STUDENT-CENTERED LEARNING IN RELATION TO CLASS PERFORMANCES AND SOFT SKILLS: A META-ANALYSIS AND SYSTEMATIC REVIEW

Elisabeth Rukmini, Cindy, Pricilia Tanoto
Medical Education Unit, School of Medicine, Atma Jaya Catholic University of Indonesia,
Jakarta – INDONESIA

ABSTRACT

Background: Studies showed that SCL improved quality of medical education through knowledge acquisition, class performance, students' attitude and soft skills. Although research about SCL and its impact has been widely known, overall correlation of SCL to the class performances has not yet been established. Strong correlation between SCL to class performances would serve the purpose of teaching and learning and more importantly would answer the skepticism of institution or faculty members in implementing SCL. In addition, learning through systematic review of others' studies, how SCL influenced soft skill aspects would be benefited for medical educators. Soft skills such as learning motivation, communication skills, and teamwork may lead educators to the favor of SCL approaches. This review was to find the correlation of student-centered learning to the students' performances and soft skill aspects in medical education.

Method: To find the correlation of the SCL and class performances, we used meta-analysis. We also performed a systematic review to qualitatively find the relationship between SCL and other aspects, such as teamwork, communication skills, and learning motivation. Literatures were filtered from databases of: Proquest, Springerlink, Biomed Central (BMC) open, BMJ open, and Google Scholar. The inclusion criteria were published empirical articles (2000-2013) reported SCL's effect on class performances or other aspects (learning motivation, teamwork, communication skills). We utilized PRISMA protocol to filter the inclusion articles. By reading abstracts and further snowballing searching, we found 12 articles for the meta-analysis and 33 articles for the systematic review.

Results: Among 12 articles of the meta-analysis, 9 articles showed positive correlation between SCL and class performances. Three studies reported that SCL had no effect on the class performances. None of the articles reported any negative impact. We utilized the *Comprehensive Meta-Analysis* software to analyze the data and found r = 0.46 and 95% CI: 0.32 - 0.57. It showed a statistically significant correlation between SCL and class performances. On the systematic review, we found that SCL improved communication skills, team work, and learning motivation.

Conclusion: From the meta-analysis we found that SCL improved class performances about 46%. It was showed that SCL methods were superior in improving soft skills such as communication skills, teamwork, and learning motivation.

Keywords: student-centered learning, correlation, class performances, teamwork and communication, learning motivation

ABSTRAK

Latar belakang: *Riset tentang SCL melalui penguasaan pengetahuan, performa kelas yang meningkat, sikap dan keterampilan mahasiswa; telah meningkatkan kualitas pendidikan kedokteran. Meskipun riset tentang SCL dan dampaknya telah banyak diketahui, korelasi gabungan SCL dengan performa kelas belum dapat diidentifikasi. Korelasi kuat antara SCL dengan performa kelas dapat meyakinkan para pihak yang terlibat dalam proses pembelajaran dan*

akan mampu menjawab sikap skeptik institusi sekaligus pengajar dalam mendorong implementasi SCL. Selain itu, mempelajari melalui penelusuran sistematik karya ilmiah periset lainnya, tentang kaitan SCL terhadap aspek semacam motivasi belajar, keterampilan berkomunikasi, dan kerja kelompok akan berguna bagi pendidik bidang kedokteran. Artikel reviu ini bertujuan untuk menemukan korelasi antara student-centered learning *dengan performa akademik mahasiswa dan aspek-aspek lainnya dalam pendidikan kedokteran.*

Metode: *Untuk menemukan korelasi antara SCL dengan performa akademik digunakan meta analisis. Kami juga melakukan tinjauan sistematis untuk menemukan relasi antara SCL dengan aspek lainnya secara kualitatif. Aspek-aspek tersebut misalnya:* teamwork, communication skills, *dan* learning motivation. *Sumber literature disaring dari beberapa* database: Proquest, Springerlink, Biomed Central (BMC) open, BMJ open, *dan* Google Scholar. *Kriteria inklusi berupa artikel empiris yang diterbitkan dari 2000-2013 yang melaporkan dampak SCL terhadap performa akademik dan aspek-aspek lainnya (*learning motivation, teamwork, communication skills*). Proses filtrasi artikel menuruti protokol* PRISMA, *setelah membaca abstrak dan melakukan pencarian lebih lanjut melalui snowballing, kami menemukan 12 artikel untuk meta-analisis dan 33 artikel untuk tinjauan sistematis.*

Hasil: *Dari 12 artikel untuk meta analisis, ditemukan 9 artikel dengan korelasi positif antara SCL dan performa akademik. Tiga penelitian melaporkan bahwa SCL tidak memiliki dampak terhadap performa akademik. Tidak satu pun artikel melaporkan akibat negatif dari SCL terhadap performa akademik. Untuk meta analisis, digunakan* Comprehensive Meta-Analysis software. *Analisis data menghasilkan r = 0,46 dan 95% CI: 0,32 – 0,57. Hasil menunjukkan korelasi antara SCL dan performa akademik bermakna. Dalam tinjauan sistematis, ditemukan bahwa SCL meningkatkan keterampilan komunikasi, team work, dan* learning motivation.

