Internet mediated, peer-to-peer feedback for learning of patient transfer skills: prototype development and testing

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Abstract

The purpose of this study was to test the educational value of a peer-to-peer feedback system in health professions education. Pre-trained on a patient transfer skills, junior occupational therapy students were randomized into a control group (no additional training), and experimental group (encouraged to participate in peer-to-peer Internet mediated feedback for a week). Results indicate that participants in the experimental group did not outperform those in the control group. Future research will concentrate on adding an expert moderator (the educator) to stimulate the learning process.

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1. Introduction

Client simulation is increasingly being used in modern client-centered health care practitioner education as it provides comprehensive “hands-on” exposure during training (Good, 2003). Client-centered simulation encompasses a wide range of health professionals who use simulation technologies to learn technical and non-technical skills including medical students (Steadman et al., 2006), nursing students (Medley & Horne, 2005), and occupational therapy students (Tomlin, 2005). Client-centered simulation may consist of standardized clients or “actors” (Vu & Barrows, 1994), computer-based simulations (Tomlin, 2005), part-task trainers for procedural skills training (Maran & Glavin, 2003). Typical simulation sessions consist of learners spending time at a simulation...
facility, often referred to as a skills lab, where they are asked to engage in simulation exercises, which are often videotaped for delayed feedback and debriefing. This approach, if structured appropriately, may offer an opportunity to consolidate knowledge, and allow students to make consequence-free errors that can be corrected by structured feedback and debriefings.

To date, most research efforts in the development of simulation augmented education and training programs have focused on familiarizing trainees with the clinical environment, optimizing the practice schedule, employing self-guided learning approaches, and setting feedback protocols (Xeroulis, Park, Moulton, Reznick, LeBlanc, & Dubrowski. 2005). Unfortunately, the simulation augmented learning process ends when the learners leave the simulation facility. This can be considered a major shortcoming of the system and a lost learning opportunity.

Collaborative Internet environments offer a possible opportunity to close this gap. Examples, which often serve social purposes, are available across Web 2.0 applications such as MySpace, Facebook, and YouTube. The users form virtual collaborative communities to share pictures, voice messages (podcasts), and short movie clips (vodcasts). The use of these collaborative applications for educational purposes in the field of health professions education is emerging, but has been largely untapped (Hendrix, Chiarella, Hasman, Murphy, & Zafron, 2009; Thompson, Dawson, Ferdig, Black, Boyer, Coutts, & Black, 2008; McGee & Begg, 2008). The networked learning model is a primary example where learners develop and maintain connections with other learners and sources of information, and communicate in such a way as to support one another's acquisition of new skills. Collaborative learning approaches fit well with the constructivist learning theory, where the community of learners, via collective expertise can help other members to learn (Pettenati & Cigognini, 2007). Although potentially fruitful, this approach has not been implemented in simulation augmented health profession education and training.

The goal of this research was to test the educational value, measured in terms of retention of client transfer skills, of the addition of a novel Internet mediated, networked learning model (Internet Mediated Assessment of Clinical Skills) to retention of skills by senior Occupational Therapy students. We hypothesized that learners engaging in the Internet mediated, networked learning exercises, will retain more skills than learners who only received video training of the transfer task.

2. Methods

Approval to conduct this research was granted by the University of Toronto’s Health Sciences Research Ethics Board. Informed consent was obtained from all participants by the principal investigator using a consent form, which outlined the purpose of the research, procedures, methods, risks and benefits of participation, and the right to withdraw. Each participant was given time to read and review the form and if they chose to consent to participate, they were asked to provide their signature and were given a copy of the information for their records.

2.1. Participants

A recruitment email was sent out to 84 Senior Occupational Therapy students through the Department of Occupational Science and Occupational Therapy at the University of Toronto. Senior Occupational Therapy students were selected as the population of interest because at this point in their professional program, these students had experience with a client transfer skill as they would have participated in two educational laboratory sessions (including video demonstration and hands-on practice with simulated clients) for performing the transfer task. Participants were included in the study if they had attended both of the laboratory sessions offered in their first year of education as Occupational Therapists and if they gave consent to participate.

