


Digital educational resources and the flipped classroom in epidemiology teaching for undergraduate nursing

 <https://doi.org/10.56238/sevened2024.009-026>

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ABSTRACT

Objective: To describe the teaching and learning process of the discipline of epidemiology for nursing, using the "flipped classroom" method and digital educational resources, in a higher education institution. **Methods:** This is a descriptive study, with a qualitative approach, experience report type, carried out during the first and second semesters of 2022, in two classes, with a total of 41 students. The flipped classroom was applied with the technological mediation of Google Classroom™ as a virtual learning environment. Bibliographic and audiovisual materials were used for the study of the contents, which also included the practical resolution of exercises, the presentation of seminars and the realization of research projects. **Results:** It was observed that this active methodology enabled the stimulation of critical thinking, the integration between theory and practice, the development of research skills, active engagement, a better use of time and a greater appropriation of the contents by the students, with the teacher monitoring and monitoring being a differential aspect in the process. **Final considerations:** The flipped classroom enhanced learning and enriched students' training as an innovative way that can reflect positively on the challenges of their professional practices.

Keywords: Teaching, Epidemiology, Nursing, Educational Technology, Universities.



INTRODUCTION

In nursing, the epidemiological method makes it possible to analyze the determinants and health problems, to observe the quality in which the discipline of epidemiology is offered for most undergraduate courses in the area of health, being interdisciplinary and extremely relevant in academic training in the broad content of public health,⁽¹⁾ Because, among other uses, the epidemiology contents also enable the student to know the importance of the method for the evaluation, whether of demand, need or process of health services, useful in any area of nursing.⁽²⁾

The epidemiological method in nursing makes it possible to analyze the determinants and health problems, observe the quality of the services offered and their efficiency, verify the effectiveness of interventions and evaluate hypotheses of disease causality, among several other actions.⁽³⁾ Epidemiological information is produced by the nursing team in its professional work all the time, and data recording, analysis and correct use are indispensable contents in nursing education.⁽⁴⁾

In the teaching of epidemiology for nursing, the need for attractive and innovative pedagogical methods is becoming increasingly notorious, in view of the evolution of technological means, including active learning methodologies that can arouse interest and motivation in the contents, which are so relevant for training and professional development.⁽⁵⁾ However, the flipped classroom method can be highlighted, which is a teaching methodology in which the content is previously studied in face-to-face or synchronous classes, providing the student with learning with an articulation between spaces and times.⁽⁶⁾

Flipped *classroom* is an approach that combines face-to-face activities and distance educational activities, carried out through Digital Information and Communication Technologies (DICT). With this method, the content on a given curricular subject is studied by students before they attend the classroom, which, in turn, becomes the place of active learning, where, with the support of the teacher, activities will be carried out encompassing problem solving, projects and discussions, in a collaborative way.⁽⁷⁾

From the dynamics of the flipped classroom, it is possible to increase the possibilities for the teacher to act effectively and innovatively, maintaining the engagement and interaction of students, in the face of the current scenario, which demands the implementation of new active methodologies to qualify teaching⁽⁶⁾. In turn, the use of digital technologies facilitates learning in an innovative way, as a viable educational tool that makes it possible to achieve objectives by producing results that impact the current challenges of work and education.⁽⁸⁻⁹⁾

In view of the need to observe innovative methodologies applied to teaching and the importance of teaching epidemiology for nursing, which has a direct impact on the professional performance of nurses in the Health System, the present study aims to describe the teaching-learning



process of the discipline of epidemiology for nursing, using the flipped classroom in a higher education institution.

METHODS

This is a descriptive study, with a qualitative approach. SR is a modality of academic-scientific writing that presupposes experience as the starting point for learning; having the ability to produce knowledge through critical-reflexive application, with theoretical-methodological support, which goes beyond the description of the experience.⁽¹⁰⁾

The analyzed experience corresponded to the application of the flipped classroom method for the pedagogical mediation of the epidemiology discipline during the first and second semesters of 2022, in two undergraduate nursing classes at the Fluminense Federal University (UFF), on the *campus* of Rio das Ostras, state of Rio de Janeiro.