Kesimpulan: *Melalui meta analisis kami menemukan SCL meningkatkan performa kelas sebanyak 46%. Literatur telah menunjukkan bahwa SCL meningkatkan penguasaan* soft skills *termasuk di antaranya* communication skills, teamwork, *dan* learning motivation.

Kata kunci: *student-centered learning, correlation, class performances, teamwork and communication, learning motivation*

INTRODUCTION

Student-centered Learning (SCL) is active learning approaches in which students become the focus of teaching and learning. This methods comprise of group discussions, problem solving using real cases, more egalitarian students-teachers relationship. In medical and health professional education, SCL as teaching and learning methods varied of Problem Based Learning (PBL), Skills Lab (SL), Peer-assisted Learning (PAL), e-learning, team-based learning, flipped teaching, and many more.

Reasons of implementing SCL or active learning were varied. Researches showed that SCL would improve quality of medical education. In addition, SCL showed also interesting impacts, especially in relation to students' attitude and soft skills. Two areas in which medical and health professional education would love to improve to ensure the future health services. On the relation of SCL and students' performances, there were some discrepancies. Some studies reported that there were no differences in students' class performances with or without SCL.[1-8] On the other hand, other studies reported positive effect.[9-16] Moreover, prior studies also showed aspects of soft skills and attitude that were developed through the SCL.[17-19]

Although research about SCL and its impact has been widely known, overall correlation of SCL to the class performances has not yet been established. Identifying the overall correlation would be important for medical and health professional education. Strong correlation between SCL to class performances would serve the purpose of teaching and learning. In the end, it would also answer the skepticism of institution or faculty members in implementing SCL. Moreover, to learn how SCL influenced other aspects, such as learning motivation, communication skills, and teamwork; through systematic review

of others' studies would be benefited for medical educators.

In order to find the overall effect of SCL toward class performances, we conducted a meta-analysis. In addition, to investigate aspects of teamwork, communication skills, and learning motivation; we performed a systematic review using the following research questions:

1. What is the overall correlation of SCL to class performances?
2. What are the line of reasoning of SCL and aspects of teamwork, communication skills, and learning motivation?

METHODS

Research design

This research did not involve human subjects, therefore it was exempt the ethical clearance. We used meta-analysis and systematic review to find the effect of SCL to class performances and other aspects including learning motivation, teamwork, and communication skills. Using meta-analysis, we would like to find a positive or negative or no significant correlation between SCL and class performances. We utilized the systematic review to find SCL's effect on aspects of learning motivation, teamwork, and communication skills.

Data sources and search strategy

BMC, BMJ open, Google Scholar, Proquest, and SpringerLink were searched from 2000 to 2013 by C and PT. The inclusion criteria were: (1) articles that performed empirical studies (primary articles); (2) articles that reported SCL's effect on class performances or other aspects (learning motivation, teamwork, communication skills); (3) articles which were published in 2000 until 2013, (4) articles were published in peer reviewed journals, (5) the participants of the studies were in the field of health and medicine, (6) articles had to report the correlation coefficient (only for meta-analysis). Key words used were student centered learning, self directed learning, personalized learning, student centered, student centered instruction, class performance, performance, achievement, academic achievement,

grade performance academic. These key words were selected since class performances could be measured from the improvement of pre-post test scores or midterm test or end test. It could also be measured from GPA.

Additionally, for the systematic review, we also add one more column in the advance search menu by type in key words: teamwork, collaborative work, learning motivation, collaborative learning, group work, motivation theories, motivation to learn, communication skills. The articles about SCL and its effect on other aspects (learning motivation, team work, communication skills) could be both quantitative and qualitative research in nature. Learning motivation could be assessed from the class attendance, doing the presentation, and desire to learn something new. While teamwork could be assessed from performance on working in a team and better communication skills upon working in a team.

