ETJ

(Educational Technology Journal)

Volume 4, Nomor 1, April 2024, 6-14
ISSN 2797-2593 (Online)

https://journal.unesa.ac.id/index.php/etj

ENHANCING STUDENTS' PROBLEM SOLVING THROUGH A FLIPPED CASED-BASED LEARNING

Syaiputra W.M. Diningrat[a]*, Andi Kristanto[a], Hirnanda Dimas Pradana[a], Citra Fitri Kholidya[a]
[a]Universitas Negeri Surabaya, Surabaya, Indonesia

***Correspondence:** syaiputradiningrat@unesa.ac.id

Abstract

The implementation of flipped classroom has become popular in higher education. However, few studies have conducted on how to expand various instructional strategies into a flipped classroom practice, which is important to learning. Meanwhile, prior studies have examined the effect of case-based learning (CBL) on improving student problem solving ability. The present study thus proposed a flipped classroom combined with CBL, an extension of the classic flipped classroom model. The present study also examined the effect of flipped classroom combined with CBL on students' problem-solving ability. To compare the effect of CBL on student problem solving in a flipped classroom, we conducted a quasi-experimental design study with three classes involving 94 students in a private university in Indonesia. Across 7 weeks, where one experimental group received Flipped classroom combined with CBL and a second experimental group received the flipped classroom model, while the control group received regular classroom activities. The results indicated that learning through the flipped classroom combined with CBL resulted in better problem-solving ability compared to the flipped classroom model and conventional method. The findings imply that a flipped classroom combined with CBL is effective in cultivating students' problem-solving ability and need to be replicated that involve larger groups of participants.

Keywords : Flipped Classroom, Case Based Learning, Problem Solving Ability.

Abstrak

Penggunaan model flipped classroom telah menjadi populer di pendidikan tinggi. Namun, hanya sedikit penelitian yang mengkaji tentang bagaimana memperluas berbagai strategi pembelajaran ke dalam praktik pedagogi model flipped classroom, yang sangat penting dalam pembelajaran. Sementara itu, penelitian sebelumnya telah menguji pengaruh Case-based learning (CBL) terhadap peningkatan kemampuan pemecahan masalah mahasiswa. Penelitian ini mengusulkan model flipped classroom yang dikombinasikan dengan CBL, yang merupakan perpanjangan dari model flipped classroom klasik. Penelitian ini juga menguji pengaruh model flipped classroom yang dikombinasikan dengan CBL terhadap kemampuan pemecahan masalah mahasiswa. Untuk membandingkan pengaruh CBL terhadap pemecahan masalah mahasiswa di kelas flipped classroom, kami melakukan studi desain kuasi-eksperimental dengan tiga kelas yang berjumlahkan 94 mahasiswa di sebuah universitas swasta di Indonesia. Selama 7 minggu, satu kelompok eksperimen menerima kelas flipped classroom yang dikombinasikan dengan CBL dan kelompok eksperimen kedua menerima kelas flipped classroom, sedangkan kelompok kontrol menerima kegiatan kelas reguler. Hasil penelitian menunjukkan bahwa pembelajaran melalui model flipped classroom yang dikombinasikan dengan CBL menghasilkan kemampuan pemecahan masalah yang lebih baik dibandingkan dengan model flipped class dan metode konvensional. Temuan ini menyiratkan bahwa kelas flipped classroom yang dikombinasikan dengan CBL efektif dalam mengembangkan kemampuan pemecahan masalah mahasiswa dan perlu direplikasi dengan melibatkan kelompok mahasiswa yang lebih besar.

Katakunci: Flipped Classroom, Case Based Learning, Pemecahan Masalah

Introduction

With the growing sophistication of the 21st century skills higher education, in particular, is facing heightened scrutiny regarding to student learning achievement. Significant learning improvements is only achieved if the students were engaged in the teaching and learning processes and were required to practice higher-order thinking (HOTs), including problem-solving ability. To enhance students' HOTs, particularly a problem solving ability, is a critical task for higher education institutions in the current era. However, this goal looks taugh to achieve because the conventional teaching continues to prevail (McLaughlin et al., 2014). The conventional teaching method seems to fail to encourage meaningful learning activities that support students to connect with the desire of the 21st century skills. This can be problematic for higher education institutions because the main critiques for this method is focused on teachers-centered learning and is less effective to promote HOTs (Alaagib et al., 2019).

