

Helping Experienced Professionals Become Tech Savvy for Lifelong Learning

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Abstract:

As technology becomes more prevalent in our lives, any professional's practice and lifelong learning becomes more dependent on it. At the University of British Columbia, Faculty of Dentistry it was noticed that some very experienced and accomplished dentists teaching on a part-time basis were becoming increasingly uncomfortable in the Faculty's high tech clinic. This has resulted in a disconnect between these clinical instructors and the dental students. We designed a continuing education course for dentists incorporating technology acceptance theory and adult learning theory with the aim of showing them how the technology could work for them. An iClicker survey administered throughout the course determined that this approach had allowed these dentists to move forward with their use of technology.

Key Words:

Lifelong learning, technology acceptance, tech savvy.

Introduction

The University of British Columbia (UBC) Faculty of Dentistry (FOD) relies heavily on community dentists' contributions to dental students' learning, especially in the areas of patient treatment. However, over the last decade, the teaching and learning environment has become increasingly computerized (Cleghorn, B., 2010) as exemplified by digital radiology, paperless charts, and drug information and reference materials computer-accessed via the Internet. The community-based dentist graduating as recently as 10 years ago may have been left behind in the digital age as their support staff handled the technology in their practice. For example, the main medical/dental data base is *MEDLINE* but a study conducted by the University of Michigan, University of Toronto and the US Department of Veteran Affairs assessing 348 dentists' use of *MEDLINE* concluded that their search skills were low resulting in a low use of the data base. Their recommendation was that dentists require training in search skills and education about the use and benefits of *MEDLINE* (Lang, W., Wenche, S., Borgnakke, Richards, P., Nyqvist, L., Shipman, B., Bradley, D., Marshall, J. and Ronis, D., 1998) (Satishchandra, P., Wenche, S., Borgnakke, Nyqvist, L., and Lang, P. 2000). This observation was also made by Georgina and Olson (2007) when they studied the faculty at fifteen University of North Dakota peer institutions resulting in the conclusion that the integration of technology in pedagogy was directly correlated to technology literacy. The overall observation presented by Spotts (1999) is that individuals with advanced (high-level) computer skills perceive instruction technologies as providing greater benefit than do those with low-level computer skills.

More concerning to us in the UBC FOD is that low-level computer skills may discourage many experienced, competent and benevolent dental practitioners from returning to the University to teach new practitioners. This creates a dilemma for course coordinators who are motivated to implement technology to enhance student learning because this may result or already has resulted in the loss of very accomplished practitioners with the unfortunate consequence that their great knowledge is not handed down to dental students and new practitioners. In addition, we envision this situation also occurring in continuing education for the new practitioner whereby the new dentists will expect high-level technology use in their continuing education courses, but the accomplished practitioner will not be able to provide it. Indeed, discomfort and discouragement is being observed in dentists who already teach part-time at UBC FOD. For example, paperless chart implementation has resulted in many part-time teachers asking students to bring up a patient's chart on the computer as they don't know how to access it or asking students "show me the treatment plan". In addition, students work in digital learning communities, blogs (post reflections on the web) with each other and upload files containing photographs of their work. Instructors in these courses often struggle with grading and providing feedback to their students 'on-line' and from home. This results in a form of humiliation for the older practitioner and is not unique to dentistry as an article in the Vancouver Province titled *Hi-tech Illiteracy Hurts* (Crawshaw, C., 2009) reports that tech illiteracy is symptomatic of rapid changes in technology with all professionals struggling to keep abreast. However, the article goes on to say that everything you do with technology represents your company and organizations must recognize that now there are different and usually better ways to do most things. We realize that we cannot turn back and solutions must be sought.

