

Benefits of the flipped classroom in health education - a systematic review

Benefícios da sala de aula virada ao contrário na educação sanitária - uma revisão sistemática interrelationship

DOI:10.34119/bjhrv3n6-160

Recebimento dos originais: 02/11/2020

Aceitação para publicação: 02/12/2020

Maria Bianca Fialho Amorim

Student of medicine – Faculdade Pernambucana de Saúde

Institution: Faculdade Pernambucana de Saúde

Adress: Avenida Mal. Mascarenhas de Moraes, 4861, Imbiribeira, Recife-PE

E-mail: Mbiancafialhoamorim@hotmail.com

Alice Rodrigues Barbosa de Moraes

Student of medicine – Faculdade Pernambucana de Saúde

Institution: Faculdade Pernambucana de Saúde

Adress: Avenida Mal. Mascarenhas de Moraes, 4861, Imbiribeira, Recife-PE

E-mail: Alicerbmoraes@gmail.com

Danielly Kosminsky Daniel de Souza

Student of medicine – Faculdade Pernambucana de Saúde

Institution: Faculdade Pernambucana de Saúde

Adress: Avenida Mal. Mascarenhas de Moraes, 4861, Imbiribeira, Recife-PE

E-mail: danikosminsky@gmail.com

Eduarda Coutinho Albuquerque Neiva Coêlho

Student of medicine – Faculdade Pernambucana de Saúde

Institution: Faculdade Pernambucana de Saúde

Adress: Avenida Mal. Mascarenhas de Moraes, 4861, Imbiribeira, Recife-PE

E-mail: eduardacoutinhoneiva@gmail.com

Gabriela Bacelar Gama Vieira

Student of medicine – Faculdade Pernambucana de Saúde

Institution: Faculdade Pernambucana de Saúde

Adress: Avenida Mal. Mascarenhas de Moraes, 4861, Imbiribeira, Recife-PE

E-mail: Gabrielabacelarg@gmail.com

Gabriela Pires de Oliveira

Student of medicine – Faculdade Pernambucana de Saúde

Institution: Faculdade Pernambucana de Saúde

Adress: Avenida Mal. Mascarenhas de Moraes, 4861, Imbiribeira, Recife-PE

E-mail: Gabrielabacelarg@gmail.com

Luciana Soares Lucio

Student of medicine – Faculdade Pernambucana de Saúde
Institution: Faculdade Pernambucana de Saúde
Address: Rua Padre Carapuzeiro, 815 - Boa Viagem, Recife-PE, Brasil
E-mail: luciana-lucioo@hotmail.com

Thâmara Raquell de Souza Vasconcelos

Student of medicine – Faculdade Pernambucana de Saúde
Institution: Faculdade Pernambucana de Saúde
Address: Rua do Futuro, 551, Graças, Recife-PE
E-mail: rsvthamara@gmail.com

Thierry Wesley de Albuquerque Aguiar

Biomedic at the Universidade Federal de Pernambuco
Institution: Universidade Federal de Pernambuco
Address: Av. Prof. Moraes Rego, 1235 - Cidade Universitária, Recife – PE
E-mail: Thierry.wesley@hotmail.com

Msc. Felipe César Gomes de Andrade

Neurologist at the Federal University of Pernambuco
Master in Health Education at the Faculdade Pernambucana de Saúde
Institution: Faculdade Pernambucana de Saúde
Address: Rua Guimarães Peixoto 75, 1906 - One Way Empresarial, Recife, Brazil
E-mail: felipecgandrade@hotmail.com

ABSTRACT

Introduction: The flipped classroom method is characterized by its contents presentation to the learners before classes and online, reserving the face-to-face meetings to deepen and apply these contents. **Objective:** To search through literature for the most recent flipped classroom method benefits in the health area. **Method:** The guidelines for the preparation of systematic reviews were followed, collecting relevant studies, searching for published data sources, selecting the terms for the research, evaluating the eligibility of studies, and extracting relevant data. **Results and Discussion:** 20 articles published between 2016 and 2020 were selected from the PUBMED, SCIELO, ERIC and MEDLINE databases, according to the eligibility criteria. The main benefits of flipped classroom for students were language development, greater interaction between learners, greater engagement in activities and involvement in projects, flexibility in learning styles, better use of time and better performance in assessments. The professors agreed with such benefits but pointed out that a longer time for the preparation of activities would be a limitation. **Conclusion:** Flipped classroom method has shown itself to be a promising strategy with many health benefits. More research is needed on its implementation in the current context of the Coronavirus Pandemic in 2020.

