

Comparison between the Standard Teaching and the Thai Version of Blended Teaching on Basic Airway Management in Siriraj Medical Students

Chatchaya Thalerngnawachart, M.D.¹, John Marc O'Donnell², Usapan Surabenjawong, M.D.^{3,*}

¹Department of Emergency Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand, ²Winter Institute for Simulation, Education and Research (WISER), Pittsburgh, Pennsylvania, USA, ³Siriraj Medical Simulation for Education and Training (SiMSET) center, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.

ABSTRACT

Objective: To compare the basic airway management skill score of Thai medical students who learned airway management utilizing blended peer-to-peer teaching with those who learned by the standard face-to-face approach. The learners' pre- and post-learning confidence, satisfaction with the learning, and stress levels were evaluated.

Materials and Methods: A randomized crossover study was conducted with third-year medical students in Thailand. Basic airway management was taught, including oropharyngeal and nasopharyngeal airway insertion, and bag-mask ventilation skills. After the learning, two blinded and independent experts rated the learners on performing the procedures.

Results: In total, 32 participants took part in the study. The blended group had significantly lower skill scores for oropharyngeal airway (8.69 ± 1.078 and 9.69 ± 0.479 , p-value 0.004) and nasopharyngeal airway (7.87 ± 1.408 and 9.38 ± 0.500 , p-value 0.001) management, respectively. The bag-mask ventilation skills scores were also lower in the blended group. The confidence level was increased in both groups. Learning with the face-to-face method was found to be slightly less stressful. Overall, the majority of the students preferred learning by the standard method.

Conclusion: Unlike Western students, Thai learners can learn basic airway management skills more effectively with the face-to-face instructor-led method than with the peer-oriented blended method.

Keywords: Basic airway management; self-instruction video; peer-to-peer debriefing; cultural diversity (Siriraj Med J 2024; 76: 422-428)

INTRODUCTION

Healthcare providers should possess fundamental airway management skills to save a patient's life if needed. A novel teaching method (blended teaching) has emerged. It integrates independent learning with prerecorded videos with peer-to-peer feedback from classmates to achieve the best practice. This learning has demonstrated its effectiveness in teaching simple skills to nursing students.¹ Results from this study suggested that this approach was as effective as traditional instructor-led

teaching. This blended peer-to-peer teaching method is thus attracting attention as an alternative for teaching basic skills. Other studies have demonstrated that computer-assisted instruction has the potential to significantly increase learning.² In particular, this approach could help tackle the challenge of maintaining educational quality amid a rapidly increasing number of healthcare student trainees in situations with limited instructors available. To achieve effective outcomes using a blended peer-to-peer teaching method, the students need to be

*Corresponding author: Usapan Surabenjawong

E-mail: Usapan.sur@mahidol.ac.th

Received 3 November 2023 Revised 11 February 2024 Accepted 11 February 2024

ORCID ID: <http://orcid.org/0000-0001-5975-4825>

<https://doi.org/10.33192/smj.v76i7.266174>



All material is licensed under terms of the Creative Commons Attribution 4.0 International (CC-BY-NC-ND 4.0) license unless otherwise stated.

proficient with self-directed learning and reflection. The novice learners may struggle to locate high-quality resources for observing, problem-solving, and providing feedback.³ In addition, the readiness for self-directed learning may vary between students due to differences in their maturity level, prior experience, and confidence, which may impact skill development.

Kolb's experiential learning theory, which highlights the process of adult learning, outlines four stages of learning.⁴ Although it is essential to undergo all stages to ensure effective learning, each learner may prefer learning through specific components more than others. One of the factors that affect these preferences among different countries and learners is cultural differences.⁵ Culture plays a crucial role in shaping our way of thinking and decision-making. It acts as a powerful socializing force that affects how we process information and perceive the world around us. It is believed that differences in cultural socialization affect learning preferences and create diverse learning styles. Parkhouse et. al. conducted a systematic review and recommended that teachers increase awareness of cultural diversity and create culturally responsive lessons.⁶ It would be advantageous for students of diverse backgrounds to have access to equitable high-quality education. However, the current research lacks sufficient evidence in theoretical approaches, educational designs, and data collection methods to conclude the most effective learning methods for students of different cultures.

