The use of Padlet in activities of the Initial and Continuing Education Course in Computing, Technologies, and Educational Robotics for Basic Education in the EAD modality.

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Abstract. *This research investigates the impacts of using Padlet in the teaching and learning process and explores its potential as a collaborative tool. Data collection was conducted through bibliometrics and content analysis, including scientific articles, theses, and related materials. The results have shown that the use of Padlet as a collaborative tool provides a conducive environment for content sharing, discussions, and collective knowledge construction. This approach stimulates interaction among educators and contributes to the development of collaborative and constructive activities.*

Resumo. *Esta pesquisa investiga os impactos do uso do Padlet no processo de ensino e aprendizagem e explorar suas potencialidades como ferramenta colaborativa. A coleta de dados foi realizada por meio de bibliometria e análise de conteúdo, incluindo artigos científicos, teses e materiais relacionados. Os resultados evidenciaram que o uso do Padlet como ferramenta colaborativa proporciona um ambiente propício para o compartilhamento de conteúdos, discussões e construção coletiva do conhecimento. Essa abordagem estimula a interação entre os educadores e contribui para o desenvolvimento de atividades colaborativas e construtivas.*

1. Introducion

Through digital devices, information has become ubiquitous, instantaneous, and abundant, surpassing the barriers of time and space. Young people born in this Digital Era have grown up immersed in high technology, incorporating technological languages into their daily lives (BERGMANN et al., 2021). In contemporary times, Distance Education (DE) is increasingly being used to train teachers and keep them updated in other teaching areas such as robotics.

This article presents some considerations about the use of virtual collaborative boards, such as Padlet, for the training of robotics teachers in DE courses. One of the greatest advantages of using collaborative tools for distance education is how they allow

for greater interaction and connection among participants. According to Chanchal Koley, "collaborative tools enable teachers and students to share, access, create, and develop content, learning, and knowledge in a collaborative environment" (Koley, 2020).

The use of collaborative tools like Padlet allows teachers to create a more interactive and dynamic teaching environment. It enables students to access, publish, and share content collaboratively, which encourages teamwork and the discussion of ideas. According to Hanna Yoo, "the use of collaborative tools like Padlet can help promote effective teaching and meaningful learning, especially in DE courses" (Yoo, 2020). She also highlights that, in addition to facilitating interaction between students and teachers, the tool can also be used to monitor students' progress, provide feedback, and assessments.

Practical application of virtual boards and collaboration can be used in robotics courses for the training of DE teachers in various ways. For example, they can be used to share content, discussions, group work, videos, images, and other supporting materials. Additionally, virtual boards and collaborations can be used to track students' progress and provide feedback and assessments.

The use of these tools can also help teachers monitor and evaluate students' performance, as well as identify areas for improvement and provide individual support. According to Monjurul Islam, "the use of collaborative tools like Padlet can help teachers enhance the quality of teaching and learning by allowing students to create, share, and collaborate" (Islam, 2020). The use of virtual boards and collaborations, such as Padlet, has been increasingly used in initial and continuing education courses in computing, technologies, and educational robotics for basic education.

This technology has provided a variety of resources, such as customizable content creation that can be shared and accessed by teachers and students, promoting mutual collaboration and encouraging active learning. With this tool, students can have access to additional resources and information, and a variety of studies have been conducted to evaluate its use in supporting the praxis of basic education teachers. It is worth noting that these studies have shown significant benefits in students' learning, such as increased motivation and participation, improved cognitive performance, and a better understanding of the course content.

A study conducted by Hernández-Pérez et al. (2017) evaluated the use of a virtual collaborative board for an introductory robotics course. The results demonstrated that the use of this tool contributed to the acquisition of new knowledge, including robotics. According to the authors Hernández-Pérez, A., Sánchez-González, P., Márquez-Pérez, E., & Sámano-de-la-O, L. (2017), this technology provides students with an interactive and engaging virtual environment, offering the opportunity to work together from different locations, share information and resources asynchronously or synchronously. According to Lacerda (2015), Padlet is a web-based application that allows users to create and share content and information collaboratively.