Keywords: Systematic review, Teaching, e-learning.

RESUMO

Introdução: O método de sala de aula folheada é caracterizado pela apresentação de seu conteúdo aos alunos antes das aulas e on-line, reservando as reuniões presenciais para aprofundar e aplicar estes conteúdos. Objetivo: Buscar na literatura os mais recentes benefícios do método de sala de

aula folheada na área da saúde. Método: As diretrizes para a preparação de revisões sistemáticas foram seguidas, coletando estudos relevantes, pesquisando fontes de dados publicados, selecionando os termos para a pesquisa, avaliando a elegibilidade dos estudos, e extraíndo dados relevantes. Resultados e Discussão: 20 artigos publicados entre 2016 e 2020 foram selecionados das bases de dados PUBMED, SCIELO, ERIC e MEDLINE, de acordo com os critérios de elegibilidade. Os principais benefícios da sala de aula folheada para os alunos foram o desenvolvimento da linguagem, maior interação entre os alunos, maior envolvimento em atividades e envolvimento em projetos, flexibilidade nos estilos de aprendizagem, melhor aproveitamento do tempo e melhor desempenho nas avaliações. Os professores concordaram com tais benefícios, mas ressaltaram que um tempo mais longo para a preparação das atividades seria uma limitação. Conclusão: O método de sala de aula invertida mostrou ser uma estratégia promissora com muitos benefícios para a saúde. É necessária mais pesquisa sobre sua implementação no contexto atual da pandemia de Coronavírus em 2020.

Palavras-chave: Revisão sistemática, Ensino, e-learning.

1 INTRODUCTION

Traditionally in the health area, face-to-face classes are used to present lectures at first, followed by reading articles and books at home, with a view to subsequent evaluations (TANG et al., 2017). In the flipped classroom method there is an inversion of this sequence, that is, the first contact with content occurs before the class, through lectures recorded by the tutor, and change of the proposal of the face-to-face meetings (MENEGAZ et al., 2018 ; PRIETO-MARTÍN et al., 2019; TANG, [sd]).

With this model, it is important to define the pre-class steps, during class and after class (LOUX; VARNER; VANNATTA, 2016). The class is configured in the flipped classroom as a moment centered on the verification and deepening of acquired basic concepts, inverting the roles of traditional teaching, and characterizing the learner as the center of the activity, and the teacher as a knowledge facilitator (GOSTELOW et al., 2018; JESURASA et al., 2017; LUCARDIE et al., 2017).

The flipped classroom proved to be a flexible method and has already been associated with other forms of teaching, especially those that use technological resources (MENEGAZ et al., 2018). This method was put into practice in several renowned courses and institutions, such as MIT (Massachusetts Institute of Technology), Harvard University, Stanford University and ITA (Instituto Tecnológico de Aeronáutica), where they proved beneficial for courses in different areas of knowledge (PAVANELO; LIMA, 2017; PRIETO-MARTÍN et al., 2019).

It is one of the most recent active teaching-learning methodologies, after Problem-Based Learning (PBL) and Team-Based Learning, developed in the 21st century and related to Blended

Learning, which is a teaching-learning based on the combination of face-to-face and distance learning (PAVANELO; LIMA, 2017; PRIETO-MARTÍN et al., 2019).

In the context of the 2020's pandemic, in which there was a change in different environments, including the restriction of face-to-face meetings at colleges around the world, the curriculum of courses in the health area had to be adapted. This change affected the teaching strategies adopted, as there was a need for new technological resources and distance learning methods.

The flipped classroom could then be developed as a valid method for coping with this phase and for implementing a recovery strategy after the return of face-to-face classes, as it combines technology in different formats. It remains to be seen, in view of the development of courses in recent years, what are the benefits that this method could bring to teaching in the health area, both for the learner and for the professors, considering their current limitations.