Study selection and data extraction

Searched results were screened by all authors (ER, C, PT). The title and abstract of all results were screened. Full papers were then retrieved for further review if relevant. For the meta-analysis, all included articles had to report correlation number of SCL to class performances. The correlation included positive or negative or no effect. For the systematic review, the articles included should report about the effect of SCL toward one of the key aspects: teamwork, communication skills, or learning motivation. We found 109 articles from Google Scholar, BMC and BMJ open (open accessed search engine) and 1026 articles from Proquest and SpringerLink (closed accessed search engine) by reading the title and footage.

Two strategies were administered. The first one, from the open accessed search engine, upon reading the full text, we included 4 articles for the meta-analysis and 4 articles for the systematic review. The references in these articles were also reviewed for further appropriate papers and we found 5 articles for the systematic review. Therefore, from the open accessed search engines we found 4 articles for the meta-analysis and 9 articles for the systematic review.

The second strategy, from the closed accessed search engine, we excluded 918 articles (included articles were 108 articles) upon reading the abstract. Next step was to search related bibliography from those articles and it was found only 35 articles. At this step, there were 143 full text articles (108+35 articles). Upon reading the full-text articles, we found 8 articles for meta-analysis and 24 articles for systematic review.
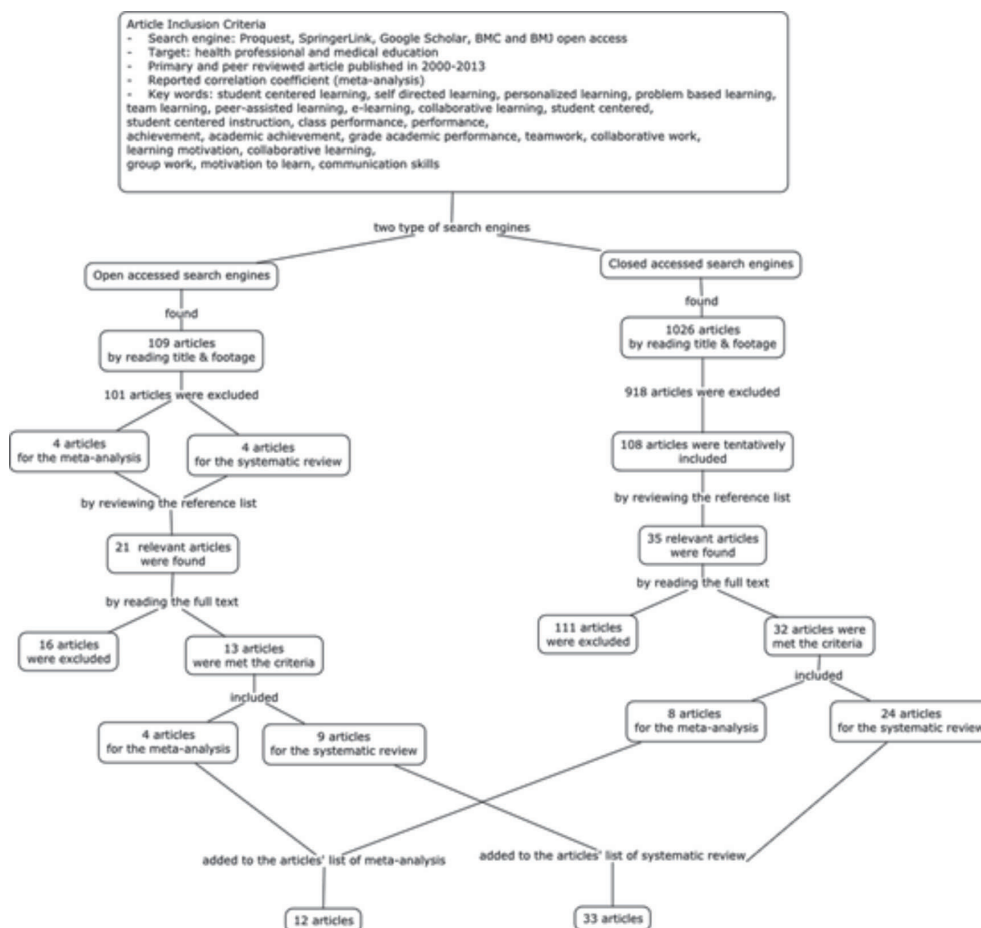

Figure 1. Study selection flowchart

Overall, from both open accessed and closed accessed search engines, we found 12 articles for the meta-analysis and 33 articles for the systematic review (Figure 1).

To remove duplicates and manage the bibliography of the selected literatures, we utilized Zotero™. A data extraction table was created in order to gather the required data for the review. Included studies were reviewed by all authors independently. Study objective, context, method (study design, SCL intervention details, data collection and analysis), and results (correlation coefficient for the meta-analysis, impact on students for the systematic review) were retrieved. Following independent data collection tables were merged into one and any discrepancies were resolved by consensus.