A study by Chayakonvikom et al. indicated that Thai learners could not effectively self-study outside training classes despite being provided with a computer and user manual for self-learning.⁷ Therefore, as part of the implementation of the blended peer-to-peer method in the curriculum, the research team sought to clarify whether cultural diversity, especially considering the learning preferences of Thai students, would affect the effectiveness of this learning style approach.

This study aimed to compare the effectiveness of a blended peer-to-peer educational approach with standard expert instruction among Thai medical students for basic airway management regarding their skills, satisfaction with the learning, confidence levels, and stress levels.

MATERIALS AND METHODS

The study design was a randomized crossover trial. The participants were third-year medical students with no prior airway management experience. The exclusion criteria included physical disabilities, such as hand or coordination problems that could affect their ability to perform the required procedures. Once the participants had contacted the principal investigator to volunteer, they

were coupled and randomly assigned to one of two groups using computerized blocked randomization, in blocks of 8 in a 1:1 ratio. In the study, a group of students was divided into two halves - labeled as group A and group B. Group A was assigned to learn airway equipment insertion skills with blended method, while they were taught bag-mask ventilation by standard teaching. On the other hand, group B learned airway insertion from the staff and bag-mask ventilation with their peers in a crossover method.

In the standard instructor-led teaching method, experienced emergency physicians with proven expertise in basic airway management acted as instructors. They were trained with a 2-hour session to standardize their teaching techniques before the study. During the instructor-led teaching with a timeframe of 30 minutes, the participants could practice as much as they needed.

The peer-to-peer learning method involved self-instruction videos to guide the students in learning all the steps needed for developing each airway management skill and in using a debriefing model for conducting a peer review. After watching the videos, the participants received a checklist for practicing each skill and for reflecting on each skill. This group also had 30 minutes to perfect their skills.

The participants were scheduled in groups of 4 to attend the learning sessions at the Siriraj Medical Simulation for Education and Training (SiMSET) center. After completing a pre-course attitude and confidence survey, all the participants were directed to practice basic airway management in the order of the assigned group. After each session, participants were asked to demonstrate skills with 2-angle video recordings conducted to capture their performance. The videos were shot with angles that recorded the skills but did not include images that would reveal the participants' identity. Confidence, stress level, and satisfaction surveys were conducted again after completing the learning process, as shown in Fig 1.

As noted, two blinded expert observers later viewed and rated these videos. These assessors were professional emergency medicine physicians with airway management experience of more than ten years. The checklists were developed with reference to the pre-hospital trauma life support (PHTLS) course.⁷ For content validation, a modified Delphi process was conducted using an electronic survey system. The content agreement with oral airway and nasal airway management, and bag-mask ventilation skills ranged between 0.82 and 0.98.

The pre and post-course surveys were created to evaluate the learners' knowledge confidence, stress during class, and satisfaction. Each survey was rated