In the first semester of 2022, 23 students attended the course and, in the second semester, 18 students. The SR presented itself from the perspective of the teaching practice and two monitors of the discipline who accompanied the process.

The construction of this report meets the criteria for not requiring evaluation by the Human Research Ethics Committee, as it refers to an activity carried out with the sole purpose of educating undergraduate students, without research purposes and without performing individual identification of subjects, according to Resolution No. 510, of April 7, 2016. of the National Health Council.⁽¹¹⁾

DESCRIPTION OF THE EXPERIENCE

The experience corresponded to the use of the flipped classroom in the teaching-learning process of the discipline of epidemiology for nursing, which had the following objectives: 1) to understand the coefficients, indicators and indices most used in public health; 2) subsidize the use of epidemiological indicators in health planning practices; and, 3) to know and identify the types of epidemiological studies.

The contents of the course were addressed through two major modules: module 1, called "Basic concepts of epidemiology and collective health measures", contained the following themes: basic concepts and uses of epidemiology; introduction to epidemiological methods; natural history of diseases; frequency measures and frequency measures in public health; health indicators; and epidemic process and control diagram. Module 2, called "Distribution of diseases and types of studies", covered topics such as: epidemic process and control diagram; epidemiological surveillance; and design of epidemiological studies: cross-sectional, ecological, case-control, cohort, intervention, and meta-analysis studies.



The discipline was taught, mainly, with the technological mediation of the Google Classroom™ platform, using its resources for the creation and organization of content, tasks and publication of comments, allowing interaction between teachers, monitors and students. Other digital tools – such as Google Meet™, WhatsApp® and Google Forms™ – were used to carry out the telepresence meetings of the monitors, the communication and interaction between the participants of the discipline and the presentation and resolution of the exercises and evaluation activities by the students.

The contents of the modules were organized in Google Classroom™ by different topics for each week of class, presenting the topics with various educational resources, such as video classes recorded by the teacher of the subject, *slides* and bibliographic materials, such as articles and books. Each week contained a questionnaire with practical activities related to the themes and, at the end of each week, a document was posted with the resolution of the proposed exercises. Each module was formed for eight weeks.

In addition to the modules, the platform exhibited the topic "library", with the availability of various support materials on the themes of the discipline, and the topic "doubts", which served as a space for permanent interaction between students, teachers and monitors for the exchange of questions and solutions to the practical exercises of each week.

In module 2, in addition to the application of activities and exercises developed each week, a seminar was held with the availability of articles for each group of students to analyze and present the characteristics and structure of the types of epidemiological studies.

In the same module, it was also proposed to carry out the cross-sectional research project, as part of the evaluation and consolidation of the contents, enabling: practical application, elaboration of a directed project and schedule, bibliographic search and research. The research comprised the students as protagonists of an online interview activity, through the Google Forms™ tool, with the participation of other academic colleagues, collecting and analyzing data, based on a project previously approved by the opinion of the Ethics Committee of UFF.

The planning of the classes was carried out jointly by teachers, monitors and students of the discipline, who agreed on the dates for the delivery of activities and for the realization of the weekly monitoring meetings. Two monitors supported the didactic pedagogical development of the discipline and performed a student monitoring function.

Several evaluation methods, both summative and formative, were used: theoretical tests, seminars, research activities and directed studies. Participation during classes was considered for the mandatory criterion of the educational institution for the attribution of grades.

With the flipped classroom as an active method for the development of the discipline, audiovisual materials, readings and activities were made available a week in advance, through the



Google Classroom™ platform. Students had time to study the week's content and *feedback* on activities before face-to-face classes.

The weekly face-to-face classes lasted 4 hours, with a 15-minute break, and were developed based on the doubts that the students brought about the materials previously studied and the activities carried out. The teacher resumed the theoretical concepts on the theme of the week, and the practical exercises were corrected together. However, these activities previously posted on Google Classroom™ had already been evaluated on the platform through *feedback*.