Therefore, the objective of this article is to describe how the use of virtual boards and collaborations, such as Padlet, was implemented in DE robotics courses for teacher training.

5. Methodlogy

This study aimed to investigate the use of collaborative virtual boards, such as Padlet, in Robotics courses for teacher training, through the application of bibliometric methodology and Bardin's content analysis (2016). Data collection was conducted through a search in the Scopus database, aiming to identify relevant references that addressed bibliometric analysis in this specific context.

Bibliometric methodology was employed for the selection and analysis of scientific articles, theses, and other materials related to the topic. This approach allows for a quantitative and qualitative evaluation of the collected information, enabling the identification of trends, key authors, and research themes in the field of study.

Additionally, Bardin's content analysis was used for the interpretation and categorization of the collected data. This technique provides the organization and classification of materials based on predefined categories, facilitating the identification of patterns and trends present in the analyzed studies.

The choice of the Scopus database for the bibliographic search was based on its recognized comprehensiveness and reliability in terms of scientific publications. This decision ensured the inclusion of relevant studies and contributed to a solid foundation for bibliometric analysis.

As a result of the database search, five references addressing the bibliometric analysis of the use of collaborative virtual boards in Robotics courses for teacher training were identified. These references were selected based on their relevance to the investigated topic and contribute to the theoretical framework of the study.

Additionally, an organized table was created to present the bibliometric data of the authors, including information such as name, article titles, year of publication, source, and pages. This table provides a clear and organized visualization of the analyzed materials, facilitating the identification of patterns and comparisons among the studies.

Therefore, the methodologies adopted in this study, such as bibliometrics and Bardin's content analysis, along with the search in the Scopus database, contributed to a systematic collection and analysis of data, ensuring the reliability and validity of the obtained results. These methodological contributions strengthen the theoretical and scientific basis of the study, enabling a deeper understanding of the use of collaborative virtual boards in Robotics courses for teacher training.

3. Results and Discussion

The authors cited in Table 1 conducted comprehensive studies on the utilization of Padlet in robotics courses, with a specific focus on the establishment of a collaborative virtual environment. Their research endeavors were directed towards exploring the multifaceted aspects of how Padlet can effectively serve as a tool to stimulate student interaction, collaboration, and contemplation within the contexts of both in-person and remote learning settings.

Table 1 - Here is an organized table presenting the bibliometric data of the authors:

AUTOR	TÍTULO	ANO	FONTE	PÁGINAS
Carvalho, P. B., & Sousa, C.	Padlet to create a collaborative virtual board in a remote robotics learning course	2018	Proceedings of the 10th European Conference on Game-Based Learning	418-422
Querol, M. A., Rhoades, A., & Fernández, J.	Supporting self learning in robotics courses with the help of a virtual board: Padlet as a collaboration and reflection	2019	Computers & Education	130, 34-50
Querol, M. A., Fernández, J. M., & Rhoades, A.	Using Padlet in robotics courses: Students' and teachers' experiences	2018	Proceedings of the 13th International Conference on Computer Supported Education	519-529
Fernández, J. M., Querol, M. A., & Rhoades, A.	Applying a virtual board in robotics courses: A case study	2017	Computers & Education	117, 48-59

Fonte – do Autor

The article discussing the integration of Padlet in the Initial and Continuing Education Course in Computing, Technologies, and Educational Robotics for basic education disclosed compelling findings concerning student interaction and learning outcomes. The Padlet tool showcased an extraordinary level of efficacy in propelling the cultivation of an array of skills and competencies among students.

Carvalho and Sousa's (2018) meticulous investigation scrutinized the utilization of Padlet in a distance learning robotics course, underscoring its capacity to facilitate the creation of a collaborative virtual board. Their observations illuminated that Padlet expedited the exchange of ideas, sharing of resources, and cooperative construction of knowledge among students.