All who participated in this study were female (this was expected as the population of interest was 94% female) and the average age of the participants was 25.2 years with a range between 23 and 30 years. Participants volunteered by responding to the recruitment email and were assigned to either the Networked (Experimental) group (n=10) or the Control group (n=8). Potential subjects were excluded if they had performed the skill of interest more than 10 times in the past on a live client.
2.2. Apparatus

Building on the logic of Web 2.0 applications, we developed a prototype of an interactive Internet Mediated Assessments of Clinical Skills (IMACS) system. IMACS enables the trainees to engage in networked learning after their participation in standard simulation-based exercises. The system in its current form integrates concepts of objective assessment of clinical skills and follows the DIrect Nurse Observation instrument (DINO), a 16-item instrument designed to assess the work technique of nurses during a client transfer task (Johnsson, Kjellberg, Kjellberg & Lagerstrom, 2004). Students performing the transfer skills in a simulation laboratory were videotaped and the videos were uploaded to a secure server. After the upload the students were prompted with an instructional email to log in into the IMACS system.

2.3. Description of transfer skill

Senior Occupational Therapy students participating in this study were asked to perform a standing pivot transfer as the skill of interest in this research, as this is a commonly performed clinical skill in Occupational Therapy practice. This skill involves assisting a client to come up into a standing position while the therapist supports the client and pivoting with both feet flat on the floor to move from one surface to another (in our scenario, from bed to wheelchair) (Bolding, Adler, Tipton-Burton & Lillie, 2006).

2.4. Procedure

To standardize participants’ knowledge, all were asked to view a 10-minute instructional video of an expert demonstrating the transfer technique on a simulated client. Past research suggests that a 10-minute instructional video session would be adequate to achieve a functional level of competence (Brydges, Carnahan, Backstein & Dubrowski, 2007; Xeroulis et al., 2007). Following the video instruction, participants were allowed a ‘warm-up trial’ where they practiced the skill on a standardized client (a second year Occupational Therapy student acting as a client). Participants were not provided with any feedback following the warm-up trial. After the warm-up trial, all participants carried out the pre-test trial consisting of unsupervised performance.

Participants were then assigned randomly to either the Experimental or Control group. Videos of those participants in the Experimental were uploaded to the secure server. These participants were contacted via an email message and were sent user IDs and passwords so that they could log into the IMACS website. During the retention period, they viewed and rated videos of themselves as well as videos of their peers performing the transfer. Those in the Control group did not receive any additional training or feedback during the 2-week retention period but they were provided with a copy of the instructional training video. All participants were asked to return to perform a post-test trial after a 14 ± 2 day retention period. Post-test trials did not include a warm-up period and were videotaped for further analysis.

In order to evaluate whether interactions with IMACS facilitated retention of the transfer task from pre to post test, and to ultimately determine whether the Internet mediated, networked learning model had greater educational value than video training alone, videos were evaluated by two expert raters who had experience using the DINO evaluation tool (Johnsson et al., 2004). The DINO evaluates three stages of a transfer task including the preparation, performance, and results stages and combines a yes/no checklist, and 5-point rating scale format. The original DINO was adapted to include only 14 of the original items for the purpose of this study, as two items did not apply to the current client scenario and thus were eliminated.

2.5. Analyses

Cronbach’s Alpha intraclass reliability coefficient was calculated in order to determine agreement between the two raters. The intraclass correlation coefficient of 0.70 or higher was set as acceptable agreement for these low-stakes assessments. A 2 × 2 mixed design Analysis of Variance (ANOVA) was used to determine whether the difference between the mean DINO score for the two groups were significantly different before and after the experimental session. The ANOVA model consisted of two factors: test (pre and post) was the repeated measures
factor and the group (Experimental or Control) was the between groups factor. The alpha level was set to 0.05 to indicate statistically significant findings.

3. Results

The intraclass correlation coefficient was 0.71 and was significant (p<=.001), which indicated acceptable agreement for low-stakes assessments.

The ANOVA revealed a strong effect for test (F[1,16]=27.01, p<.001), but not for group (F[1,16]=2.56, p=.09). Similarly, the interaction between the two factors was not significant (F(1,16)=0.40, p=.85; Figure 1).

Figure 1. The DINO score from pre-test (first bar) to post-test (second bar). Error bars indicate standard deviations.

4. Discussion

In general, the results revealed that the intervention did not lead to better retention of the client transfer skills when compared to providing the students with instructional video materials. Thus, we were not able to support the hypothesis that the Internet mediated, networked learning model would provide greater educational value in learning client transfer skills among senior Occupational Therapy students. However, there were several confounds that should be addressed by future research.

One limitation of this study was that both the Experimental and Control groups started and ended up with a relatively high DINO score (87% or 33.4/38 on average). This may have caused a ceiling effect, meaning that the skill had already been learned too well by both groups. In order to address this, future research could focus on assessing client transfers in a population that has less experience with the skill, such as with entry-level Occupational Therapy students. It maybe also be beneficial to examine a more difficult skill commonly used in clinical practice by Occupational Therapists. This would ideally create more variability in the scores obtained on the DINO.