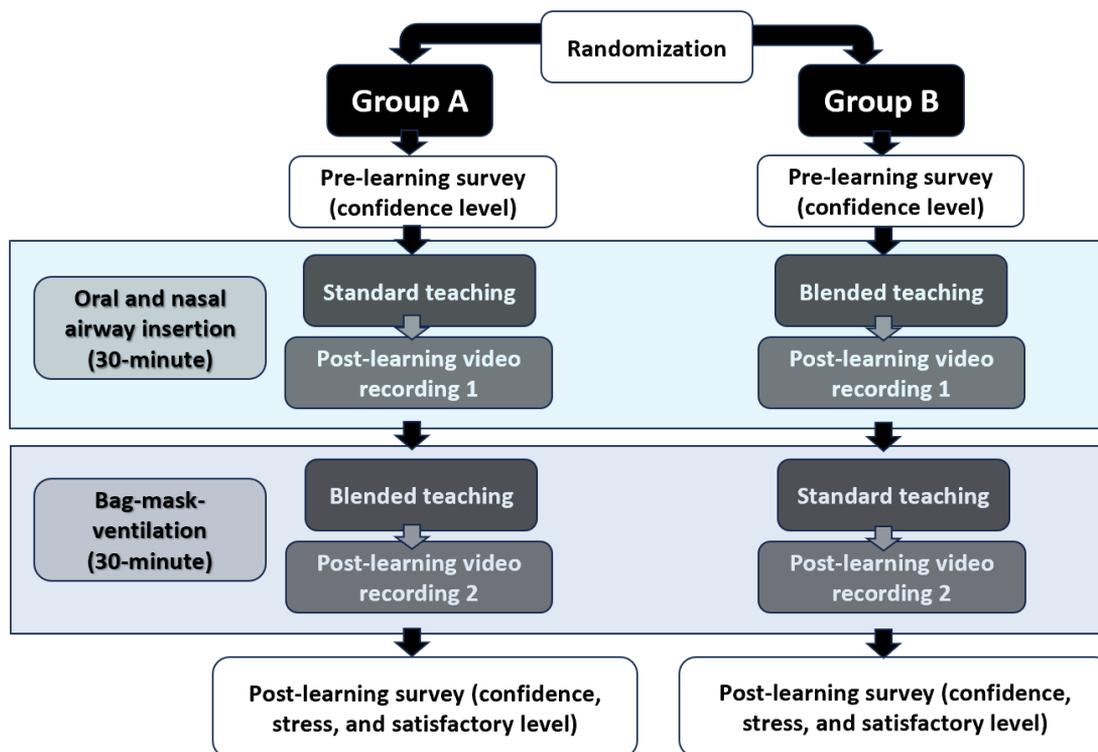


Fig 1. Flow of the study

using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An additional item was also asked after both groups had completed the learning process. This item queried the participants with respect to their preferences (choosing between standard training and blended peer-to-peer teaching).

Statistical analysis

Based on data from a previous study¹, the researcher hypothesized that the students who learned with blended peer-to-peer teaching would be likely to score 1.5 points higher (SD = 1) than those who did not. With a desired power of 90% (1-β) and 0.01 type I error (α), at least 15 students per group were needed.

The Fisher exact test was used for analyzing the categorical data. To compare the pre-and post-confidence data, the Wilcoxon signed-rank test and the Mann-Whitney U tests were used. Skill assessment inter-rater reliability was demonstrated using Cohen's kappa coefficient. Finally, Cohen's d was used to calculate the skill improvement effect sizes. Statistical analyses were done through IBM SPSS™ Statistics 25.

RESULTS

The 32 third-year medical students in the study cohort were randomly assigned into two groups, Group A and Group B, in a 1:1 ratio. The median age was 20 and 50% of the participants were female. The two groups had

no significant differences related to age or grade point averages (GPAs) with Group A having significantly more male participants (p-value = 0.032, Table 1).

Upon comparing the skill rating scores between the two groups, the mean oropharyngeal and nasopharyngeal airway scores were 8.69 ± 1.078 and 7.87 ± 1.408 in the blended peer-to-peer instructional group. Meanwhile, in the standard group, the mean scores were 9.69 ± 0.479 and 9.38 ± 0.500 respectively. The mean scores for bag-mask ventilation for the blended peer-to-peer and standard instructional groups were 14.25 ± 1.125 and 15.25 ± 1.065 respectively. The scores of the students in the standard teaching group were significantly higher than those in the blended peer-to-peer group (as shown in Table 2). The difference in skill rating scores was substantial, with a large effect size. Specifically, Cohen's d values were 1.198 (p-value = 0.004) for oropharyngeal airway management, 1.429 (p-value = 0.001) for nasopharyngeal airway management, and 0.913 (p-value = 0.012) for bag-mask ventilation. The inter-rater reliability scores for oropharyngeal and nasopharyngeal management skills, and bag-mask ventilation skills were 85.62%, 88.75%, and 80.86%, respectively.

All students reported higher confidence levels after learning each skill. The two learning methods displayed no statistically significant difference in confidence levels (Fig 2). Stress levels were slightly higher in the blended peer-to-peer group (2.34 ± 1.066 and 2.28 ± 0.924 ,

TABLE 1. Baseline demographic characteristics of the participants.

(Group A: oropharyngeal and nasopharyngeal airway skills by blended peer-to-peer learning with bag-mask ventilation skills taught by the standard instructor-led method; Group B: standard instruction for oropharyngeal and nasopharyngeal airway skills taught by the standard instructor-led method followed by bag-mask ventilation skills instruction by blended peer-to-peer learning.)

	Total N=32, No (%)	Group A N=16, No (%)	Group B N=16, No (%)
Age (years);			
Mean ± SD	20.22 ± 0.706	20.25 ± 0.683	20.19 ± 0.750
Male	16 (50)	11 (69)	5 (31)
Grade point average (GPA)			
3.50–4.00	27 (84.0)	12 (75.0)	15 (93.8)
3.00–3.49	3 (10.0)	3 (18.8)	0 (0.0)
2.50–2.99	2 (6.0)	1 (6.2)	1 (6.2)
< 2.50	0 (0.0)	0 (0.0)	0 (0.0)

TABLE 2. Procedural scores according to the learning method.