Student-centered learning environment, which encourage such active learning, can improve student achievement. For example, a flipped classroom is designed based on the student-centered pedagogical approach that not only promote student-teachers interaction but also provide more opportunities for practicing the problem solving and critical thinking activities (DeRuisseau, 2016; Etemadfar et al., 2020). In the flipped classroom learning environment, the teachers posted pre-recorded lecturers and reading online activity or provide access to other online learning resources for students that could be learned based on their own (O'Flaherty & Phillips, 2015). Thus, during a face-to-face class time is dedicated to practice assignments, activities that promote HOTs and abilities such as problem solving and critical thinking (Strayer, 2017). In addition, flipped classroom make it possible to provife learning environment that is focused on student-centered than teachers-centered (Kim et al., 2014).

Numerous studies on learning outcomes have helped us comprehend their usefulness. For instance, Birgili et al., (2021) did a study that involved a comprehensive evaluation of the literature. The findings showed that 22 studies had established the efficacy of the flipped classroom paradigm in fostering students' critical thinking abilities, HOTs, and flexibility. The study by Dehghanzadeh & Jafaraghaee (2018), which compared the impacts of the traditional approach and the flipped classroom on students' critical thinking abilities, validated the findings. The findings revealed that the flipped classroom group's critical thinking ability mean scores and its engagement areas were much greater than those of the traditional method group. The research results suggested that the flipped classroom paradigm holds promise for encouraging students to engage with the necessary learning materials while providing opportunity for practicing HOTs during in-class time (Diningrat et al., 2023).

This teaching model has several disadvantages in addition to its advantages. According to Cui and Yu (2019), the flipped classroom generally places more of a focus on watching videos and participating actively in learning activities. According to Akçayr & Akçayr (2018), one of the biggest problems is the pre-class learning session's poor design of the learning activities and the need for direction from the students. Karabulut-Ilgu et al. (2018) conducted a systematic literature evaluation of research on the flipped classroom in response to this finding. According to the report, the enormous workload that instructors face before and during class is one of their top challenges. According to Dehghanzadeh and Jafaraghaee (2018), teachers cannot proceed with the course as intended if students arrive unprepared for the in-class session without having watched the video. As a result, it is possible that not all students appreciated the active learning process during the in-class session (Fraga & Harmon, 2014).

As a result, if designed and implemented properly, the flipped classroom has the potential to boost student achievement. Given the need for more empirical and design-based research on flipped classroom implementation in higher education, well-organized instruction is required to successfully design the flipped classroom model, in which pre-class and in-class learning activities

must be carefully managed in order to achieve successful implementation. Furthermore, changes in the specific classroom activities are likely to have resulted in the many varied results.

In the meantime, past research has looked into the impact of case-based learning (CBL) on boosting student learning through in-depth thinking such as critical thinking and problem-solving. Yoo and Park (2015), for example, did a study to investigate the influence of CBL on communication, problem-solving ability, and learning motivation. The CBL group had much better communication skills, problem-solving ability, and learning desire, according to the findings. Other advantages highlighted by Williams (2005) include the development of intrinsic and extrinsic motivation, allowing for personalised learning; the encouragement of self-evaluation and critical reflection; and the development of learning skills such as HOTs. Roshangar et al., (2020) undertook a quasi-experimental study to investigate the influence of case-based learning on students' critical thinking and academic self-efficacy. The study's findings revealed that when comparing the average post-test scores of groups, both critical thinking and academic self-efficacy increased significantly for students who employed a case-based learning strategy.

CBL is an active learning technique that uses realistic, real-world experiences to train students for professional activity (Williams, 2005). CBL links theory to practice by posing contextualized questions based on "real life" concerns and using inquiry-based learning to apply knowledge to the situations (Thistlethwaite et al., 2012). CBL is a type of student-centered learning in which professors commonly serve as facilitators to assist students in solving problems jointly from various perspectives. The group as a whole as a result, lectures and prior experience are essential for completing CBL effectively. Participatory CBL assists students in developing problem-solving and critical thinking abilities, as well as the capacity to manage group dynamics. CBL has also been shown to be effective at encouraging critical thinking and the development of learning abilities (Williams, 2005).

CBL is a student-centered learning technique and a constructivist learning paradigm in which students choose, construct, and make decisions based on newly learned and old information (Brandon & All, 2010). Cases or problems in the CBL method, according to Kaddoura (2011), take the form of factual news, complicated problems created to inspire class discussion, and collaborative analysis. Principles that must be considered in the CBL learning method include a student-centered and activity-based learning process that supports problem-solving abilities (Choi & Lee, 2009; Jonassen & Hernandez-Serrano, 2002; McLean, 2016).