In our work at the university we see other professions using technology in their everyday practice. For example, lawyers developed the www.pbworks.com on-line collaboration site (known as a wiki), which is free to the public and used by lawyers throughout the world for global collaboration on their cases. In the recent Certified General Accountants' publication *Outlook* (Outlook, 2010) technology as it related to the accounting profession is mainstream with articles such as *Tech Update the Latest in Accounting Software* and *Three Rules of Social Media Marketing* juxtaposed to *What Big Tax Events Happened This Summer?* and *Ethics in Focus*. That is, technology is part of what defines their practice as professional accountants and we wonder if the older practitioner in accounting or law is being left behind as well. Indeed, Canadian mainly dentists regard the Internet as a source for product information (54%), journal articles (45%), purchasing (34%) and continuing education (33%) (Palmer, C., Huston, H., and Major, P., 2006) and not as a working platform. McGill University (Makansi, N., Bedos, C., and Allison, P., 2010) recognized a link is essential for knowledge translation between research and practice to support an evidence-based approach by testing the efficacy of a research network and concluded that it is essential to determine the readiness of participating dentists before designing the framework. This supports our contention that knowledge translation, professional development, and lifelong learning in a digital format will be effective for all professionals once they are comfortable with using the technology and understand the usefulness of working in this format. It will require scholarship into the teaching and integration of technology for the older professional to assist them into high-level technology use.

In an effort to address this situation, we offered a Continuing Dental Education (CDE) course at UBC called "*Navigating the Information Superhighway: What Can All This Digital Stuff Do For Me?*" The target audience was the experienced dental practitioner with a low-level of technology literacy. Our objectives included creating a learning environment that would be comfortable and stimulating for the "left-behind" and re-ignite an enthusiasm for learning by reducing embarrassment. In an effort to introduce reverse mentoring (Grant, T., 2010) (younger mentors teaching older students), third year dental students were recruited to tutor in a hands-on, computer-lab session. Anonymous non-threatening survey data was collected during the morning lecture using the iClicker digital remote response system in the classroom to discern the attitudes and beliefs of course participants.

Drawing from the Technology Acceptance Model (TAM) (Lee, Y., Kozar, K., Larsen, K., 2010) and foundations of adult learning (Knowles, M., Holton, E., and Swanson, R., 2005), we designed a day-long course to help the low-level technology-literate dental personnel learn how to bridge gaps in their technology savvy. TAM has established technology acceptance as mainly dependent on perception of usefulness and perceived ease of use with modifiers such as subjective norms (influence of social peers) and self-efficacy (personal digital capability) affecting the process as well (**Figure 1**).

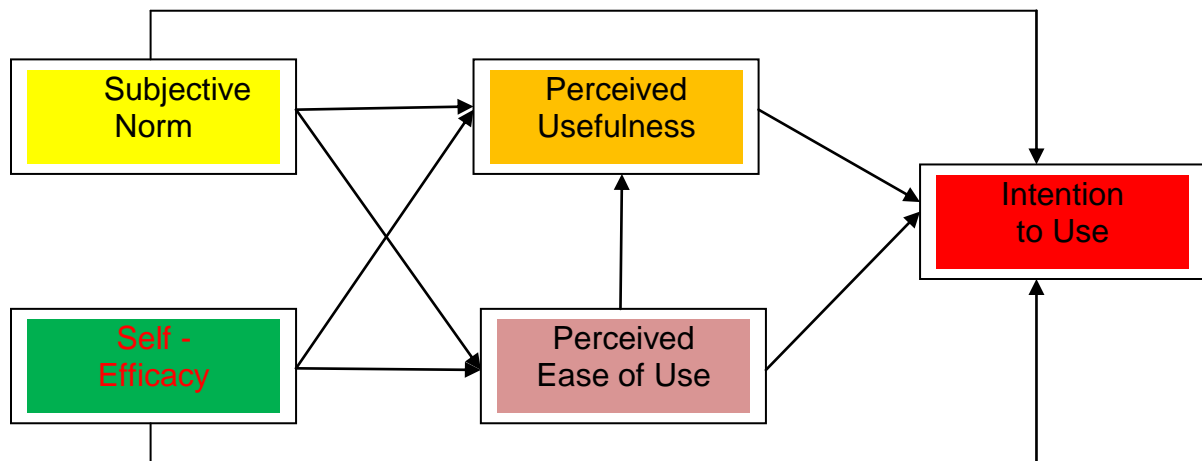


Figure 1: Technology Acceptance Model

TAM 11 (adapted from Lee, Kozar & Kai, 2010) Technology Acceptance Model has established that the intention to use technology is primarily dependent on perceived usefulness and perceived ease of use but is also influenced by subjective norms (influence of social peers) and self-efficacy (tech savvyness)

