

Students' Perceptions of Teaching Methods That Bridge Theory to Practice in Dental Hygiene Education

Denise M. Wilkinson, RDH, MS; Dianne Smallidge, RDH, MDH; Linda D. Boyd, RDH, RD, EdD; Lori Giblin, RDH, MS

Abstract

Purpose: Health care education requires students to connect classroom learning with patient care. The purpose of this study was to explore dental hygiene students' perceptions of teaching tools, activities and teaching methods useful in closing the gap between theory and practice as students transition from classroom learning into the clinical phase of their training.

Methods: This was an exploratory qualitative study design examining retrospective data from journal postings of a convenience sample of dental hygiene students (n=85). Open-ended questions related to patient care were given to junior and senior students to respond in a reflective journaling activity. A systematic approach was used to establish themes.

Results: Junior students predicted hands-on experiences (51%), critical thinking exercises (42%) and visual aids (27%) would be the most supportive in helping them connect theory to practice. Senior students identified critical thinking exercises (44%) and visual aids (44%) as the most beneficial in connecting classroom learning to patient care. Seniors also identified barriers preventing them from connecting theory to patient care. Barriers most often cited were not being able to see firsthand what is in the text (56%) and being unsure that what was seen during clinical practice was the same as what was taught (28%).

Conclusion: Students recognized the benefits of critical thinking and problem solving skills after having experienced patient care and were most concerned with performance abilities prior to patient care experiences. This information will be useful in developing curricula to enhance critical thinking and problem solving skills.

Keywords: theory-practice gap, students' perspective, reflective journaling, teaching methodology, clinical practice

This study supports the NDHRA priority area, **Professional Education and Development:** Validate and test measures that evaluate student critical thinking and decision-making skills.

INTRODUCTION

Health care education requires development of curricula that incorporate classroom learning with clinical practice. Since many health care disciplines involve clinical treatment, it is necessary for students to have an opportunity to practice skills involving application of these treatments. For treatments to be successful, students must understand the reasons, purposes and histories behind them, as well as, the biological, chemical and physical properties involved with them.¹⁻⁴ This understanding is considered the theory behind the practice. Once the understanding of the theory is developed, the practical skills of the treatment process can be introduced. Often this introduction is in a controlled clinic or laboratory where students utilize forms of simulation to practice these skills under direct supervision.⁵⁻⁷ This gives the students the opportunity to practice these skills while trained instructors provide feedback for skills enhancement.^{6,8,9} Eventually the students enter the clinical environment to put these skills to work in a real life scenario.

As students progress from the classroom setting to the clinical setting, the connection between the two is often missed.¹⁻³ This is known as the theory-practice gap (TPG). Understanding theory behind practice allows students to connect and apply their knowledge to react in unforeseen situations and will result in better patient outcomes.^{1,3} Without the connection between theory and practice, the student becomes anxious, confused and loses confidence when faced with difficult clinical situations.¹⁰ As a result, it is important for educational institutions to reduce the theory-practice gap before introducing students to clinical experiences.

To help make the connection between theory and practice, teaching methods have been developed to improve critical thinking skills and increase confidence levels during the clinical phase of learning.^{3,4,11-13} As a student becomes familiar with processes of clinical practice and can rephrase the purposes behind each action, the action becomes more automatic and

involves less cognitive processing.^{3,4,14-16} In situations where the scenario is unfamiliar, the student is required to bounce back into cognitive control that allows a more thought provoked response to formulate a new course of action which is an adaptation of the original.¹⁴⁻¹⁶ This practice is necessary in many health care settings, since patient care can often be unpredictable and vary considerably from the norm. It requires critical thinking and an understanding of the purpose behind the action to develop a modified plan to address the individual patient's needs.^{12,15}

Little research exists to specifically define the teaching methodology useful in bridging the knowledge gained in the classroom with its usefulness in the clinical setting.¹⁷ Although many studies have been developed to address the TPG,^{2-4,6} little is known about how this impacts psychomotor skills development and successful treatment applications. A gap also exists in the research identifying learning methods to reduce the TPG and improve students' ability to relate classroom learning to clinical practice. Another missing piece is the identification of barriers students perceive as preventing them from making this connection.

