarily know what dispositions we wish to pass onto our future health educators, but I suspect we would like to have health educators who are open-minded, ethical, as well as empathetic. The University of Alabama at Birmingham's School of Education offers an excellent list of the dispositions they try to establish for their health education students: [31]

- Legal and Ethical Conduct
- Professional Conduct
- Sensitivity to Diversity
- Safety and Well-being
- Acceptance of Feedback
- Commitment to Effective Communication
- Commitment to Collaboration
- Commitment to Improving Professional Practice
- Commitment to the Profession

Can health educators "teach" such dispositions through an online or distance learning format? Unfortunately, we do not know this because there are no studies in the health education literature to test this hypothesis. Thus, I had to look at other disciplines.

One particularly interesting study was done at The Ohio State University about the training of dental hygienists. Of all health care workers, I think it is safe to say that we are most intimately involved with the dental hygienist. Theoretically, twice a year, we all sit in a chair while a dental hygienist places their fingers in our mouth, with their face less than 6-12 inches from ours, for up to an hour.

Besides having very delicate work done with very sharp instruments in a very sensitive part of one's body, the personal interactions and professionals skills needed by dental hygienists are critical. Granted, the dispositions traits may be different than that of a health educator…but one could not argue that they are any less important.

Interestingly, Ohio State prepares its dental hygienists through an online course of study. Dental hygienists learn critical skills and develop certain dispositions through an online training. The evaluation of this program, based on the Institute for Higher Education Policy (that set 24 benchmarks to assess quality of internet-based distance education) found that this program exceeded expectations on all 24 benchmarks.[32]

CONCLUSIONS

There are several challenges facing the profession of health education regarding the use of technology. We tend to confuse quality with convenience; we need to rethink the way we teach.

Historically, we have always asked the question on whether distance learning and online courses maintain the same quality and rigor of face-to-face, and whether it can meet the needs of students. Based on my review of research, including the meta-analyses of over 140 rigorous studies, it appears we may have to rephrase the question. The question should be: Can face-to-face meet the same quality/rigor as distance learning and online courses? Basically, the literature shows that face-to-face is NOT as good as distance learning or online formats.

It's important to remember that NOT finding any significance is important. It should be noted that there are very few studies that show face-to-face as being superior to either online or distance education programs. I found none. There were, however, many studies that found no significant difference. What this means is that online and distance learning is as good as face-to-face. As noted, there are numerous articles that demonstrated that online and distance learning is superior in increasing both knowledge and skills. What this means is that one can feel absolutely confident that, at the very least, online and distance education initiatives can do as good of a job, if not better, in providing knowledge and training skills. Yet, we still (and even in the face of literature) continue to offer large lecture classes because it's "convenient".

For those of us in higher education, we often know that what is listed in the college catalog or the syllabus is not what is always followed by the instructor. This is especially critical as we are relying more on the use of part-time, adjunct, or term faculty (it is estimated that two-thirds of all faculty are reported as adjunct or term). [33] In particular, online courses will keep students on-task with the true intent of the course. This profession is in desperate need of having research conducted in the practice of using technologies.

We've overdone it with the 'soft' research assessing one's attitudes and whether people support it. It's time to start showing how well technology-based programs can do the job. As I have referred to several times throughout this paper, there is a dearth of quasi-experimental types of studies in the profession of health education. If we don't do the research, we are then forced to accept other disciplines' findings and that may not always be in our best interest.

Although this paper only focused on the use of Web-based and distance-learning formats, there are a whole series of other technologies that are unexplored as to its role in preparing health educators and delivering health education programs. Technologies such as social networking websites, blogs, podcasting, gaming, and virtual learning software all deserve attention as to how they can be successfully used. Again, this requires interest and research initiatives.

These are not foreign technologies and are being used on a regular basis by many groups. For example, the National Institutes of Health (NIH) uses Second Life virtual world as a software application in its eHealth clinical practice.[34] Public health departments are utilizing social networks to provide educational materials. The Jackson County (Illinois) Health Department's Division of Nursing published a MySpace website on sexual health.[35] Most will recall that in August 2008, Democratic Presidential nominee Barack Obama announced his choice for vice president on his Twitter account.[36] It's time we have health educators who can *theoretically conceptualize* the development of online and distance-based courses.

There is no question that for any program to be successful it needs to be well-developed. Historically, we've done a pretty good job with face-to-face courses. Where we are having problems are with online and distance education courses. What is meant by theoretically conceptualizing something? It goes beyond just knowing the basics of how to put a PowerPoint® presentation together or how to upload a video to one's Blackboard account; we have people who possess that skill. What we need are people who can help create ways to put complex concepts into effective online/distance education formats.

I equate this mechanics. A mechanic may know how a car operates, but that mechanic may not know how best to teach somebody safe driving skills. We need health EDUCATORS who plan effective technology-based curriculum. This takes great energy, thought and planning using various learning theories, planning skills and needs assessments (major competency skills of health educators).