	Total (Mean ± SD)	Blended peer-to-peer (Mean ± SD)	Standard instructor-led (Mean ± SD)	p-value	Effect size (Cohen’s d)
Oropharyngeal airway (Total = 10)	9.19 ± 0.965	8.69 ± 1.078	9.69 ± 0.479	0.004	1.198
Nasopharyngeal airway (Total = 10)	8.63 ± 1.289	7.87 ± 1.408	9.38 ± 0.500	0.001	1.429
Bag-valve mask ventilation (Total = 16)	14.75 ± 1.191	14.25 ± 1.125	15.25 ± 1.065	0.012	0.913

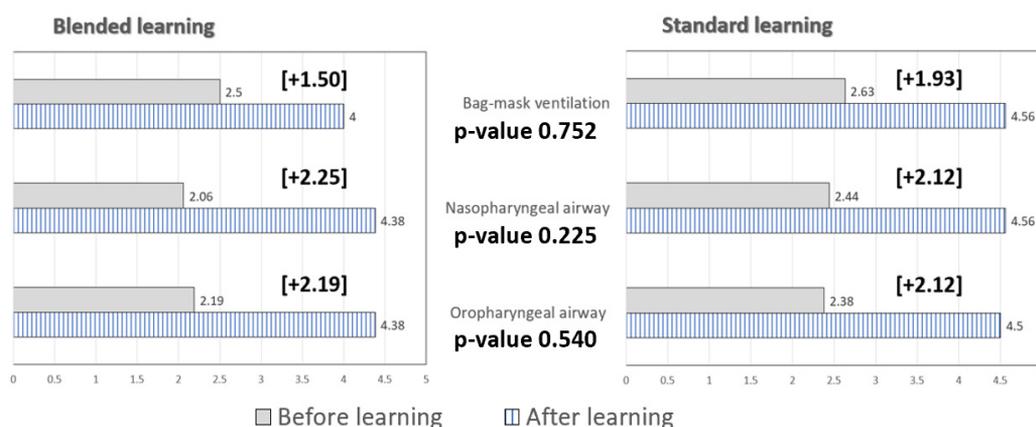


Fig 2. Confidence levels before and after skills training according to the learning method [using Likert scale from 1 (strongly disagree) to 5 (strongly agree)] and p-value for the difference in post-learning confidence between the blended peer-to-peer and standard teaching groups

p-value = 0.70). Additionally, the students reported higher satisfaction level for the standard instructor-led teaching (4.59 ± 0.560 vs 3.72 ± 0.729 , p-value < 0.001). The order of the learning method did not influence either stress or satisfaction scores, as indicated in Fig 3.

After each learning session, the participants were given the option to choose their preferred method with 90.6% of the participants (29/32) indicating that the standard instructor-led teaching was their preferred method.

DISCUSSION

The results show a divergence when compared to a previous study,¹ yet the study design and materials were nearly identical except for the professional domain (nursing students vs. medical students) and the gender composition with this study enrolling more male students.

Therefore, the difference could be the result of several factors including cultural diversity, professional domain, and gender. The earlier study was conducted in the USA whereas this study was conducted in Thailand. While some differences have been identified between genders in the area of airway-related motor skills for intubation^{8,9}, there is little literature concerning the attainment of the more basic airway skills evaluated in these two studies. Further, there is a paucity of literature comparing airway skill attainment by medical vs. nursing students. The authors speculate that culture may be a key factor in the different outcomes between the two studies. Experiential learning theory emphasizes that

individuals have different approaches to learning based on their learning style preferences. The Kolb Learning Style Inventory is a tool designed to evaluate how individuals exhibit various learning styles. This tool separates the four modes of learning which are concrete experiences, reflective observation, abstract conceptualization, and active experimentation. The learning style is not a psychological trait but a dynamic state resulting from interaction between the person and the environment. Thus, cultural differences can affect the effectiveness of the same learning method.

