

## TRAINING TEACHERS TO DESIGN PORTFOLIO-BASED LEARNING ACTIVITIES USING TRELLO AND CHAT GPT: EXPLORATORY STUDY

### FORMAÇÃO DE PROFESSORES SOBRE O DESENHO DE ATIVIDADES DE APRENDIZAGEM BASEADAS EM PORTFÓLIO USANDO O TRELLO E O CHAT GPT: UM ESTUDO EXPLORATÓRIO

### FORMACIÓN DE PROFESORES PARA DISEÑAR ACTIVIDADES DE APRENDIZAJE BASADAS EN PORTAFOLIOS UTILIZANDO TRELLO Y CHAT GPT: ESTUDIO EXPLORATORIO

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#### Abstract

Trello is a versatile and user-friendly project management tool that can be adapted for portfolio-based learning activities in educational settings. This paper presents an exploratory study on digital teacher training using Trello to promote innovative pedagogical methodologies, involving the creation of digital portfolios with the assistance of ChatGPT. The study involved fifty-five teachers from various subject areas and employed a mixed-method approach that combines quantitative and qualitative methodology to assess whether teachers are receptive to integrating portfolio-based learning activities and artificial intelligence into their professional practice. The findings suggest that while teachers are open to incorporating these activities into their teaching, they encounter difficulties using ChatGPT. The results also indicate that teachers' exploration of Trello has led them to recognize that this tool facilitates virtual teamwork, thereby enhancing productivity and coordination among remote team members. Additionally, the results suggest that combining portfolio-based learning activities with artificial intelligence can foster the creation of innovative and personalized educational experiences.

**Keywords:** Teacher training, e-Portfolio, Portfolio-Based Learning, ChatGPT, Trello.

#### Resumo

O Trello é uma ferramenta de gestão de projetos versátil e fácil de usar que pode ser adaptada para atividades de aprendizagem baseadas em portfólio para serem utilizadas em contextos educativos. Este artigo apresenta um estudo exploratório sobre uma formação de professores onde foi utilizado o Trello para promover metodologias pedagógicas inovadoras que envolvem a criação de portfólios digitais com recurso ao ChatGPT. O estudo envolveu cinquenta e cinco professores de diferentes áreas disciplinares. Tratou-se de uma investigação mista que combina uma metodologia quantitativa e qualitativa para entender se os professores estão receptivos a usar atividades de aprendizagem baseadas em portfólio utilizando inteligência artificial na sua prática profissional. Os resultados sugerem que os professores estão receptivos à introdução de atividades de aprendizagem baseadas em portfólio utilizando inteligência artificial na sua prática docente, mas admitem dificuldades no uso do ChatGPT. Os resultados mostram que a exploração do Trello pelos professores levou-os a considerar que esta ferramenta facilita o trabalho em equipas à distância, melhora a produtividade e coordenação entre membros de equipa. Os resultados também

sugerem que combinar atividades de aprendizagem baseadas em portfólio com inteligência artificial pode promover a criação de experiências educativas inovadoras e personalizadas.

**Palavras-chave:** Formação de professores, e-Portfólio, Aprendizagem Baseada em Portfólio, Chat GPT, Trello.

## Resumen

Trello es una herramienta de gestión de proyectos versátil y fácil de usar que puede adaptarse para actividades de aprendizaje basadas en portafolios en entornos educativos. Este documento presenta un estudio exploratorio sobre la formación digital de profesores utilizando Trello para promover metodologías pedagógicas innovadoras que involucran la creación de portafolios digitales usando Chat GPT. El estudio involucró a cincuenta y cinco profesores de diferentes áreas temáticas. El estudio fue una investigación enfoque de método mixto que combina metodología cuantitativa y cualitativa para entender si los profesores están receptivos a usar actividades de aprendizaje basadas en portafolio usando inteligencia artificial en su práctica profesional. Los hallazgos sugieren que los profesores están receptivos a introducir actividades de aprendizaje basadas en portafolio utilizando inteligencia artificial en su práctica docente, pero admiten dificultades al usar Chat GPT. Los resultados muestran que la exploración de Trello por parte de los profesores los llevó a considerar que esta herramienta facilita el trabajo en equipo virtual sin interrupciones, mejorando la productividad y coordinación entre miembros del equipo a distancia. Combinar actividades de aprendizaje basadas en portafolio con inteligencia artificial puede crear experiencias educativas innovadoras y personalizadas.

**Palabras-clave:** Formación de profesores, e-portfolio, Aprendizaje Basado en Portafolio, Chat GPT, Trello.

## INTRODUCTION

Portfolio-based learning activities are educational approaches that involve students compiling, organizing, and reflecting upon a collection of their work (Laksana et al., 2021; Nurmilah et al., 2022). These portfolios can include a wide range of items such as essays, projects, artwork, reflections, assessments, and more and, therefore, can constitute a relevant pedagogical resource for developing skills (Widayanti et al., 2022). The portfolios constitute a record of a student's progress, achievements, and learning journey (Nurmilah et al., 2022; Shidiq et al., 2023). Combining portfolio-based learning with AI technologies can enhance the educational experience, fostering personalized learning journeys while providing valuable insights for students and educators (Ausat et al., 2023; Shidiq et al., 2023). In this sense, with this exploratory study, we use a quantitative and qualitative methodology to describe the results and understand whether teachers are receptive to portfolio-based learning activities using artificial intelligence in their professional practice.