When considering clinical dentists who are involved in routine clinical care it is not difficult to see how they could easily avoid digital technology if they are not interested. For example, their assistants can program the machines to mix the restorative materials, their receptionists can electronically submit the insurance forms and book patients on-line and their office managers can program the plasma screens in the waiting rooms. The dentists continue the “clinical procedures” they learned in dental school and have refined in continuing education...it all works so there is a lack of the perceived usefulness of technology. However, even in clinical practice, practitioners are required to use technology as procedures such as prescription-writing require on-line access to current drug dosages and interactions. A study with physicians and nurse practitioners indicated that indeed their ability to answer clinical questions based on literature searching was moderate at best (Hersh, W., Crabtree, M., Hickman, D., Sacherek, L., Friedman, C., Tidmarsh, P., Mosbaek, C., Kraemer, D., 2002) As the *Hi-tech illiteracy* article discussed, things are changing; continuing education is becoming increasingly electronic with video conferencing, Skyping (voice/video calling over the internet), digital study clubs etc. resulting in fewer choices for the professional with low-level technology skills. In addition, adult learners require autonomy, self-direction, life-relatedness, intrinsic value and personal payoff; this is difficult to attain/provide in a computerized world if they do not have a tech-savvy foundation to build on and we fear this will lead to increasing isolation. Professions may consider viewing technology not just as an information storage system, known as Web 1.0 (Getting, B., 2010), but to now consider technology and the web as a working platform (Makansi et al, 2010), known as Web 2.0 (Getting, B., 2010). The example of lawyers collaborating on-line in a wiki would in essence be Web 2.0. New practitioners in all professional fields expect this to be the norm and the experienced practitioner may be left behind or humiliated as the *Hi-Tech Illiteracy* article points out using some amusing episodes of hi-tech illiteracy such as bosses dictating emails or having a complete document printed because they don't know how to print a single page.

Method

The continuing education course was designed to be congenial and to take a light-hearted look at technology use in general and culminate with a discussion of how technology could be applied to the professional setting. Twenty-one dental professionals between the ages of 35 and 70 attended the full-day course. During the morning session we prepared a PowerPoint presentation that addressed the TAM in the real life of dental personnel and then extrapolated this to the professional area of their life. For example, we initially talked about awkward moments we ourselves had experienced when dealing with technology (subjective norms) and our initial lack of computer skills (self-efficacy) when we started as full-time educators at UBC FOD. As adult learners, the participants could relate to this. Then we presented examples of what we had learned and how we were able to learn it (perceived ease of use). Perceived usefulness was revealed using websites and databases that have information directly related to dentistry. Throughout this session we surveyed the participants using iClickers (an electronic multiple choice devices that integrates participants' responses into a PowerPoint presentation) to determine if the participants were learning from our presentation.

In the beginning of the morning session we asked a set of questions on perceived usefulness and a short time later another set of questions concerning perceived ease of use and self-efficacy (**Tables 1 and 2**). Toward the end of the morning session we again presented questions on perceived usefulness and self-efficacy to try and determine if participants were learning from our presentation. In addition, at this time we asked questions on subjective norms.

Table 1: First set of questions in the iClicker survey dealing with Perceived Usefulness of Technology

Question	Multiple Choice Answers
1. I use my cell phone in the following way:	a) I don't have a cell phone b) I have a cell phone but I only turn it on when I really need it c) I have a simple cell phone with me and "on" right now d) I have a Blackberry with email e) I have a newer version "smart phone" connected to the internet
2. I use text messaging:	a) Never b) Rarely c) Occasionally d) Often e) Daily
3. I am on the computer:	a) Rarely or never b) A couple of times a week c) Every day d) Many times a day e) I have access to it all day
4. I use email:	a) Never b) Occasionally c) Daily d) Many times a day e) Constantly
5. I Google (or Bing or Yahoo) to search for information:	a) Never b) Rarely c) Occasionally d) Daily e) Many times a day
I use social networking sites like Facebook:	a) Never b) Rarely c) Occasionally d) Daily e) Many times a day

