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Intelligent Flipped Classroom (IFC); a relevant strategy for the medical internship.

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Abstract. This study evaluates student perception regarding the educational experience using "Intelligent Flipped Classroom (IFC)" in an Obstetrics and Gynecology internship at Universidad San Sebastián. This strategy inverts the traditional elements of teaching, providing asynchronous instruction outside the classroom, incorporating lesson plans, materials, and study guides to clarify the process. The synchronous instance consists of input control and class oriented to resolve clinical cases and develop major cognitive processes. A descriptive and cross-sectional study was conducted to evaluate the implementation of IFC in the feto-placental unit evaluation seminar. The results indicate that most students agreed that IFC facilitated learning, provided an efficient roadmap for the study of the topic, promoted active study and participation, and improved the quality of the seminars. The inclusion of student assistants in the preparation of the materials is suggested to optimize the strategy. Future research could compare the effectiveness of IFC with other teaching methods, explore its effectiveness in other contexts and with different groups of students.

Keywords: Flipped classroom, Medical Student, Teaching method.

1 Introduction

The internship represents the culmination of the medical undergraduate program, in line with the "doing" phase of the pyramid proposed by Miller (1990). Within this framework, seminars are developed, in which the teacher focuses on crucial topics for the performance of the general practitioner, frequently using the discussion of clinical cases as a method.

It is imperative that students are proactive and committed, capable of directing and regulating their learning, as well as their actions and emotions. Therefore, teaching should encourage active and self-regulated learning (Perez et al., 2010).

2 Theoretical Framework

Flipped learning is a pedagogical model that moves online instruction out of the classroom, reserving face-to-face time for hands-on activities (Bergman & Sans, 2016). In medical education, this strategy has improved student performance and experience

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compared to traditional techniques (Angadi et al., 2019). A meta-analysis supported its efficacy (Hew & Lo, 2018), and it has been evidenced to promote autonomous and deep learning (McLean, 2016). In large student groups, it has shown improvements in performance and positive feedback (Kaur et al., 2022). Online experiences in boarding schools have been interactive and motivating (Kauskik et al., 2023).

A detailed analysis identified key factors for their effectiveness, including student, teacher, and implementation characteristics, among others (Oudbier et al., 2022). To enhance its impact, the "Intelligent Flipped Classroom (IFC)" is proposed, integrating study material, lesson plan and study guide.

3 Methods

A descriptive and transversal study was carried out to evaluate the students' perception of the implementation of the "Intelligent Flipped Classroom (IFC)" methodology in the seminar "evaluation of the feto-placental unit" in the Obstetrics and Gynecology internship of the Universidad San Sebastián, Santiago campus, group 1 2023, made up of 39 students. After the activity, a link was sent by institutional mail with a questionnaire to evaluate the experience, with 13 questions with Likert-type alternatives. A voluntary response was requested, with acceptance of informed consent.

To prepare for the seminar, a folder was shared with students in OneDrive, containing study material (recorded plenary, review of the topic in Spanish and summary mind map), class plan (document with justified structure of the activity) and study guide (instructions to achieve results). The synchronous instance was established with virtual modality, given the presence of interns in different clinical fields. To begin with, a test with 7 multiple-choice questions using Forms was asked to be answered in 9 minutes. Then, clinical cases were discussed for 45 minutes.

4 Results

Of the total number of students, 26 responded to the survey (66%). Of the students who responded: 76% reviewed the materials contained in the portfolio, 84% considered that IIC facilitated the learning of the subject, 81% that IIC establishes an efficient roadmap for the study of the subject, 84% that IIC allows focusing the study, 81% that IIC promotes active study and participation, 96% that the "lesson plan" demonstrates teaching professionalism, 84% that the study guide oriented their study, 65% that IIC improves the quality of the seminars and allows better use of synchronous time with docent, 73% recommend using IIC as a defined strategy for seminars in the internship, 65% reported having improved their educational experience with IIC, 88% consider that IIC allows them to equalize the educational experience of different clinical fields, 73% that IIC gives them peace of mind to face the activity, and 73% consider that the participation of student assistants in the construction of IIC folders would improve the strategy.

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5 Discussion

The "Intelligent Flipped Classroom (IFC)" in the medical internship was well rated by students, aligning with what Bergmann & Sams (2016) described about Flipped Learning. Angadi et al. (2019) and Hew & Lo (2018) also highlighted improvements in learning with similar strategies. Our findings highlight that IIC facilitates learning and promotes active participation, consistent with McLean (2016). Although effective, the implementation of IIC has challenges, as noted by Oudbier et al. (2022). The inclusion of assistants with their strategic outlook could optimize the methodology, suggesting its potential in other educational contexts.

6 Conclusions

The IIC strategy was effective and well appreciated by the students, making it relevant. It proved to be an effective tool to facilitate learning, promote active participation and improve the quality of the seminars. In addition, it showed potential for leveling educational experiences in various clinical fields and for increasing student confidence. The inclusion of student assistants in the preparation of the materials is suggested to further optimize the strategy.

7 Limitations and Future Research

Limitations include the sample size and the lack of a control group. Future research could include an experimental design to compare the effectiveness of IIC with other teaching methods. In addition, it would be useful to explore the effectiveness of IIC in other contexts and with different groups of students.

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