Journal of Peer Learning

Volume 11 Article 7

2018

Does peer education increase academic achievement in first year students? A mixed-method study

Gholamhosein Zarifnejad
Mashhad University of Medical Sciences, zarifnejadgh@mums.ac.ir

Amir Mirhaghi
Mashhad University of Medical Sciences, mirhaghi@mail.com

Mohammad Rajabpoor
Mashhad University of Medical Sciences, rajabpoorm921@mums.ac.ir

Acknowledgment We thank all students who participated in this study and special thanks to Prof. Hossein Karimi Moonaghi for his help with qualitative data analysis. Conflict of interest There is no conflict of interest concerning to this study.

Does peer education increase academic achievement in first year students? A mixed-method study

Cover Page Footnote

Acknowledgment We thank all students who participated in this study and special thanks to Prof. Hossein Karimi Moonaghi for his help with qualitative data analysis. Conflict of interest There is no conflict of interest concerning to this study.

Journal of Peer Learning (2018) Vol 11: 89-98

Does peer education increase academic achievement in first year students? A mixed-method study

Gholamhosein Zarifnejad, Amir Mirhaghi, and Mohammad Rajabpoor

ABSTRACT
Research on the impact of peer education (PE) on learning outcomes has produced inconclusive results, partly due to the methodology employed in such studies. There is a necessity to design blind, controlled studies. Further, quantitative approaches to evaluating PE may not provide a complete picture of the impact of PE on learning outcomes. The aim of the study was to determine the effect of peer education on students' academic achievement and to explain students' lived experience of participating in a PE program. The study employed an exploratory, sequential mixed-method design and occurred in two distinct and consecutive phases. The first phase consisted of a cluster-controlled, double-blind educational trial; the second, of a qualitative conventional content analysis. Data was collected during the second semester from February to July 2015 from undergraduate students. Analysis of the pre- and post-tests has been performed to evaluate the program among those enrolled in nursing and midwifery (intervention groups) and anaesthesia nursing (control group) in physiology and anatomy courses. PE resulted in significant differences in the physiology post-test scores and the anatomy post-test scores in favour of midwifery and nursing students respectively (intervention groups). Statistically significant improvement was not achieved based on formal academic exams. Themes were identified by analysing the content of qualitative feedback, with "facilitated learning" being the main theme emerging from the data. The PE program promoted learning based on the facilitator-based examination (based on post-test scores). However, PE did not improve learning in blinded condition in the current study (formal academic exam).

INTRODUCTION

Peer education (PE) is an impressive and rapidly developing educational method to enhance student learning, especially in the fields of nursing education (Stone, Cooper, & Cant, 2013) and medical education (Burgess & Nestel, 2014). PE is defined as "people of similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching" (Tzu-Chieh et al., 2011). Students instruct fellow students, and face new experiences and a challenging role (Sobral, 2002; Srivastava et al., 2015) while taking part in an experience that is different from typical teacher-centred learning strategies (Mirhaghi, Karimi-Moonaghi, Sharafi, & Emami-Zeydi, 2015). Studies have shown that students perceive the peer tutoring sessions favourably and show their passion to continue PE as part of other courses (Glynn, MacFarlane, Kelly, Cantillon, & Murphy, 2006; Lake, 1999; Srivastava et al., 2015). Additionally, as a learner-centred approach, PE is well-received by students because it provides a great opportunity for them to fully

participate in an educational program (Outhred & Chester, 2010; Sevenhuysen et al., 2013).

While studies highlight students' positive perceptions of PE, the impact on learning outcomes is inconclusive (Secomb, 2008). Peer education has been positively associated with an increase in students' confidence, self-awareness (Ramm, Thomson, & Jackson, 2015; Secomb, 2008; Stone et al., 2013), and with insignificant changes in students` learning and level of bonding with the instructor. Several studies have found that peer tutorials may have a positive effect on students' outcomes in post-tutorial physiology examination scores (Glynn et al., 2006; Jackson & Evans, 2012; Kibble, 2009) as well as in anatomy courses (Manyama et al., 2016; Weyrich et al., 2008). Anatomy and physiology courses have been regarded as the most challenging courses in the undergraduate program, and have been subject to several studies. Some remarkable additional effects from PE have included alleviating the faculty teaching burden, preparing students to be role models, developing teaching skills, helping students acquire skills for their future roles as instructors (Ten Cate & Durning, 2007) and a positive social learning experience (Ramm et al., 2015). Finally, studies have indicated that PE has reasonable and pragmatic implications for clinical education despite statistically non-significant results (Benè & Bergus, 2014; Secomb, 2008; Stone et al., 2013). In addition, the evaluation of PE has primarily relied on written examinations due to the fact that peer assessment questionnaires have not been fully developed or sufficiently validated (Speyer, Pilz, Van Der Kruis, & Brunings, 2011).