Meta-analysis

We use Comprehensive Meta-Analysis (CMA)™ to measure the overall correlation between SCL and class performances. We measured the positive correlation and no effect or negative correlation between SCL and class performances. We used 95%

confidence interval which meant that the effect of SCL on the class performance would be statistically significant if the probability (p) is less than 0.05 (5%) and if the confidence interval did not pass the middle line (or 0 value). Additionally, the research was practically significant if the overall correlation coefficient reached the researchers' expectation. Researchers' expectation for this study was that the combined correlation ≥ 0.5.

There were four possibilities in summing up the research results: 1) they might be statistically and practically significant, 2) they might be statistically significant, but practically insignificant, 3) they might be statistically insignificant but practically significant ,4) they might be statistically and practically insignificant. For the first and second possibilities, we would conclude that SCL could improved class performances but didn't reach researchers' expectation. Meanwhile, for the last two possibilities, the final conclusion would be no significant contribution of SCL to class performances.

Prior to the determination of the analysis model, we performed the heterogeneity test. The heterogeneity test would show us the value of I^2 and p. In the case when I^2 value was large and p values less than 0.05, we could say that the data were heterogenous and thus the random effects model should be utilized as the analysis model. For this study, we found that $I^2 = 0.89$ and $p < 0.05$ (0.000) therefore we utilized random effects model.

RESULTS

From the selection process, we found there were 45 articles that matched with the inclusion criteria. Twelve articles reported the correlation values from their studies, hence those would be our sources for the meta-analysis. The rest of the included articles (33 articles) would cover the systematic review. Most studies reported that class performances and other aspects improved by implementing SCL approaches. There were no studies reported that SCL aggravated class performances. Overall, there were only three studies[6-8] which reported that SCL had no significant effect on class performances.

Study Quality

Articles for meta-analysis were published majority in BMC*Medical Education*, *MedIcal Education*, *American Journal of Pharmaceutical Education*, *Journal of Nursing Education*, *Nurse Education in Practice*, *Pharmacy Education*, *Medical Teacher*. Most of the participants in those articles were students from pharmacy and nursing, only small portion of the articles investigated students from the school of medicine.[8,11,12,20] Most studies applied quantitative method with pre- and post-test research design to compare before and after the SCL intervention. The participants of the studies were selected randomly, total population, or as *convenience sampling*.

Some articles were excluded because they were not match with all of the inclusion criteria. It was quite difficult to find studies which investigated and reported the correlation between SCL and class performances. Researchers used to investigate and compare pre- and post- tests quantitatively from their specific participants or based on the program evaluation or in-depth interview (qualitative in nature). Table 2 were some examples of excluded articles. Studies from some researchers[21-23,2,15] were excluded because the writers did not report the coefficient correlation between SCL and class performances. However, these articles reported that there were positive or increasing class performances upon their SCL intervention. The articles were excluded from the systematic review as well because they did not mention other aspects affected by SCL. For example,[21] implemented PBL to asses nursing students' attitude and knowledge towards alcohol-related problems. The students were divided into several groups. The researchers investigated pre- and post-test and showed that all groups' knowledge and attitude towards alcohol drinkers were improved.

Letassy's *et al.*[22] article was about the Team Based Learning (TBL) method in endocrine topic. The participants were the third year pharmacy students. They were divided into 20 groups. The result of this study were students who were in TBL group had higher score than the traditional class in year 2003. In TBL, there were 23% of students received grade A,while in the traditional class only 9.5% of students received the same. Moreover, in TBL class, there

were no students failed in the class. This research showed that TBL has helped students to achieve higher academic performance. Similar to this study was the study by Reddy[2] They researched on active learning which included fast thinking and case based learning. The participants were 114 pharmacy students. Fast thinking was assesed by answering questions from the lecturers in the class activities. The students had to write down their answers and to discuss about it. In this method (active learning), participants' examination scores were higher than traditional class.

Huckstadt and Hayes[23] researched about online learning method to 73 nursing students. All of them had a significant enhancement on their pre-test and post test scores. The students said that online learning was a time saving, innovative, and practical approach and they could learn more comparing to studying in traditional class. Similar to this study, Moazami et al.[15] compared a virtual lecture to traditional lecture and assessed participants' knowledge by post tests. The virtual lecture group resulted higher post test scores than the traditional method.[15] concluded that virtual learning could help students to store some

information in the long term memory rather than traditional lecture.