Table 2: Second set of questions in the iClicker survey dealing with Perceived Ease of Use/Self-Efficacy of Technology

Question	Multiple Choice Answers
1. The one piece of digital technology I would NOT give up is my:	a) Cell phone b) Blue-tooth device c) PC (computer) d) Apple product (iPod Nano, Touch, iPad)
2. My cellphone is valuable to me for:	a) It's NOT b) Phone calls c) Phone calls and photos d) Phone calls, photos, and text messaging e) Everything including video chat
3. My computer is valuable to me for:	a) It's NOT b) Looking AT information (browsing) c) Looking FOR information (searching) d) Communication via email e) Talking to people with sound and video
4. I use email:	a) I don't b) On my computer at home or office c) On the web i.e.: internet-based email d) On a Notebook or iPad or WiFi on my laptop e) On my cellphone
5. I search for information by:	a) Going to the library b) Filling in the blank www. _____ .com c) Using a website like ww.google.ca d) Using a search box by the address bar e) Using a database like PubMed
6. I social network:	a) Over cocktails b) On the phone c) At seminars and conventions d) Using Facebook e) Using BLOGs

In the afternoon we hosted a three-hour hands-on session in the UBC FOD computer learning centre to work with the websites and databases presented in the morning session. During this session we introduced the concept of reverse mentoring with third-year dental students helping the participants work through the planned exercises. This session implemented the concepts of self-direction and autonomy, important for adult learners, as we had previously coached the students to ask participants if they could help with tasks but to not take over and do the tasks for them. In addition, the exercises were designed to deal with real-life dental issues that technology can solve. For example, learning how to search databases such as *MEDLINE* for relevant recent peer-reviewed dental literature, how to take Google.com beyond email and apply it to learning situations, etc.

Results

The iClicker survey revealed interesting data although the authors interpret results with caution due to a relatively small sample n of 21. The survey was conducted in four parts based on the TAM using a standard five-question, multiple-choice format. After a short ice-breaker the questions relating to perceived usefulness (**Table 1**) were presented revealing that the participants believed cell phones were mainly for phone calls followed by text messaging and computers were primarily for email, e.g., Web 1.0. (**Figure 1**)

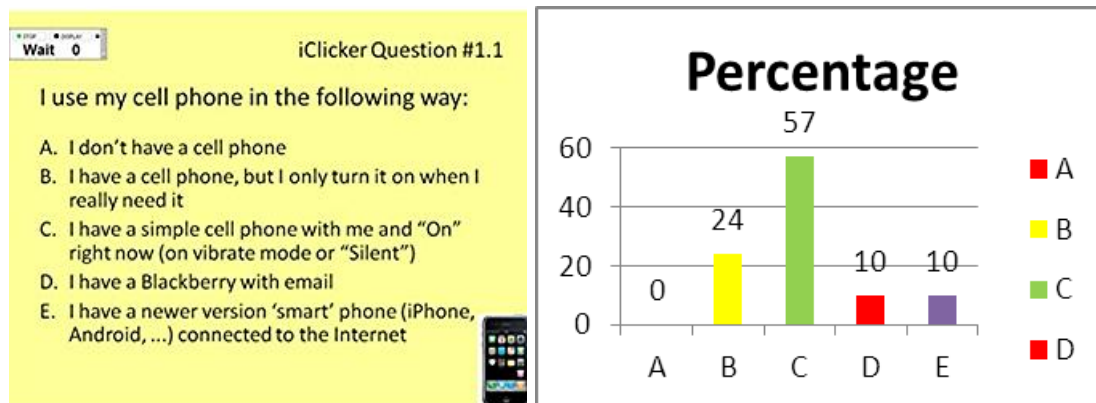


Figure 1: iClicker Questions from the presentation on Cell Phone Use

Perceived Ease of Use/Self-Efficacy

Based on our research and observations of dentists in UBC's FOD clinic we anticipated this response and so during the second set of slides we focused on engaging participants in many of the other uses of smart phones and the Internet. Our next set of questions was used to determine if their perceived usefulness had changed. The second set of questions (**table 2**) revealed a change in perceived usefulness as participants now said they would use the computer to search for information.