As a strategy to monitor the teaching-learning process of the students, group activities were developed in the monitors, through the Google Meet™ tool. In the Telepresence meetings, workshops were held to solve exercises and review the study materials; teaching of synchronous content classes with the objective of addressing the doubts pointed out, an activity called "doubt shift"; and supervision of seminars and projects, according to the themes of the course syllabus.

In order to allow students to get closer to the monitor, the questions were answered by the monitors of the discipline in the shortest possible time, and, when necessary due to the complexity, they were discussed with the teacher to be answered together. In addition, the topic "doubts", available on the platform, was effectively used to post specific demands related to the resolution of the proposed activities. However, in case of more immediate questions, WhatsApp® groups were used, which also allowed the sharing of information on the themes of the discipline.

During the development of the course, a strategy was carried out to evaluate the teaching practice, with the aim of verifying the quality of teaching and the acceptability of the flipped classroom method by the students. In this way, the discipline had evaluation both of the process and also of the result through a weekly activity and at the end of the discipline.

Thus, at the end of each face-to-face class, a discussion space lasting approximately 15 minutes was opened, so that students could present their perceptions, feelings and opinions related to the achievement of the class objectives, the clarity and understanding of the contents, the pedagogical resources and educational technologies used, the experience of using the flipped classroom, the motivation to participate in the activities, the difficulties encountered, the teacher and the monitors as mediators of learning and the proposals for improvement. The evaluation of the process allowed the necessary adjustments to be made in order to improve the discipline. Communication channels such as Google Classroom™ interaction spaces, WhatsApp® groups, and telepresence meetings for monitoring also contributed to obtaining this data.

In the last week of the course, a conversation circle was held, as a final evaluation strategy, with the participation of all students and mediated by the professor and monitors. The activity lasted 30 minutes and was guided by a script that explored similar issues to each week's final discussions.



MAIN RESULTS AND DISCUSSION

The use of the flipped classroom in the teaching of epidemiology in nursing proved to be an adequate active learning method in two classes at UFF, *Rio das Ostras* campus. The results of the evaluations of the teaching practice and of the summative and formative evaluations of the students presented *positive feedbacks* on: (1) the blended teaching methodology, (2) the use of pedagogical resources, (3) the teacher mediation, (4) the academic support of the monitors, (5) the contents covered and (6) the evaluation process.

As a pedagogical innovation, the use of the flipped classroom was evaluated as creative and facilitating the achievement of the objectives of the course. The availability of study materials prior to face-to-face classes and telepresence meetings with monitors was evaluated as positive, in addition to verifying that students had frequent access and interaction in Google Classroom™, both for the consultation of the materials and for the subsequent delivery of the proposed exercises.

Through the Google Classroom™ platform, it was possible to highlight the resolutions of the students' activities, who, even with the possible mistakes in the elaboration, received *feedback* and grades. In addition, they had their doubts resolved in face-to-face classes and, complementarily, in monitoring. Thus, the method provided a learning process based on the construction of individual and collective knowledge.

In the flipped classroom, students study the content at home, through videos and readings, and carry out activities. Then, they discuss and apply what they have learned in the classroom, consolidating the knowledge acquired, providing a more dynamic and participatory learning environment⁽¹¹⁾. It is important to select and create high-quality, relevant and interesting materials, promoting student motivation and interaction and validating the contents applied in each week of class taught⁽¹³⁾.

It was observed that the hybrid flipped classroom methodology allowed a better use of time. For example, a complementation of the content usually taught in the subject in previous periods was carried out, providing a practical activity on the theme related to the design of epidemiological studies, based on the elaboration of a cross-sectional study by groups of students of the discipline. The group activities in the form of seminars and this activity, called "cross-sectional project and research", contributed to the learning of several epidemiological studies in a practical and different way from the usual way. The results of the studies can be disseminated later in order to strengthen the body of nursing knowledge.