Meta-Analysis

Abstraction table (Table 1) showed the 12 articles included in this meta-analytic study. The articles not only reported correlation values between SCL and class performances but also other soft skills aspects those affected by SCL such as communication, critical thinking, and teamwork. Nine of the 12 articles reported the increased class performances using any type of SCL. Several of these articles performed qualitative studies by doing observation, reflective writing, and interviews. Each articles reported the variety of time allocation and intervention. For examples, the study by Martineau et al.[12] and by Nkenke et al.[8] were cross sectional in nature, while research of Varghese, Faith, and Jacob[11] allocated one year intervention and Nieder et al.[20] used up to 9 weeks of study. Nieder et al.[20] implemented TBL, Martineau et al.[12] applied skills lab, while Varghese, Faith, and Jacob[11] and Nkenke et al.[8] implemented e-learning as the intervention.

Table 1. Abstraction data

No	Author	Research Goal	Year	Participant	r	Class Performance
1	Bollmeier[6]	To see the duration and how often students accessed the online material (audio and power point) using comprehensive approach versus the class performances.	2010	195	0,033	No differences
2	Franic[25]	To see the effectivity of WebCT (online quizzes to trigger the exam questions)	2004	121	0.312	Increase
3	Freeman[25]	Online learning and WebCT (quizzes those similar with exam questions)	2006	124	0.321	Increase
4	Gardner[27]	To see the difference between skills lab training using Standardized patient versus the traditional learning.	2001	73	0.58	Increase

5	Johnston[10]	Compared e-learning (online video lecture) and traditional (face to face) learning	2013	499	0.452	Increase
6	Kirton[7]	To see the correlation of OSCE (there were stations with patient and without patient) and class performance.	2011	39	0.6	No differences
7	Martineau[12]	Compared group learning to the individual learning. Tutor facilitated and monitored the learning proceses.	2013	185	0.37	Increase
8	Nieder[20]	To see the effectivity of TBL by comparing IRAT and TRAT result	2004	95	0.8118	Increase
9	Nkenke[8]	Compared e-learning (online video lecture) to TCL approaches.	2012	42	0.27	No differences
10	Salinitri[9]	Compared the PBL assessments to the traditional written test.	2012	60	0.281	Increase
11	Varghese[11]	To see the effectivity of e-learning in one year by comparing between classes.	2012	60	0.66	Increase
12	Zingone[26]	Compared TBL to the Mixed Active Learning approaches.	2010	64	0.57	Increase

We analyzed these 12 studies using CMA (Figure 2). The combined correlation was 0.46 with CI (95%) = 0.325-0.578. CI of this study showed that the data was statistically significant. However, the value of combined correlation (0.46) did not meet the expected or practical value set in the method (0.5).

It can be concluded that this study was statistically significant but practically insignificant. The combined correlation showed that the correlation between SCL and class performances was 46%. It meant that 46% from 100 students would improve their class performance by implementing SCL.
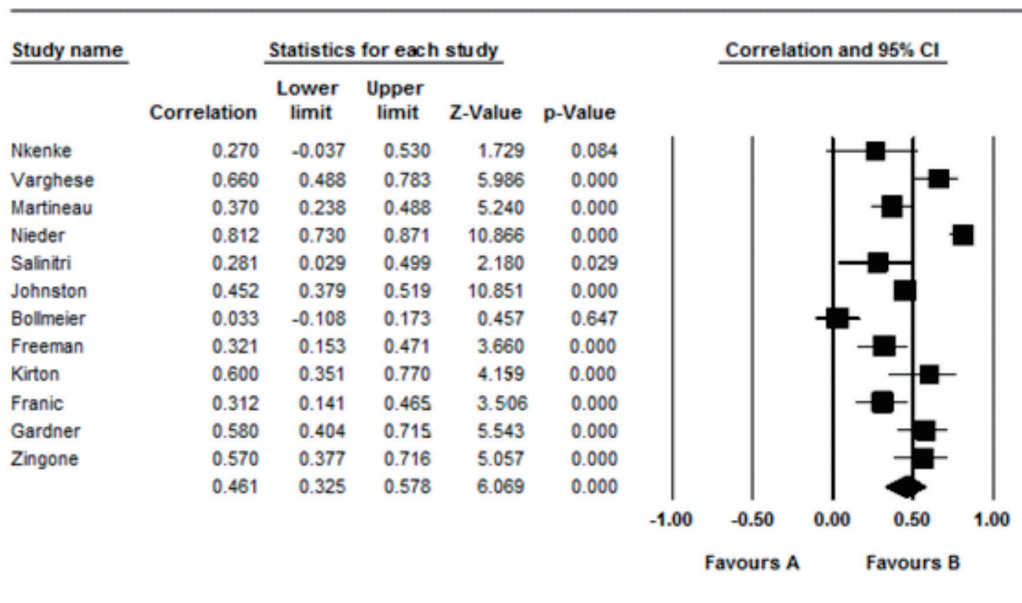
Study name	Statistics for each study					Correlation and 95% CI
	Correlation	Lower limit	Upper limit	Z-Value	p-Value	
Nkenke	0.270	-0.037	0.530	1.729	0.084	
Varghese	0.660	0.488	0.783	5.986	0.000	
Martineau	0.370	0.238	0.488	5.240	0.000	
Nieder	0.812	0.730	0.871	10.866	0.000	
Salinitri	0.281	0.029	0.499	2.180	0.029	
Johnston	0.452	0.379	0.519	10.851	0.000	
Bollmeier	0.033	-0.108	0.173	0.457	0.647	
Freeman	0.321	0.153	0.471	3.660	0.000	
Kirton	0.600	0.351	0.770	4.159	0.000	
Franic	0.312	0.141	0.465	3.506	0.000	
Gardner	0.580	0.404	0.715	5.543	0.000	
Zingone	0.570	0.377	0.716	5.057	0.000	
	0.461	0.325	0.578	6.069	0.000	