2 METHODOLOGY

The guidelines for the systematic reviews were followed, which include (1) collecting relevant studies, (2) searching published data sources, (3) selecting search terms, (4) evaluating study eligibility, and (5) extracting the relevant data (BRAZIL; DEPARTAMENTO DE CIÊNCIA E TECNOLOGIA EM SAÚDE, 2012).

2.1 LITERARY SEARCH

The bibliographic research was carried out in four databases (ERIC, PUBMED, SCIELO and MEDLINE) using keywords. In MEDLINE, the search terms Flipped classroom AND health were used. In the ERIC, PUBMED and SCIELO research platforms, the search terms Flipped classroom AND health, Flipped learning AND health and Inverted learning AND health were used.

2.2 INCLUSION AND EXCLUSION CRITERIA

Initially, only works published from 2016 to 2020 were included, which addressed the benefits of flipped classroom or discussed the application of flipped classroom in the health area. These studies should be fully available and free of charges. Studies that did not have access available in indexed libraries with free access, meta-analyzes and systematic reviews, and those that did not refer to the health area were excluded.

2.3 ELIGIBILITY OF PUBLICATIONS

Two teams were formed with four members each, who followed, in the selected databases, the same keywords and inclusion criteria. After the independent analysis of these teams regarding the eligible studies, meetings were held for consensus on which articles should or should not be included in the systematic review. When there was no consensus, another member, called a judge, evaluated the studies in question and decided whether to include them or not. In the end, the two teams wrote the systematic review article with their conclusions.

3 RESULTS AND DISCUSSION

116 articles were obtained through the search terms (see table 1). Among these, 65 articles were repeated, or did not have free and available access. These were excluded from the research, resulting in 51 potentially eligible articles at the end.

Table 1

TERMOS DE BUSCA	Período 2016 - 2020		Plataformas SciELO, ERIC, Pubmed e Medline		Total
	SCIELO	ERIC	PUBMED	MEDLINE	
Flipped classroom AND health	5.	22.	5.	43.	
Flipped learning AND health	4.	27.	5.	-	
Inverted learning AND health	1.	1.	3.		
Total de publicações	10.	50.	13.	43.	116.

FONTE: autoral

After this first phase, the two teams agreed to exclude 30 articles that were not compatible with the inclusion criteria. One study was excluded due to the lack of consensus between the teams, and after analysis by the judge, as it addressed the use of the method in doctoral programs. At the end, 20 articles were selected by consensus to be analyzed.

3.1 BENEFITS FOR THE LEARNER

Among the flipped classroom method advantages, the development and search for an accessible language were highlighted in the reviewed papers. The problems proposed during classroom activities and their discussions are strongly related to the resolution of language barriers (WARUGABA et al., 2016). In the health area, the development of this competence is a relevant point for the application of the method, seen as a possibility of clarification for materials in other languages (BATES, 2018; KÜHL et al., 2017a).

Another benefit of flipped classroom method was the greater interaction between students. This fact can be evidenced when it is considered that they are able to debate solutions to proposed problems among themselves, which reflects greater cooperation, motivation and interest among them, minimizing anxiety about participation in class discussions and work with other colleagues (ENTEZARI ; JAVDAN, 2016). In addition, it is noticed that the learning environment becomes a more engaging, interesting, and supportive place, as there is a greater engagement of students in the classroom (BATES, 2018; HE et al., 2019). In the medical residency, there was also a greater involvement in projects and appreciation of the educational benefit of teamwork (BONNES et al., 2017).

The flipped classroom method presents advantages for health area students, due to the flexibility of different types of study according to the style and characteristic preferred by each one, as well as to enable the organization of the routine according to the learning habits (HE et al., 2019), considering the pace of each individual (MATZUMURA-KASANO et al., 2018). The students mentioned the possibility of revising the materials as often as necessary and using the most convenient to their aptitude (BATES, 2018). As for the structure of the method, the pre-class, in-class, and post-class activities characterized a plurality of approaches, as students could be listening, watching, reading or in practical activities (PERSKY; MCLAUGHLIN, 2017).

It was observed that the study time outside the classroom provides more engaged learning and favors that face-to-face meetings are focused on practical repetitions (BATES, 2018). Other studies say that the period in the classroom is used for high-level learning, as analytical and critical thinking of themes (RUI et al., 2017), and that the approach optimizes the room in solving problems, the shortage of time in classroom activities (PRIETO-MARTÍN et al., 2019).