The article presents an exploratory study on portfolio-based learning and briefly introduces Trello as a fun and flexible virtual collaboration tool for organizing information. We describe the methodology adopted in the exploratory study and briefly discuss the results, some of the main conclusions, and proposals for future research.

## 1. CONCEPTUAL FRAMEWORK

### 1.1 Portfolio-Based Learning with Chat GPT

Using e-portfolio-based learning improves student self-efficacy, academic performance, engagement, and learning outcomes. However, some authors recognize challenges related to implementation logistics, technical aspects, and scalability in more extensive educational settings, suggesting areas for further exploration and refinement of these methods (Laksana et al., 2021; Nurmilah et al., 2022). Laksana (2021) conducted research evaluating the efficacy of e-portfolio-based learning on student self-efficacy in speaking ability. The study employed statistical analysis, revealing a significant positive impact of e-portfolios on students' self-efficacy in speaking. Another study by Jayanto

et al. (2023) investigated the effects of portfolio-based learning models on historical learning outcomes for class XI students. Employing an experimental design, the study showed a significant contribution of portfolio-based learning to historical learning outcomes, highlighting marked differences between experimental and control groups. This research provided comprehensive insights into the impact of portfolio-based learning on academic performance. Furthermore, Laskaca et al. (2023) explored students' perceptions regarding Trello as a learning aid in e-portfolio-based blended learning. The study revealed positive student perceptions, indicating enhanced engagement, motivation, and effective digital portfolio development. Additionally, Nurmilah et al. (2022) focused on portfolio-based learning in the philosophy of mathematics education, demonstrating its positive impact on student activities and cognitive learning outcomes. The study highlighted students' active engagement and strong cognitive understanding, showcasing the potential of portfolio-based learning to boost students' self-confidence, and learning readiness. Despite these positive outcomes, e-portfolio-based learning has limitations concerning implementation logistics and student volume in a classroom setting, suggesting potential areas for further research to expand its application (Laksana et al., 2021). Also, Laskasa et al. (2023) related technical challenges were identified, highlighting the need for ongoing support for optimal utilization of Trello in education.

While AI, including systems like ChatGPT, offers remarkable conveniences such as virtual mentors, smart classrooms, and automatic assessments, it also raises concerns regarding its impact on creativity in student writing (Shidiq et al., 2023). In their study, Ausat et al. (2023) delve into the evolving role of technology in the classroom setting, focusing on the potential for ChatGPT to replace the traditional role of teachers as primary instructors. This qualitative study advocates for a balanced perspective, highlighting that while technology, including ChatGPT, serves as a valuable tool, it cannot entirely supplant the indispensable role of teachers in the learning process. The study accentuates the significance of integrating technology effectively within education and emphasizes teachers' need to augment their competencies in leveraging technology for instruction. It underscores the importance of teacher training to enhance their understanding and proficiency in managing technology-enabled learning environments, including the nuanced use of ChatGPT. Also, Shidiq et al. (2023) states that ChatGPT's capacity to generate text based on input keywords might lead to decreased originality in students' work, potentially affecting their creative writing skills. Utilizing innovative writing theory, the article qualitatively examines how ChatGPT's ease of text generation might hinder students' creativity, emphasizing the necessity for educators to adopt strategies beyond internet-based learning to prevent potential misuse by students in assignments.

## 1.2 Trello

Trello is a web-based project management application that uses boards, lists, and cards to help teams organize and prioritize tasks, projects, and workflows. It provides a visual and flexible way to manage tasks and collaborate with team members, allowing users to create boards for various projects, add lists to represent different stages or categories, and use cards to track specific tasks or items (Salsabila et al., 2023; Weeks, 2023). Trello offers features such as checklists, due dates, file attachments, labels, and comments, enabling users to customize their workflow and streamline communication within teams (Kipps & Jones, 2022). Further contributing to this discourse, Shchetykina et al. (2022) delved into the application of Trello in secondary education, specifically in developing lifelong learning skills. This research highlighted Trello's efficacy in structuring learning environments, promoting collaboration, and aiding in individually oriented learning. The study confirmed that implementing Trello led to a notable increase in lifelong learning skills among students, thus supporting the hypothesis. Additionally, Widayanti et al. (2022) discussed the integration of Trello in e-business courses, focusing on project-based learning. It highlighted Trello's role in enhancing student collaboration and communication skills, ultimately resulting in increased productivity in e-business projects.