We can create our own resources. As dollars become tighter and tighter for universities, the use of distance learning and web-based courses could serve as a viable mode to increase enrollment, obtain operating funds and reach those health educators who would otherwise not participate in further training. Jim Eddy, while at the University of Alabama, showed that distance education programs can be both quality-based and profitable.

We are doing the profession a disservice by not preparing our students to use the wide range of technologies we are putting our graduates at risk at being unprepared to survive in the workplace. That means that as professional preparation faculty we must become familiar with such components ourselves, even if it feels uncomfortable.

Imagine a faculty in a health education

program that is uncomfortable teaching program planning or a topic on sexuality—so they decide not to. We might question their dedication and professionalism if that were to occur. Why are we not as aggressive for those programs that ignore preparing their students to use technology?

It is an unacceptable excuse to not prepare future health educators in the use of technologies because the instructor is not comfortable with the particular technology. A major role of a professional is to continuously update oneself on major components of their profession. One cannot argue that technology is an important tool in the health educator's arsenal.

There are those who believe that the use of technology is alienating or isolating people from others. They claim that the use of an impersonal vehicle, such as email, text messaging, blogs, or cell phone use tend to drive people away from each other. Note that there is no evidence that this exists, but it's what they believe. I propose that the use of technology does just the opposite. Nowhere in time, EVER, have we had instant contact with others.

For example, during previous wars there was little contact with family and loved ones. My father shared his story with me about when he left his farm town in North Dakota to enlist in the army during World War II. There was little contact with his family throughout his military tenure, even after he was shot and was recovering in an army hospital. Contrast that to our soldiers in Afghanistan and Iraq who have almost instantaneous (and daily) contact with their loved ones.

Early in our nation's history it was not unusual for people to leave their home (i.e., New York) for the new frontier (i.e., California), with the realization that they would never, ever hear or see their loved ones again. Imagine the families boarding the Mayflower. First, not sure if they would arrive safely but also knowing that they would never see or speak to the family they are leaving. Yet, families persisted; communities continued to grow; and society survived. To simply state, without any supporting data, that technology alienates or isolates individuals is shortsighted and beneath our profession.

I do think it would be inappropriate to have the family eating dinner at the table, while text messaging their friends without talking. But that's not a tech problem… that's a family problem. That's almost as inappropriate as watching TV while eating dinner (like most of us in my generation experienced).

SUMMARY

During the 1990s I was asked to serve on the first Graduate Standards Committee to review the seven areas of health educator responsibilities. We were amazed that the competencies that were created 25 years earlier were just as practical and viable in the mid-1990s …especially in light of the technology changes that were underway. Historically, our profession has had great foresight by its leaders.

We need to keep that practice going. We need to look at our profession not only into the near future, but what we will be like in 25 years. In 25 years, the 2034 AAHE Scholar will be standing for their presentation looking out over the current leaders/legends of the profession. As referenced earlier, technology will be an incredible influence on our profession, whether we want it to or not. Let's not be like the Swiss watch makers and allow our pride, ignorance, or refusal to acknowledge that "other" ideas might work. Let's create our future by encouraging research to show us how to best incorporate technology into what we do.

I challenge our young professionals to create our future by conducting research to show us how best to incorporate technology. For those of you, who feel the calling, please contact me. I would love to work with you—wherever I might be.

Note: A podcast of this AAHE Scholar presentation can be downloaded at www.hedir.org.

REFERENCES

1. Kittleson MJ. The history of the HEDIR: One person's view. *American Journal of Health Studies*. 1997;13(4):215-220.

2. Rogers E. *Diffusions of Innovations*, 5th edition. New York, NY: Simon & Schuster; 2003:281.

3. O'Brien T. Could your iPhone or BlackBerry ever replace your laptop? Available at http://www.switched.com/tag/windowsmobile. Accessed July 1, 2009.

4. Williams B. WingX: Flight planning in the palm of your hand. Available at http://www.bruceair.com/product_reviews/WingX.htm. Accessed July 1, 2009.

5. Massey M. *What you are is where you were when.* Lakewood, Washington: The Richardson Co. Training Media; 1972.

6. HarrisInteractive. Cell phones key to teens' social lives, 47% can text with eyes closed (online). Available at http://www.marketingcharts.com/interactive/cell-phones-key-to-teens-social-lives-47-can-text-with-eyes-closed-6126/harris-ctia-teen-cell-phone-use-die-without-cell-phone-august-2008jpg. Accessed July 1, 2009.

7. CTIA. National study reveals how teens are shaping & reshaping their wireless world. Study sheds new light on teens' cell phone habits, expectations & dream phone wishes (online). Available at http://ctia.org/media/press/body.cfm/prid/1774. Accessed July 1, 2009.

8. Oreskovic A. Google widens lead in U.S. searches: comScore. Available at http://www.reuters.com/article/technologyNews/idUSTRE53E6YT20090415. Accessed July 1, 2009.

9. Tschabitscher H. How many emails are sent every day. Available at http://email.about.com/od/emailtrivia/f/emails_per_day.htm. Accessed July 1, 2009.