As a result, the study's goal was to look at undergraduate students' problem-solving abilities after implementing a flipped classroom and a flipped classroom combined with CBL. As a result, the following research questions led this study: Do students' problem-solving abilities alter depending on whether they learn using the traditional technique, a flipped classroom, or a flipped classroom paired with CBL?.

Methods

The current study sought to ascertain the impact of a flipped classroom and a flipped classroom integrated with CBL on students' problem-solving abilities. To achieve this goal, a quasi-experimental study with non-equivalent control groups and a pre- and post-test was used (Tuckman & Harper, 2012). Furthermore, this research used a quasi-experimental design with three conditions serving as control and experiment groups. The kids in the control condition got their regular classroom activities. Students in one experimental condition were given the flipped classroom model. In the other experimental condition, students were given a flipped classroom containing CBL activities.

This study included 94 students from three educational technology classes at an Indonesian public institution. Students in one experimental group were taught in a flipped classroom, students in the second experimental group were taught in a flipped classroom mixed

with CBL, and students in the control group were taught using traditional techniques. To ensure study validity, all groups received the same course and duration.

Measuring students' capacity to generate arguments in support of their problem-solving solutions was one of the most appropriate forms for measuring problem-solving talent (Jonassen, 2010). Essays were utilized as the pre-test and post-test in this study to assess the participants' problem-solving ability. Students were requested to produce an essay about "technology and its effects on learning" for the pre-test. Students were requested to produce an essay about "information technology enabled online learning" for the post-test. Jonassen's (2010) writing rubric was used to grade the essays. It contained the following criteria: conclusion quality (4 marks), sound premises (4 marks), adequacy of premises (4 marks), assumptions connected (4 marks), credibility of premises (4 marks), counterarguments accommodated (4 marks), and argument organization (4 marks).

This study used a quasi-experimental approach with three intact classes (existing courses): one control group and two experimental groups producing pre and post-test essays. A pre-test (week 1), implementation (weeks 2–8), and post-test (week 9) were all part of this intervention study. Prior to implementation, all groups were evaluated on their problem-solving abilities in the pre-test. The typical strategy was used in the control group during the implementation phase. The flipped classroom was employed in one experimental group, while the flipped classroom mixed with CBL was used in other experimental groups. Then, in the last week, a post-test to assess problem-solving skills was given to all groups, identical to what was done during the pre-test phase.

Because the pre-test and post-test score distributions matched the conditions for normality ($p > .05$) and variance homogeneity ($p > .05$), we performed parametric tests to estimate the given results: analysis of variance (ANOVA). Descriptive statistics were computed using the mean and standard deviation, and the effect size (-square, h2) calculation allowed the magnitude of the difference to be measured when a significant difference occurred (Cohen, 1988). SPSS 26 (IMB) was used to analyze the data

Results and Discussion

Tabel 1. Normality results for pre-test

Groups	Statistic	df	Sig
Conventional	.14	28	.15
Flipped Classroom	.09	33	.20
Flipped Classroom combined with CBL	.20	33	.25

Descriptive statistics of pretest scores were analyzed to examine possible differences in student problem solving ability depending on whether they were in the flipped classroom, the flipped classroom combined with CBL, or the traditional group. These statistical results showed that there was no significant difference in problem-solving ability between control and experimental groups before the experiment was performed ($F(2.91) = .487$, $p = .61$). See Table 4.

Table 2 Normality results for post-test

Groups	Statistic	df	Sig
Conventional	.83	28	.09
Flipped Classroom	.80	33	.17
Flipped Classroom combined with CBL	.87	33	.40

These statistical results showed that there was no significant difference in problem-solving ability between control and experimental groups before the experiment was performed $F(2.91) = .487$, $p = .61$, see Table 4.

Tabel 3. Levene's test of quality of error variances

	Levene statistic	df1	df2	Sig
Pre-test	0.78	2	91	.93
Post-test	1.26	2	91	.55

In contrast, after 7 weeks of experimentation, the results indicated a statistically significant difference in problem-solving ability across the flipped classroom, flipped classroom combined with CBL, and conventional method, F (2,88) = 74.23, p= .000.

In contrast, results after the 7-week experiment showed a statistically significant difference in problem solving ability across the flipped classroom, flipped classroom combined with CBL, and traditional methods F (2.88)=74.23, p=.000).