Moreover, Salsabila et al. (2023) provided insights into strategic use of Trello in social media content planning. This study emphasized how Trello facilitated efficient content creation workflows, streamlined collaboration within the team and with clients, and contributed to maintaining content quality and meeting project deadlines. Also, Santos et al. (2022) explored Trello's application in university extension activities. The study showcased Trello's role in improving team productivity, optimizing time management, and fostering collaboration within teams involved in various projects. Trello has diverse applications for education project management, content creation, and team collaboration, highlighting its versatility and effectiveness in different contexts (Shchetykina et al., 2022; Santos et al., 2022; Salsabila et al., 2023).

Portfolio-based learning with AI systems like ChatGPT offers several advantages, including enhanced learning experiences, access to a wealth of information, and improved efficiency (AI-Smadi, 2023). ChatGPT can be used by

teachers to generate personalized learning materials, provide feedback on assignments, and facilitate interactive learning experiences, for students, ChatGPT can assist with research, writing, and problem-solving, potentially improving their understanding and engagement with course material (Qadir, 2023). ChatGPT can aid in diverse information searches, offer personalized feedback on learning outcomes, contribute to learning enhancement, and encourage self-directed learning (Park, 2023). However, there are also significant disadvantages to consider. One major concern is the lack of personalization and the risk of potential biases and inaccuracies in the information provided by AI systems, as they rely on the data they were trained on (Daneshjou et al., 2021).

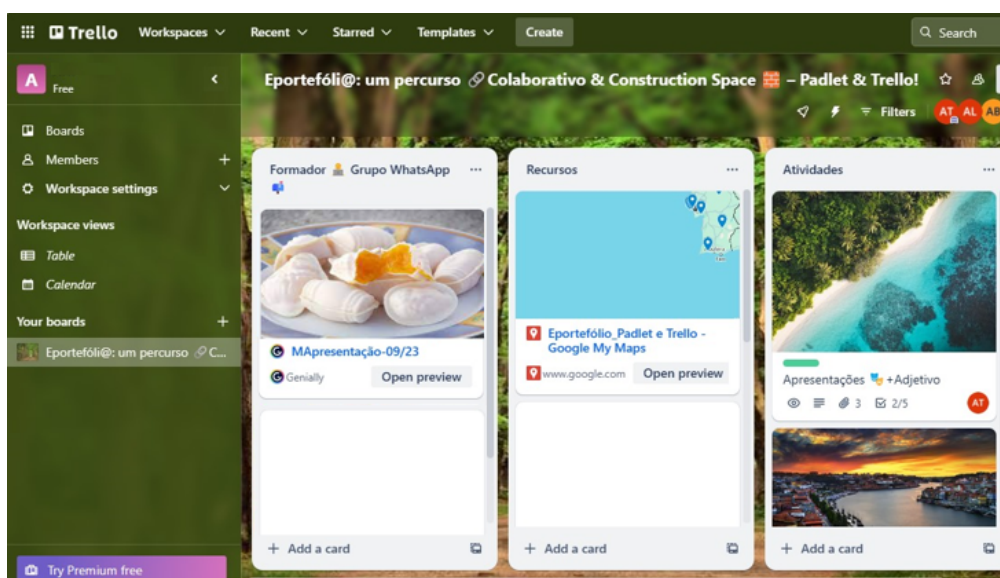
## 2. METHOD

This exploratory study took place during an in-service training course for Portuguese teachers. The training course for teachers took distance classes through videoconferencing platforms. The study has been developed using quantitative and qualitative methodology through quasi-experimental research designed around digital teacher empowerment in virtual learning environments with Trello using ChatGPT whenever appropriate. Using a mixed methods approach that combines quantitative and qualitative methodologies allows for a more comprehensive understanding of research problems by integrating numerical data with in-depth insights, which can provide a fuller picture of the phenomena being studied. This approach also enables the triangulation of findings, enhancing the validity and reliability of the results (Ponce & Pagán-Maldonado, 2015; Almeida, 2028).

The course was divided into two moments. Initially, teachers learned how to use ChatGPT to create educational resources, such as content for lesson plans, presentations, and tests. In the second moment, teachers had contact with Trello while the pedagogical tool and teachers designed and created their pedagogical resources in Trello. Then, we guided teachers through the following steps: (i) teachers made a knowledge diagnosis; (ii) were involved in an activity that involves using ChatGPT; (iii) were involved in an activity involving Trello as a virtual collaborative tool; (iv) each teacher built a pedagogical resource in Trello about a topic of her choice and (v) teachers made a final reflection about the pedagogical contribution of Trello to development and competence. The Zoom platform, the Trello web-based app and ChatGPT mediated the training course. Different methods were applied to collect the data: (i) system logs on the platform, (ii) a diary to collect direct observations, (iii) collection of material produced by teachers and (iv) a final reflection through a questionnaire.

Figure 1

*Pedagogical resource created in Trello for training course*



The qualitative data based on the teachers' reports and opinions obtained from the resources produced by teachers on the platform were analysed using qualitative methods. As we aim to understand if teachers are receptive to using portfolio-based learning activities with artificial intelligence in their professional practice, the categories of analysis used were as follows: (i) the development of skills using e-Portfolios, (ii) the promotion of digital literacy through the creation of an e-Portfolio, (iii) Trello as a technology for e-Portfolio creation, and (iv) the use of Chat GPT to assist in finding information and generating text.