Ten Cate and Durning indicated that a low level of evidence exists on the efficacy of PE (2007). Furthermore, the efficacy studies that have been completed are detracted from by their poor methodological quality (Ten Cate & Durning, 2007). Peer education is often led by instructors, leading to these instructors playing a significant role. This confounding variable violates the requirements for study validity, and highlights the necessity to design blind, controlled trials to ensure more consistent results. In addition, each peer educator has an individualised teaching-learning style that should be adjusted according to the peers being taught and peers` skills, the content of the course material, and the course's setting and context (Ramm et al., 2015). Several contextual factors (such as confidence level and motivation) impact the learning-teaching process. Studies using a qualitative approach are capable of explaining the impact of these factors on student-related outcomes that are implicitly embedded in an educational process (Ramm et al., 2015; Secomb, 2008). This complex scenario increases the probability that the quantitative approach may provide an incomplete picture in relation to the impact of PE on learning outcomes.

OBJECTIVES

In light of the inconclusive results from previous studies and methodologically flawed studies, this study aimed to determine the effect of peer education on students' academic achievement and explain the students' lived experience during participation in a PE program.

METHODS

Study design

The study employed an exploratory, sequential mixed-method design. The collection and analysis of quantitative data was performed primarily to

determine the effect of PE on students` academic achievement. The second, qualitative phase of the study was designed to explain the students' lived experience of their participation in a PE program (Figure 1). The mixed method approach brings opportunity for in-depth insight, in which the findings of the first quantitative phase can be explained in terms of its humanistic and social aspects. In fact, PE has several effects on students as human subjects, including in the cognitive, psychological, and social domains, so it is worth reaching a comprehensive insight into PE implementation and outcomes in the academic setting by utilising mixed methodologies (Karimi Moonaghi, Dabbaghi, Oskouie, Vehviläinen-Julkunen, & Binaghi, 2010).

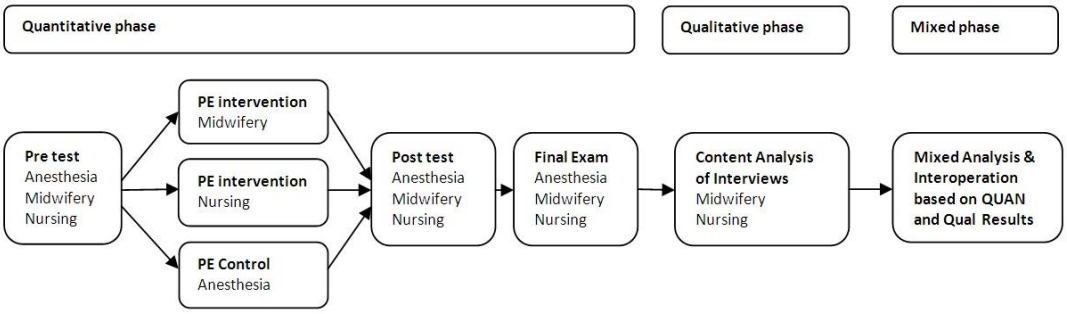

Figure 1. Explanatory sequential mixed method design.

Ethical principles

This study was approved by the Ethics Committee of the Mashhad University of Medical Sciences in Iran and the Education Development Centre Review Board (ID: 921530). Each student gave written informed consent to participate in the interviews, which were performed in the nursing and midwifery school and generally took around 45 minutes.