The purpose of this study was to investigate students' perceptions of the teaching strategies currently used in theoretical learning and their impact on connecting theory to practice as students transition into the clinical phase of their training in dental hygiene education. In addition, the study identified perceived barriers impacting students' ability to make this connection.

METHODS AND MATERIALS

The Institutional Review Board granted permission to conduct this study. Based on the established educational practices in normal educational settings, the status of "exempt" was given in accordance with 45 CFR 46.101.

This was an exploratory qualitative study design examining retrospective data from journal postings of a convenience sample of dental hygiene students (n=85). Dental hygiene was the chosen discipline studied as it requires significant psychomotor development, patient care and the ability to connect knowledge with practice.

Retrospective data from students' Blackboard Learn™ journal postings of the junior (n=67) and senior (n=18) classes enrolled in the Baccalaureate of Science dental hygiene program were obtained. All student participants were informed of the use of their journal postings for research prior to data collection. All personal identifiers were removed from data prior to delivery to the principal investigator (PI) to protect student confidentiality.

Students were asked to respond to open-ended questions relating to their clinical dental hygiene experiences and were given 1 week to post responses in a journaling reflective practice through their Blackboard Learn™ accounts. The journal postings were related to reflections on clinical dental hygiene practice and were collected from 2 time points: prior to beginning patient care and at the end of the clinical curriculum prior to graduation. Data was copied and pasted into a Word document from Blackboard Learn™ by an administrative assistant.

Survey Instrument

The journaling prompt provided to the junior class prior to clinical experience was the following:

- What learning tools, activities and teaching methods introduced since entering the dental hygiene program and/or previous learning experiences are going to help you connect what you have learned in the classroom to providing patient care in the clinic?

The journaling prompts provided to the senior class at the end of the clinical curriculum was the same along with the following additional question:

- What barriers, obstacles or other things hindered your ability to connect classroom learning to your clinical patient care experiences?

Journaling prompts were developed and reviewed by an expert panel of faculty. To assure students had a good understanding of the journal prompts; 4 dental hygiene students piloted the questions. These 4 students did not participate in the actual study.

A thematic analysis, using a data driven inductive approach to develop themes and interpret the results, was established.¹⁸ Themes were developed through careful reading and rereading of the data.¹⁸ This established patterns associated with the data that emerged into themes.¹⁸ Relevant and useful findings were formulated into thematic categories to further classify the data.^{17,18}

A systematic approach was developed to establish useful items by underlining and highlighting potential patterns.¹⁸ Once patterns were recognized, themes began to surface directly from the students' postings.¹⁸ Themes were given codes to categorize and classify the data.¹⁸ Further analysis involved applying codes to each data item.¹⁸ This helped to establish relevance of material and understanding of the findings.

Each code was tallied and a percentage was calculated to determine frequency of response. This illustrated the most common perceived tools, activities or methods influential in bridging the gap between class-

room learning and clinical practice in the students studied. Data was evaluated in terms of juniors or seniors and a comparison was made. There was also an evaluation of perceived barriers that influenced students' ability to connect theory with practice.

RESULTS

Many students listed several items that influenced their ability to make the connection between classroom learning and patient care. The junior class (n=67) had a response rate of 87% of usable data. Table I displays the collected data, 1 response was unrelated to the question and not included in the study. Hands-on activities was reported 50.7% of the time as having the greatest influence aiding students in connecting classroom learning with patient care. Many of the students specified hands-on activities as clinical experiences with a partner or the opportunity to practice a skill in a simulation-type atmosphere. Several students mentioned having the opportunity to practice a dietary analysis or completion of a clinical assessment on a patient, as contributed to making the connection.

Examples of statements referencing hands-on activities contributing to students' ability to connect classroom learning with patient care are the following:

"To me, the best learning method or technique is 'learning by doing' and being able to see it in action. The best way to learn anything, in my opinion, is to apply the knowledge in real life scenarios."

"In other words, making the connection from the books to the patient chair in my perspective can only be done through hands-on experience."

The junior class also identified critical thinking activities as potentially contributing to connecting classroom learning to patient care. As many as 41.8% of students made reference to case studies or other thought provoking activities as the second most common response. Visual aids were the third most common activity or tool named, with as many as 26.9% of the students referred to videos, internet links and handouts as potential tools that would aid them in making the connection.

Examples of quotes referencing critical thinking activities are the following:

"For me, I really like the case studies we do in class. It gives me the opportunity to apply some things we have learned in class in a semi-clinical setting."

".....in helping me connect things I learn in class to what I will be doing or seeing in clinic are the case studies we have done. Those case studies have pro-

Table I: Qualitative Data from Junior Class Journal Responses with Their Ideas of Learning Tools, Activities and Teaching Methods That Will Be Beneficial in Connecting Classroom Learning to Clinical Practice

	Junior Class Responses	Number of responses in category	Percentage
1	Hands-on Experiences	34	51%
2	Critical thinking exercises	28	42%
3	Visual Aids	18	27%
4	Peer-to-peer relationships	7	10%
5	Study Groups	9	13%
6	Peer-to-peer relationships/Study Groups	16	24%
7	Collaborations with Faculty/feedback	15	22%
8	Specific coursework	17	25%
9	Previous Experiences (work, education)	12	18%
10	Miscellaneous		<10%

vided us with numerous possible scenarios of what we could be seeing and it also gave us an opportunity to discuss treatment ..."

Examples of quotes referencing visual aids are the following:

"...it definitely made more sense seeing it done on the videos..."

The junior class recognized peer-to-peer collaborations in 10% of the responses and 13.4% made reference to study groups. The combination of these 2 categories resulted in 23.8% of the students referring peer-to-peer collaborations, peer-to-peer discussions and study groups as having a strong influence on their ability to connect theory to practice. Because study groups involve peer-to-peer collaborations, they were identified separately and combined with peer-to-peer collaborations. Collaborations with faculty were also identified by 22.4% of the junior students. Many stated the continuous feedback given by the instructors would help them make this connection during patient care sessions.

Examples of quotes referencing peer-to-peer collaborations are the following:

"...with a student partner and even sitting as patient

I learned a lot by just listening and learning new things from what my clinician did.”

“What has also helped me connect one thing to another was studying with other students in class. When I studied with fellow colleagues, sometimes they bring up ways to remember things easier.”

Examples of quotes referencing faculty support are the following:

“The instructors inside and outside of the classroom have been encouraging and incredibly helpful...”

“Another tool that has helped me connect what I learned in the classroom to providing patient care in the clinic is the faculty feedback after each lab.”

Several specific courses were acknowledged by 25.3% of the junior students as contributing to their ability to make the connection. Previous work or educational experiences were also referenced in 17.9% of the responses. Some students had previous experiences working in dental practices and others had unrelated work experiences they felt contributed to their ability to make the connection. Other items...were identified by less than 10% of the students.

Examples of quotes referencing specific coursework are the following:

“...taking radiology class has taught much more, like how to measure bone loss and calculus detection.”

“...I learned SO much in dental materials last semester.”

Examples of quotes referencing previous work or education experiences are the following:

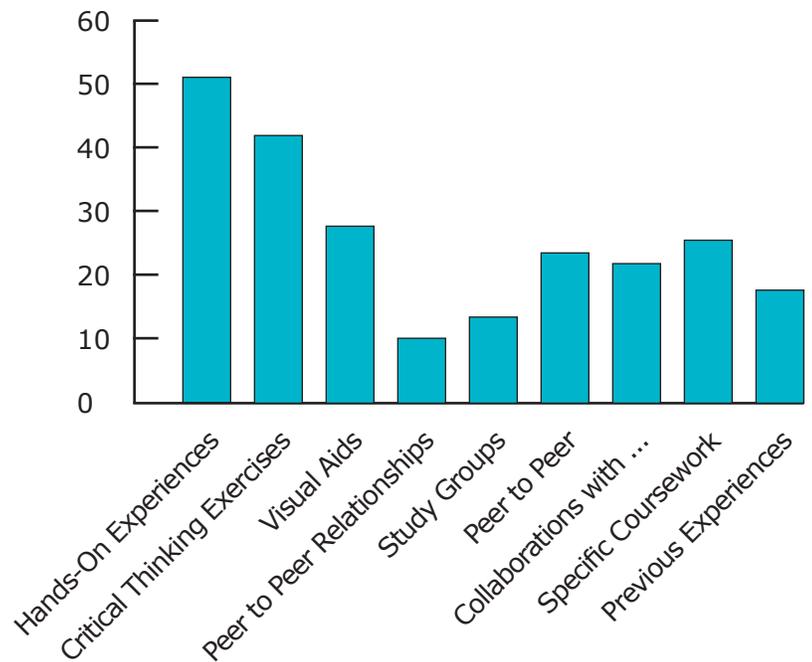
“I have held many part-time jobs throughout high school where I learned how to interact with all different types of people, be responsible, professional and dependable.”

“...from my assisting experience in high school...”

“I think that my experience working in the business world (developing projects, implementing them, dealing with angry customers, fixing other people’s mistakes and - this is huge - managing weird/unpleasant personalities) has prepared me for life in the clinic.”

Figure 1 displays a graph comparing the frequency of the junior class responses.

Figure 1: Junior Class Results to Open-Ended Question



Question: What learning tools, activities and teaching methods introduced since entering the dental hygiene program and/or previous learning experiences are going to help you connect what you have learned in the classroom to providing patient care in the clinic?

The senior class results were analyzed separately. The senior students (n = 18) had a response rate of 64%. All collected data was utilized and tallied and results are displayed in Table II.

Themes identified from the data resulted in 44% of the students stating critical thinking exercises such as case studies and visual aids were the most useful tools in connecting classroom learning to patient care. Other responses included 17% of the seniors reporting hands-on activities as the most useful and 11% finding study groups as the most beneficial and these results vary slightly from the junior class results.

Examples of quotes from the senior students that found critical thinking exercises are as follows:

“The case studies we have done in various classes have definitely been beneficial through hygiene school...they were helpful for providing patient care because you will see many of these case study scenarios in real life.”

“These case studies show us different cases, some of which we may not see in clinic.”

Examples of quotes from the senior students that found visual aids as most useful are as follows:

“...I found to be very helpful was online videos.”

Table II: Qualitative Data from Senior Class Journal Responses Establishing the Learning Tools, Activities and Teaching Methods That Have Helped Them Make the Connection between Classroom Theory and Clinical Practice

	Senior Class Responses	Number of responses in category	Percentage
1	Critical thinking Exercises	8	44%
2	Visual Aids	8	44%
3	Hands-on Exercises	3	17%
4	Peer-to-peer relationships/ Study Groups	2	11%
5	Miscellaneous		<10%

"The learning tools that have helped me in providing care in clinical setting are video tutorials"

"...having the clinic sheets and the process of care sheets..."

Examples of quotes from the senior students that found hands-on exercises or experiences as most useful are as follows:

"I feel that the best way to learn is to actually do it and experience it firsthand."

"One activity stuck out to me, a professor gave us mazes and told us to do it through the mirror to help with our indirect vision and I felt as if it really helped me."

Examples of quotes from the senior students that found study groups as most useful are as follows:

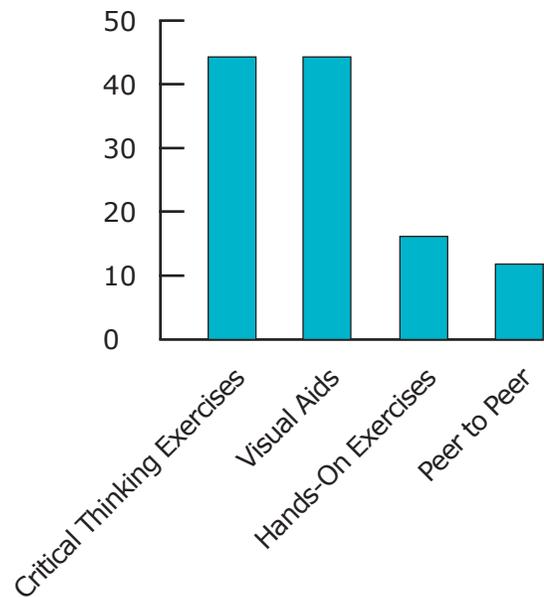
"I think seminar was a great help to be able to get together as a group and ask clinical questions outside of clinic."

Figure 2 displays a graph comparing the frequency of the senior class responses to the first open-ended question.

