

RESEARCH

Open Access



The effects of flipped classroom and jigsaw teaching strategies on learning, retention of course content, and satisfaction among nursing students: a quasi-experimental study

Alireza khodadadeh¹, Mozghan Rivaz^{2*}  and Camellia Torabizadeh² 

Abstract

Introduction The evolution of healthcare systems has highlighted the need for new educational approaches to develop professional skills. Active learning strategies, such as the flipped classroom (FC) and jigsaw techniques with an emphasis on collaboration play a key role in empowering learners. This study aimed to determine the effects of FC and jigsaw methods on nursing students' learning, retention of course content, and satisfaction.

Methods A quasi-experimental, posttest design study was conducted on 111 nursing students from January 2023 to November 2024 in the three academic semesters. Three groups—flipped classroom (FC), jigsaw, and Lecture-Based-Teaching (LBT)—were assessed over a period of 10 weeks. The FC and jigsaw groups served as the experimental groups, while the LBT group was used as the control group. A census sampling method was employed for participant selection. The groups were randomly allocated to the three teaching approaches: FC ($n = 35$), jigsaw ($n = 43$), and LBT ($n = 34$). Data were collected via a demographic information form, a multiple-choice question (MCQ), and a student satisfaction questioner. The MCQ test was given to each group separately, right after the four teaching sessions and six weeks after the intervention's end, to assess the learning and retention of course content of the students. Data was analyzed using ANOVA and the Mann–Whitney tests.

Result Compared with the other two methods, the jigsaw method resulted in significantly higher learning scores ($p < 0.05$). There was no statistically significant difference in retention of course content among the three groups ($p > 0.05$). Most students were satisfied with the FC and jigsaw.

Conclusion The jigsaw method, compared to the FC and LBT methods, fostered better learning outcomes, by encouraging student interaction. This method is an effective means to encourage nursing students to assume responsibility for their learning. Therefore, the learner-centered approaches can provide viable and desirable alternatives for LBT, while considering educational needs, conditions, and available resources. So, their use is recommended for nursing educators to enhance student learning.

Clinical trial number Not applicable.

*Correspondence:

Mozghan Rivaz

mrivaz@sums.ac.ir; mrivaz2012@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

and satisfaction than LBT methods did [30]. Mortezaei et al. (2021) demonstrated that combining the FC and jigsaw methods can promote greater academic motivation among nursing students compared to synchronous online classes [48]. However, Kugler et al. (2019) reported that most students preferred face-to-face lectures over FC sessions that used videos, which contrasts with our findings [38]. This discrepancy may be due to differences in delivery methods and content. In the aforementioned study, the interval between sessions was just one day, which may have created challenges for students, and they did not have the opportunity to review content before attending class.

Limitations

This study compared two innovative educational methods, FC and jigsaw, and investigated both learning and retention of course content, which are critical aspects of education. Nevertheless, one limitation of the study was the inadequate study time by some students, which could affect their learning and, hence, their retention of course content, particularly in the FC method. To overcome this limitation, future studies are recommended to implement more supervision throughout the study process and strategies to encourage students and increase their motivation for increased active participation. Another limitation of the study was the non-randomized group allocation at the level of individual participants that may be the impact on internal validity. Although the self-constructed satisfaction questionnaire demonstrated acceptable content validity and internal consistency, it has not undergone comprehensive psychometric evaluation. The absence of construct validity (e.g., factor analysis) assessment, which may limit the interpretability of findings. Moreover, the use of a self-report questionnaire might influence the accuracy of satisfaction report due to social desirability and recall bias.

Conclusion

Our results demonstrate that the Jigsaw method was more effective than both the FC and LBT approaches in enhancing learning outcomes. This method is an effective means to encourage nursing students to assume responsibility for their learning. In terms of course content retention, both methods showed comparable effectiveness to LBT. Additionally, students reported higher satisfaction levels with these active methods and expressed a preference for them over LBT. While the learning outcomes achieved through these methods were comparable to and as satisfactory as those from LBT, they offered distinct advantages. These learning strategies promote greater peer-to-peer and student-instructor interaction, thereby fostering more engaged participation in the learning process. Consequently, they provided students with more

fulfilling learning experiences. For healthcare educators, particularly in nursing education, these findings suggest that both Jigsaw and FC methods - being both effective and student-preferred can be strategically implemented to optimize learning processes and increase classroom engagement, provided that institutional needs, conditions, and available resources are carefully considered.

Abbreviations

FC	Flipped classroom
LBT	Lecture-based teaching
MCQ	Multiple-choice question
SPSS	Statistical package for the social sciences
SD	Standard deviation
GPA	Grade point average

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12909-025-07662-1>.

Supplementary Material 1

Acknowledgements

This manuscript is a part of Alireza Khodadadeh thesis for the Master of Science degree in Nursing. The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran, and also the Center for Development of Clinical Research of Nemazee Hospital and Ali Mohammad Keshavarz Hesam Abadi for statistical assistance. We sincerely thank the nursing students who participated in this study.

Author contributions

AR: Conceptualization, Methodology, Investigation, Data collection, Validation, Writing- Original draft and Writing- review & editing, intervention, Project administration. MR: Conceptualization, Methodology, Investigation, Validation, Writing- review & editing, intervention Project administration. CT: Conceptualization, Methodology, Investigation, Validation, Supervision, Project administration, Writing- review & editing, intervention. All the authors reviewed the manuscript and approved the final manuscript.

Funding

This study was funded by the Vice-chancellor of research of Shiraz University of Medical Sciences, Iran (NO: 28807).

Data availability

The database used and/or analyzed in the current study is accessible from the corresponding author upon reasonable request.

Declarations

Ethical approval and consent to participate

The study was approved by the Research Ethics Committee of Shiraz University of Medical Sciences (approval no.: IR.SUMS.NUMIMG.REC.1402.097) and followed the Helsinki Declaration. All research participants gave their written informed consent and were fully informed about the aim of the study, as well as the anonymity and confidentiality of personal information. Moreover, they were assured of voluntary participation and would freely leave at any research stage.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Student research committee, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran