INNOVATION IN HIGHER EDUCATION: EVALUATION OF FLIPPED CLASS AND CRITICAL PEDAGOGY IN COMMUNITY LINKAGE PROJECTS

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Abstract

This study investigated the effects of combining flipped classroom methodology and critical pedagogy with higher education students involved in community engagement projects. It was carried out in a Technological Education Institute and the students' perception, the use of critical pedagogy, the influence on motivation and skills, as well as social awareness about the community were evaluated. The results indicated that the implementation of these methodologies had a mostly positive effect, with an increase in student involvement, social awareness, and collaboration in community projects. Students expressed an interest in more practical education and skills applicable in real life. Although there were benefits, areas for improvement were identified, such as the organization of and access to online resources. In general, this study supports the promotion of inclusive and quality education, aligned with the UN Sustainable Development Goals; and, furthermore, it suggests that the combination of these methodologies can promote learning and student participation in community engagement projects in higher education.

Palabras clave: Keywords: learning method, active learning, self-learning, educational technology

Introduction

This study focuses on higher level teaching, specifically on how the flipped classroom methodology and the application of critical pedagogy impact students in the subject of community engagement projects. The study is carried out in an Institute of Technological Education in Ecuador, where these careers are considered third level, equivalent to university training (CES, 2022).

The importance of this transversal subject is highlighted, which faces the challenge of limited time of synchronous contact between teachers and students. To address this limitation; and, in addition, improve the quality of learning, the flipped

class methodology and critical pedagogy are proposed. A pilot program was previously conducted (Gallegos-Montero, 2023), and the current research focuses on a broader group over a longer period.

The research is based on specific objectives, such as assessing student perception, examining the application of critical pedagogy, investigating the impact on student motivation and engagement, exploring skill development for community engagement projects, and analyzing how students perceive its impact on the community.

The report focuses on the results of the April 2023 diagnosis and the September 2023 final evaluation after the implementation of the flipped classroom methodology and the critical pedagogy approach, providing a comprehensive view of the effectiveness of these methodological approaches. and pedagogical in higher education and its impact on the training of students.

Review

The literature review carried out with various authors provides a comprehensive perspective on the implementation of the flipped classroom methodology and the adoption of the critical pedagogy approach in the subject of community engagement projects in higher education students. This analysis draws on research such as that of Aznar-Díaz *et al.* (2020), who highlight the benefits of the flipped class, according to which academic performance, dialogic learning and creativity stand out as positive results. Her research focuses on the practical aspects and positive impacts of the flipped classroom.

As for, Colomo-Magaña *et al.* (2020) emphasize the positive assessment of the flipped class by higher education students, with greater focus on time management and teacher availability as key factors for successful implementation. Meanwhile *et al.* (2019) contribute by highlighting that the flipped class positively impacts students' knowledge and skills, providing practical recommendations for implementation. Likewise (2019) adds a solid theoretical perspective supporting the implementation of flipped classes and critical pedagogy, emphasizing his perspective on the student, personalization and collaboration as essential foundations.

On the other hand, Buil-Fabregá *et al.* (2019) focused their study on sustainable development and how the flipped classroom improves students' understanding and dedication. They provide practical recommendations for educational institutions and future research areas. Additionally, Steen-Utheim & Foldnes (2017) delve into the effectiveness of the flipped class, highlighting its positive impact on student participation and affective dimensions. Its socio-constructionist approach and its attention to psychosocial dimensions offered valuable perspectives.

Alebrahim & Ku (2020) provide direct experiences of teachers and students in the application of the flipped classroom, highlighting the importance of prior

preparation, active interaction, and adaptability. At the same time, Al-Samarraie, *et al.* (2019) provide a comprehensive review spanning various disciplines, highlighting the effectiveness of the flipped classroom in improving student learning and engagement. Although not directly focused on critical pedagogy, its robust analysis provides a theoretical framework for exploring the intersection between the flipped classroom and critical pedagogical approaches. Meanwhile, Berić-Stojšić *et al.* (2019) enrich the discussion by examining the effectiveness of the flipped classroom in a public health course, integrating theories such as liberation pedagogy and Vygotsky's theory, highlighting its inclusive and empowering potential.

Together, these studies provide a solid foundation to address the research question about how the application of the flipped classroom methodology and the application of critical pedagogy in the subject of community engagement projects influences higher-level students.