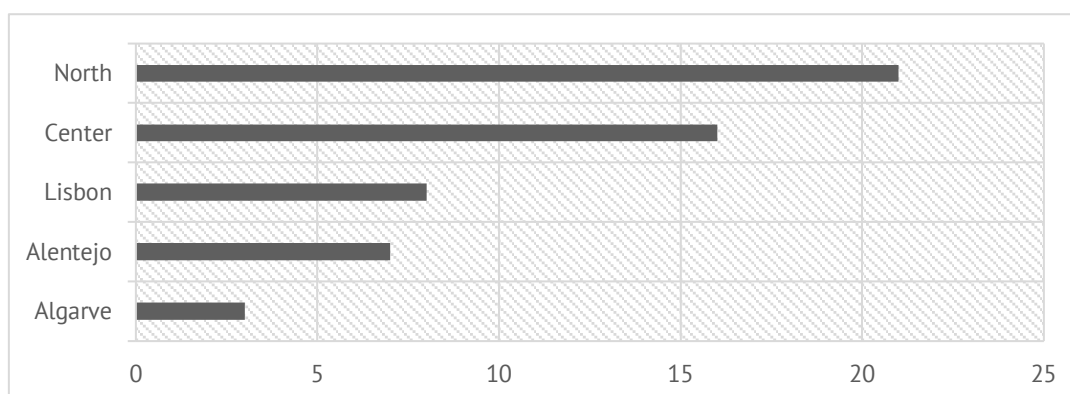
The final questionnaire was based on the Zambraro et al. (2023) scale that was made based on the literature review and expert interviews carried out validation. These authors concluded that the questionnaire could be useful in measuring and making visible digital portfolios' characteristics and pedagogical potential. The data collection instrument consisted of three parts: the first referred to the development of skills of the curriculum, the second referred to the development of digital skills, and the third referred to the use of the Trello tool to create portfolios. The questionnaire consists of twenty-three questions to be answered using a Likert scale with five degrees of variation, with level 1 - I totally agree and the opposite extreme, level 5 - I totally disagree; the intermediate point grade 3 - Neutral and grades 2 and 4 agree and disagree. The instrument was subjected to analysis of the internal consistency coefficient to verify whether the content was representative of the theoretical universe intended to be measured. In this way, Cronbach's Alpha was applied, and the value obtained was 0.969, which is considered reliable. Data from the fifty-five respondents were first saved in an Excel file. The questionnaire data was analysed using the Statistical Package for Social Sciences (SPSS®), version 18.0 for Windows. In this way, data analysis was carried out through descriptive analysis and Cronbach's Alpha test.

### 3. RESULTS

In this exploratory study, we involved 55 teachers from different regions of Portugal and various disciplinary areas, comprising 7 male and 48 female teachers (graph 1). At the beginning of the training course, we realized that most of the teachers involved had already used portfolio-based learning activities in their practice with students. However, most teachers needed to learn and had never heard of Trello.

**Graph 1**

*Region of teachers participating in the training course*



In the final reflection, we seek to understand the perception regarding (i) the development of skills using E-portfolios, (ii) the promotion of digital literacy, the creation of an e-Portfolio, and (iii) Trello as a technology for e-Portfolio creation.

Regarding the development of skills using portfolio-based learning activities, most teachers consider that Trello can stimulate creativity, encourage critical thinking, enhance teamwork in the students, aid in forming a vital view of the

content to be included in the portfolio, encourage to research information, enhance the application of content covered and increase the application of content. The professors' responses are in Table 1 below.

**Table 1**

*Teachers' responses regarding the development of skills using e-Portfolio*

Heading level	1	2	3	4	5
Stimulates creativity	43	9	3	0	0
Encourages critical thinking	37	15	3	0	0
Enhances teamwork	22	30	3	0	0
Aids in forming a critical view of the content to be included in the e-Portfolio	40	12	3	0	0
Encourages teachers and students to research information	31	24	0	0	0
Enhances the application of content covered by the teacher	37	15	3	0	0
Fosters interdisciplinary work	31	24	0	0	0
Enhances the application of content covered by the teacher	36	16	3	0	0
Promotes self-reflection processes among students	40	12	3	0	0

*Legend: 1- Strongly agree, 2- Agree, 3 - Neutral, 4 - Disagree, 5 - Strongly disagree*

Regarding the promotion of digital literacy, the creation of an e-Portfolio, most teachers consider that it encourages the use of technology for the development of digital information, enables the creation of well-organized digital information using, for instance, infographics, promotes reading comprehension through the creation of digital texts, boosts the development of digital communication skills, the development of oral communication can be stimulated the creation of educational content videos, can promote the use of chats for real-time communication and be capable of improving the ability to convey ideas and opinions effectively. We present teachers' responses about the ability of portfolio-based learning activities to promote digital literacy in Table 2.