Tabel 4. ANOVA results of pre-test scores

Groups	Subjects	Mean	SD	F	Sig	Partial Eta Squared
Conventional	28	2.89	0.31	0.487	0.61	0.01
Flipped Classroom	33	2.95	0.31			
Flipped Classroom combined with CBL	33	2.96	0.32			

The results also indicated a large effect size, h^2 = .61. Furthermore, the flipped classroom combined with CBL group members had higher problem-solving ability (M= 4.42, SD= 0.44) than the participants belonging to the flipped classroom model (M= 3.60, SD=0.31) and conventional method (M= 3.36, SD=0.34), see table 5.

Tabel 5. ANOVA results of post-test scores

Groups	Subjects	Mean	SD	F	Sig	Partial Eta Squared
Conventional	28	3.36	0.34	69.360	0.00	0.60
Flipped Classroom	33	3.60	0.31			
Flipped Classroom combined with CBL	33	4.42	0.44			

The increased focus on implementing a flipped classroom model in higher education has been matched by insufficient focus on the theoretical foundation, which is critical to learning. Traditional lecturers utilized in the traditional technique do not correspond well with problem-solving skills. Recently, alternate methods to the traditional method have emerged, such as FC and CBL, which focus on enhancing students' ability to solve practical problems (Tucker, 2012). These active-learning methodologies are becoming increasingly popular in higher education. This study looked into the design of a flipped classroom and a flipped classroom mixed with CBL in order to improve students' problem-solving abilities. The learning activities in the flipped classroom were systematically designed by following Strayer's (2017) procedures and the flipped classroom combined with CBL were systematically designed by following Strayer's (2017) procedures and Choi and Lee's (2009) case-based learning proposal. The use of pre-test scores demonstrated that there were no variations in students' problem-solving abilities prior to the deployment of our experiment.

We discovered that combining the flipped classroom with CBL had a considerable impact on students' problem-solving abilities. Whereas students in the control group exhibited no change over the intervention period, counterparts in both experimental groups gained a remarkable high level of problem-solving skill. The findings indicated that the flipped classroom paired with CBL was more beneficial than the flipped classroom alone in improving students' problem-solving abilities.

These findings are congruent with those of other investigations. For example, Yang et al. (2021) investigated the influence of flipped classroom mixed with CBL on the development of higher-order abilities. The findings indicated that the flipped classroom mixed with CBL group fared better in comprehension and critical thinking than the traditional technique. Another study on the flipped classroom mixed with CBL was conducted by (Cai et al., 2022). Students in the flipped classroom mixed with CBL group scored much higher on the post-test than those in the usual way.

The benefit of flipped classroom mixed with CBL can be ascribed to numerous factors during course preparation and implementation. The flipped classroom mixed with CBL enables self-paced pre-class learning that consists of reviewing and analyzing problems activity, allowing students to make better use of their time. During in-class time, the flipped classroom mixed with CBL promotes high levels of cognitive ability by pushing students to use what they have learned to solve problems through discussion, solution seeking, and evaluation of the solution. Thus, when combined with CBL, the flipped classroom provides a progressive and gradual learning process that bridges the gap between pre-class study of basic knowledge and in-class training of application and problem-solving skills. Previous research has shown that flipped classrooms can provide students with opportunity for higher-order thinking skills such as problem solving (Long et al., 2017).

The study discovered that combining a flipped classroom with case-based learning has the potential to increase students' problem-solving abilities. However, this study has numerous drawbacks. The first is that the findings may have limited generalizability because this portion of the research was a quasi-experimental study with a small number of participants. Future research could use a mixed method study to see if the flipped classroom combined with casbased learning improves students' problem-solving abilities. The second limitation is that this study did not include after-class activities, instead focusing solely on pre-class and in-class activities, despite the fact that after-class activities may aid in reinforcing and optimizing problem-solving skills. Despite these constraints, the current study sheds light on the design and implementation of the flipped classroom in conjunction with case-based learning. It expands on key flipped classroom aspects to present a practical approach that undergraduate students can use as a guide

Regulating AI is a slippery slope—too much could drive the industry to lax jurisdictions (Sundar et. al., 2023), while risk could arise with minimal oversight (Reed, 2018). As such, tech companies are already quasi-independent entities with end-user license agreements (EULA) acting as de facto laws (Manheim & Kaplan, 2019). There exists a scarcity of consensus on how laws will interact with specific AI applications and how these will work in diverse contexts (Chauhan, 2022).