Perceived Usefulness

Perceived usefulness was assessed in the third set of questions (**table 3**) revealing participants were unaware of the extent of applications available on the web.

Table 3: Third set of questions in the iClicker survey dealing with Perceived Usefulness of Technology

Question	Multiple Choice Answers
1. I would like to upgrade my cell phone:	a) I don't have one and I don't want one b) I think I would like to learn to use one c) Because I would like to do more than just talk d) Because I need more than just local calling e) Because I want to video chat
2. Newer computers:	a) Are too complicated for me b) Are difficult to learn c) Have an adjustment period d) Are very user friendly e) Will improve the quality of my life
3. Email:	a) Is useless to me b) Will not replace Canada Post c) Takes some getting used to d) Is essential for me e) Is fun
4. When I am looking for information, I'm most likely to:	a) Ask a friend b) Use a book c) Look at websites d) Use Google e) Use a discipline specific database
5. When I want to show pictures, I:	a) Put them in a photo album b) Send them by email c) Put them on Facebook d) Send them with my cell phone e) Show them while I video chat

Self-Efficacy

In the fourth portion of the presentation we wanted to see if the participants understood our presentation and if they now perceived digital technology as providing more than the very basic of functions (**table 4**).

Table 4: Fourth set of questions in the iClicker survey dealing with Subjective Norms Associated with Technology

Question	Multiple Choice Answers
1. Using a cell phone:	a) Makes me feel embarrassed or dumb b) Is only for emergencies c) Has improved my connection with family and friends d) Is essential for networking e) improves the quality of my life
2. Using a computer:	a) Makes me feel embarrassed or stupid b) Is only for finding information c) Has improved my connection with family and friends d) Is essential for staying in touch e) Improves the quality of my life
3. Email:	a) Does not help me b) Is annoying and frustrating c) Has improved my connection with family and friends d) Is essential for staying in touch e) Improves the quality of my life
4. Finding information via the web:	a) Has not helped me b) Is difficult and inefficient c) Could be useful with some training d) Is part of my life e) Improves the quality of my life
5. Social networking (e.g., Facebook)	a) Is unsafe b) Is invasive c) Is okay for family d) Meets some of my basic needs for socialization e) Is useful and fun

Indeed, when asked if they would like to upgrade their cell phones, 95% said they would like to do more than just talk with 20% requesting video chat. Participants also indicated they were convinced they could actually accomplish this (self-efficacy) (**figure 2**)

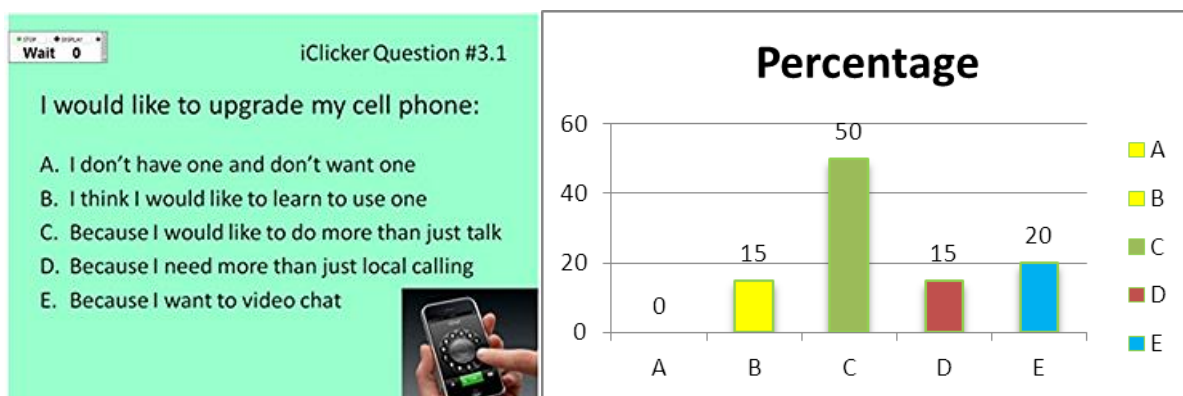


Figure 2: iClicker Question from the lecture on Desire to Use More Functions on a Smart Phone

In addition, 70% now felt new computers were user friendly and/or would improve the quality of their life, 100% thought computers were essential, and 52% felt the web could be useful with training and/or that it improved their lives.