**Table 2**

*Teachers' responses regarding the development of digital literacy*

Heading level	1	2	3	4	5
Encourages the use of technology for the development of digital information	38	17	0	0	0
Encourages the creation of well-organised digital information using, for instance, infographics	36	16	3	0	0
Promotes reading comprehension through the creation of digital texts	35	17	3	0	0
Enhances written comprehension through the creation of digital texts	29	23	3	0	0
Boosts the development of digital communication skills	36	19	0	0	0
Stimulates the development of oral communication through the creation of educational content videos	16	30	9	0	0
Promotes the use of chats for real-time communication	30	25	0	0	0
Enhances the ability to communicate ideas and opinions	31	21	3	0	0

*Legend: 1- Strongly agree, 2- Agree, 3 - Neutral, 4 - Disagree, 5 - Strongly disagree*

Trello is an effective technology for e-Portfolio creation and a pedagogical resource that facilitates information organisation and aids in visualising information, enabling effective collaboration between teachers and students in e-Portfolio construction. Despite this, most teachers consider that Trello presents some complexity in creating e-Portfolios. However, they also admit that for creating portfolio-based learning activities, Trello brings more benefits than drawbacks.



Table 3

*Teachers' responses regarding Trello as a technology for e-Portfolio creation*

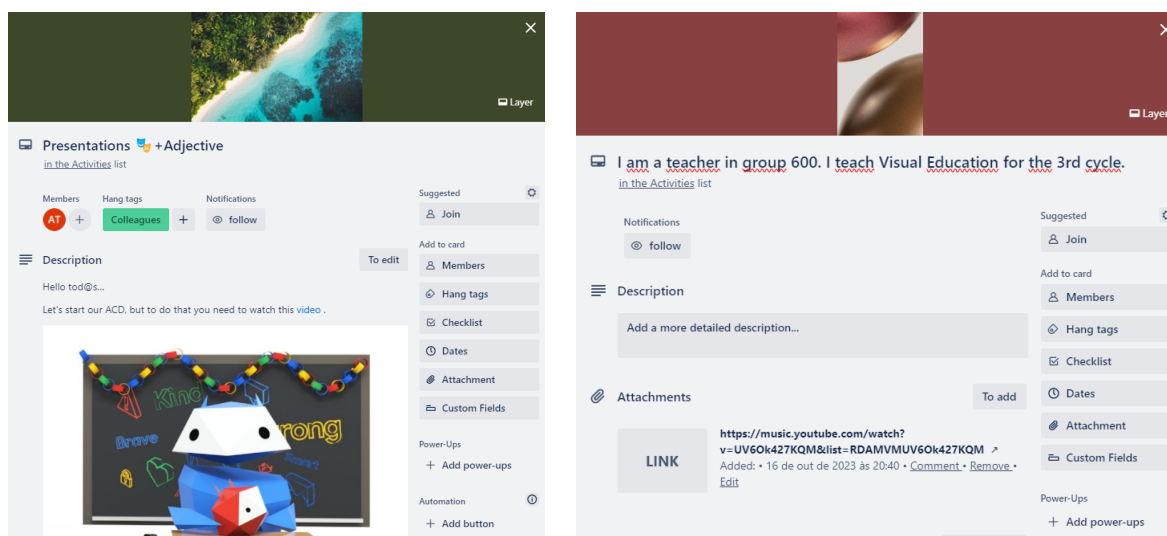
Heading level	1	2	3	4	5
It's an effective technology for creating e-Portfolios.	36	13	6	0	0
Facilitates information organization within the e-Portfolio.	36	10	9	0	0
Aids in visualizing information in the e-Portfolio.	40	9	6	0	0
Enables effective collaboration between teachers and students in e-Portfolio construction.	34	3	18	0	0
Presents some complexity in its use for creating e-Portfolios.	34	12	9	0	0
Overall, I consider that using Trello for creating e-Portfolios, brings more benefits than drawbacks	42	7	6	0	0

Legend: 1- Strongly agree, 2- Agree, 3 - Neutral, 4 - Disagree, 5 - Strongly disagree

At the end of the training course, teachers were encouraged to apply the pedagogical resources they had created to meet their students' needs. Some teachers implemented these resources and provided positive feedback on their application. All teachers involved in the course could create their portfolios on Trello. They used Chat GPT to create, revise, or adapt content for their portfolios whenever necessary. The following image presents some of the work accomplished.

Figure 2

*Pedagogical resources created in Trello by teachers*



Teachers' opinions regarding the use of ChatGPT to create e-Portfolios with Trello technology were collected by various materials created by the teachers during the training and organised according to the following categories of analysis: (i) the development of skills using e-Portfolios, (ii) the promotion of digital literacy through the creation of an e-Portfolio, (iii) Trello as a technology for e-Portfolio creation, and (iv) the use of Chat GPT to assist in finding information and generating text.