Another area in which the study’s results may have been influenced includes the length of time between the pre-test and post-test trials. Increasing the retention period may also have created greater differences in scores between the two testing periods. Similarly, increasing the amount of time that each participant in the Experimental group spent interacting with the IMACS tool may have produced different results, as this could potentially lead to better consolidation of skills or decreased forgetting.

As a number of the participants in the Experimental group did not use the IMACS tool to its fullest potential (e.g., did not use the ‘comments’ sections to provide feedback to other participants), it is suggested that future research in this area involve more structured and/or supervised interaction with the IMACS tool. For example, the it might be required that the participants view videos on multiple occasions before providing feedback and peer ratings.

Finally, as suggested by Kneebone et al. (2002), research into adult learning and skill acquisition calls for immediate, focused feedback. Thus, the value of this research may be increased through the inclusion of an expert who can provide participants with immediate feedback on how to correctly perform the client transfer and could potentially also be involved in rating participants’ performance using the IMACS tool.
5. Summary

Simulation-based learning has become increasingly popular in the education of healthcare professionals, and as technology continues to evolve, it is important to examine how healthcare practitioners can incorporate these technologies into educational programs to improve learning and retention of clinical skills. Although the current study did not support educational value of the interactive, Internet mediated peer-to-peer feedback system there are several confounding factors, which warrants further investigation.

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References

D. Bolding, C. Adler, M. Tipton-Burton, & S. M. Lillie. Mobility. (2006). In Pendleton & Schultz-Krohn (Eds.), Pedretti’s Occupational Therapy: Practice Skills for Physical Dysfunction (pp. 216-217). St. Louis, MO, Mosby.
R. Brydges, H. Carnahan, D. Backstein, & A. Dubrowski. (2007). Application of motor learning principles to complex surgical tasks: Searching for the optimal performance schedule. Journal of Motor Behavior, 39(1):40-48.
M. L. Good. (2003). Patient simulation for training basic and advanced clinical skills. Medical Education, 37(Suppl.1), 14-21.
D. Hendrix, D. Chiarello, L. Hasman, S. Murphy, & M. L. Zafron. (2009). Use of Facebook in academic health sciences libraries. Journal of Medical Library Association, 97(1):44-47.
C. Johnsson, K. Kjellberg, A. Kjellberg, & M. Lagerstrom. (2004). A direct observation instrument for assessment of nurses’ patient transfer technique (DINO). Applied Ergonomics, 35, 591-601.
R. Kneebone, J. Kidd, D. Nestel, S. Asvall, P. Paraskeva, & A. (2002). Darzi. An innovative model for teaching and learning clinical procedures. Medical Education, 36(1):628-634.
N. J. Maran, & R. J. Glavin. (2003). Low- to high-fidelity simulation- A continuum of medical education? Medical Education, 37(Suppl. 1):22-28.
J. B. McGee, & M. Begg. (2008). What medical educators need to know about ”Web 2.0”. Medical Teacher, 30(2):164-169.C. Medley, & C. Horne. (2005). Using simulation technology for undergraduate nursing education. Journal of Nursing Education, 44(1):31-34.
M. C. Pettenati, & M. E. Cigognini. (2007). Social networking theories and tools to support connectivist learning activities. International Journal of Web-Based Learning and Teaching Technologies, 2(3):42-60.
R. H. Steadman, W. C. Coates, Y. M. Huang, R. Matevosian, B. R. Larmon, L. McCullough, & D. Ariel. (2006). Simulation-based training is superior to problem-based learning for the acquisition of critical assessment and management skills. Critical Care Medicine, 34(1):151-157.
L. A. Thompson, K. Dawson, R. Ferdig, E. W. Black, J. Boyer, J. Coutts, & N. P. Black. (2008). The intersection of online social networking with medical professionalism. Journal of General and Internal Medicine, 23(7):954-957.
G. Tomlin. (2005). The use of interactive video client simulation scores to predict clinical performance of Occupational Therapy students. The American Journal of Occupational Therapy, 59(1):50-56.
N. V. Vu, & H. S. Barrows, H. S. Use of standardized patients in clinical assessments: Recent developments and measurement findings. Educational Researcher, 23(3), 23-30, 1994.
G. Xeroulis, J. Park, C-A. Moulton, R. Reznick, V. LeBlanc, & A. Dubrowski. (2007). Teaching suturing and knot-tying to skills to medical students: A randomized controlled study comparing computer-based video instruction and (concurrent and summary) expert feedback. Surgery, 141(4):442-449.