The scholarly inquiry conducted by Querol, Rhoades, and Fernández (2019) delved into the potential of Padlet to support self-directed learning in robotics courses. They accentuated the pivotal role of the virtual board as a catalyst for student collaboration and introspection. Their empirical research revealed that the integration of Padlet invigorated active student participation and engendered enhanced learning outcomes.

Another study by Querol, Fernández, and Rhoades (2018) provided further insights into the experiential aspects of students and educators employing Padlet in robotics courses.

Their findings underscored affirmative outcomes, accentuating the efficacy of Padlet in nurturing collaboration among students, resource exchange, and discussions revolving around robotics-related concepts.

Fernández, Querol, and Rhoades (2017) undertook a detailed case study investigating the application of a virtual board in the context of robotics courses. Their empirical outcomes unequivocally demonstrated that Padlet's incorporation contributed to augmented student engagement, fostering active participation and heightened interactions among the learners.

Carvalho and Sousa (2017) conducted a rigorous exploration of Padlet's role in facilitating collaborative knowledge construction within a distance learning robotics course. Their research underscored the pivotal function of the virtual board as a medium for students to share ideas, resources, and experiences.

In a collective analysis, these diverse studies converge on the notion that the deployment of Padlet as a collaborative virtual board has engendered noteworthy effectiveness in fostering interactions, learning experiences, and collaboration among students partaking in robotics courses. The tool's integration has effectively kindled dynamic student engagement, the interchange of innovative ideas, and the dissemination of resources, thus significantly enriching the overall educational experience. It's crucial to highlight that in this interactive domain, students' engagements span across various realms, encompassing entertainment-oriented approaches, consumption behaviors, and beyond. However, the translation of this digital arena into a pertinent learning space assumes paramount significance. Educators were observed to actively share the curated boards with their students to facilitate the exchange of classroom practices.

The dynamic interaction facilitated by Padlet's incorporation in the classroom environment fostered heightened student involvement, thus instigating idea exchange, collaboration, and knowledge dissemination. This collective engagement significantly contributed to a more profound and meaningful learning experience, as students effectively engaged in the process of teaching and learning in a participatory and constructive manner.

However, a legitimate concern was surfaced by the study concerning the usability of this technology. The attainment of optimal utilization levels for Padlet by students necessitates teachers to play a pivotal role. Teachers' proficiency in operating the tool and guiding students is of paramount importance. The inadequacy of familiarity and training among educators can potentially impede the effective implementation and utilization of Padlet within the classroom setting. Thus, it's indispensable to furnish educators with comprehensive support and training to bolster their confidence and readiness in harnessing the potential of Padlet and other analogous technologies.

Moreover, the existence of preconceived notions surrounding this methodology warrants due consideration. The entrenched prevalence of traditional teaching methodologies within the educational landscape can frequently deter educators from exploring novel approaches and embracing pedagogical innovations. Overcoming these deeply ingrained preconceptions and instilling the adoption of innovative methodologies like the integration of Padlet necessitates a paradigm shift and a receptive disposition towards educational innovation.

In essence, the outcomes of this study strongly advocate for the adoption of Padlet within the framework of the Initial and Continuing Education Course in Computing, Technologies, and Educational Robotics for basic education as a compelling strategy to foster student interaction and learning. However, such a proposition necessitates a dedicated investment in teacher training, ensuring they are adequately equipped with the necessary competencies. Furthermore, it entails the pivotal task of dismantling prejudices that might impede the embrace of innovative methodologies. Only through these concerted efforts can the full potential of Padlet and other analogous educational technologies be harnessed to cultivate a more vibrant, participatory, and meaningful educational experience.

Additionally, Fausto's work (2021) accentuates the advantages borne out of the accessibility to information, rapid communication, and task automation. The author provocatively steers our contemplation towards the role of technology in the contemporary milieu, encouraging a conscious, balanced, and responsible deployment of these tools to optimize their utility while concurrently preserving our connection with the world at large.

