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Comparison of the teaching clinical biochemistry in face-to-face and the flex-flipped classroom to medical and dental students: a quasi-experimental study from IRAN

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Abstract

Introduction Biochemistry is one of the main courses of basic sciences in the medical curriculum, along with other difficult subjects that are difficult to learn. The emergence of new technologies has made it possible to test new methods such as e-Learning. In this study, we compared two methods of Flex-Flipped Classroom (FFC) and face-to-face.

Method A quasi-experimental research was done which involved both medical and dental students studying the clinical biochemistry course in the joint semester in 2019. A total of 100 medical students were trained in biochemistry through face-to-face teaching, and 60 dental students were trained in the same course through the FFC model. Three researcher-made tools were used to compare the two groups to assess the student's satisfaction, scores, and self-evaluation. The content validity of the tools was checked using the opinions of 10 experts through the CVI index. The results were analyzed using one-sample t-tests, independent t-tests, and ANOVA.

Results Both groups scored significantly more than the cut-off-point (Mean > 3.5) in their average scores of the total and sub-components of the self-evaluation questionnaire ($P < 0.05$). Face-to-face teaching was viewed more favorably than the FFC teaching except for considering the flexibility (4.14 ± 1.55), but the difference was not significant ($P > 0.05$). The students' knowledge score in the FFC was slightly higher than that in the face-to-face method, but this difference was not significant ($P = 0.758$).

Conclusion Both face-to-face and FFC methods were effective according to the students, but the level of satisfaction with the face-to-face method was higher. It seems that teacher-student interaction is an important factor in students' preferences. However, the students preferred the flexibility of multimedia. It seems necessary to use the advantages of each method in a model appropriate to the students' conditions and available facilities.

Keywords Face-to-face education, e-learning, Blended learning, Flipped class, Flex model, Knowledge, Quality

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Introduction

Biochemistry is one of the main subjects of the basic sciences in the medical curriculum, which is important for understanding the clinical sciences of the medical profession [1, 2]. Meanwhile, it is one of the hardest courses in basic medicine and an abstract subject that is difficult for students to learn [3, 4]. The course content is



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Abbreviations

FFC	Flex Flipped Classroom
SUMS	Shiraz University of Medical Sciences
LMS	Learning Management System
CVI	Content Validity Index
CBD	Case Based Discussion

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Authors' contributions

ZK developed the study idea, contributed to the study design, developed the questionnaire, conducted reliability and validity tests, analyzed and interpreted the statistical data, and wrote the first and final drafts of the study. PM contributed to the study design, developed the questionnaires, participated in the experimental intervention, and revised the final draft of the manuscript. NZ participated in the study design and revised the research proposal. All authors critically reviewed and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was designed as an educational comparison, and it did not pose any particular threat to the research subjects, and its results were only used to improve the students' education. All methods were carried out in accordance with relevant guidelines and regulations. Before starting, the students were informed that they were participating in a research project, as the participants' data were collected and analyzed confidentially, and the participants entered the project knowingly and were free to withdraw from the research at any time. This study was reviewed by the ethics committee of Shiraz University of Medical Sciences and approved with the ethics code number of IR.SUMS.REC.1400.148 and has been registered in the system of the National Ethics Committee in Environmental Research. Written informed consent was obtained from all the participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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