Theoretical framework

The implementation of critical pedagogy and the flipped classroom methodology in the subject of community engagement projects in higher education students offers a transformative perspective that goes beyond conventional educational structures. This theoretical framework seeks to provide a solid foundation to understand how these two pedagogical streams can positively influence knowledge acquisition and student engagement, with a particular focus on sustainability and the Sustainable Development Goals (SDGs), UN (2018)).

Critical pedagogy, rooted in the ideas of Freire (2002) and supported by Giroux & Ocampo (2020), is positioned as a catalyst for student empowerment, social consciousness, and transformative action. Fundamental principles, such as dialogue and participation, critical reflection, awareness-raising and transformative action, offer a solid framework to foster the connection between academic learning and social reality.

The application of critical pedagogy in community engagement projects involves engaging students in an active dialogue with social problems, promoting reflection on structures of oppression and stimulating actions that contribute to positive social change. This methodology, aligned with the SDGs (UN, 2018), can nurture crucial skills such as critical thinking, active citizenship and awareness of social responsibility, essential elements for building a sustainable future (Giroux & Ocampo, 2020).

The flipped classroom methodology offers an innovative approach by allowing students to acquire theoretical knowledge autonomously before class (Sanchez-Rodriguez *et al.* 2014). This frees up valuable classroom time for interactive and collaborative activities, aligning perfectly with the foundations of critical pedagogy.

The flipped classroom makes it easy to personalize learning, allowing each student to progress at their personal speed and delve into specific areas based on their individual needs. Adding to the above, it promotes active and collaborative learning, essential to develop superior skills such as critical thinking and problem solving (Freire, 2002; Sanchez-Rodriguez *et al.*, 2014).

Technology plays a crucial role in both methodologies. The flipped class relies on digital resources, providing flexibility and access to students anytime, anywhere (Cobo & Moravec, 2011). This not only aligns with contemporary learning demands, but also contributes to a sustainable approach by reducing the need for printed materials and optimizing the use of class time.

The evaluation of these methodologies must go beyond the conventional measurement of academic performance. Students' ability to use the knowledge acquired in real-life situations, their active involvement in solving social challenges and their contribution to sustainable development, in line with the SDGs, must be considered (Cobo & Moravec, 2011).

The proposed research is especially aligned with Sustainable Development Goal number 4 (SDG 4): "Ensure inclusive, equitable quality education and promote lifelong learning opportunities for all" (UN, 2018). The combination of critical pedagogy and the flipped classroom not only seeks to raise the level of excellence in university teaching, but also advocates for equity and inclusion by allowing the active participation of students in their knowledge acquisition process, adapting it to your individual needs. Along the same lines, it promotes fundamental competencies necessary for life and the workplace in an increasingly intricate and varied global environment, thus contributing to the achievement of SDG 4 (UN, 2018).

Methodology

This study is framed in the interpretive approach (Burrel & Morgan, 1979; Guba & Lincoln, 1994), whose objective is to understand in depth the experiences of students in relation to the flipped classroom methodology and critical pedagogy in connection projects with the community. With this interpretive perspective, the study adopts a mixed approach (Creswell, 2014), combining qualitative and quantitative methods to provide both a detailed understanding of students' perceptions and quantifiable data that reflects the influence of these pedagogical methodologies.

The research design is exploratory and descriptive. The exploratory approach allows a deep and holistic examination of students' perceptions, prior knowledge and expectations. In turn, the descriptive approach is used to identify patterns and trends in the data obtained, which facilitates a systematic and robust interpretation of the results.

For data collection, a survey design was used based on questionnaires administered anonymously, to promote confidentiality and honesty in the responses (Dillman, 2000). The questionnaires included open and closed questions, allowing us to obtain both qualitative data on the individual experiences of the students and quantitative data on the frequency and distribution of certain opinions and experiences.

The selection of the sample followed two phases to ensure its representativeness and validity. In the initial phase, a simple random sample was carried out (Levy & Lemeshow, 2013) for a population of 243 students enrolled in the subject of community engagement projects, with the support of the following formula:

$$n = \frac{Z^2 \cdot p \cdot q \cdot N}{E^2 \cdot (N-1) + Z^2 \cdot p \cdot q}$$

Where: n: is the sample size; N: total population size; Z: confidence level, usually 95%, which corresponds to a value of 1.96; p: expected proportion of success in the population, usually 0.5 is used if there is no known value, to maximize variability; q: complement of p, that is, q = 1 – p; E: Allowable margin of error desirable to be 5% = 0.05. That by establishing values, a sample of 98 surveys was obtained.

This simple random sample was used to obtain an overview of students' experiences and perceptions and had a favorable collaborative response that allowed for the application of 157 instruments. To determine stratified sampling (Fowler, 2014), the number of instruments applied in the previous phase was used as the calculated sample size, to improve the expected representativeness of the instrument. In this phase, factors considered relevant and applicable to the type of study such as gender, age and majors of the students were considered, which allowed us to reflect the diversity of the student population and ensure that the subgroups were proportionally represented in the final sample. It was distributed as shown in Table 1.:

This stratification allowed the results to be generalizable to the entire

Table 1. Calculation of the stratified sample.

Stratification factors	Representativeness (%)	n	n_e
Gender	50	121.5	46.61
Ages	25	60.75	30.45
Vocational training	25	60.75	30.45
		243	107.5

n: Relative population size, n_e: Stratified sample size.
Source: Own elaboration.

population of interest, guaranteeing that the experiences and perceptions collected are representative of the different profiles present in the student community. The application in this second phase, the sample was expanded to 200 students, due to the students' interest in participation. For the interpretation of the results, the response obtained was considered, which allows representative inferences to be made, based on the response obtained in the application of the study instruments.

Data Collection and Analysis Process

Qualitative data were analyzed using thematic coding, identifying patterns and trends in the perceptions and experiences expressed by students. On the other hand, the quantitative data were analyzed with descriptive statistics techniques to detect the frequency and distribution of the responses in relation to the methodological approaches evaluated. Self-administered questionnaires were used that included closed questions with the purpose of simplifying the analysis of numerical data and using open questions to collect additional qualitative information. The surveys were distributed electronically, guaranteeing the confidentiality and anonymity of the responses. A brief introduction was provided to contextualize the purpose of each survey and highlighted the importance of honest responses to obtain meaningful results. A specific period was assigned to complete the surveys.

1. Diagnostic Questionnaire: Applied at the beginning to obtain data on expectations and prior knowledge (Fraenkel & Wallen, 2006).
2. Didactic Intervention: Implementation of the flipped class methodology and critical pedagogy.
3. Evaluation Questionnaire: Applied at the end to collect data on students' experiences and perceptions.
4. Data Analysis: Quantitative (descriptive statistics) and qualitative analysis is used, through content analysis (Hsieh & Shannon, 2005) to identify patterns and trends.

This methodological design integrated elements of both approaches to offer a holistic and precise vision of the influence of the flipped classroom methodology and critical pedagogy on learning for the application of community engagement projects.

Results and Discussion

The results of the diagnostic questionnaire provided a complete vision of the students' perception and previous experience regarding the use of the flipped classroom methodology and critical pedagogy in the subject of community engagement projects.

A relevant finding is that 73.89% of the students have no previous experience with the flipped class. Even so, those who have previously used it express a marked preference for practical activities over theory (54.78%), which reflects an alignment with the fundamental principles of this methodology, which promotes active and practice-based learning (Giroux & Ocampo, 2020).

Likewise, student's express expectations of acquiring practical skills (47.13%) and improving skills such as teamwork, leadership and interpersonal communication (29.30%). This interest in practical skills and group work coincides with the objectives of critical pedagogy, which seeks to go beyond the mere transmission of theoretical knowledge to promote transformative and socially engaged learning (Murillo-Zamorano *et al.*, 2019). Furthermore, a significant percentage of students (46.50%) consider connection with the community essential in their academic training, which reinforces the idea that both the flipped classroom and critical pedagogy have the potential to contribute to sustainable development (UN, 2018).

On the other hand, a high percentage of students (96.18%) express high learning expectations, valuing the development of practical skills applicable in real life (42.68%). These results reflect the positive perception of students regarding the benefits of the flipped classroom and critical pedagogy, in terms of both academic learning and practical skills (Buil-Fabregá *et al.*, 2019). In line, 54.78% of students express the desire to participate in practical activities, which coincides with the purpose of the flipped class to promote active and collaborative learning (Sánchez-Rodríguez *et al.*, 2014).

The lack of experience in the flipped classroom methodology (73.89%) highlights the importance of training for teachers in this methodology, since its correct application requires specific classroom facilitation and organization skills (Colomo-Magaña *et al.*, 2020). This is even more relevant when observing the skills considered key by students, such as effective communication (10.91%), teamwork (16.59%) and planning and organization (14.32%), which are closely aligned with the principles of critical pedagogy and the flipped classroom (Freire, 2002; Sánchez-Rodríguez *et al.*, 2014).

Together, these results show a convergence between student expectations, demand for practical skills, and the principles of critical pedagogy and the flipped classroom. This coincidence suggests an opportunity to design the subject taking these elements into account, providing an educational experience that encourages both academic learning and the development of social and practical skills, necessary in a context of community engagement.