In particular, blended peer-to-peer teaching is considered a form of self-directed learning. In a previous study in Thailand, the author demonstrated that despite being provided with computers and a manual for instruction, Thai students struggle with self-studying, and this style may not suit Thai learners, unlike their Western counterparts.¹⁰ Differences between traditional Thai instruction and student-centered learning thus create challenges for curriculum management.¹¹ Due to the close connection between traditional instruction and culture in Thailand, teachers and students often resist change in their routine methods of teaching.¹² However, for better student-centered learning, teacher training programs should be reformed. The effective preparation of students to allow them to thrive in life after graduation is necessary. Self-directed, experiential learning opportunities are an excellent way for students to explore their interests and develop their definition of what it means and what is required to be a professional.¹³

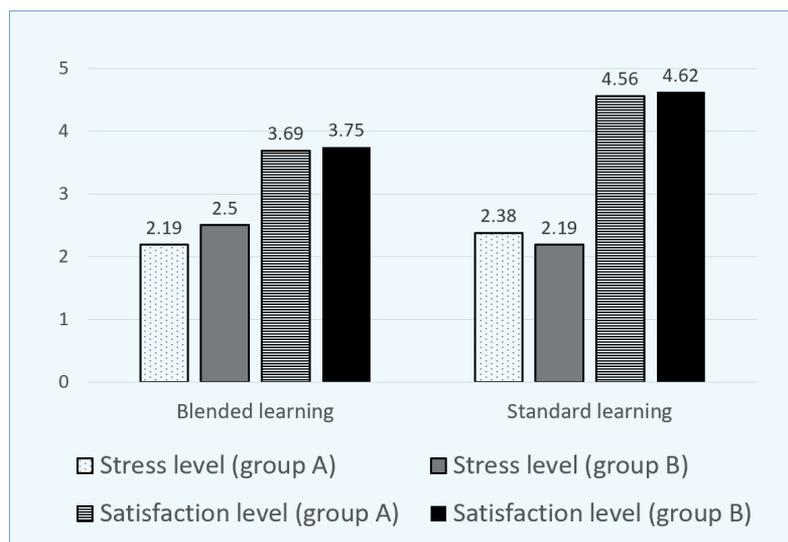


Fig 3. Stress and satisfaction level of both teaching methods comparing two groups.

(Group A: oropharyngeal and nasopharyngeal airway skills taught by blended peer-to-peer learning with bag-mask ventilation skills taught by the standard instructor-led method; Group B: standard instruction for oropharyngeal and nasopharyngeal airway skills taught by the standard instructor-led method followed by bag-mask ventilation skills instruction taught by the blended peer-to-peer method.)

Although the procedural scores between the 2 teaching methods are statistically significant, the difference score is between 1-2 points. From an educational outcomes perspective, having scores that are 1-2 points lower on a test for third-year medical students doesn't mean this blended peer-to-peer method is entirely ineffective. If there is a process that identifies the area where blended learner groups are inferior, the instructor could work to improve that area in order to improve blended learning outcomes. From this study, the scores of blended peer-to-peer learning were inferior when participants attempted more complex and detailed steps, for example, the size measurement of devices and the insertion process. It is possible that more simple procedures are better suited for teaching by the blended method. Moreover, improving the quality of the instructional videos for better visualization and clearer understanding might be a solution for improving blended learning.

Before implementing the new self-learning method, instructors should assess learners' readiness, which involves considering their autonomy, organization, self-discipline, effective communication skills, constructive feedback acceptance, and self-reflection. Moreover, selecting the proper school year to match with the appropriate self-learning method is also essential. For example, novices should not be assigned to learn complex procedures alone. During the curriculum continuum, the complexity of self-learning should be added gradually.

The standard teaching method was deemed the most preferable by the vast majority of students because it allows students to ask the teacher questions when they are unsure or hesitant about an aspect. Also, the teacher can quickly correct any missed procedural steps and help build the student's confidence. On the other hand, blended peer teaching is more suitable for simple procedures and can help students retain knowledge for longer periods. However, the learning process may fail if the instruction video is not detailed enough or the peers are not confident about giving proper feedback.

Although this study found that the blended peer method is not practical for teaching airway skills to third-year medical students in Siriraj Hospital, this method might be useful if we choose a higher year with students more ready to adopt this learning approach instead of traditional teaching methods.

Limitations

The present study was done in a single medical school with a small sample size. As such, it might not represent the normal characteristics of all medical students across Thailand. For example, since the enrollment process

asks for volunteers, only active learners with high GPAs participated. The generalization of the results could thus be limited.