Regarding the individualized construction of knowledge, the inversion of the classroom, by bringing students' doubts into the pre-class, impacts the face-to-face approach, prompting a class debate based on particular issues. Zeng Rui (RUI et al., 2017) states that students were satisfied with the method since their potential is explored through meeting individual needs and improving self-learning.

Unlike traditional teaching, in which the student has a single contact with the content, flipped classroom provides multiple contacts, which facilitates the process of learning and familiarizing with the content (MENEGAZ et al., 2018). Thus, it was found that students who experienced the active method had better performance and success when compared to groups that used traditional method. This was because students who adopted the flipped classroom method

format showed greater involvement, mastery, and critical thinking on the subject (BATES, 2018; BOYSEN-OSBORN et al., 2016; SCHWARTZ; AJAZI; MONACO, 2018; TANG et al. , 2017).

3.2 BENEFITS FOR THE TEACHER

As for the advantages for teachers in adopting inverted teaching in the classroom, there was an increase in the interaction between students and teachers, since 86.4% of the people inserted in one of the studies showed greater dedication when answering questions during classes, in addition to greater feedback from students after classess (MATZUMURA-KASANO et al., 2018).

In general, flipped classroom is recognized as a learning method with several benefits for students in the health field, in the same way that it is well accepted by teachers when applied correctly (DOMBROWSKI et al., 2018). The benefits go beyond the better performance in written tests, since the activities develop social interaction among students through discussions, which are widely encouraged in this method (ENTEZARI; JAVDAN, 2016).

3.3 LIMITATIONS OF THE METHOD

From the student point of view, in spite of better performance, students reported lack of confidence (LOUX; VARNER; VANNATTA, 2016), fear and shame of asking questions during class (MATZUMURA-KASANO et al., 2018), overload in the face of amount of material for reading and need to review study habits (BATES, 2018). These points reveal a certain resistance to the method, as students are still used to the passively learning methods, and need discipline to manage their study time, becoming an obstacle to the implementation of flipped classroom method (KÜHL et al., 2017b).

Another point is the quality of internet access, as the low quality of connection can hinder students in the search for materials before class (WARUGABA et al., 2016). From the teaching point of view, the greater demand for lesson planing and mastering of the content was noticeable (MENEGAZ et al., 2018). Additional time and costs were associated with the implementation of this method by teachers (BOYSEN-OSBORN et al., 2016).

4 CONCLUSION

The flipped classroom proved to be a promising strategy with many health benefits. However, research on the maintenance of these benefits during the 2020's Pandemic is lacking, since face-to-face meetings were restricted. There is room for research on this academic performance around courses in Brazil, compared to traditional methods. It is necessary to develop a guide to instruct, especially teachers, how to prepare instructional materials and the phases inside classrooms, through teams or tests.

BIBLIOGRAPHIC REFERENCES

BATES, D. K. Flipped Classroom in an Orthopaedic Assessment Course: Students' Perspective. **Athletic Training Education Journal**, v. 13, n. 4, p. 324–331, 1 dez. 2018.

BONNES, S. L. et al. Flipping the Quality Improvement Classroom in Residency Education. **Academic Medicine**, v. 92, n. 1, p. 101–107, jan. 2017.

BOYSEN-OSBORN, M. et al. Flipping the advanced cardiac life support classroom with team-based learning: comparison of cognitive testing performance for medical students at the University of California, Irvine, United State. **Journal of Educational Evaluation for Health Professions**, v. 13, 18 fev. 2016.

BRAZIL; DEPARTAMENTO DE CIÊNCIA E TECNOLOGIA EM SAÚDE. **Diretrizes metodológicas: elaboração de revisão sistemática e metanálise de ensaios clínicos randomizados**. [s.l: s.n.].

DOMBROWSKI, T. et al. Flipped classroom frameworks improve efficacy in undergraduate practical courses – a quasi-randomized pilot study in otorhinolaryngology. **BMC Medical Education**, v. 18, 4 dez. 2018.

ENTEZARI, M.; JAVDAN, M. Active Learning and Flipped Classroom, Hand in Hand Approach to Improve Students Learning in Human Anatomy and Physiology. **International Journal of Higher Education**, v. 5, n. 4, p. p222, 23 out. 2016.