The senior class was also asked to identify barriers, obstacles or other things that prevented them from making the connection between classroom learning and patient care. Themes were identified from the data and the results are displayed in Table III.

The most common theme identified as a barrier (56%) was not being able to see firsthand what was being taught in class or in the text. The second most

Figure 2: Senior Class Results to First Open-Ended Question



Question: What learning tools, activities and teaching methods introduced since entering the dental hygiene program and/or previous learning experiences have helped you connect what you have learned in the classroom to providing patient care in the clinic?

common theme identified as a barrier (27% of the students) was being unsure that what was learned matched what was being seen.

Examples of quotes from the senior students referring to the theme of not being able to see firsthand what was being taught are as follows:

"Seeing the pictures in the book was very helpful, but it's not the same as seeing it firsthand clinically."

"Not being able to ever see certain conditions or diseases that we learn about in the classroom and hope or expect to see it in the clinic and don't get to I feel is a barrier."

Examples of quotes from the senior students referring to the theme of being unsure what was learned matched what was being seen are as follows:

"We have learned different conditions a patient can have, but trying to determine whether a patient has a chronic or acute gingivitis or periodontitis and whether they may need NSPT can be challenging."

"The hardest obstacle I found was just figuring out a way to connect everything because classroom and clinical is so different."

Figure 3 displays a graph comparing the frequency of the senior class responses to the second open-ended question.

Table III: Qualitative Data from Senior Class Journal Responses Identifying Barriers and Obstacles That Prevented Them from Connecting Theory to Practice

	Senior Class Identified Barriers	Number of responses in category	Percentage
1	Unable to see firsthand what we learn in classroom and text	10	56%
2	Unsure what we learned matches what we see	5	28%
3	Miscellaneous items	3	16%

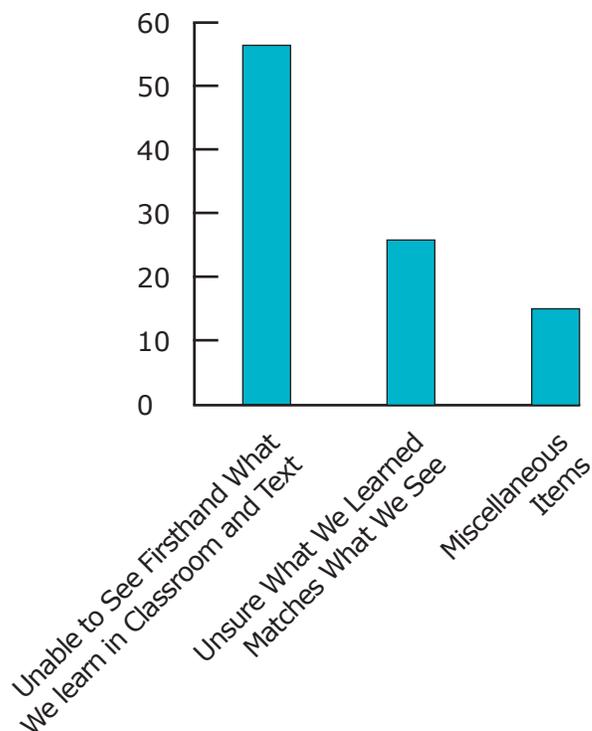
DISCUSSION

The results of this study identified the differences in students' perspectives of learning tools beneficial in helping them make the connection between classroom learning and patient care in dental hygiene education. Prior to entering into clinical practice with live patients, students perceived their hands-on experiences as the most beneficial activity in helping them make the connection between what they had learned and what they were doing. Following live patient experiences, students' perceptions of what aided them changed; they recognized critical thinking activities and visual aids were most beneficial in helping them make the connection between classroom learning and patient care.

As students begin to transition into clinical practice their responses demonstrated greater concern with performance. However, after gaining more experience with patient care, the responses changed and students began to recognize the importance of being able to apply what they had learned to what they are doing.