The first phase: quantitative

A cluster-controlled, blind educational trial was performed in three classrooms in the school of nursing and midwifery of the Mashhad University of Medical Sciences during the second semester of the school year (February to June 2015). Each classroom had fewer than thirty students. Anaesthesia nursing, midwifery, and nursing students voluntarily participated in this study. A convenience sample of three classrooms was selected. Students were organised into three separate classrooms based on their major. All students were in the first year (second semester) of their undergraduate programs. Midwifery students with a physiology course as well as nursing students with an anatomy course were allocated to the intervention group that participated in the PE program, so they received PE in addition to faculty instruction. Anaesthesia nursing students with anatomy and physiology courses were allocated to the control group simultaneously and therefore they received faculty instruction without PE. Anatomy and physiology are both two-credit courses that are required for all majors during the second semester. Prior to intervention, students were fully instructed by the researchers with respect to PE and their roles in the program. Peer-education sessions were held every two weeks during the school year; the content of the courses was divided among volunteer students. Each student was allowed to lecture once during

the program in order to broaden participation in the PE program, with four students lecturing in each session. Eight to ten sessions, each lasting 90 to 120 minutes, were held during the program implementation period. Students were not forced to choose any specific kind of teaching style. A faculty member served as a facilitator, organising the time, coordinating the students, and directing all sessions. The faculty member supervised junior students during the sessions to ensure that students perform their role (such as lecturing and group discussion) effectively and reviewed presentations before each session. All students were taught by the same anatomy and physiology teachers, and all anaesthesia, midwifery, and nursing students received equal amounts of faculty instruction. The anatomy and physiology teachers were blinded to all conditions of the PE program. Anaesthesia nursing students were monitored through the entire semester to ensure they did not receive any other extra instructional support. Any anaesthesia nursing student who took part in extracurricular activities in anatomy and physiology courses was excluded from the study. In addition, midwifery or nursing students who were absent from two sessions or more were excluded from the final studies. Students were kept unaware of their status during the study. The same version of the pre- and post-tests were conducted for all three classrooms by facilitators before and after the PE program, while each desired course had substantially similar content among these majors. The multiple-choice test questions were mainly derived from the final exam. Face and content validity were assessed by experienced reviewers. Internal consistency reliability was also assessed. The final examination results of all students for the desired courses were collected.

The second phase: qualitative

A conventional, qualitative content analysis was conducted in July 2015 to explain the students' lived experience of participating in the PE program (Brannagan et al., 2013). Participants were purposefully selected from amongst the midwifery and nursing cohort who took part in the PE program, meaning that only students who fully participated in the PE program and volunteered to be interviewed were interviewed. Sixteen participants (ten males, six females) were equally selected from among the midwifery and nursing students and interviewed until saturation was reached. The qualitative data were collected in face-to-face, semi-structured interviews using a voice recorder. As noted earlier, these interviews took place in the nursing and midwifery school, and usually lasted around 45 minutes. The interviewer used an interview guide to probe students' experience of PE. Questions included "Would you please describe a PE session?"; "Would you please explain your experience?"; "Would you please talk about your feelings about participation in PE?"; and "How did PE differ from conventional education?". Interviews were transcribed verbatim and read several times to generate initial codes, subcategories, categories, and themes.

Data analysis

Descriptive and inferential statistics have been reported; differences among the three groups were analysed using Tukey's test followed by one-way analysis of variance (ANOVA) for comparison. A *P* value less than 0.05 was considered statistically significant. Qualitative data was analysed using MAXQDA (Version 10.0; VERBI Gmbh, Berlin, Germany) software. Trustworthiness has been met based on prolonged engagement in data collection, the consistency of the interviews, the provision of a detailed

description of the method, member and peer checking, and the reporting of a voluminous and detailed set of findings (Hsieh & Shannon, 2005).

RESULTS

Phase I

Demographic characteristics for the three groups, including age, sex, total average, pre-term, post-term, and final scores, have been presented in Table 1. More than 95% of nursing and midwifery students have participated in all PE sessions. No significant differences existed in age, total educational average, pre-test scores ($P > 0.05$), final physiology scores (F = 11.09, df = 2, $P = 0.365$) or final anatomy semester scores among three groups (F = 14.49, df = 2, $P = 0.274$). Significant differences did exist in physiology post-term scores (F = 188.67, df = 2, $P = 0.001$) and anatomy post-test scores among the three groups (F = 209.09, df = 2, $P = 0.001$) held by the facilitator. A Tukey's post-hoc test revealed significant intergroup differences between the anatomy post-PE test scores of nursing students and the physiology post-PE test scores of midwifery students compared to those of other students (Table 1).

Phase II

Eleven students participated in interviews. The theme "facilitated learning" clearly emerged from the data and this theme consisted of three key elements: "making it easy to understand", "modifying learning strategies" and "internalisation of learning". Overall, the PE program provided a friendly and informal atmosphere that allowed all students to freely participate in classroom discussions. The highly dynamic and interactive learning context in the PE setting formed a synergy that led to improvements in learning. Students also modified their learning strategies, listening actively and paying attention to feedback during group discussions. The PE program was a supplementary learning program that effectively promoted learning. Additionally, the program helped students internalise learning through conscious learning and critical thinking (Table 2).

