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Integración de las tecnologías del aprendizaje y conocimiento en la gestión de proyectos interdisciplinarios en bachillerato en la Unidad Educativa "Rumipamba"

Integration of learning and knowledge technologies in the management of interdisciplinary projects in high school in the Unidad Educativa "Rumipamba"

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Palabras claves:
Tecnologías del aprendizaje y conocimiento, Proyectos interdisciplinarios, Competencias digitales, Capacitación docente, Proceso de enseñanza – aprendizaje

Resumen

Introducción: En el contexto ecuatoriano, la integración de tecnologías del aprendizaje y conocimiento (TAC) en proyectos interdisciplinarios en el bachillerato es una oportunidad para mejorar el aprendizaje de los estudiantes y su preparación para el futuro. **Objetivo**: El artículo aborda la necesidad de maximizar el impacto positivo de la integración de tecnologías en proyectos interdisciplinarios en la Unidad educativa Rumipamba. Los objetivos incluyen analizar el estado actual de la integración de tecnologías, evaluar desafíos y limitaciones, y proponer recomendaciones concretas. **Metodología**: Se utilizó un enfoque mixto que combinó métodos cuantitativos y cualitativos, incluyendo un cuestionario estructurado implementado en la plataforma Google Form. **Resultados**: Los hallazgos revelan el estado actual de la integración de tecnologías del aprendizaje y conocimiento en proyectos interdisciplinarios en bachillerato en el contexto ecuatoriano, obtenidos a través de un cuestionario estructurado. Se proponen recomendaciones concretas para mejorar la implementación de tecnologías en proyectos interdisciplinarios en el contexto educativo ecuatoriano. **Conclusión**: Se destaca la necesidad de mayor apoyo y recursos para la formación docente en el uso efectivo de tecnologías del aprendizaje y conocimiento en el contexto educativo ecuatoriano. **Área de estudio general**: Educación. **Área de estudio específica**: Pedagogía.

Keywords:
Learning technologies and knowledge, Interdisciplinary projects, Digital competencies, Teacher training, Teaching and learning process, Teaching and learning process.

Abstract

Introduction: In the Ecuadorian context, the integration of learning and knowledge technologies (LKT) in interdisciplinary projects in high school is an opportunity to improve students' learning and their preparation for the future. Objective: The article addresses the need to maximize the positive impact of the integration of technologies in interdisciplinary projects in the Rumipamba Educational Unit. The objectives include analyzing the current state of technology integration, assessing challenges and limitations, and proposing concrete recommendations. Methodology: A mixed approach combining quantitative and qualitative methods was used, including a structured questionnaire implemented in the Google Form platform. Results: The findings reveal the current state of the integration of learning and knowledge technologies in interdisciplinary projects in high school in the Ecuadorian context,

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obtained through a structured questionnaire. Concrete recommendations are proposed to improve the implementation of technologies in interdisciplinary projects in the Ecuadorian educational context. Conclusion: The need for greater support and resources for teacher training in the effective use of learning and knowledge technologies in the Ecuadorian educational context is highlighted. General area of study: Ecuadorian Educational System. Specific area of study: "Rumipamba" Educational Unit.

Introduction

The integration of learning technologies and knowledge in the teaching of interdisciplinary projects in the Ecuadorian high school is a topic of great relevance in the current educational context.(Espinosa Izquierdo et al., 2023a). The growing influence of digital technologies in society has generated the need to explore how these tools can be used effectively to improve the quality of teaching and learning, especially in the field of interdisciplinary project management.(Table, 2015).

Globally, the integration of learning and knowledge technologies has acquired significant importance in the development of key competencies for the 21st century, such as collaboration, problem solving, effective communication and critical thinking. These competencies are essential to prepare students to face the complex and multidisciplinary challenges that characterize the contemporary world.(Bueno et al., 2023; Tixi et al., 2023).

In the specific context of Ecuador, the implementation of interdisciplinary projects in high school has become a priority within the framework of educational reform. However, it faces the challenge of guaranteeing that these projects are effectively managed and that they promote the comprehensive development of students.(Mesa et al., 2022). The integration of learning and knowledge technologies could offer powerful tools to address these challenges by facilitating collaboration across disciplines, fostering creativity, and improving understanding of content.

In this context, the need arises to investigate and understand how learning and knowledge technologies can be used significantly to improve the management of interdisciplinary projects in the Ecuadorian high school. This research will not only contribute to the advancement of knowledge in the field of education, but will also have important practical implications for educators, educational policy makers and other actors involved in the continuous improvement of the educational system in Ecuador.(Chávez & Céspedes, 2018).

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Therefore, this article aims to explore effective strategies for the integration of learning technologies and knowledge in the management of interdisciplinary projects in the Ecuadorian high school, in order to improve the quality of teaching and learning at this educational level.

In the last decade, the integration of learning and knowledge technologies in the educational context has been the subject of numerous research worldwide.(Céspedes-Isaac et al., 2018). Previous studies have shown that the effective use of these technologies can significantly improve the quality of teaching and learning, especially within the framework of interdisciplinary projects. Existing literature has identified various advantages of integrating technologies in teaching, such as fostering collaboration, personalizing learning, improving student motivation and engagement, and developing digital skills essential for their future.(Mesa & Rivas, 2021; Rodríguez et al., 2019).

In the specific context of Ecuador, the implementation of interdisciplinary projects in high school has become a priority within the framework of educational reform. However, existing literature suggests that the effective management of these projects remains a challenge, and that their impact on the comprehensive development of students is variable.(Cabero-Almenara et al., 2021; Martín-Párraga et al., 2022). Despite efforts to promote interdisciplinarity, there are limitations regarding the effective integration of ICT in these projects, as well as in teacher training and the availability of technological resources in educational institutions.

Furthermore, previous research has identified the need to explore specific strategies for the integration of learning technologies and knowledge in interdisciplinary projects in the Ecuadorian context, in order to maximize their impact on the development of key competencies for the 21st century. These strategies should address both the opportunities and challenges associated with the effective implementation of ICT in interdisciplinary projects, considering the unique characteristics of the Ecuadorian educational context.(Cabero-Almenara et al., 2020, 2022).

In this sense, the detailed review of previous research related to the integration of learning technologies and interdisciplinary teaching in the Ecuadorian educational context is essential to understand the current state of knowledge in this field and to identify gaps and opportunities for future research. This review will allow us to contextualize the problem within the global and local context, as well as identify the lessons learned and best practices that can be applied in the design and implementation of effective strategies for the integration of technologies in interdisciplinary projects in the Ecuadorian high school.(Rojas-Viteri & Álvarez-Zurita, 2023).

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Rationale of the study

The integration of learning technologies and knowledge in interdisciplinary projects in the Ecuadorian educational context is a relevant and very important topic today.(Mesa et al., 2023). The effective implementation of these technologies can have a significant impact on the quality of teaching and learning, as well as the development of key 21st century competencies in students. However, despite efforts to promote interdisciplinarity and the use of technologies in the Ecuadorian educational system, there are challenges and limitations that require specific attention.

Globally, existing literature has highlighted the importance of integrating technologies in interdisciplinary projects as a means to foster collaboration, personalization of learning, student motivation, and the development of digital skills.(Álvarez-Arregui, 2021). In addition, effective strategies have been identified for the successful implementation of these technologies in interdisciplinary projects in other educational contexts.

In the specific context of Ecuador, the implementation of interdisciplinary projects has become a priority in the framework of educational reform, but the effective management of these projects and their impact on the comprehensive development of students remains a challenge. (Bailón & Solórzano, 2021). The existing literature suggests that there are limitations regarding the effective integration of ICT in these projects, as well as in teacher training and the availability of technological resources in educational institutions.

Therefore, this study is justified by the need to address these specific limitations and challenges to maximize the positive impact of the integration of learning and knowledge technologies in interdisciplinary projects in the Ecuadorian high school. Furthermore, this research will contribute to filling the gaps identified in the existing literature and providing concrete recommendations to improve the implementation of these technologies in the Ecuadorian educational context.

Research objectives

1. Analyze the current state of the integration of learning technologies and knowledge in interdisciplinary projects in high school in the Ecuadorian context.

2. Evaluate the current panorama of the implementation of interdisciplinary projects and the use of technologies in the Ecuadorian educational context, identifying specific challenges and limitations.

3. Propose concrete recommendations to improve the implementation of technologies in interdisciplinary projects in the Ecuadorian educational context, with the aim of strengthening the comprehensive development of students and their preparation for the future.

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These objectives will allow the identified problem to be comprehensively addressed, providing a solid framework to understand the current state of knowledge and propose concrete solutions that can be applied in the Ecuadorian educational context.

Methodology

To carry out this study, a mixed methodological approach was used that combined quantitative and qualitative methods. The objective was to obtain detailed information on the current state of the integration of learning technologies and knowledge in interdisciplinary projects in high school institutions in Ecuador.(Alarcón et al., 2023).

The target population for this study is teachers who work in high school institutions in Ecuador. Specifically, it will focus on the total population of "Unidad Educativa Rumipamba", which consists of 46 teachers at the public-state educational institution located in the La Esperanza sector in the city of Ibarra, Ecuador. The sample selected for this study consists of 21 teachers from the aforementioned total population. The selection of the sample was carried out through simple random sampling, with the objective of obtaining a significant representation of teachers who work on interdisciplinary projects at the institution. The type of sampling used in the study, in this case simple random sampling, which provides a solid basis for the generalization of the results, contributes to the representativeness and validity of the study, and is efficient in terms of resources.

A structured questionnaire was designed consisting of closed and open questions. The questionnaire was implemented on the Google Form platform to facilitate data collection and subsequent analysis. The questionnaire addressed topics related to the use of learning and knowledge technologies in interdisciplinary projects, perceived barriers, institutional support and technological infrastructure.

Before the implementation of the questionnaire, informed consent was obtained from the participants. Subsequently, the link to the questionnaire was distributed through emails and social networks, with a brief explanation of the purpose of the study and instructions for completing the questionnaire. A specific period was established for data collection, during which participation was actively monitored and reminders were sent to participants.

In addition to the questionnaire, semi-structured interviews were conducted with a randomly selected subgroup of participants to gain a deeper understanding of the perceptions and experiences related to integrating technologies into interdisciplinary projects. The design and implementation of the questionnaire on the Google Form platform allowed for efficient data collection and guaranteed confidentiality of the responses.