The senior students identified perceived barriers that prevented them from connecting their classroom learning with their patient care. Many students recognized live patient experiences as being different from what they had encountered in the classroom or in simulation practice. Recognizing this difference contributed to their ability to better prepare for variations from the norm that they encountered in clinical practice. Many students emphasized the fact that what was seen in the textbook didn't always match what they saw in the clinic and several students added they would have liked to have had more firsthand experience with the potential varia-

Figure 3: Senior Class Responses to Second Open-Ended Question



Question: What barriers, obstacles or other things hindered your ability to connect classroom learning to your clinical patient care experiences?

tions. Because students encountered unknowns or variations of what was taught in the classroom, they questioned their understanding of what they were seeing in actual patient care situations.

Previous research has identified confidence levels, stress and anxieties as the greatest barriers preventing students from making the connection between classroom learning and clinical practice.^{10,13,17,19} Although, students in this study did not recognize these things as barriers, they did make reference to the inconsistency of what is taught in the classroom and what is seen in clinical practice as being a barrier. Corlette et al,¹ Ferguson et al,² Baxter³ and Rolfe¹² identified the unpredictable nature of health care resulting in unforeseen events in clinical practice as a contributing factor in making the connection between theory and practice. The unknown or ambiguity of patient care in health care could be contributing to overall stress, anxiety and confidence level in the students and could be a potential underlying barrier that was not apparent in this study.

Many studies have attempted to identify learning strategies and teaching methods useful in preventing barriers that contribute to the TPG.^{3,15,20} While others have recognized the impact the TPG has on a student's ability to determine the proper course of action during unforeseen events.^{19,21-23} Reflec-

tive activities, the use of a mentor or preceptor and problem-based learning are among the strategies previously recognized.^{11,12,14-16,21,24-26} In this study students identified hands-on experiences, critical thinking activities and visual aids as the most useful strategies for bridging the classroom to practice gap. The strategies identified in the literature reinforced building critical thinking and problem solving skills in bridging the TPG and this is aligned to what students in this study found as helpful when beginning live patient experiences.^{11,21,26} Prior to live patient experiences students predicted hands-on experiences and visual aids would be most helpful, however, once students gain more clinical experience, their perceptions of what educational strategies benefited them changed.

The greatest limitation of this study was the use of a single institution and one program of study. Another limitation is the data analysis; the qualitative nature of the study required some interpretation of the data with some of the responses being vague and difficult to categorize. However, with the use of coding and categorization to identify themes, the interpretation was done uniformly and consistently. Lastly, it is possible that students' learning style may have impacted the perceived barriers listed by the students.

CONCLUSION

This study identified learning strategies most useful to students in bridging the gap between classroom learning and clinical practice from the students' perspective. Students perceived hands-on activities and visual aids as being most helpful prior to live patient experiences. Following more experience with live patient care, the strategies perceived by the students as being helpful changed as the senior students recognized the benefits of being able to problem solve when faced with unexpected events in clinical practice. Curricula that encourage students to utilize all available tools for strengthening critical thinking and problem solving skills will improve learning outcomes in health care education. Further studies identifying students' perceptions of strategies that increase these skills will provide another means to improve health care curricula.

Denise M. Wilkinson, RDH, MS, is a practicing Dental Hygienist and Adjunct Faculty at Northern Essex Community College, Lawrence, Massachusetts. Dianne Smallidge, RDH, MDH, is an Associate Professor at Forsyth School of Dental Hygiene at MCPHS University, Boston, Massachusetts. Linda D. Boyd, RDH, RD, EdD, is Dean of Forsyth School of Dental Hygiene at MCPHS University, Boston, Massachusetts. Lori Giblin, RDH, MS, is an Assistant Professor at Forsyth School of Dental Hygiene at MCPHS University, Boston, Massachusetts.