10. ZDNet Research. 2.3 trillion text messages sent by 2010 (online). Available at http://blogs.zdnet.com/ITFacts/?p=12176. Accessed July 1, 2009.

11. Hesseldahl A. Apple's iPod Problem. Available at http://www.businessweek.com/technology/content/dec2008/tc2008122_679456.htm. Accessed July 1, 2009.

12. Glover ED. A new health education paradigm: Uncommon thoughts about common matters. *Am J Health Educ.* 2004; 35(5):260-271.

13. Gold RS, Kelly MA. Is knowledge really power? *Health Education.* 1988; 19(4):40-46.

14. Shieh D. Professors regard online instruction as less effective than classroom learning

(online). Available at http://chronicle.com/free/2009/02/11232n.htm. Accessed July 1, 2009.

15. Caywood K and Duckett J. Online vs on-campus learning in teacher education. Teacher Education and Special Education. 2003; 26: 98-105.

16. Koljactic M, Silva M, Varas E, Vergara A. Comparison of two modes of Web-based instruction in a course on environmental protection. *Br J Educ Technol.* 2004; 35(5):657-658.

17. Holloman HL, Warren LL. Online instruction: Are the outcomes the same? *Journal of Instructional Psychology.* 2005; 32(2):148-151.

18. Gallagher JE, Dobrosielski-Vergona KA, Wingard, RG, Williams, TM. Web-based vs. traditional classroom instruction in gerontology: A pilot study. *J Dent Hyg.* 2005; 79(3):1-10.

19. Bata-Jones B, Avery MD. Teaching pharmacology to graduate nursing students: Evaluation and comparison of Web-based and Face-to-Face methods. *J Nurs Educ.* 2004; 43(4):185-189.

20. Kraiger K., Stewart D. Re:SEARCH: Is e-learning as effective as classroom learning? *T+D Magazine*. 2005; 59(8):18.

21. Beasley JM. Evaluation of a Web-based, pictorial diet history questionnaire. *Public Health Nutr* [1368-9800]. 2009;12(5):651.

22. Campbell M., Gibson W, Hall A, Richards D, Callery P. Online vs. Face-to-Face discussion in a Web-based research methods course for post-graduate nursing students: A quasi-experimental study. *Int J Nurs Stud*. 2008; 45:750–759.

23. Ragon RE, Kleoppel JW. Comparison of outcomes on like exams, administered to in-residence and asynchronous distance-based Pharm.D. students. *Journal of Asynchronous Learning Networks.* 2004;8(4):15-24.

24. Maki, RH, Maki WS, Patterson M, Whittaker PD. Evaluation of a Web-based introductory psychology course: I, learning and satisfaction in online versus lecture courses. *Behavior Research Methods, Instruments, and Computers*. 2000;32:230-239.

25. Corral M, Guevara JC, Luquin PA, Pena HJ, Otero JJM. Usefulness of an internet-based thematic learning network: Comparison of effectiveness with traditional teaching. *Med Inform Internet Med*. 2006;31(1):59-66.

26. Shachar M, Neumann Y. Differences between traditional and distance education academic performances: A meta-analytic approach. *The International Review of Research in Open and Distance Learning.* 2003;4(2). Available at http://www.irrodl.org/index.php/irrodl/article/view/153/704. Accessed July 1, 2009.

27. Williams SL. The effectiveness of distance education in allied health science programs: A meta-analysis of outcomes. *The American Journal of Distance Education.* 2006; 20(3):127-141.

28. Bewick BM, Trusler K, Barkham M, Hill AJ, Cahill J, Mulhern B. The effectiveness of Web-based interventions designed to decrease alcohol consumption-A systematic review. *Prev Med.* 2008;47:17-26.

29. Detwiler JE. Comparing student performance in online and blended sections of a GIS programming class. Transactions in GIS. 2008;12(1):131-144.

30. Yang YC, Newby T, Bill R. Facilitating interactions through structured Web-based bulletin boards: A quasi-experimental study on promoting learners' critical thinking skills. *Computers and Education.* 2008;50:1572-1585.

31. University of Alabama Birmingham. A model for assessing candidate dispositions in health education non-teacher education. Available at http://www.ed.uab.edu/healtheducation/documents/Dispositionsnonteachered.pdf. Accessed July 1, 2009.

32. Moore W. An assessment of online learning in a dental hygiene baccalaureate degree completion program. *J Dent Hyg.* 2007;81(4).

33. Louis D. Adjuncts: Solutions for a mistreated majority. Available at http://chronicle.com/weekly/v55/i39/39a07201.htm. Accessed July 1, 2009.

34. Hanna A. National Institutes of Health on Second Life. Available at http://www.collaborationproject.org/display/case/National+Institutes+of+Health+on+Second+Life. Accessed July 1, 2009.

35. Jackson County Health Department. JCHD sexual health. Available at http://www.myspace.com/jchdsexualhealth. Accessed July 1, 2009.

36. Barack Obama announces his vice president by text message + Making Technology History. Available at http://butyoureagirl.com/2008/08/23/barack-obama-announces-his-vice-president-by-text-message-making-technology-history/. Accessed July 1, 2009.