GOSTELOW, N. et al. Flipping social determinants on its head: Medical student perspectives on the flipped classroom and simulated patients to teach social determinants of health. **Medical Teacher**, v. 40, n. 7, p. 728–735, 3 jul. 2018.

HE, Y. et al. The effects of flipped classrooms on undergraduate pharmaceutical marketing learning: A clustered randomized controlled study. **PLoS ONE**, v. 14, n. 4, 10 abr. 2019.

JESURASA, A. et al. **What factors facilitate the engagement with flipped classrooms used in the preparation for postgraduate medical membership examinations?** Disponível em: <<https://www.dovepress.com/what-factors-facilitate-the-engagement-with-flipped-classrooms-used-in-peer-reviewed-fulltext-article-AMEP>>. Acesso em: 10 jul. 2020.

KÜHL, S. J. et al. Concept and benefits of the Inverted Classroom method for a competency-based biochemistry course in the pre-clinical stage of a human medicine course of studies. **GMS Journal for Medical Education**, v. 34, n. 3, 15 ago. 2017a.

KÜHL, S. J. et al. Concept and benefits of the Inverted Classroom method for a competency-based biochemistry course in the pre-clinical stage of a human medicine course of studies. **GMS Journal for Medical Education**, v. 34, n. 3, 15 ago. 2017b.

LOUX, T. M.; VARNER, S. E.; VANNATTA, M. Flipping an Introductory Biostatistics Course: A Case Study of Student Attitudes and Confidence. **Journal of Statistics Education**, v. 24, n. 1, p. 1–7, 2 jan. 2016.

LUCARDIE, A. T. et al. **Flipping the classroom to teach Millennial residents medical leadership: a proof of concept**. Disponível em: <<https://www.dovepress.com/flipping-the-classroom-to-teach-millennial-residents-medical-leadership-peer-reviewed-fulltext-article-AMEP>>. Acesso em: 10 jul. 2020.

MATZUMURA-KASANO, J. P. et al. Aprendizaje invertido para la mejora y logro de metas de aprendizaje en el Curso de Metodología de la Investigación en estudiantes de universidad. **Revista Electrónica Educare**, v. 22, n. 3, p. 177–197, dez. 2018.

MENEGAZ, J. DO C. et al. Flipped Classroom in teaching nursing management: experience report. **Escola Anna Nery**, v. 22, n. 3, 4 jun. 2018.

PAVANELO, E.; LIMA, R. Sala de Aula Invertida: a análise de uma experiência na disciplina de Cálculo I. **Bolema: Boletim de Educação Matemática**, v. 31, n. 58, p. 739–759, ago. 2017.

PERSKY, A. M.; MCLAUGHLIN, J. E. The Flipped Classroom – From Theory to Practice in Health Professional Education. **American Journal of Pharmaceutical Education**, v. 81, n. 6, p. 118, ago. 2017.

PRIETO-MARTÍN, A. et al. Aula invertida en enseñanzas sanitarias: recomendaciones para su puesta en práctica. **Revista de la Fundación Educación Médica**, v. 22, n. 6, p. 253, 2019.

RUI, Z. et al. Friend or Foe? Flipped Classroom for Undergraduate Electrocardiogram Learning: a Randomized Controlled Study. **BMC Medical Education**, v. 17, 7 mar. 2017.

SCHWARTZ, T. A.; AJAZI, E.; MONACO, J. Findings from a Survey of Statistics and Biostatistics Instructors in the Health Sciences Who Teach Using an Online or Flipped Format. **Journal of Statistics Education**, v. 26, n. 2, p. 143–148, 4 maio 2018.

TANG, F. et al. Comparison between flipped classroom and lecture-based classroom in ophthalmology clerkship. **Medical Education Online**, v. 22, n. 1, p. 1395679, jan. 2017.

TANG, F. Comparison between flipped classroom and lecture-based classroom in ophthalmology clerkship. p. 10, [s.d.].

WARUGABA, C. et al. Experience with a Massive Open Online Course in Rural Rwanda. **The International Review of Research in Open and Distributed Learning**, v. 17, n. 2, 1 mar. 2016.