Ideally, guidelines must be developed in the sweet spot between utilizing AI ethically and safely, while implementing safety standards and oversight, and keeping up with the pace of AI development (Meltzer, 2023). With risks relating to AI evolving and changing rapidly, guidelines must stay ahead of the curve and deploy anticipatory approaches in the ever-changing AI landscape (Future of Life Institute, n.d.). The consequences of inaction and overregulation, along with the creation of harm avoidance laws without impeding AI technology development (Reed, 2018), need to be taken seriously. Foremost should be the recognition that humans must have ultimate command of AI technology to maintain public trust (Ferrario et al., 2020) and encourage innovation (Reed, 2018).

For now, formal guidance on generative AI for educators and learners is limited to a few schools and universities (UNESCO, 2023). We, therefore, suggest conducting a SWOT analysis as a great start to guideline development, wherefor higher education institutions consequently create a task force of faculty members, faculty developers, and instructional designers. The guidelines can include educator best practices for ideating ways to generate educational materials and learning activities that can improve student learning experiences and implement the use of AI tools to enhance learning. The recommendations on the ethical use of AI issued by the Office of Educational Technology (Office of Educational Technology, 2023) and UNESCO (UNESCO, 2022) can also be used to inform the development of guidance on generative AI applications for their educators and learners.

Conclusion

In conclusion, the findings point to flipped classrooms combined with CBL as a potential and successful method for improving students' problem-solving abilities in higher education. According to the current study's findings, creating an atmosphere such as a flipped classroom mixed with CBL that emphasizes active learning can assist students in improving higher-order thinking skills. More research with a more detailed design to optimize flipped classroom combined with CBL in terms of optimal tactics and the assessment system could help advance the impact and efficacy of flipped classroom combined with CBL.

References

Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education*, *126*(August), 334–345. https://doi.org/10.1016/j.compedu.2018.07.021

Alaagib, N. A., Musa, O. A., & Saeed, A. M. (2019). Comparison of the effectiveness of lectures based on problems and traditional lectures in physiology teaching in Sudan. *BMC Medical Education*, *19*(1). https://doi.org/10.1186/s12909-019-1799-0

Birgili, B., Seggie, F. N., & Oğuz, E. (2021). The trends and outcomes of flipped learning research between 2012 and 2018: A descriptive content analysis. *Journal of Computers in Education*, *8*(3), 365–394. https://doi.org/10.1007/s40692-021-00183-y

Brandon, A. F., & All, A. C. (2010). Constructivism theory analysis and application to curricula. *Nursing Education Perspectives*, *31*(2).

Cai, L., Li, Y., Hu, X., & Li, R. (2022). Implementation of flipped classroom combined with case-based learning. *Medicine*, *101*(5), e28782. https://doi.org/10.1097/MD.0000000000028782

Choi, I., & Lee, K. (2009). Designing and implementing a case-based learning environment for enhancing ill-structured problem solving: Classroom management problems for prospective teachers. *Educational Technology Research and Development*, *57*(1), 99–129. https://doi.org/10.1007/s11423-008-9089-2

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associate.

Cui, J., & Yu, S. (2019). Fostering deeper learning in a flipped classroom: Effects of knowledge graphs versus concept maps. *British Journal of Educational Technology*, *50*(5), 2308–2328. https://doi.org/10.1111/bjet.12841

Dehghanzadeh, S., & Jafaraghaee, F. (2018). Comparing the effects of traditional lecture and flipped classroom on nursing students' critical thinking disposition: A quasi-experimental study. *Nurse Education Today*, *71*, 151–156. https://doi.org/10.1016/j.nedt.2018.09.027

DeRuisseau, L. R. (2016). The flipped classroom allows for more class time devoted to critical thinking. *Advances in Physiology Education*, *40*(4), 522–528. https://doi.org/10.1152/ADVAN.00033.2016

Diningrat, S. W. M., Setyosari, P., Ulfa, S., & Widiati, U. (2023). The Effect of an Extended Flipped Classroom Model for Fully Online Learning and its interaction with Working Memory Capacity on Students' Reading Comprehension. *Journal of New Approaches in Educational Research*, *12*(1), 77. https://doi.org/10.7821/naer.2023.1.1073

Etemadfar, P., Soozandehfar, S. M. A., & Namaziandost, E. (2020). An account of EFL learners' listening comprehension and critical thinking in the flipped classroom model. *Cogent Education*, *7*(1), 1835150. https://doi.org/10.1080/2331186X.2020.1835150