Results

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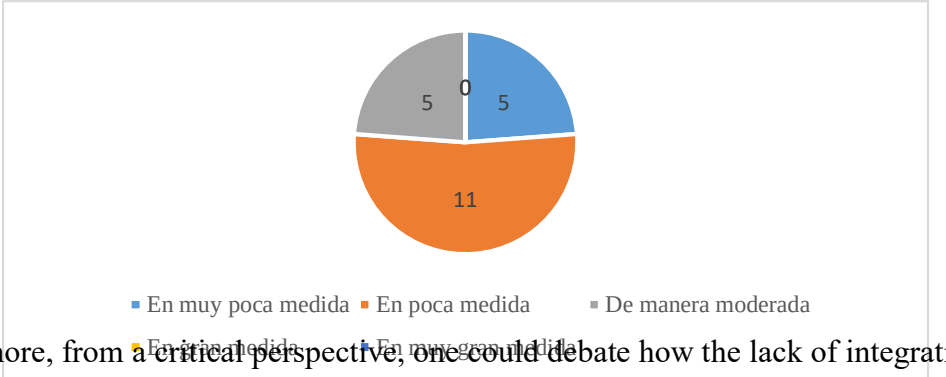
¿To what extent are learning and knowledge technologies used in interdisciplinary projects in your educational institution?

From a quantitative perspective, it can be seen that the majority of respondents indicate that learning and knowledge technologies are used to little or very little extent in interdisciplinary projects in their educational institutions. This result could be interpreted as a sign that there is a low level of technology integration in this particular context. Furthermore, as there are no responses that indicate use to a great or very great extent, it can be inferred that the adoption of technologies in interdisciplinary projects is limited in general.

From a qualitative perspective, these results could be analyzed in terms of the possible reasons behind the low integration of technologies. Contextual factors could be explored, such as resource limitations, lack of teacher training or institutional barriers, which could be influencing the observed level of technology adoption. This would provide a deeper understanding of the specific dynamics and challenges that educational institutions in Ecuador face in relation to the integration of technologies in interdisciplinary projects.

Figure 1

Use of TAC in interdisciplinary projects



Furthermore, from a critical perspective, one could debate how the lack of integration of technologies in interdisciplinary projects could be affecting students' learning and skill development, as well as the ability of educational institutions to prepare students for a world increasingly digitalized.

What types of technologies are used most frequently?

Regarding the type of technologies, it can be seen that mobile applications are the most used technologies with 17 responses, followed by educational platforms with 13 responses and online resources with 12 responses. This quantitative result suggests that mobile applications are the most frequently used technology in interdisciplinary projects in high school institutions in Ecuador.

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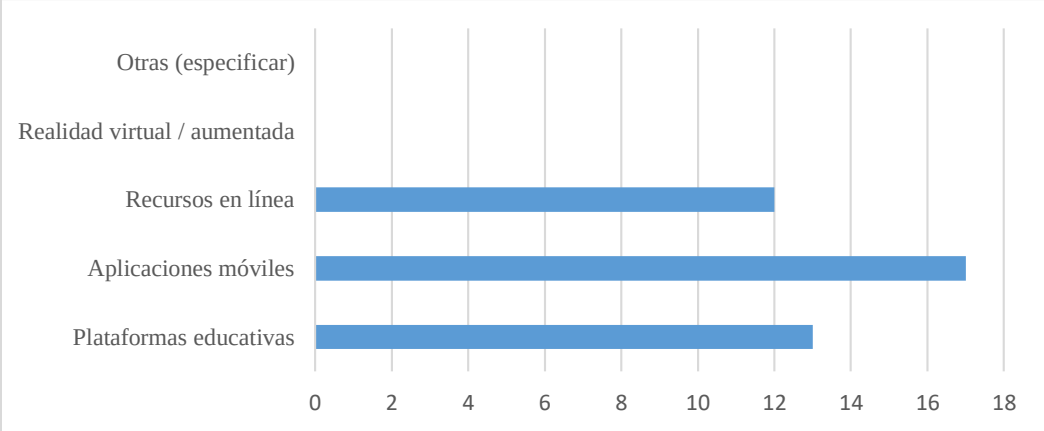
The reasons behind the predominant use of mobile applications could be further analyzed. One could investigate the specific characteristics and functionalities of these applications that make them attractive to teachers and students in interdisciplinary projects.

Figure 2

Technologies that are most frequently used



These results show that the predominance of mobile applications reflects an effective adoption of technologies that promote interdisciplinarity and the development of transversal skills in students. It could be analyzed whether these applications are promoting collaboration between disciplines, the resolution of complex problems or critical thinking, fundamental aspects of interdisciplinary projects.

Do you consider that the use of technologies has improved interdisciplinarity in educational projects?

It can be seen that the majority of respondents (12 responses) consider that the use of technologies has improved interdisciplinarity in educational projects "to a great extent." This quantitative result suggests that the integration of learning and knowledge technologies is being perceived positively in terms of its impact on interdisciplinarity. However, it is important to note that a significant number of respondents (5 responses) consider that the impact has been "moderate", indicating that there is a variety of perceptions about the degree of improvement in interdisciplinarity.

It would be relevant to explore how specific technologies are contributing to improving interdisciplinarity in educational projects. In addition, concrete examples could be

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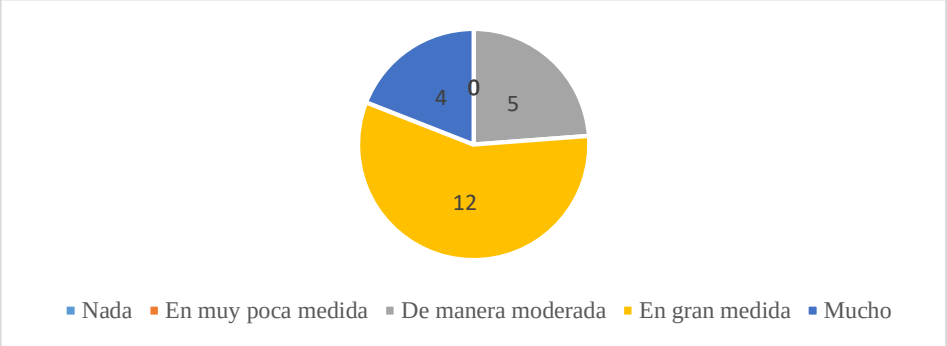
investigated of how technologies are facilitating collaboration between disciplines, the integration of knowledge and the resolution of complex problems.

Figure 3

Interdisciplinarity in educational projects



In this result, it could be questioned whether the positive perception about the impact of technologies on interdisciplinarity is based on solid evidence or if it is influenced by factors such as novelty or the expectation that technologies always generate improvements. It would also be relevant to analyze whether these perceptions align with the pedagogical and curricular objectives of interdisciplinary projects, or if there is a risk of overvaluing the impact of technologies without considering other important aspects of the educational process.

What are the main challenges to integrating learning and knowledge technologies in interdisciplinary projects?

It can be seen that resistance to change is the main challenge identified, with 20 responses indicating it as a major obstacle. This result suggests that resistance to change is a significant factor that hinders the effective integration of learning and knowledge technologies in interdisciplinary projects. The high frequency of this response indicates that resistance to change is a relevant issue that deserves special attention in the context of the implementation of technologies in interdisciplinary projects.

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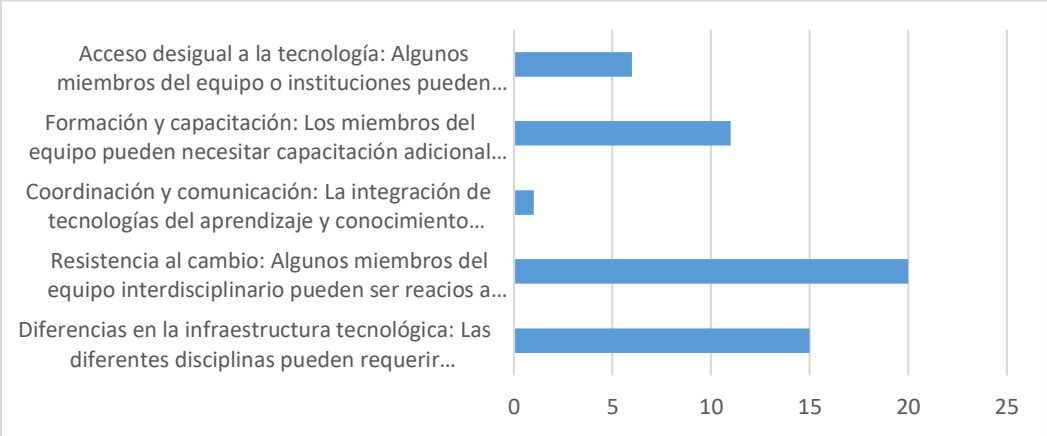
Figure 4

Main challenges to integrate TAC in interdisciplinary projects



Regarding this question, it would be relevant to analyze how the identified challenges are intertwined and related to each other, since it is likely that there is a complex interaction between technological infrastructure, education and training, coordination and communication, and unequal access to information. technology.

What specific limitations does your educational institution face in implementing technologies in interdisciplinary projects?

Regarding the possible limitations, the result is that connectivity and institutional support are the most mentioned specific limitations, with 12 and 14 responses respectively. This quantitative result suggests that connectivity and institutional support are significant factors that hinder the effective implementation of technologies in interdisciplinary projects.

It is important to consider in the analysis the reasons behind these specific limitations. For example, in the case of connectivity, one could investigate the underlying causes of this problem, such as poor telecommunications infrastructure, the geographical location of educational institutions or the lack of resources to improve connectivity. Regarding institutional support, one could investigate the reasons why the necessary support is not provided for the successful implementation of technologies in interdisciplinary projects, such as possible administrative or cultural barriers within the institution.

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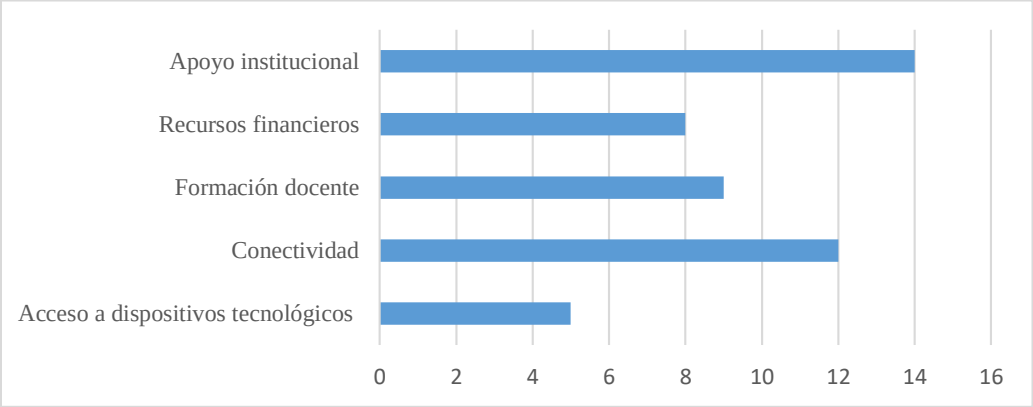
Figure 5

Limitations to implement technologies in interdisciplinary projects



From a critical scientific perspective, one could question whether these specific limitations are exclusive to the Ecuadorian context or whether they also occur in other educational contexts. It would also be relevant to analyze how these limitations relate to each other and how they impact the effective implementation of technologies in interdisciplinary projects.

Have you received specific training to integrate technologies in interdisciplinary projects?

From a scientific perspective, it is observed that the vast majority of respondents (17 out of 21) indicated that they have not received specific training to integrate technologies in interdisciplinary projects. This quantitative result reveals a significant lack of training in the effective use of learning and knowledge technologies in an interdisciplinary context. This absence of specific training can be a significant obstacle to the successful implementation of technologies in interdisciplinary projects in high school institutions in Ecuador.

It would be notable to investigate the reasons behind this lack of specific training. Underlying causes could be explored, such as the availability of teacher training programs, the curricular structure of educational institutions, resource limitations or lack of awareness about the importance of integrating technologies in interdisciplinary projects.

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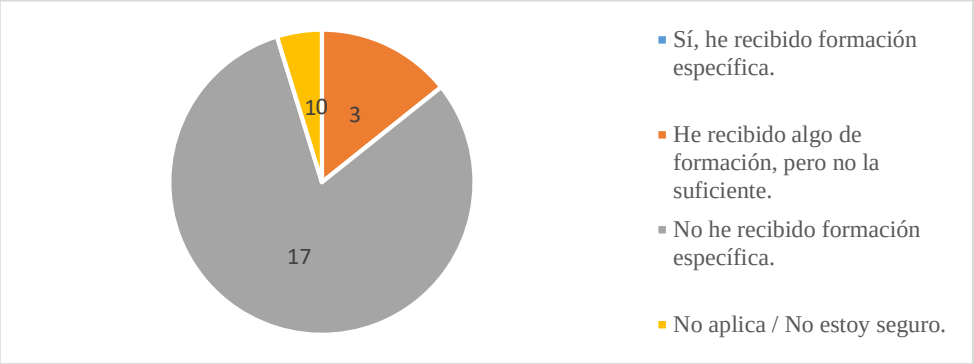
Figure 6

Specific training to integrate technologies in interdisciplinary projects



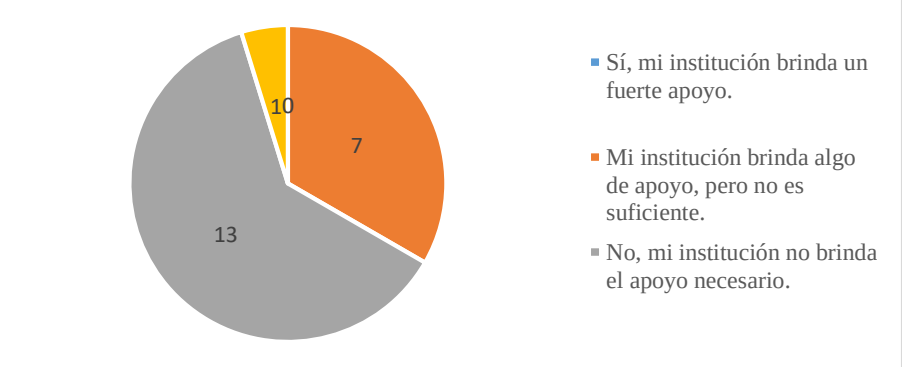
In the comprehensive analysis of these results, one could question whether this lack of specific training is a problem exclusive to the Ecuadorian context or whether it also occurs in other educational contexts. It would also be relevant to analyze how this deficiency affects the ability of teachers to foster interdisciplinary collaboration and promote the development of project management skills, as posed in the scientific problem addressed by the article.

Do you consider that your institution provides the necessary support for the effective implementation of technologies in interdisciplinary projects?

Regarding the results presented, it is observed that the majority of respondents (13 of 21) indicated that their institution does not provide the necessary support for the effective implementation of technologies in interdisciplinary projects. This reveals a lack of institutional support that can hinder the effective use of learning and knowledge technologies in interdisciplinary projects in high school institutions in Ecuador.

Figure 7

Institutional support in the effective implementation of technologies in interdisciplinary projects



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From an epistemological analysis, these results suggest that there is a gap between the need to integrate learning technologies and knowledge in interdisciplinary projects and the real support provided by educational institutions. This discrepancy raises questions about the effectiveness of educational policies and institutional management in relation to the integration of technologies in the educational context.

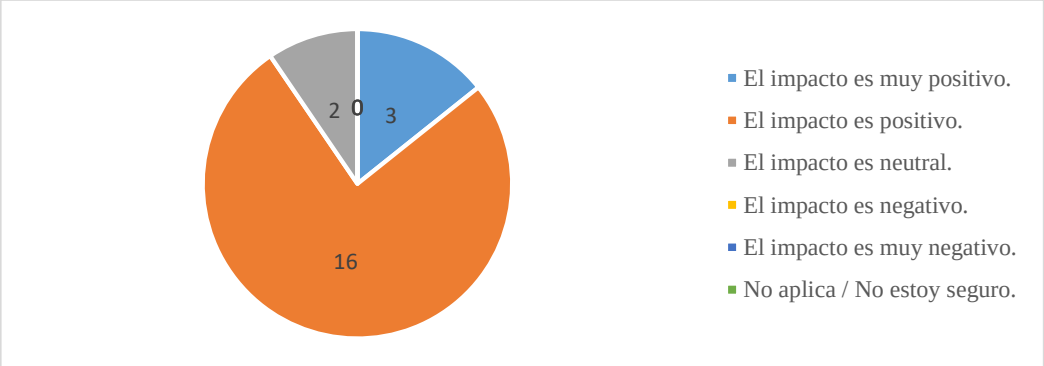
How do you perceive the impact of the use of technologies in interdisciplinary projects on student learning?

It is important to consider that the responses of the respondents reflect subjective perceptions about the impact of technologies on interdisciplinary learning. From an epistemological point of view, this leads us to question the nature of the knowledge generated from these perceptions. To what extent do these perceptions represent the objective reality of the impact of technologies on interdisciplinary learning? What factors influence the formation of these perceptions?

Furthermore, it is relevant to analyze the validity and reliability of the responses. Are the perceptions expressed by respondents consistent with their actual experiences? Are there biases or outside influences that may have affected your responses? These questions are fundamental to understand the nature of the knowledge generated from this survey and its relationship with the reality studied.

Figure 8

Perception of the impact on the use of TAC in interdisciplinary projects



From an epistemological approach, it is also important to consider the sociocultural context in which this research is developed. Perceptions about the impact of technologies on learning may be influenced by cultural, social and educational factors specific to Ecuador. Therefore, it is crucial to reflect on how these contextual factors may have influenced respondents' responses and the interpretation of results.

Do you think that the use of technologies has contributed to the development of digital skills in students?

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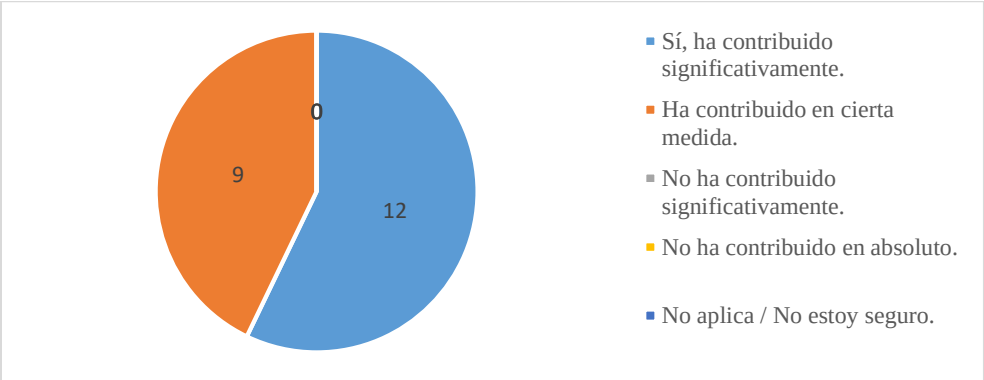
The responses of the respondents reflect subjective perceptions about the impact of the use of technologies on the development of digital competencies. From an epistemological point of view, this leads us to question the nature of the knowledge generated from these perceptions.

Figure 9

Contribution to the development of digital skills



Furthermore, it is relevant to analyze the validity and reliability of the responses. Are the perceptions expressed by respondents consistent with their actual experiences? Are there biases or outside influences that may have affected your responses? These questions are fundamental to understand the nature of the knowledge generated from this survey and its relationship with the reality studied.

Discussion

The results obtained in this study show that, in general, the use of learning and knowledge technologies in interdisciplinary projects at the high school level of the Rumipamba educational unit is limited, and that there are various challenges and limitations for their effective integration. Next, these results are discussed in relation to the existing literature and the implications for the integration of learning technologies in the teaching of interdisciplinary projects in the high school of the "Rumipamba" educational unit are highlighted.

The data reveals that technologies are underused in interdisciplinary projects, suggesting that there is untapped potential to harness the power of technologies in interdisciplinary teaching. This situation is in line with existing literature, which highlights the importance of integrating technologies to foster collaboration, creativity and access to diverse information sources in interdisciplinary projects.(Tixi et al., 2023). Therefore, these results highlight the need to promote effective strategies for the integration of technologies in interdisciplinary projects in the high school of the educational unit.

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Regarding the challenges to integrating learning and knowledge technologies in interdisciplinary projects, the data show that resistance to change, teacher training, and differences in technological infrastructure are significant challenges. These findings are supported by existing literature, which highlights the importance of addressing these barriers to achieve effective integration of technologies in the classroom.(Espinosa Izquierdo et al., 2023b). In the Ecuadorian context, this suggests the need for policies and programs that promote teacher training in the use of technologies, as well as the provision of adequate digital resources to support interdisciplinary project-based teaching.