Making it easy to understand

Students believe that lessons are easier to understand in a dynamic and interactive learning context. In this type of environment, each student participates in forming and answering a question. Mutual understanding also helps students understand lessons more easily when their classmates teach them, and everyone feels free to take part due to the friendly, informal atmosphere:

> "We were much more comfortable with each other in the classroom, asking each other questions, and we discussed [the questions] together until we understand completely … All are engaged in discussions to understand and it was not like our official classrooms, in which only a few students speak and comment more than the other students. Even silent students are more active during this program." Sara*

* Participants were given pseudonyms to protect their identity and maintain confidentiality

Remodelling learning strategies

The PE program provides a unique experience for students to promote their learning style. As students must teach lessons to other students, they must effectively learn the content. They also experienced collaborative learning instead of individual learning; the process of discussions leads to active listening. Students received a large amount of feedback during discussions so they could cover the gaps in their learning. Students found that supplementary learning could significantly enhance their mastery of the course content.

> "… When I read the lesson, of course I knew that the results of my study should be such that I can explain it to classmates effectively … So I read something that needed to be read. The first time I read [as part of a presentation to the class], I did not know [what needed to be read], so my presentation was ruined. [Now], it's getting better and I'm not reading anything extra, or [less than I need to]." Ali

Internalisation of learning

Peer education provides a desirable learning environment for students, especially those who present lessons for others. It can engender more confidence leading into the final examinations. Students are also able to learn consciously, with a critical thinking approach embedded in the discussions. Students were empowered to determine their most effective methods for learning.

> "Repeated readings by [the students and me] before and during [the classroom session] caused a perfect understanding, so later we would be able to remember when we needed [to], whether in exam sessions or in the clinical ward when we were faced with related topics." Maryam

DISCUSSION

Peer education promotes learning for both the student-learner and the student-teacher. Differences in post-test scores were statistically significant within nursing and midwifery (as intervention groups). Nursing students in the anatomy class and midwifery students in the physiology class (as intervention groups) scored statistically significant higher than other students on post-term exams (P=0.001). In line with our results, several studies reported that PE improves students' learning in university classes (Glynn et al., 2006; Jackson & Evans, 2012; Secomb, 2008). The PE program was effective for both anatomy and physiology courses, which is notable given that several studies have focused on physiology courses alone (Glynn et al., 2006; Jackson & Evans, 2012; Kibble, 2009).

Significant differences were not present among the intervention groups and the control groups in anatomy and physiology with respect to final examination scores. Teachers were blinded to the PE program, and the program was conducted by an educational facilitator in the current study. While peer tutoring has mostly been conducted by teachers in other studies, the current intervention involving a facilitator presenting new evidence in a medical education environment. Given this, it is possible that the specific objective of the teachers of these classes may have been underestimated during the PE program. Some students have also reported that the cognitive

taxonomy of the final questions was higher than those for the post-test exam, so item difficulty index may have been decreased in the official final examinations. However, while students who participated in the PE program did not score higher than other students in final examinations, they felt confident and prepared for final examinations as well as for clinical practice. So this paper reproduces some information from previously published studies by the authors on this subject, including feeling well prepared for examination (Graneheim & Lundman, 2004; Secomb, 2008).

The current study supports the notion that even first year students can be considered as student-teachers within an academic curriculum in a supervised program (Jackson & Evans, 2012; Ramm et al., 2015; Srivastava et al., 2015; Ten Cate & Durning, 2007; Weyrich et al., 2008). Peer education enhances the learning of the student-teachers relative to the lessons being taught (Benè & Bergus, 2014). Qualitative feedback showed that students found the tutorials to be outstanding (Kibble, 2009; Lake, 1999). "Facilitated learning" was the main theme that shows students develop and shape their own learning objectives by modifications in their learning strategies so they can internalise learning in a highly dynamic and interactive learning context. Other studies have shown that this positive perception is independent of final scores (Glynn et al., 2006; Karimi Moonaghi et al., 2010) and may be related to the nature of student-centred learning strategies welcomed by students. This social learning experience may develop students' skills in self-confidence, team work, critical thinking, and communication (Karimi-Moonaghi, Mirhaghi, Oladi, & Emami-Zeydi, 2015; Ramm et al., 2015; Stone et al., 2013). It can also be used to prepare students for post-graduate examinations that require self-confidence for optimal performance (Ahanchian & Mirhaghi, 2013).