Figure 2. Forest plot of meta-analysis of the combined correlation of SCL and class performances

There were six studies about e-learning from: Nkenke[8], Varghese[11], Johnston[10], Bollmeier[6], Freeman[24], and Franic[25]. Nkenke et al.[8] and Johnston[10] compared Teacher Centered Learning (TCL) with e-learning (online forum and online video lecture). Nkenke[8] found that there were not any significant differences between control and experimental group in terms of students' performance. From the program evaluation, students suggested that e-learning should not replace TCL. They suggested that e-learning should become an additional or ancillary approach of teaching and learning. From Johnston[10] survey, students found that the online lecture was an effective and flexible approach of learning. Students found that they learned the material everywhere and replay the video anytime they wanted. The researchers found that the attendance of the online group were lower (53%) than the group that did not have access to the online material (80%-85%).

Although Bollmeier[6], Freeman[24], and Varghese[11] were incorporated technology in learning, they didn't compared e-learning to the traditional learning. Varghese[11] used pre-post test and showed positive effect of the approach. Students felt that e-learning could help their understanding about the class. Bollmeier[6] measured the effectiveness of online video lecture (audio and power point slide)

using "Tegrity®" program to record the duration and number of video lecture accessed by students. Results showed that there were no correlation between number of video lecture accessed (r = 0.033) and duration of accessed (r = 0.001) with class performance. Freeman, Schrimsher, and Kendrach[24] and Franic[25] implemented an online video lecture and WebCT that contained online quizzes. The quiz was designed resemble to the final exam. Both of the studies showed positive correlation between doing the WebCT quizzes to the examination score. Students felt that WebCT quizzes has helped them in preparing for their final exam.

Three studies from: Martineau[12], Nieder[20], and Zingone[26] were about group learning (for example: team-based learning, TBL) related to class performances. Martineau et al.[12] compared class performances between traditional skills lab as one-on-one tutorial to the grouping skills lab activity. Students required to do some clinical skills and tutor would assess them. The control group learned some clinical skills from tutor individually, while the experimental group learned clinical skills from tutor in a group. Results showed that the experimental group had higher class performance than the control group.

Nieder et al.[20] and Zingone[26] performed researches on TBL method. To assessed and measure students' learning, the researchers used Individual Readiness Assurance Test (IRAT) prior to the TBL activity. The second instrument was Group Readiness Assurance Test (GRAT) which was distributed after the IRAT. The last instrument was the Group Application Problem (GAP) which was completed as the last activity in TBL. Results showed that students' score were improved especially in comparing between GRAT and IRAT. This article also showed that teamworking improved students' final examination scores. Zingone[26] compared the TBL to the mixed active learning. In the TBL students required to read some materials prior to the class activity and did the IRAT to assess their readiness in learning. Within a group, students were asked to do the Team Reassurance Assessment Test (TRAT) and to discuss a case provided by the instructor. On the other hand, in the mixed active learning there were no learning objective nor page limitation for the reading assignments. In this method, there were no IRAT and TRAT and their class performances were assessed by written mid and end tests. This study found a positive correlation between TBL and Grade Point Average (GPA) ($r = 0.57$). In the survey, students expressed their satisfaction in using these two methods and they found that both methods helped them to increase the ability to communicate, problem solving, team work, and critical thinking.