Furthermore, the data also reveals that connectivity and access to technological devices are specific limitations that educational institutions face in implementing technologies in interdisciplinary projects. These findings highlight the importance of addressing barriers related to technological infrastructure to achieve effective integration of technologies in interdisciplinary projects.

Regarding institutional support for the effective implementation of technologies in interdisciplinary projects, the results show that there is a deficit of support in some educational institutions. Existing literature highlights the importance of institutional leadership and administrative support to promote the effective integration of technologies in the classroom.(Espinosa Izquierdo et al., 2023c; Vásquez & Marcillo, 2020). Therefore, these results highlight the need to strengthen institutional support for the effective implementation of technologies in interdisciplinary projects in the Ecuadorian high school.

These results presented in this study have important implications for the integration of learning technologies in the teaching of interdisciplinary projects in the Ecuadorian high school. Interpretation of these results in light of the existing literature highlights the need to address barriers related to technological infrastructure, teacher training and institutional support, as well as the untapped potential of technologies to promote collaboration, creativity and access to diverse sources of information in interdisciplinary projects. These implications can guide future research and educational policies aimed at strengthening the use of technologies in the educational context of the Rumipamba educational unit.

Proposal of recommendations to improve the implementation of TAC in interdisciplinary projects in the Ecuadorian educational context

To improve the implementation of TAC in interdisciplinary projects in the educational context of the Rumipamba educational unit, with the aim of strengthening the

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comprehensive development of students and their preparation for the future, the following recommendations are proposed:

1. Teacher training: It is essential to provide continuous training to high school teachers in the effective use of learning and knowledge technologies. This includes developing skills to integrate technological tools into interdisciplinary projects, as well as understanding how these technologies can enhance students' holistic learning.

2. Adequate technological infrastructure: it must be ensured that educational institutions have the necessary infrastructure, including access to technological devices and reliable internet connectivity. This is essential so that interdisciplinary projects can effectively incorporate learning and knowledge technologies.

3. Development of digital resources: The creation and compilation of relevant digital resources for interdisciplinary projects is recommended. These resources may include interactive educational materials, online collaboration platforms, and content creation tools, which enrich students' learning experience.

*4. Focus on digital skills:*It is crucial that interdisciplinary projects incorporate the development of digital competencies in students, including digital literacy, the ability to search and evaluate information online, and critical thinking about the ethical and responsible use of technology.

*5. Formative evaluation:*An evaluation system must be implemented that allows monitoring the impact of technologies in interdisciplinary projects, as well as the progress of students in the comprehensive development of skills. Constant feedback will allow the integration of technologies to be continually adjusted and improved.

These recommendations are based on the idea that the effective integration of learning and knowledge technologies in interdisciplinary projects can enhance the comprehensive development of students, preparing them to face the challenges of the current and future world. By providing robust teacher training, ensuring the necessary technological infrastructure, developing relevant digital resources, fostering digital competencies, and establishing a formative assessment system, we seek to create an educational environment that takes full advantage of the transformative potential of technologies for interdisciplinary learning.

Conclusions

- The results of this study revealed that the integration of learning technologies and knowledge in interdisciplinary projects in the high school of the “Rumipamba” educational unit is limited. Despite access to technology, significant barriers were identified, such as lack of teacher training, scarcity of technological resources,

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and lack of institutional support. Furthermore, it was found that students have a positive perception towards the use of technologies in interdisciplinary projects, but they also face challenges related to technological infrastructure and adequate training for its use.

- The findings of this study have important implications for teaching in the Ecuadorian high school. It is crucial that the educational institution provides greater support and resources for teacher training in the effective use of learning and knowledge technologies. Likewise, an investment in technological infrastructure and equitable access to devices and connectivity for students is required. Furthermore, it is necessary to encourage interdisciplinary collaboration between teachers to promote the effective integration of technologies in educational projects.
- A limitation of this study was the lack of management of technological resources to complete the questionnaire, suggesting the need for future research that addresses this gap. Furthermore, it is recommended to carry out longitudinal studies to evaluate the long-term impact of the integration of technologies in interdisciplinary projects. Likewise, it would be beneficial to investigate specific strategies to overcome the identified barriers, as well as explore the role of educational policies in promoting the integration of technologies in the context of the Ecuadorian high school.

Conflict of interests

Authors must declare whether or not there is a conflict of interest in relation to the article presented.

Bibliographic references

Alarcón Borges, RY, Pérez Montero, O., Tejera, RG, Silveira, MTD, Montoya, JC, Hernández Mestre, D., Vázquez, JM, Mestanza-Ramon, C., Hernández-Guzmán, D., & Milanes, CB (2023). Legal Risk in the Management of Forest Cover in a River Basin San Juan, Cuba. Land, 12(4), 1–30. https://doi.org/10.3390/land12040842

Bailón Panta, FE, & Solórzano Zamora, C. (2021). Use of ICT for learning in the natural sciences subject of students in the third year of basic education in the "Federico Bravo Bazurto" Educational Unit of the Portoviejo canton-Ecuador. Cuadernos de Educación y Desarrollo, 13(5), 48–67. https://doi.org/10.51896/atlante/mlsh2345

Bueno Gualan, PA Yanangomez Duchi, JA, Neira Gavilanes, DA, López Rodríguez, DJ, & Mesa Vázquez, J. (2023). Competencies for basic education teachers in the