Educational trials may not be controlled as precisely as clinical trials. It is very difficult to divide a classroom to three compartments as well as maintaining blinding in the study. It was also impossible for us to randomise students because we had a different schedule for each classroom. Students were thoroughly engaged with each other in the classroom. In this context, the John Henry effect may threaten successful blinding among participants, meaning that other students who did not take part in this study may work harder (Holden, 2001). In addition, there is no evidence that nursing, midwifery or anaesthesia students have significantly better performance in their respective courses. So, there may be no explanatory variable associated with the student type because no significant differences existed in age, total educational average, or pre-term scores in the current study. Therefore, it can be assumed that the student type did not play a role as a confounding variable in the study. It`s also worth mentioning that most studies in favour of PE have been led by teachers in their classrooms, so the findings may be subjected to bias, especially experimenter bias. Extra-curricular activities such as PE are costly and time-consuming, so it must be clear how they can produce value-added effects in educational systems. The current study tries to shed light on what would happen if PE was added to formal teacher-centred approaches in a double-blind fashion. Our results showed that PE did not increase the scores of final exams significantly in a blind design, implying that the benefits of PE as an extra-curricular activity may be limited to affective domain.

CONCLUSIONS

The PE program promoted learning (based on a facilitator-based exam scores). The PE effect was not confirmed by formal academic achievement (based on the final semester exam). In conclusion, PE did not improve learning in blind conditions in the current study. Students reacted very enthusiastically to the PE sessions, and the participants have endorsed this approach for other courses. Further blind studies may be required to evaluate effect of PE on learning and also more research is needed to investigate how to enhance the student learning experience in order to deepen learning.

Table 1.
Demographic characteristics and test scores

Variables	Nursing (n=40)	Midwifery (n=32)	Anaesthesia (n=30)	Total (n=102)
Age (years old)	20.33 ± 0.56	20.34 ± 1.09	20.36 ± 0.85	20.34 ± 0.82
Gender (male:female)	0:40	0:32	8:22	8:94
Total Average	14.28 ± 1.52	14.33 ± 1.89	14.79 ± 1.31	14.44 ± 1.59
Anatomy Pre-test*	8.60 ± 2.63	9.43 ± 3.34	9.23 ± 2.66	9.07 ± 2.89
Physiology Pre-test*	9.80 ± 3.40	10.06 ± 3.53	10.50 ± 2.62	10.08 ± 3.22
Anatomy Post-test*	13.79 ± 2.82**	10.65 ± 3.79	10.76 ± 2.90	11.80 ± 3.50
Physiology Post-test*	13.70 ± 3.44	15.81 ± 3.08**	12.36 ± 3.21	13.97 ± 3.51
Anatomy Final semester exam	12.84 ± 2.03	12.64 ± 2.62	11.94 ± 2.42	12.51 ± 2.35
Physiology Final semester exam	12.31 ± 2.45	12.03 ± 2.41	10.74 ± 2.05	11.99 ± 2.33

**Scores are out of 20*
***Significant compared with other groups*

Table 2.
Theme, categories, and sub-categories derived from qualitative data analysis

Theme	Categories	Sub-categories
Facilitated learning	Making content easy to understand	Mutual understanding Friendly and informal atmosphere Dynamic learning
	Remodelling learning strategies	Active involvement Receiving feedback Supplementary learning
	Internalisation of learning	Conscious learning Critical thinking

REFERENCES

Ahanchian, M., & Mirhaghi, A. (2013). Nursing Postgraduate Students` Experience of Preparing for Nursing Postgraduate Entrance Exam. *Iranian Journal of Medical Education, 13*(4), 270-279.

Benè, K., & Bergus, G. (2014). When learners become teachers: a review of peer teaching in medical student education. *Family Medicine, 46*(10), 783-787.

Brannagan, K., Dellinger, A., Thomas, J., Mitchell, D., Lewis-Trabeaux, S., & Dupre, S. (2013). Impact of peer teaching on nursing students: perceptions of learning environment, self-efficacy, and knowledge. *Nurse Education Today, 33*(11), 1440-1447.

Burgess, A., & Nestel, D. (2014). Facilitating the development of professional identity through peer assisted learning in medical education. *Advances in Medical Education and Practice, 30*(5), 403-406.