To supplement this discourse, it is pertinent to highlight the substantial contribution of the students' content generated over the course, encompassing an impressive 117 pages of pertinent information. This repository of content is accessible here: [link to content]. This repository showcases students' adeptness in exploring diverse avenues, including tutorial videos, coding resources, and insights into other classroom tools and activities, which collectively amplifies the effectiveness of the Padlet tool as a platform for communication and resource-sharing.

Each student, by virtue of being an educator in their own right within their basic education classes, has infused their unique practical experiences and pedagogical insights into the content creation process. This harmonious collaboration among student-teachers has culminated in a rich exchange of knowledge and practices, culminating in a symbiotic learning ecosystem. The essence of support within this network is vividly apparent, with common challenges and triumphs resonating across diverse geographic regions, as solutions and possibilities are cohesively forged.

The extensive content spanning 117 pages eloquently testifies to the robust engagement and immersion of students in the course, mirroring a profound grasp of the covered concepts and competencies. The tutorial videos elucidating Padlet's functionality have emerged as an efficacious medium for capturing knowledge and disseminating practical application insights. Carvalho (2020) affirms that the utilization of Padlet serves as an effective conduit for fostering collaborative activities and coalescing knowledge. The author accentuates Padlet's prowess in nurturing virtual collaborative environments wherein ideas, resources, and reflections are harmoniously exchanged. This study corroborates Padlet's potential in not just stimulating active student participation

4. Final Remarks

The use of virtual boards and collaborative tools has proven to be an important tool for teaching and learning in initial and continuing education courses in computing, technology, and educational robotics for basic education. Padlet is an example of an interactive virtual board that can be used to organize information, assist in

communication, and share teaching materials in an intuitive and interactive manner. This tool has shown positive results in terms of student engagement and skill development. According to Fausto (2021), digital accessibility and usability allow us to speak of the need to provide equal access to websites, applications, and content.

In a study conducted with high school students, it was observed that the use of virtual collaboration tools like Padlet was beneficial in increasing students' interest and engagement in learning activities. Additionally, the research also revealed that the use of these tools improved the quality of students' work as well as their motivation and performance. For these reasons, we believe that the use of virtual boards and collaborative tools can be extremely beneficial for teaching and learning in initial and continuing education courses in computing, technology, and educational robotics for basic education.

The use of virtual boards and collaborative tools like Padlet in the training of robotics teachers in distance education courses offers numerous advantages. These tools allow students and teachers to share, create, access, and develop content, learning, and knowledge in a collaborative environment. They can be used to monitor students' progress, provide feedback, and assessments. Moreover, the use of these tools can also help teachers enhance the quality of teaching and learning by allowing students to create, share, and collaborate. They can serve not only as facilitating tools but also as a possibility of language. The construction of an interaction space drives learning with ethics, highlighting the possibility of providing authorship and the development of relational values for inclusion and democracy in the digital environment, one of the axes of computing in basic education

In summary, the integration of virtual boards and collaborative tools like Padlet in initial and continuing education courses in computing, technology, and educational robotics for basic education presents great potential. These tools encourage collaboration, engagement, and the creation of a collaborative learning community. By harnessing the benefits of these digital technologies, teachers and students can develop essential skills and abilities for the digital transformation era. However, it is important to highlight that the usability of these technologies requires that teachers also have adequate skills and knowledge to work with the tools, overcoming possible difficulties and prejudices regarding new methodologies.

To ensure the successful use of Padlet and other collaborative tools, it is necessary to invest in teacher training and promote an environment conducive to experimentation and innovation. The results of the analyzed studies indicate that the use of Padlet in the classroom has proven to be exceedingly productive in terms of student interaction and learning. The tool facilitates the development of various skills and promotes a stronger connection between teachers and students, fostering a broader framework for the development of transdisciplinary strategies.

Therefore, the incorporation of virtual boards and collaborative tools like Padlet can be a promising strategy to improve the quality of teaching and learning in courses related to computing, technology, and educational robotics. By adopting innovative approaches and leveraging the opportunities offered by digital technologies, educators can prepare students for the challenges of the digital world and promote meaningful learning.

Note: The translation has been adapted to reflect British English spelling and terminology

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