ISSN: 2602-8085
Vol. 8 No. 2, pp. 185 – 205, April – June 2024

creation of digital educational content in Ecuador. University and Society Magazine, 15(5), 336–348. https://rus.ucf.edu.cu/index.php/rus/article/view/4082

Cabero-Almenara, J., Barroso-Osuna, J., Palacios-Rodríguez, A., & Llorente-Cejudo, C. (2020). Digital Competence Frameworks for university teachers: their evaluation through the expert competence coefficient. Interuniversity Electronic Journal of Teacher Training, 23(2), 1-18. https://doi.org/10.6018/reifop.413601

Cabero-Almenara, J., Barroso-Osuna, J., & Palacios-Rodríguez, A. (2021). Digital competences of educators in Health Sciences: Their relationship with some variables. Medical Education, 22(2), 94–98. https://doi.org/10.1016/j.edumed.2020.11.014

Cabero-Almenara, J., Gutiérrez-Castillo, JJ, Guillén-Gámez, FD, & Gaete-Bravo, AF (2022). Digital competence of higher education students as a predictor of academic success. Technology, Knowledge, and Learning, 28, 1–20. https://doi.org/10.1007/s10758-022-09624-8

Céspedes-Isaac, M., Reyes-Sánchez, G., & Mesa-Vázquez, J. (2018). The use of information and communications technologies, as an alternative for the visualization of the scientific production of the Universidad de Oriente. Teacher and Society, 18(3), 89–98. https://maestroysociedad.uo.edu.cu/index.php/MyS/article/view/4261

Chávez Rondón, D., & Céspedes Isaac, M. (2018). Information and communications technologies, a tool for managing old documents. Maestro y Sociedad Magazine, 18(3), 82-95. https://bit.ly/3KRksAs

Espinosa Izquierdo, J., Villamar Bravo, J., Quijije Acosta, K., & Mesa Vázquez, J. (2023a). Applicability of emerging technologies in virtual learning environments. a look at the university of Guayaquil. International Technology Science and Society Review, 15(1), 177–181. https://doi.org/https://doi.org/10.37467/revtechno.v15.5098

Espinosa Izquierdo, J., Villamar Bravo, J., Quijije Acosta, K., & Mesa Vázquez, J. (2023b). Digital ecosystems of learning and education 4.0, an approach to emerging pedagogies. Polo Del Conocimiento Magazine, 8(9), 134–158. https://doi.org/10.23857/pc.v8i9.6005

Espinosa Izquierdo, J., Villamar Bravo, J., Quijije Acosta, K., & Mesa Vázquez, J. (2023c). new information and communication technologies in the development of education, science and culture. Polo Del Conocimiento Magazine, 8(3), 17. https://doi.org/10.23857/pc.v8i3

ISSN: 2602-8085
Vol. 8 No. 2, pp. 185 – 205, April – June 2024

Martín-Párraga, L., Llorente-Cejudo, C., & Cabero-Almenara, J. (2022). Analysis of teachers' digital competencies from assessment frameworks and instruments. International Journal of Educational Research and Innovation, 2022(18), 62–79. https://doi.org/10.46661/ijeri.7444

Mesa Vázquez, J. (2015). The development of teaching aids supported by information and communications technologies in the initial training of educational professionals [Doctoral Thesis, Universidad de Oriente Santiago de Cuba, Cuba]. http://repositorio.eduniv.cu/items/show/1375

Mesa Vázquez, J., Claudia Bonfante, M., Antonia Diaz Mendoza, M., Terán Palacio, E., & Ramón Velázquez Labrada, Y. (2023). Quality criteria for the evaluation of virtual learning environments from a teaching approach. University and Society, 15(4). 552-564. https://rus.ucf.edu.cu/index.php/rus/article/view/4011

Mesa Vázquez, J., Pardo Gómez, ME, & Cedeño Marcillo, GE (2022). Informatics and informational competencies in scientific information management in postgraduate education. Pedagogical Studies, 48(2), 103–114. https://doi.org/10.4067/S0718-07052022000200103

Mesa Vázquez, J., & Rivas Vega, M. (2021). Diagnostic study of the didactic use of virtual classrooms. Competencies for virtual teaching. Encounter Classroom, 23(1), 45–66. https://doi.org/10.17561/ae.v23n1.5811

Rodríguez, KL, Gómez, MEP, & Vázquez, JM (2019). Social networks as an educational environment in the training of university professionals. REFCalE: Electronic Journal of Training and Educational Quality, 7(2), 33–42. http://refcale.uleam.edu.ec/index.php/refcale/article/view/2838

Rojas-Viteri, J., & Álvarez-Zurita, A. (2023). Teaching digital competence in future Computer Science teachers in Ecuador. Teaching competence in future Computer Science teachers in Ecuador. Cátedra Magazine, 6(2), 51–66. https://doi.org/10.29166/catedra.v6i2.4636

Tixi Cujilema, N., Veloz Montenegro, C., López Rodríguez, D., & Mesa Vázquez, J. (2023). Perception of students about the use of digital technologies in the natural sciences in Ecuador. University and Society, 15(6), 110-120. https://rus.ucf.edu.cu/index.php/rus/article/view/4128

Vásquez, JM, & Marcillo, GEC (2020). Scale for measuring the level of pedagogical professionalization in the development of teaching aids supported by ICT. Mikarimin. Multidisciplinary Scientific Journal, 6(3), 117–132. https://bit.ly/3saFzSl

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