Glynn, L., MacFarlane, A., Kelly, M., Cantillon, P., & Murphy, A. (2006). Helping each other to learn--a process evaluation of peer assisted learning. *BMC Medical Education, 8*, 6:18.

Graneheim, U., & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today, 24*(2), 105-112.

Holden, J. D. (2001). Hawthorne effects and research into professional practice. *Journal of evaluation in clinical practice*, 7(1), 65-70.

Hsieh, H., & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288.

Jackson, T., & Evans, D. (2012). Can medical students teach? A near-peer-led teaching program for year 1 students. *Advances in Physiology Education, 36*(3), 192-196.

Karimi-Moonaghi, H., Mirhaghi, A., Oladi, S., & Emami-Zeydi, A. (2015). A Journey across an Unwelcoming Field: A Qualitative Study Exploring the Factors Influencing Nursing Students` Clinincal Education. *Health Science Journal, 9*(4), 4.

Karimi Moonaghi, H., Dabbaghi, F., Oskouie, S. F., Vehviläinen-Julkunen, K., & Binaghi, T. (2010). Teaching style in clinical nursing education: A qualitative study of Iranian nursing teachers' experiences. *Nurse Education in Practice, 10*(1), 8-12.

Kibble, J. (2009). A peer-led supplemental tutorial project for medical physiology: implementation in a large class. *Advances in Physiology Education, 33*(2), 111-114.

Lake, D. (1999). Peer tutoring improves student performance in an advanced physiology course. *Advances in Physiology Education, 276*(6 Pt 2), S86-92.

Manyama, M., Stafford, R., Mazyala, E., Lukanima, A., Magele, N., Kidenya, B., & Kauki, J. (2016). Improving gross anatomy learning using reciprocal peer teaching. *BMC Medical Education, 16*, 95.

Mirhaghi, A., Karimi-Moonaghi, H., Sharafi, S., & Emami-Zeydi, A. (2015). Role modeling: A Precious Heritage in Medical Education. *Scientific Journal of the Faculty of Medicine in Niš, 32*(1), 31-42.

Outhred, T., & Chester, A. (2010). The experience of class tutors in a peer tutoring programme: A novel theoretical framework. *Journal of Peer Learning, 3*(1), 12-23.

Ramm, D., Thomson, A., & Jackson, A. (2015). Learning clinical skills in the simulation suite: the lived experiences of student nurses involved in peer teaching and peer assessment. *Nurse Education Today, 35*(6), 823-827.

Secomb, J. (2008). A systematic review of peer teaching and learning in clinical education. *Journal of Clinical Nursing, 17*(6), 703-716.

Sevenhuysen, S., Nickson, W., Farlie, M., Raitman, L., Keating, J., Molloy, E., & Haines, T. (2013). The development of a peer assisted learning model for the clinical education of physiotherapy students. *Journal of Peer Learning, 6*(1), 4.

Sobral, D. (2002). Cross-year peer tutoring experience in a medical school: conditions and outcomes for student tutors. *Medical Education, 36*(11), 1064-1070.

Speyer, R., Pilz, W., Van Der Kruis, J., & Brunings, J. (2011). Reliability and validity of student peer assessment in medical education: a systematic review. *Medical Teacher, 33*(11), e572-585.

Srivastava, T., Waghmare, L., Mishra, V., Rawekar, A., Quazi, N., & Jagzape, A. (2015). Peer Teaching to Foster Learning in Physiology. *J Clin Diagn Res, 9*(8), JC01-06.

Stone, R., Cooper, S., & Cant, R. (2013). The value of peer learning in undergraduate nursing education: a systematic review. *ISRN Nursing*, 2013:930901.

Ten Cate, O., & Durning, S. (2007). Peer teaching in medical education: twelve reasons to move from theory to practice. *Medical Teacher, 29*(6), 591-599.

Tzu-Chieh, Y., Nichola C, W., Primal P, S., Daniel P, L., Susan J, H., & Andrew G, H. (2011). Medical students-as-teachers: a systematic review of peer-assisted teaching during medical school. *Advances in Medical Education Practice, 2*, 157-172.

Weyrich, P., Schrauth, M., Kraus, B., Habermehl, D., Netzhammer, N., Zipfel, S., & Nikendei, C. (2008). Undergraduate technical skills training guided by student tutors--analysis of tutors' attitudes, tutees' acceptance and learning progress in an innovative teaching model. *BMC Medical Education, 8*, 18.