Regarding the development of skills using e-Portfolios, teachers consider that "e-Portfolios significantly enhance students' ability to reflect on their outcomes, fostering critical self-assessment" (T7). They enable students to "document and showcase their achievements" (T11), providing a "platform for receiving essential feedback from peers and instructors, essential for development" (T20). This process "encourages students to engage in their own learning

and update their skills and knowledge" (T34). Additionally, "the structured nature of e-Portfolios helps develop organisational skills" (T52). Creating e-Portfolios promotes digital literacy by teaching students to "use digital environments effectively" (T31). The process of creating an e-Portfolio involves researching various sources and comparing data, enhancing "students' ability to manage digital data and organise information" (T38). Additionally, it fosters "skills related to digital communication and online collaboration" (T40). Furthermore, building e-Portfolios helps students "understand the importance of digital security and privacy, and the need to adhere to certain standards" (T55). Concerning Trello as a technology for e-Portfolio creation, teachers highlight that "Trello's user-friendly interface makes it easy for students to create and manage their e-Portfolios" (T11). Additionally, they consider that Trello helped students to "organise their work visually using Trello's boards and cards" (T19). The teachers also believe that "the platform supports collaboration between students" (T33), allowing students to "track their progress and set milestones within their Trello e-Portfolios" (T48). Teachers emphasise that "Trello's flexibility allows for a personalised approach to e-Portfolio creation and helps students maintain a structured and organised e-Portfolio" (T50). Teachers expressed positive opinions about the use of Chat GPT to assist in finding information and generating text for their e-Portfolios. They noted that Chat GPT can help to "quickly find relevant information" (T2) and "can improve the quality of writing through suggestions and improvements" (T29). Teachers also highlighted that "students can use AI to check the accuracy and relevance of their e-Portfolio content" (T31). For example, the use of AI assists with language translation, "making e-Portfolios accessible to a broader audience" (T44). Finally, teachers believe that AI-powered tools help to obtain information, "but it is necessary for them to analyse it critically" (T37). Lastly, teachers appreciated that "Chat GPT also assists with language translation, making e-Portfolios accessible to a broader audience" (T44). In table 4, we present the opinions and reflections provided by this group of teachers.

**Table 4**

*Categories of analysis from teachers' opinions on resources produced*

Categories	Teacher response
Development skills using E-portfolios	<p>"e-Portfolios significantly enhance students' ability to reflect on their outcomes, fostering critical self-assessment" (T7).</p> <p>"Using e-Portfolios, students can document and showcase their achievements" (T11).</p> <p>"They provide a platform to receive feedback from peers and instructors, essential for development" (T20).</p> <p>"They encourage students to engage in their own learning and update their skills and knowledge" (T34).</p> <p>"The structured nature of e-Portfolios helps students develop organizational skills" (T52).</p> <p>"Creating an e-Portfolio leads students to work with various digital tools and platforms" (T3).</p> <p>"I also noticed that some students became proficient in using cloud-based tools for storing and sharing their e-Portfolios and were excited to share this knowledge with each other" (T11).</p>
Promotion digital literacy through the creation of an e-Portfolio	<p>"Students learn to use digital environments effectively while building their e-Portfolios" (T31).</p> <p>"The construction of e-Portfolios led students to research different sources and compare data. I realized that it enhances students' ability to manage digital data and organize information" (T38).</p> <p>"The process promotes skills related to digital communication and online collaboration in students" (T40).</p> <p>"Students developed skills related to critically evaluating digital sources" (T42).</p> <p>"Building the e-Portfolio helped my students understand the importance of digital security and privacy and to pay attention to certain standards" (T55).</p>
Trello as a technology for e-Portfolio creation	<p>"Trello's user-friendly interface makes it easy for students to create and manage their e-Portfolios" (T11).</p> <p>"The tool helped, because students can organize their work visually using Trello's boards and cards" (T19).</p> <p>"The fact that Trello allows for the integration of various media types facilitated the work. The students quickly understood how to use it, enhancing the e-Portfolio's interactivity" (T27).</p> <p>"I consider that the platform supports collaboration between students" (T33).</p> <p>"One of the advantages I found with this platform is the fact that Students can track their progress and set milestones within their Trello e-Portfolios" (T48).</p>



*"Trello's flexibility allows for a personalized approach to e-Portfolio creation and helps students maintain a structured and organized e-Portfolio" (T50).*

Chat GPT to assist in finding information and generating text	<i>"Amazingly, GPT Chat helped students quickly find relevant information for their e-Portfolios" (T2).</i>
	<i>"AI assists like Chat GPT can improve the quality of writing through suggestions and improvements" (T29).</i>
	<i>"Students can use AI to check the accuracy and relevance of their e-Portfolio content" (T31).</i>
	<i>"I believe AI-powered tools help students stay up to date with the latest information and trends, but it is necessary for them to analyze it critically" (37).</i>
	<i>"Chat GPT also assists with language translation, making e-Portfolios accessible to a broader audience" (44).</i>