REFERENCES

1. Corlett J, Palfreyman JW, Staines HJ, Marr H. Factors influencing theoretical knowledge and practical skill acquisition in student nurses: An empirical experiment. *Nurse Educ Today*. 2003;23(3):183-190.
2. Ferguson KE, Jinks AM. Integrating what is taught with what is practised in the nursing curriculum: A multi-dimensional model. *J Adv Nurs*. 1994;20(4):687-695.
3. Baxter P. The CCARE model of clinical supervision: Bridging the theory-practice gap. *Nurse Educ Pract*. 2007;7(2):103-111.
4. McCaugherty D. The use of a teaching model to promote reflection and the experiential integration of theory and practice in first-year student nurses: An action research study. *J Adv Nurs*. 1991;16(5):534-543.
5. Stefanidis D, Scerbo MW, Montero PN, Acker CE, Smith WD. Simulator training to automaticity leads to improved skill transfer compared with traditional proficiency-based training: A randomized controlled trial. *Ann Surg*. 2012;255(1):30-37.
6. Hope A, Garside J, Prescott S. Rethinking theory and practice: Pre-registration student nurses experiences of simulation teaching and learning in the acquisition of clinical skills in preparation for practice. *Nurse Educ Today*. 2011;31(7):711-715.
7. Willis RE, Richa J, Oppeltz R, et al. Comparing three pedagogical approaches to psychomotor skills acquisition. *Am J Surg*. 2012;203(1):8-13.
8. Waldman KB, Macdonald G, Wilson SG. The relationship between standardized psychomotor tests and basic clinical dental hygiene skills. *J Dent Hyg*. 1995;69(4):163-168.
9. McNett S. Teaching nursing psychomotor skills in a fundamentals laboratory: A literature review. *Nurs Educ Perspectives*. 2012;33(5):328-333.
10. Hutchinson TL, Janiszewski Goodin H. Nursing student anxiety as a context for teaching/learning. *J Holistic Nurs*. 2013;31(1):19-24.
11. Andrews M, Jones PR. Problem-based learning in an undergraduate nursing programme: A case study. *J Adv Nurs*. 1996;23(2):357-365.

12. Rolfe G. Beyond expertise: Theory, practice and the reflexive practitioner. *J Clin Nurs*. 1997;6(2):93-97.
13. Iley K, McInulty L, Jones I, Yorke J, Johnson M. Developing competence in cardiac care through the use of blended learning: Course members' and mentors' accounts. *Nurse Educ Today*. 2011;31(4):323-327.
14. Cole M. Exploring the hand hygiene competence of student nurses: A case of flawed self assessment. *Nurse Educ Today*. 2009;29(4):380-388.
15. Hatlevik IKR. The theory-practice relationship: Reflective skills and theoretical knowledge as key factors in bridging the gap between theory and practice in initial nursing education. *J Adv Nurs*. 2012;68(4):868-877.
16. Allmark P. A classical view of the theory-practice gap in nursing. *J Adv Nurs*. 1995;22(1):18-23.
17. Yardley S, Brosnan C, Richardson J. Sharing methodology: A worked example of theoretical integration with qualitative data to clarify practical understanding of learning and generate new theoretical development. *Med Teach*. 2013;35(3):e1011-1019.
18. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77-101.
19. Chesser-Smyth PA, Long T. Understanding the influences on self-confidence among first-year undergraduate nursing students in Ireland. *J Adv Nurs*. 2013;69(1):145-157.
20. Sargeant J, Curran V, Allen M, Jarvis-Selinger S, Ho K. Facilitating interpersonal interaction and learning online: Linking theory and practice. *J Contin Educ Health Prof*. 2006;26(2):128-136.
21. Moreno-López LA, Somacarrera-Pérez ML, Díaz-Rodríguez MM, Campo-Trapero J, Cano-Sánchez J. Problem-based learning versus lectures: Comparison of academic results and time devoted by teachers in a course on dentistry in special patients. *Medicina Oral, Patología Oral y Cirugía Bucal*. 2009;14(11):e583-e587.
22. Schwerha DJ, Wiker SF, Jaraiedi M. Effect of distractors, age, and level of education upon psychomotor task learning. *Int J Ind Ergonomics*. 2007;37(9-10):801-809.
23. Ganor-Stern D, Plonsker R, Perlman A, Tzelgov J. Are all changes equal? comparing early and late changes in sequence learning. *Acta Psychol*. 2013;144(1):180-189.
24. Sharif F, Masoumi S. A qualitative study of nursing student experiences of clinical practice. *BMC Nursing*. 2005;4.
25. Spouse J. Bridging theory and practice in the supervisory relationship: A sociocultural perspective. *J Adv Nurs*. 2001;33(4):512-522.
26. Shin I, Kim J. The effect of problem-based learning in nursing education: A meta-analysis. *Advanc Health Sci Educ*. 2013;18(5):1103-1120.