There were three studies about OSCE and Standardized Patient (SP).[9,7,27] Salinitri[9] implemented Problem Based Learning (PBL) to assess students' performance, they compared OSCE and written tests. Results showed that there was a significant class improvement on the topic of women's health. Some students said that OSCE created greater pressure than the written test because of the presence of an observer. Gardner et al.[27] studies result also showed positive correlation between SP exam and class performance. While Kirton and Kravitz[7] found no significant differences between OSCE and written test.

Systematic Review

Through the selection process, we found 33 articles for systematic review (Table 2). The systematic review was intended to evaluate how SCL affect on other aspects such as communication skills, time managements team work, and learning motivation.

Studies about e-learning [28-32] were reported the benefits in relation to communication skills, motivation, and team work. Drybye et al.[29], Lin and Crawford[32]), Haidet, O'Malley, and Richards[31] and Woo et al.[30] used video lecture and online forum. They found that using video lecture was flexible (students can study anywhere and anytime), easier to understand the lecture topics (students can replay the lectures as much as students want). Drybye[29] performed a survey in which they found some negative opinions about the online forum. Students felt that this method was ineffective since there was no affirmation whether others' commentaries in the online forum were correct or wrong. Haidet[31] assessed their communication skills by questionnaire before and after writing in the forum. In their results, researchers concluded that this method could increase participants' communication skills. The researchers found improvements in students' enthusiasm to learn (motivation to search for literature), team work, and communication skills.

Lu, Lin, and Li[28] augmented web based learning in the traditional class. All of the participants received the same lecture and demonstration. The experimental group interacted with other students and with the lecturer by an online forum. They accessed an online demonstration video. The study reported that the experimental group's posttest increased and was higher than the control group's. The combination of web based learning and traditional learning has proven to be an interactive way of learning for students. Participants were also more motivated in learning.

Some of the researches utilized group learning methods.[33-35] Clark et al.[33] and McMullen et al.[34] researched on the team-based learning (TBL). Their researches showed that TBL increased students' motivation to learn so that students had better skills in reasoning. It was also proven that students' team work and communication skills improved during and by the end of the course. Moreover, participants thought that the TBL was important for their profession because it helped them in dealing with patients in their future career.[34]

The long tradition of PBL in medical education also brought Rideout et al.[35] to compare the traditional method to the PBL. From the questionnaire, they found that there were no significant differences between the control and experimental groups in their readiness to enter the clinical phase and their satisfaction in using PBL or the traditional class. However, this study showed that students were more satisfy with the PBL approach. From their analysis, it was found that students satisfy for having a good mentorship and communication with the tutor and other students.

Studies about Peer-Assisted Learning (PAL) related to motivation and academic performance were reported by several researchers.[36,37] Robinson and Niemer[36] used a case control design in which students who met the criteria (have failed some classes and have borderline GPA 2.3-2.8) but did not enroll in the PAL was the control group. The result showed that the GPA of both the control and experimental groups showed no significant differences. From the survey, it was found that peer tutors became more motivated to delve into teaching and learning. While Hughes[37] used pre-post research design. They found that students who enrolled in six or more sessions of PAL achieved higher scores in the post test. In the survey, students felt that PAL has helped them in their learning. Students mentioned that PAL has made them easier to understand the material and easier to ask questions.

Yoo and Chae[38] researched on 47 nursing students using the approach of video based peer review. Researchers assessed their communication skills and learning motivation. The students were divided into two groups, the experimental group (N=24) and the control group (N=23). All of the participants took the communication class followed by the motivation test. They also communicated with standardized patients and the process had been recorded. The experimental group's video was assessed by their peers, while the control group's video was self-assessed. This research showed that motivation and communication skills in the experimental group were increased significantly. From the survey, there were 67% students felt that peer reviewing could help them to identify their communication problems and 41% students felt that the method was interesting.

Scicluna et al.[39] compared the TCL and SCL at the University of New South Wales. There were 92 students in the TCL group and 55 students in the SCL group. This study showed that SCL students were more confident to enter the clinical setting because in the SCL students were trained in the communication skills using standardized patients and they were able to work in a team. The researcher concluded that SCL method could increase communication skills.

DISCUSSION

We conducted meta-analysis and systematic review to evaluate the effectiveness of SCL learning outcomes. In the meta-analysis there were no articles that reported any negative effect of the SCL towards the class performances. There were only three articles[6-8] that showed no significant effect between SCL and class performances. From the CMA, we found that SCL was able to improve the class performance with correlation coefficient 0.46 and CI 0.325-0.578. It meant that there were 46% from 100 students would increase in their class performances when SCL was implemented. Borderline students' class performance would improve even higher when compared to the other group.[22] Therefore, if this is the case, then we may put effort as well as hope to the SCL approaches in assisting the borderline students to the better class performance.