Evaluation of the application of the flipped classroom methodology and critical pedagogy

When evaluating the implementation of the flipped classroom and critical pedagogy, the results are generally positive according to the perception of the students. Regarding the flipped class, 80.5% of students consider that this methodology allows more active participation in class sessions, which coincides with the benefits of this methodology for dynamic learning (Aznar-Díaz *et al.*, 2020). Furthermore, 26.5% appreciate the flexibility that this methodology provides in the organization of study and work time on the project.

In relation to critical pedagogy, a notable influence is observed on the motivation and commitment of students in the process of design and development of community engagement projects, reaching 75.5%. Furthermore, 54% consider that this pedagogy is effective in identifying relevant social needs and problems, in line with its fundamental principles of social awareness and transformative action (Giroux & Ocampo, 2020).

The perception of effectiveness of the flipped class reaches 74.5% in terms of application of tools and strategies for the development of community engagement projects, facilitating the dedication of more time to practical and collaborative activities (Sánchez-Rodríguez *et al.*, 2014). Additionally, students' responsibility in the knowledge acquisition process increases (84%), as does peer interaction and collaboration (80%), which reinforces the notion that critical pedagogy drives social awareness. and collective action, as well as active learning (Giroux & Ocampo, 2020; Sánchez-Rodríguez *et al.*, 2014).

Skill development and application of critical pedagogical principles

Regarding the development of skills for working on linking projects, the flipped class contributes significantly to strengthening teamwork (49%), aligning with the promotion of active and collaborative learning (Freire, 2002). However, other skills such as critical analysis and effective communication do not seem to have been so influenced, which suggests the need to reinforce these aspects in the implementation of the flipped class.

The results regarding critical pedagogy highlight the importance of aspects such as respectful dialogue (13%), the promotion of a deep criticism of the causes of social problems (18%), and citizen awareness and active participation (18%). These results demonstrate the application of critical pedagogical principles aimed at empowering students to influence their community (Freire, 2002; Giroux & Ocampo, 2020).

Synthesis of findings and contribution to the Sustainable Development Goals

In summary, the implementation of the flipped classroom methodology and critical pedagogy has a positive impact on student learning and participation in higher education, aligning with UN Sustainable Development Goal number 4, which promotes better education. inclusive, equitable and quality. However, areas for improvement are identified in aspects such as the organization and classification of online educational resources, which could optimize the educational experience of students.

Finally, the content analysis of the student responses reveals enriching experiences, such as team learning and the application of knowledge in real contexts, coinciding with the observations of Aznar-Díaz *et al.* (2020) and Colomo-Magaña *et al.* (2020) on the benefits of the flipped classroom on academic performance and dialogic learning. However, students also mention challenges, such as time management and coordination in online activities. According to Colomo-Magaña *et al.* (2020) and Steen-Utheim & Foldnes (2017), efficient time management is crucial to maximizing the effectiveness of the flipped classroom on student engagement.

Conclusions

This research focused on understanding how the flipped classroom methodology and the adoption of critical pedagogy affect higher education students who participate in community engagement projects. The effects of the study reveal that the majority of students had a positive experience with the flipped class, as it allowed them to engage more dynamically in classes and discussions, which is consistent with previous research that highlights its benefits, such as better performance. academic and more participatory and creative learning (Gallegos-Montero, 2023). Additionally, students appreciated the flexibility that this methodology gave them to organize their study time and work on community projects.

Together, the findings highlight the relevance of the flipped classroom and critical pedagogy in teaching, as well as its contribution to promoting collaborative and community-linking initiatives in the educational field, in accordance with the SDGs. Regarding the adoption of critical pedagogy, it was found that it positively influenced the motivation and commitment of students in the planning and development of community projects. This pedagogy has an approach that is directed towards social awareness and transformative impact, which promotes critical reflection on community problems. Additionally, the flipped class methodology is considered effective for applying tools and strategies in community outreach projects.

In terms of skill development, the flipped classroom contributed to improving students' group collaboration skills, which is essential in community projects. However, some skills, such as critical analysis and effective communication, were not as influenced. Students also identified areas for improvement, such as organizing online educational resources.

In summary, the implementation of the flipped classroom and critical pedagogy in community engagement projects in higher education had an overall positive impact. These approaches not only improved academic learning, but also fostered social awareness, contributed to dynamic engagement and cooperation among students, thus contributing to promoting high-quality education that is inclusive and equitable, in line with the UN Sustainable Development Goals.

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