One of the main advantages of the flipped classroom is that students have more control over their own learning process. Students can study the materials at their own pace and answer questions before going to class through platforms that allow teachers to use classroom time more efficiently,



focusing on hands-on activities, group discussions, problem-solving, and other activities that promote active learning.^(4,8)

Similar to our findings regarding the optimization of learning time in the flipped classroom methodology, studies conducted by Rodrigues *et. al.*⁽⁵⁾ and Bethânia *et. al.*⁽⁸⁾ – who evaluated university students in health courses, such as psychology, nursing, among others –, observed that the method plays an important role in maximizing the contents taught and increases the students' performance coefficient, due to the consolidation of the contents and the effectiveness in correlating practice with theory. Both studies confirm our findings that it is important to use active methodologies because they are effective, facilitate learning and have high feasibility for the immediate need for new active methodologies for the academic environment.⁽¹⁴⁾

The flipped classroom method applied to the teaching of epidemiology corroborated the minimization of previous learning deficits related to the analysis of tables and graphs, mathematical and statistical concepts, through a previous diagnosis of these elements. Thus, there was an increase in interest and motivation, enabling a language accessible to students, corroborating communication between students and teachers, mediating wanting and knowing. Therefore, using several tools in teaching has the benefit of contributing to the development of studies, consolidating more content in less time, in a viable way. The use of technologies in teaching attracted creativity, aroused the interest of students and provided positive *feedback* from students in relation to teachers and monitors.

However, the development of this method may present challenges related to access to technological resources for home study and skills for the use of digital technologies; issues addressed through the prior verification of the viable technological means that the students had for the studies and, respectively, the support of the monitors for the resolution of doubts.

It is known that the modification of traditional teaching, through the flipped classroom, is in fact an inversion of what was obtained over the years, when the student was a mere listener in relation to the teachers, who needed to be the holders of knowledge and apply a teaching methodology instituted in the speech, on the part of the teacher. and in listening, on the part of the student. Thus, with the application of this method, teachers become facilitators and advisors, rather than providers of information, but they need to be willing to experiment with new approaches and to work collaboratively with students and monitors.^{(8; (12)}

Experiences and changes in teaching methods, with technological means and the flipped classroom method, were defined, based on the results produced, as viable and effective educational tools. Complementary to digital tools in remote and hybrid teaching, it was an approach that emerged to meet the demand for remote teaching during the COVID-19 pandemic period, as studies have



shown, being implemented with good acceptability by teachers and students of public universities.^(4,15)

Ries *et al.* ⁽⁴⁾ evaluated the pedagogical adaptation of three undergraduate classes in nursing and pharmacy in the transition from face-to-face to remote teaching, verifying that the use of active methodologies valued the student's prior knowledge, as well as provided the production of scientific materials and research in the field of epidemiology during the aforementioned study during the pandemic period. Similarly, Bethânia *et al.* ⁽⁸⁾ in a quantitative-qualitative study conducted with 132 teachers from an educational institution in Rio Grande do Sul, observed a very receptive academic disposition of teachers in relation to the flipped classroom teaching method in the pedagogical experience for remote teaching.

LIMITATIONS OF THE EXPERIMENT

The implementation of the flipped classroom required a significant change in the traditional teaching dynamics, requiring students to adapt to take an active role in learning. Future challenges include adapted experiences in other disciplines.

CONTRIBUTIONS TO PRACTICE

The reported experience provides the possibility of considering the use of active methodologies and digital technologies in nursing education as an innovative way, due to its ability to promote skills, attitudes and knowledge that can reflect positively on professional practice.

FINAL THOUGHTS

The flipped classroom enhanced learning by promoting active engagement, practical activities, the development of research skills, the stimulation of critical thinking, and the integration between theory and practice in the discipline of epidemiology for nursing. Teacher mediation and monitoring support made these results possible. The methodology enriched the students' training, overcoming the traditional difficulties of the topics addressed, advancing in the development of products that prepare them more effectively for professional challenges.



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