CONTINUOUS TEACHERS' TRAINING FOCUSED ON INTEGRATION OF TECHNOLOGIES IN PEDAGOGICAL PRACTICE

FORMAÇÃO CONTÍNUA DE PROFESSORES FOCADA NA INTEGRAÇÃO DAS TECNOLOGIAS NA PRÁTICA PEDAGÓGICA

FORMACIÓN CONTINUA DE PROFESORES ENFOCADA A LA INTEGRACIÓN DE TECNOLOGÍAS EN LA PRÁCTICA PEDAGÓGICA

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ABSTRACT: Technological evolution has arrived in the school context, and the teacher must use and teach by integrating technological resources into their pedagogical practice. The article aims to analyze the perception of primary education teachers about an online continuing education program focused on the integration of technologies in the teaching process. Research of a primarily quantitative nature with the application of a questionnaire, with 114 respondents, to characterize and evaluate perceptions about training. It is concluded that there is a need to provide continued training in the area of technology integration in teachers' didactic actions and reflections, that the training was positively appreciated by teachers, and that the appropriate use of technological resources and tools, the articulation between time and demands of tasks, the acquisition of new knowledge and skills, and the perception of the relevance of resources are important factors in achieving the objectives of training on the integration of technologies in education.

KEYWORDS: Teacher Training. Technology. Education. Pedagogical Practice.

RESUMO: *A evolução tecnológica chegou no contexto escolar e, o professor, deverá utilizar e ensinar integrando os recursos tecnológicos na sua prática pedagógica. O artigo objetiva analisar a percepção dos professores da educação básica sobre um programa online de formação contínua focado na integração das tecnologias no processo de ensino. Pesquisa de natureza prioritariamente quantitativa com aplicação de um questionário, com 114 respondentes, para caracterização e avaliação das percepções sobre a formação. Conclui-se a necessidade de fornecer formação continuada na área de integração das tecnologias nas ações e reflexões didáticas dos professores, que a formação foi apreciada positivamente pelos professores, e que o uso adequado de recursos e ferramentas tecnológicas, a articulação entre tempo e exigências das tarefas, a aquisição de novos conhecimentos e competências, e a percepção da relevância dos recursos são fatores importantes para o alcance dos objetivos da formação sobre integração das tecnologias na educação.*

PALAVRAS-CHAVE: *Formação Continuada de Professores. Integração das Tecnologias. Educação. Prática Pedagógica.*

RESUMEN*: La evolución tecnológica ha llegado al contexto escolar y el docente debe utilizar y enseñar integrando los recursos tecnológicos a su práctica pedagógica. El artículo tiene como objetivo analizar la percepción de docentes de educación básica sobre un programa de educación continua en línea enfocado en la integración de tecnologías en el proceso de enseñanza. Investigación de carácter principalmente cuantitativo con la aplicación de un cuestionario, con 114 encuestados, para caracterizar y evaluar percepciones sobre la formación. Se concluye que existe la necesidad de brindar una formación continua en el área de integración de la tecnología en las acciones y reflexiones didácticas de los docentes, que la formación fue valorada positivamente por los docentes, y que el uso adecuado de los recursos y herramientas tecnológicas, la articulación entre el tiempo y las demandas de las tareas, la adquisición de nuevos conocimientos y habilidades, y la percepción de la relevancia de los recursos son factores importantes para alcanzar los objetivos de la formación sobre la integración de tecnologías en la educación.*

PALABRAS CLAVE*: Formación Docente. Tecnología. Educación. Práctica pedagógica.*

Introduction

At the beginning of the 21st century, Perrenoud (2000) published about the 10 new competencies for teaching, and interestingly, the eighth competency listed was the use of new technologies. According to the author, schools could not ignore the changes occurring in the world at the turn of the century, as Information and Communication Technologies (ICT) were transforming not only the way we communicate but also how we work, think, and even make decisions.

Technologies can be presented in various ways: innovative technologies, new technologies, technological elements, digital media, educational technologies, and digital technology. This diversity is due to the fact that technologies have been transforming ways of life and knowledge production by involving various resources and possibilities for communicating and receiving information through technological resources and systems (Bueno; Gomes, 2011).

More recently, there has been discussion about the impact and possibilities of artificial intelligence (AI) technologies in education. These AI models can be used to enhance students' educational experiences but also present challenges. These challenges include the need for various skills, technological literacy, and strategies for verifying and validating information, concepts, and facts by both teachers and students. All this presupposes the need for ongoing human supervision to avoid bias and misuse of AI. However, if addressed wisely, these challenges can offer opportunities for students to become familiar with potential social biases and risks associated with AI applications in education.

> Furthermore, a clear strategy within educational systems and a well-defined pedagogical approach with a strong focus on critical thinking and fact-checking strategies are necessary to integrate and make the most of large language models in learning environments and teaching curricula (Kasneci *et al.*, 2023, p. 1, our translation).

In this technological context, it is expected that individuals have a minimum level of digital competence to use these tools in their daily lives and educational processes (Costa, 2008). These competencies can be divided into three levels that can be certified: **Level 1**: Digital Competence Certificate, where the teacher demonstrates basic knowledge and uses ICT tools functionally in a professional context. **Level 2**: Pedagogical Competence with ICT Certificate, where the teacher integrates technology and pedagogy, demonstrating a solid understanding of ICT tools specific to the subjects they teach and recognizing the benefits of their use to enhance

pedagogical practices and student learning. **Level 3**: Advanced Pedagogical Competence with ICT Certificate, where the teacher innovates pedagogical practices with ICT, shares experiences, collaborates with the educational community, and understands the potential of ICT tools for professional development and pedagogical innovation.