In addition to the 12 results of the meta-analysis, Table 2 showed some interesting studies. Most of the studies showed increasing class performance using SCL methods. Since these studies did not reported their correlation values of SCL to the class performance then we excluded them from the meta-analysis. However, we may learn that most of the SCL methods bring to the increasing knowledge acquisition as reported in the table 2. The lack of correlation values was a further opportunity for research in the area of SCL implementation in correlation to the class performances. The research design for at least pre-post test design of SCL implementation would contribute to the better understanding of the importance of SCL. Moreover, research on SCL that correlate to the class performance would encourage faculty members to implement the SCL.

Table 2. Some studies with no correlation values reported (excluded articles)

Author	SCL Method	Results
Mennenga[1]	TBL & traditional	No significant differences in their examination score.
Letassy[22]	TBL & traditional	TBL increase class performance higher than traditional learning and reduces the number of failures.
Moazami[15]	Virtual lecture & traditional	By comparing virtual lecture and traditional post test. Virtual lecture post test was higher.
Rivkin[13]	Active learning & traditional	In active learning, students have to read article or listen to the podcast before the class. Their examination score is higher than traditional class.
Reddy[2]	Active learning & traditional	No significant differences in active and traditional group examination score.
Buckley[3]	Web based learning and traditional	No significant differences in their mid test score. But from survey, students prefer web based learning.
Bata[4]	Web based learning and face to face lecture	There was no significant differences in their examination score.
Huckstadt[23]	Web based learning	Assessed by pre and post test. Class performance improved.
Morgulis[14]	Modified E-learning & E-learning	There was higher post test score in modified E-learning
Arthur[21]	PBL	Assessed by pre and post test. Class performance improved.
Hoffman[46]	PBL	Result showed higher test score.
Webster[47]	PBL & non PBL	Assessed by pre and post test. Non PBL students score improved higher than PBL student.
Wang[16]	PBL & traditional	Significant improvement in the test score of PBL group
Rich[48]	PBL & traditional	PBL group test score improved higher. However, in the clinical test, there were no significant differences.
Remmen[49]	SCL & TCL	SCL test score was higher but there were no significant differences in basic skills.
Blake[50]	SCL & TCL	The test score were higher after the implementation.
Becker[5]	Standardized patient (SP) & non SP	No significant differences in their pre and post test.

From the systematic review, SCL helped students in developing their soft skills such as communication skills, team work, and their motivation to learn. In Salinitri[9], Kirton and Kravitz[7], and Salih, Bahari, and Sulaiman[40], we found that OSCE could improve students' communication skills. In the OSCE which utilized standardized patients, it is clear that students must communicate to standardized patients. Chen et al.[41], Clark et al.[33], and Kritikos et al.[42] reported that PBL and TBL could increase student's team work, because students must discussed the cases within the group.These skills (communication skills, team work, and learning motivation) were important in the health and medical professions for working as a team. In MacNaughton, Chreim , and Bourgeault[43] and Jaruseviciene et al.[44], it was showed that healthcare providers should provide comprehensive health services. If health workers could work together as a team, patients did not have to wait too long for healthcare services. In addition, motivation to learn is important, because medical technology is always evolving.

Study by Drybye et al.[29] gave different results. Their results showed that students had difficulties to learn in the online based learning. Lake[45] investigated the students' satisfaction in the discussion class. The results showed that the students doubted that the online based learning could be better than the traditional class. Kritikos et al.[42] studied about PBL and the students felt that they learn more in PBL. Differences in the results were likely caused by the differences in the students' background. Therefore, a systematic review about SCL and the class performance should also investigate the socio-culture background where the health professional education were held.

Limitations

There were some limitations in this research that resulted combined correlation which did not reach researchers' expectation. The limitations were in the language restriction (English only) papers and the restricted inclusion criteria. For the future research, we hope that there will be another language (international language) such as Mandarin, Arabic, France, Russian, Spanish, and English to get more article about SCL in various setting of the health professional education. Furthermore, we only included the health and medical-related articles. For the future research, we suggested to include other professions such as business, and science, technology, engineering, and mathematic (STEM).

CONCLUSION

We found from the meta-analysis that SCL improved class performances about 46%. The systematic review revealed that SCL methods were superior in improving soft skills including communication skills, teamwork, and learning motivation. There was no negative or decreasing class performance in relation to SCL. Although small number of articles found that SCL did not show any differences in comparing to the traditional (TCL) approaches to the class performances, most of the researchers agreed that SCL promised a more collaborative work and thus the approach was more applicable to the future of their students in their real health and medicine professions. The implication of this results should engage more faculties and institutions to choose SCL more rather than TCL.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this research.

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