## 4. DISCUSSION

Regarding the development of skills using e-Portfolios, responses from teachers concerning various statements about the integration of e-Portfolios in education show significant agreement on several benefits. A breakdown of the percentages demonstrates strong endorsement in key areas. For example, 82% of the respondents (43 out of 55) strongly agree that e-Portfolios stimulate creativity. Similarly, 67% (37 out of 55) strongly agree and 27% agree that e-Portfolios encourage critical thinking, accounting for 94% agreement. In terms of teamwork enhancement, 40% (22 out of 55) strongly agree and 55% (30 out of 55) agree, summing up to 95% consensus. Furthermore, 73% (40 out of 55) strongly agree and 22% (12 out of 55) agree that e-Portfolios aid in forming a critical view of the content to be included, showing a total of 95% agreement. In terms of the development of skills using portfolio-based learning activities, most teachers consider that Trello encourages both teachers and students to research information. Of the respondents, 56% (31 out of 55) strongly agree and 44% (24 out of 55) agree. In relation to the enhancement of the application of content covered by the teacher, 67% (37 out of 55) strongly agree and 27% (15 out of 55) agree, indicating strong support in this area as well. Additionally, 56% (31 out of 55) strongly agree and 44% (24 out of 55) agree that e-Portfolios foster interdisciplinary work. Finally, 73% (40 out of 55) strongly agree and 22% (12 out of 55) agree that e-Portfolios promote self-reflection processes among students, representing 95% agreement. However, the relatively lower percentage of strong agreement in some areas, such as fostering interdisciplinary work, suggests a more diverse range of opinions. Digital portfolios foster learners' independence and enhance their digital skills, which are crucial for managing their own learning and critically reflecting on their progress. This approach is underpinned by scaffolded learning, where support is progressively withdrawn to build these foundational skills. Research by Mogas et al. (2023) indicates that the use of digital portfolios can result in significant learning gains, enhanced self-regulation, and improved reflective abilities.

Regarding the promotion of digital literacy through the creation of e-Portfolios, responses from teachers concerning various aspects related to the integration of technology for educational purposes reveal significant agreement on numerous benefits. An analysis of the percentages makes it clear that the majority either strongly agree or agree with the advantages of using technology in education. For instance, 70% (38 out of 55) of the respondents strongly agree that e-Portfolios encourage the use of technology for the development of digital information. Similarly, 66% (36 out of 55) strongly agree that e-Portfolios facilitate the creation of well-organized digital information, like infographics. Furthermore, 64% (35 out of 55) also strongly agree that e-Portfolios promote reading comprehension by creating digital texts.

Regarding enhancing written comprehension through digital texts, 53% (29 out of 55) strongly agree and 31% (17 out of 55) agree. In addition, 66% (36 out of 55) strongly agree that e-Portfolios boost the development of digital communication skills. Only 29% (16 out of 55) strongly agree that they stimulate the development of oral communication by creating educational content videos, with a slightly higher number of neutral responses. All teachers also supported the use of chats for real-time communication. Moreover, 56% (31 out of 55) strongly agree that e-Portfolios enhance the ability to communicate ideas and opinions effectively. While there is a strong consensus on most aspects, particularly in encouraging the use of technology for various educational purposes, opinions are more diverse or less strong regarding the impact on oral communication through the creation of educational content videos, indicating areas where perceptions vary more significantly. These aspects are in line with Ausat et al. (2023), which underscores the need for ongoing training and development sessions for educators to

continually update their knowledge and skills, considering various aspects like infrastructure availability and human resources, thus maximizing the potential benefits of technology in improving learning quality for both students and teachers. Also, in line with Cruz et al. (2014), technology can be an ally of pedagogy using devices that most teachers have at their disposal.

Participant feedback strongly supports the effectiveness and benefits of using Trello as a technology for creating e-Portfolios. A significant majority of respondents indicated agreement or strong agreement on several aspects of using Trello. For example, 66% (36 of 55) strongly agree and 24% (13 out of 55) agree that Trello is an effective technology for creating e-Portfolios. Likewise, 66% (36 of 55) strongly agree that Trello makes it easier to organize information within the e-Portfolio. Additionally, 73% (40 of 55) also recognized Trello's ability to help visualize information in e-Portfolios. However, although there is substantial agreement, some mixed perceptions were observed regarding Trello's role in enabling effective collaboration between teachers and learners in e-Portfolio construction, with 62% (34 of 55) strongly agreeing, but a number significant 33% (18 out of 55) providing neutral responses.

Responses also highlighted some complexity in using it to create e-Portfolios, with 62% (34 of 55) recognizing this aspect to some extent, indicating that although Trello is beneficial, it can also present certain challenges to users. Despite these complexities, a large majority, 76% (42 of 55), consider that using Trello to create an e-Portfolio brings more benefits than disadvantages. According to research results by Shchetynina et al. (2022) and Salsabila et al. (2023), although Trello is widely recognized as an effective tool for creating e-Portfolios, aiding in organizing and visualizing information, perspectives on its general benefits versus disadvantages differ significantly among users, highlighting a range of opinions regarding its usefulness in educational environments.