The ratio of students to teachers in this study was 2:1. Normally, the ratio in Thai classrooms is much higher, and consequently, the effectiveness of face-to-face instructor-led teaching in real situations will not be as good as shown in this study.

Moreover, the students are familiar with the face-to-face expert-led method while they have little experience in self-directed peer-to-peer learning. Their mindset of face-to-face teaching as the gold standard of teaching and their familiarity may have led to some bias in the students' preferences for instructor-led sessions.

Lastly is the statistical bias of cross-over design, which is the carryover effect and potential for contamination.¹⁴ Because, in this study, there is no washout period between 2 learning sessions, and the post-learning survey was done immediately after the second teaching.

CONCLUSION

Contrary to a previous study with US nursing students, Thai medical students learn basic airway management more effectively through the instructor-led method than the new blended peer-to-peer method. Although the stress and confidence levels were not different, students preferred to learn with the teacher. Cultural diversity appears to be a possible contributing factor among several other variables influencing the outcomes.

ACKNOWLEDGMENT

Funding

There was no specific grant obtained from any funding agency in the public, commercial, or not-for-profit sectors.

Competing interests

None declared.

Ethics approval

Si 399/2021, approved under the Siriraj Institutional Review Board.

Provenance and peer review

Not commissioned; externally peer-reviewed.

Data sharing statement

No additional unpublished data.

REFERENCES

1. Surabenjawong U, Phrampus PE, Lutz J, Farkas D, Gopalakrishna A, Monsomboon A, et al. Comparison of Innovative Peer-to-

- Peer Education and Standard Instruction on Airway Management Skill Training. *Clin Simul Nurs.* 2020;47:16-24.
2. Limawongpranee S, Suwutho S, Pittayawaranant B, Pittayawaranant S, Surinwont N. The effectiveness of using computer-assisted instruction (CAI) to support self-studying of the third-year Medical students taking the Medical Platyhelminthes course, Faculty of Medicine Siriraj Hospital, Mahidol University. *Siriraj Med J.* 2004;56(3):117-22.
3. Robinson JD, Persky AM. Developing Self-Directed Learners. *Am J Pharm Educ* 2020;84(3):847512.
4. Wijnen-Meijer M, Brandhuber T, Schneider A, Berberat PO. Implementing Kolb's Experiential Learning Cycle by Linking Real Experience, Case-Based Discussion and Simulation. *J Med Educ Curric Dev.* 2022;9:23821205221091511.
5. Joy S, Kolb DA. Are there cultural differences in learning style? *Int J Intercult Relat.* 2009;33:69-85.
6. Parkhouse H, Lu CY, Massaro VR. Multicultural Education Professional Development: A Review of the Literature. *Review of Educational Research.* 2019;89(3):416-58.
7. Chayakonvikom M, Fuangvut P, Cannell S. Exploring Education Culture by Employing Hofstede's Cultural Dimensions to Evaluate the Effectiveness of the Current ERP Training Approach in Thailand. *J Educ Train Stud.* 2016;4(10):78-89.
8. Choi H, Hwang W, Moon YE, Chae MS. Gender differences among medical students learning tracheal intubation: A prospective cohort study. *Eur J Anaesthesiol.* 2021;38(3):309-11.
9. Gaszynski T. A comparison of intubation performance between male and female medical students in a manikin model. *Eur J Anaesthesiol.* 2022;39(5):480-2.
10. McSwain NE, Pons PT. PHTLS: Pre-hospital trauma life support (8th ed). Burlington, MA: Jones & Bartlett Learning, (Chapter 8); 2016.
11. Sessoms J. Exploring the Culture Gap between Western Student-Centered Learning and Traditional Thai Education. Proceedings of 14th International Conference on Humanities and Social Sciences 2018 (IC-HUSO 2018) 22nd-23rd November 2018, Faculty of Humanities and Social Sciences, Khon Kaen University, Thailand.
12. Sarobol N. Implementing Cooperative Learning in English Language Classroom: Thai University Students' Perceptions. *The International Journal of Interdisciplinary Social Sciences.* 2012;6(10):111-22.
13. Loeng S. Self-Directed Learning: A Core Concept in Adult Education. *Hindawi Education Research International.* 2020;3816132. <https://doi.org/10.1155/2020/3816132>
14. Leppink J, Kok EM, Bergman EM, van Loon MH, de Bruin AB. Four Common Pitfalls of Quantitative Analysis in Experimental Research. *Acad Med.* 2016;91(6):891.