Overall there was a clear trend towards improvement, i.e. at the end of the workshop participants felt more at ease using technologies as well as their knowledge about diverse technology use increased (**Figures 3-5**). Box whisker plots represent responses, where 50% of answers are within a box and the line within a box represents the median response.

Figure 3 illustrates how perception of diverse cell phone use changed during the workshop. Although median responses at the beginning and the end of the workshop were the same (the score 3), at the end of the workshop 75% of participants self-perceived usefulness of diverse cell-phone use increased i.e. they chose answers between 3 and 5.

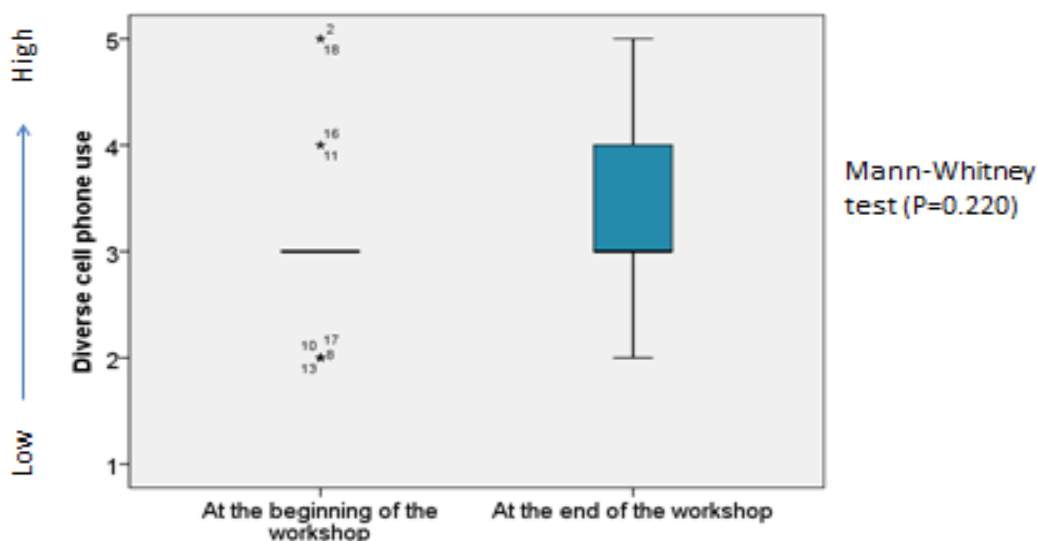


Figure 3. Perception about diverse cell-phone use - comparisons between responses at the beginning and at the end of the workshop

Figure 4 demonstrates the shift in self-perceived frequency of PC use. While 50% of responses remained within 3-4 score range during the workshop, at the end of the workshop there were no participants who perceived PC use limited and there were more participants who acquired and were willing to expand on their PC diverse possibilities.