Fraga, L. M., & Harmon, J. (2014). The Flipped Classroom Model of Learning in Higher Education: An Investigation of Preservice Teachers' Perspectives and Achievement. *Journal of Digital Learning in Teacher Education*, *31*(1), 18–27. https://doi.org/10.1080/21532974.2014.967420

Jonassen, D. H. (2010). Learning to solve problems: A handbook for designing problem-solving learning environments. In *Learning to Solve Problems: A Handbook for Designing Problem-Solving Learning Environments* (Vol. 9780203847527). https://doi.org/10.4324/9780203847527

Jonassen, D. H., & Hernandez-Serrano, J. (2002). Case-based reasoning and instructional design: Using stories to support problem solving. *Educational Technology Research and Development*, *50*(2). https://doi.org/10.1007/BF02504994

Kaddoura, M. A. (2011). Critical Thinking Skills of Nursing Students in Lecture-Based Teaching and Case-Based Learning. *International Journal for the Scholarship of Teaching and Learning*, *5*(2). https://doi.org/10.20429/ijsotl.2011.050220

Karabulut-Ilgu, A., Jaramillo Cherrez, N., & Jahren, C. T. (2018). A systematic review of research on the flipped learning method in engineering education. *British Journal of Educational Technology*, *49*(3), 398–411. https://doi.org/10.1111/bjet.12548

Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: an exploration of design principles. *The Internet and Higher Education*, *22*(July), 37–50. https://doi.org/10.1016/j.iheduc.2014.04.003

Long, T., Cummins, J., & Waugh, M. (2017). Use of the flipped classroom instructional model in higher education: instructors' perspectives. *Journal of Computing in Higher Education*, *29*(2). https://doi.org/10.1007/s12528-016-9119-8

McLaughlin, J. E., Roth, M. T., Glatt, D. M., Gharkholonarehe, N., Davidson, C. A., Griffin, L. M., Esserman, D. A., & Mumper, R. J. (2014). The Flipped Classroom: A Course Redesign to Foster Learning and Engagement in a Health Professions School. *Academic Medicine*, *89*(2), 236–243. https://doi.org/10.1097/ACM.0000000000000086

McLean, S. F. (2016). Case-Based Learning and its Application in Medical and Health-Care Fields: A Review of Worldwide Literature. *Journal of Medical Education and Curricular Development*, *3*, JMECD.S20377. https://doi.org/10.4137/jmecd.s20377

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *Internet and Higher Education*, *25*(February 2015), 85–95. https://doi.org/10.1016/j.iheduc.2015.02.002

Roshangar, F., Azar, E. F., Sarbakhsh, P., & Azarmi, R. (2020). The Effect of Case-Based Learning with or without Conceptual Mapping Method on Critical Thinking and Academic Self-Efficacy of Nursing Students. *Journal of Biochemical Technology*, *11*(1).

Strayer, J. (2017). Designing Instruction for Flipped Classroom. In C. Reigeluth, B. Beatty, & R. Myers (Eds.), *Instructional-Design Theories and Models: The Learner-Centered Paradigm of Education* (4th ed.). Routledge.

Thistlethwaite, J. E., Davies, D., Ekeocha, S., Kidd, J. M., MacDougall, C., Matthews, P., Purkis, J., & Clay, D. (2012). The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME Guide No. 23. *Medical Teacher*, *34*(6), e421–e444. https://doi.org/10.3109/0142159X.2012.680939

Tucker, B. (2012). The Flipped Classroom: Online instruction at home frees class time for learning. In *Education Next* (Vol. 12, Issue 1).

Tuckman, B. W., & Harper, B. E. (2012). *Conducting Educational Research* (Sixth). Rowman & Littlefield Publishers, Inc.

Williams, B. (2005). Case based learning - A review of the literature: Is there scope for this educational paradigm in prehospital education? In *Emergency Medicine Journal* (Vol. 22, Issue 8). https://doi.org/10.1136/emj.2004.022707

Yang, F., Lin, W., & Wang, Y. (2021). Flipped classroom combined with case-based learning is an effective teaching modality in nephrology clerkship. *BMC Medical Education*, *21*(1), 276. https://doi.org/10.1186/s12909-021-02723-7

Yoo, M.-S., & Park, H.-R. (2015). Effects of case-based learning on communication skills, problem-solving ability, and learning motivation in nursing students. *Nursing & Health Sciences*, *17*(2), 166–172. https://doi.org/10.1111/nhs.12151