The outcomes from teachers' responses on skill development suggest widespread acceptance of the advantages of e-Portfolios in areas such as stimulating creativity, critical thinking, and personal reflection. They also highlight a robust consensus on the practical application of these tools in enhancing teamwork and content application. In terms of teachers' responses on the development of digital literacy, the findings generally endorse the benefits of technology in education via e-Portfolios, with strong agreement on enhancing various digital literacy skills. However, there is less unanimity in specific areas, such as oral communication skills. The data on the use of Trello for e-Portfolio creation show a consensus among respondents about its effectiveness and benefits. However, variations in opinions, particularly concerning its collaborative use and complexity, indicate a diverse range of perceptions. Furthermore, these responses underline the need for a balanced approach in leveraging technologies like Trello in educational settings, emphasising the enduring importance of educators in guiding and facilitating the learning process. Continuous professional development is essential to fully harness these technologies for enhanced learning outcomes.

In the opinion of these teachers, "*e-Portfolios significantly enhance students' ability to reflect on their outcomes, fostering critical self-assessment*" (T7). They enable students to "*document and showcase their achievements*" (T11) while receiving essential "*feedback from peers and instructors*" (T20). This process encourages engagement in self-directed learning and skill updating. Additionally, "*the structured nature of e-Portfolios helps develop organisational skills*" (T52). Creating e-Portfolios also promotes digital literacy as students work with various tools and platforms, "*navigate digital environments*" (T31), and "*critically evaluate digital sources*" (T42). Teachers also seem to recognise that Trello and Chat GPT further enhance e-Portfolio creation by providing "*user-friendly interfaces*" (T11), supporting collaboration, and improving content quality through AI assistance. The rapid development of technology, such as ChatGPT, has hugely impacted education. Proper integration and teacher competence in technology management are essential. ChatGPT's language understanding enhances creative writing, but its influence on students' creativity needs scrutiny (Ausat et al., 2023; Shidiq, 2023).

## 5. CONCLUSION

This article presents a pedagogical experience involving fifty-five teachers in a training course about the virtual learning environment Trello. It should be noted that most teachers have never worked with Trello. All teachers created a teaching resource in Trello to work with their students. Results show that teachers are receptive to portfolio-based learning activities and use artificial intelligence, such as Chat GPT, in their professional practice.

Trello offers a user-friendly platform for crafting e-Portfolios, providing students with an efficient and versatile tool to showcase their academic achievements. Its intuitive interface, structured in boards, lists, and cards, enables students to curate a comprehensive display of their work, track progress, and document their learning journey. With features such as customisable boards, task checklists, file attachments, and collaborative options, Trello empowers learners to present their projects, assignments, and reflections in an organised and visually appealing manner. Its flexibility and collaborative functionalities enhance student engagement and foster essential skills in project management, organisation, and digital literacy, making Trello an asset for educational e-Portfolio creation. Our work shows these teachers' receptivity to using Virtual Trello Learning Environments. Teachers admit pedagogical advantages in the organisation of work and skills development. It is relevant to us in future studies to understand its impact on students in a practical application of curricular content. The digital training of teachers has been a focus of several governments and has aroused the interest of researchers and stakeholders. With this training course, we created conditions for teachers to integrate technologies in their curricular areas to enhance knowledge transfer from teachers to their practices with students. In this sense, it seems relevant for us to understand in future investigations whether teachers' reflection on teaching with portfolio-based learning activities enhances pedagogical differentiation and speeds up teaching/learning process. E-Portfolio-based learning enhances student self-efficacy, engagement, and academic performance, with significant positive effects observed across various studies, including improved speaking ability and historical learning outcomes; however, challenges related to implementation logistics, scalability, and the integration of technology tools like Trello have been identified, pointing to the need for further research and support to optimise these educational resources (Laksana et al., 2021; Nurmilah et al., 2022; Jayanto et al., 2023; Laskaca et al., 2023). Additionally, while AI technologies such as ChatGPT offer innovative learning aids and can enhance instructional practices, concerns about their impact on student work suggest a need for a balanced integration of technology in education, ensuring that teachers are adequately trained to manage and enhance learning environments with Chat GPT (Shidiq et al., 2023; Ausat et al., 2023). Regarding the long-term impact of e-Portfolios on pedagogical practice, it may be pertinent in future research to explore how e-Portfolios affect teachers' pedagogical practices over an extended period. Are there sustainable changes in teaching methodologies that can be directly attributed to using e-Portfolios? Similarly, concerning the effectiveness of Trello as an e-Portfolio creation tool, it would be relevant to investigate whether there are notable differences in the perceived utility of Trello across various disciplines or educational levels.

## 6. LIMITATIONS OF THIS EXPLORATORY STUDY

This exploratory study, while providing insights into digital teacher empowerment in virtual learning environments, has several limitations. Firstly, the sample size is relatively small with only 55 participants, which may not be representative of the wider population of Portuguese teachers, thus limiting the generalisability of the findings. Additionally, the voluntary nature of participation could introduce selection bias, as it is possible that those who enrolled were already positively inclined towards digital tools like Trello and Chat GPT, which might not reflect the attitudes of all teachers. Finally, the use of a quasi-experimental design without a control group makes it difficult to attribute observed changes directly to the training intervention, as other external factors could have influenced the results. We suggest that these aspects can be considered in future research that can advance knowledge on this topic.

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