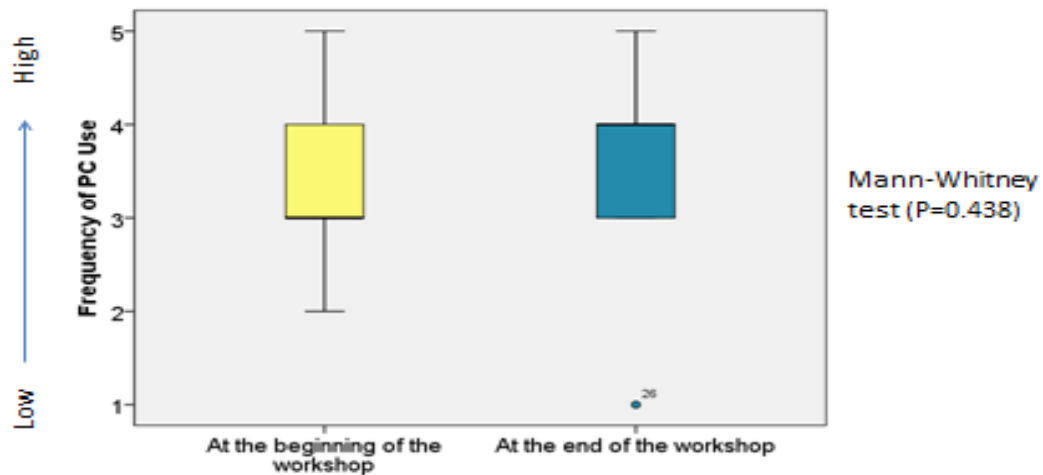


Figure 4. Frequency of PC use - comparisons between responses at the beginning and at the end of the workshop

Figure 5 shows how perceived usefulness of email increased. At the end of the workshop 75% of responses were within a 3-5 range i.e. participants acknowledged the diverse email use. Interestingly, one participant at the end of the workshop decided that email is useless.

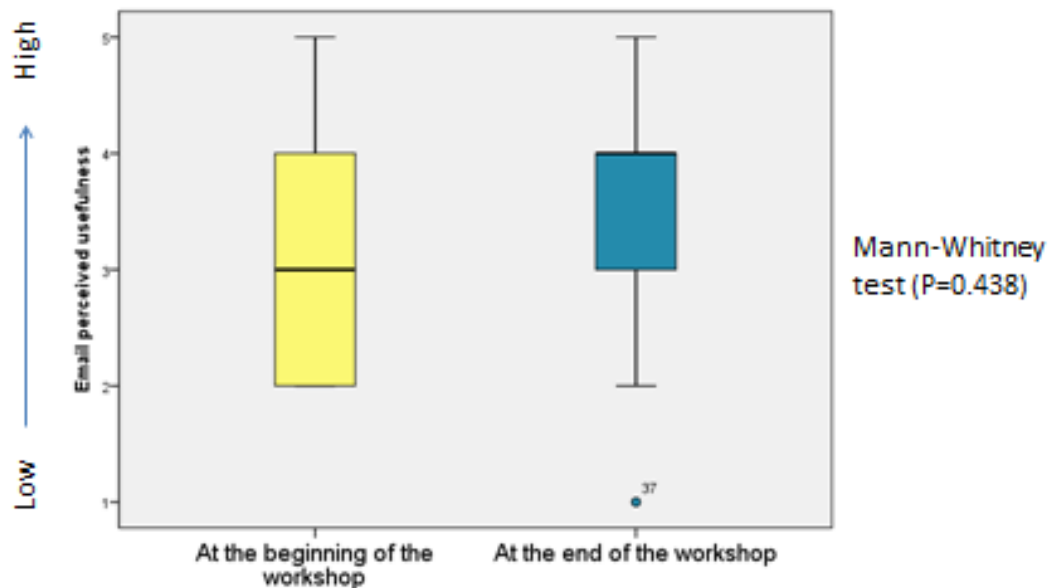


Figure 5. Email perceived usefulness - comparisons between responses at the beginning and at the end of the workshop

Discussion

This pilot study indicated that the participants were at a low level of awareness with respect to technology use and savvy but that this may be changed with the concepts of TAM – perceived usefulness, perceived ease of use, self-efficacy, and subjective norms. It was encouraging to see a change in perceived usefulness once the subjects understood that the technology was not that difficult to use (perceived ease of use) as this may be of great benefit for us in future faculty development. We attribute this breakthrough to presenting the information in a non-threatening atmosphere and by demonstrating the relevance of the technologies in their professional and personal lives.

Conclusion

The present study showed that the workshop was a useful strategy to increase acceptance of technology use among clinical dental instructors. Further work and a larger sample size are needed to validate the trends observed in the present survey and to give a specific insight into how higher level of technology acceptance is acquired among dental professionals.

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