Expanding on these concepts, Europe has developed and updated a Digital Competence Framework for Educators (Lucas; Moreira, 2018). This set of digital competencies specific to the teaching profession focuses on the skills, abilities, and knowledge required to leverage the potential of digital technologies to improve and innovate education. Naturally, these digital competence frameworks for teacher training are not unique but serve as support for establishing guidelines that can be adapted to educational contexts (Meirinhos; Osório, 2019).

At the advanced level of pedagogical competencies with ICT, Bezerra and Neri de Souza (2013, p. 150) state that "[...] the teacher becomes an investigator of their practice, effectively contributing to the construction of educational knowledge." In this sense, Hughes (2005, p. 278, our translation) asserts that "technological integration requires practicing teachers to adopt a learning stance." This is supported by the study of Gomez Junior *et al.* (2022), which emphasizes the importance of continuous professional development for teachers.

According to Lucas and Moreira (2018), teachers, as citizens, need to master these competencies to participate effectively in society, personally and professionally, especially considering that they serve as role models for students of a digitized generation. Therefore, they must be capable of exercising their digital competencies in front of their learners.

In the discourse of the various cited authors, it is common to first consider the training of teachers for the use or integration of technologies in the educational process, before focusing on the development of students. It is necessary to train the teacher first. Thus, we concur with Públio Júnior (2018, p.1097), who asserts that it is essential for teachers to update and acquire new skills to conduct educational practice with the use of technologies. Fütterer *et al.* (2023) emphasize that this need for technology integration in teaching practice requires awareness of the utility of technology.

In light of the above, this article presents an analysis of the effects and relevance of a continuous teacher training program for basic education, aimed at integrating technologies into the educational process.

Methodological Procedures

This article is part of a larger quantitative research project, utilizing a case study method focused on continuous teacher training for basic education (Mariotto, 2020). The study is based on various data collection instruments; however, this article will deeply analyze quantitative data derived from the final evaluation questionnaire of the training. Respondents were not asked for identification in accordance with the General Data Protection Law (Law No. 13.709/2018). The application of this instrument considered the participants' experiences and their contexts of practice, such as the school, specific class, teaching area, etc., elements that define, among other things, a case study according to Neri de Souza, Costa, and Neri de Souza (2015).

To analyze and deepen the understanding of the importance of this study, the research focused on the following question: **What is the contribution of a continuous training program, according to the perceptions of primary education teachers, regarding the integration of technologies in teaching practice?** To answer this question, a continuous training program offered to over 494 basic education teachers from a confessional private educational institution in Brazil was analyzed.

For data collection, a questionnaire was developed and submitted for review by the Research Ethics Committee (CEP), with approval number 3.440.105. This online questionnaire, created using Google Forms, included a Free and Informed Consent Form (TCLE) and did not request identification. It was sent to 494 teachers and educational managers enrolled in the continuous training provided by the institution. These participants constituted the study population. From this population, a random sample of 114 completed questionnaires was obtained.

This questionnaire was administered at the end of a training program on the integration of technologies, conducted in an e-learning format. The training consisted of eight modules over three months, with the support of tutors. The modules covered the following topics: i) Educational Technologies Applied in the Classroom: Digital Whiteboards – Part 1, ii) Educational Technologies Applied in the Classroom: Digital Whiteboards – Part 2, iii) Educational Technologies Applied in the Classroom: Digital Whiteboards, iv) Beyond PowerPoint: Prezi, v) Tools for Mind Maps and Flowcharts, vi) Google Docs and Its Tools, vii) Active Methodologies and Educational Technologies, viii) CPB Exam. These topics addressed the most urgent needs of the teachers targeted by the training.

The questionnaire consists of 10 questions, divided into three sections. The first section includes 6 questions regarding the demographic profile of the respondents. The next section comprises closed-ended questions evaluating the training. These questions use a Likert scale of agreement ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Statistical analysis of the data was conducted using Stata and Excel software.

The study employed multiple linear regression. According to Fávero et al. (2009, p. 346, our translation), "the objective of multiple linear regression is to study the relationship between two or more explanatory variables that are presented linearly and a metric dependent variable." In general, multiple linear regression seeks to identify how a dependent variable is influenced by a series of independent variables.

Although there are debates about using multiple linear regression with Likert scale data, this technique is recognized as a valid option in theoretical studies on the subject (Boone Jr.; Boone, 2012). Norman (2010) argues that although some authors criticize the use of multivariate analysis with Likert scales, there is a conceptual basis for applying the method with such questionnaires.

For the research, the dependent variables "Objective" and "Sufficient" were determined to assess perceptions of the program concerning the training process. The dependent variables "Motivation" and "Application" were aimed at evaluating interest in applying the tools learned during the training. To achieve the study's objectives, two multiple linear regression models were developed, one for each dependent variable (see Appendix[4]).

After data collection and preliminary analysis, the data were organized and standardized in Excel, variables were adjusted and coded appropriately, and all data were processed using Stata software version 15.0, generating descriptive statistics and results from the multiple linear regression analysis, which will be presented and discussed in the following section.

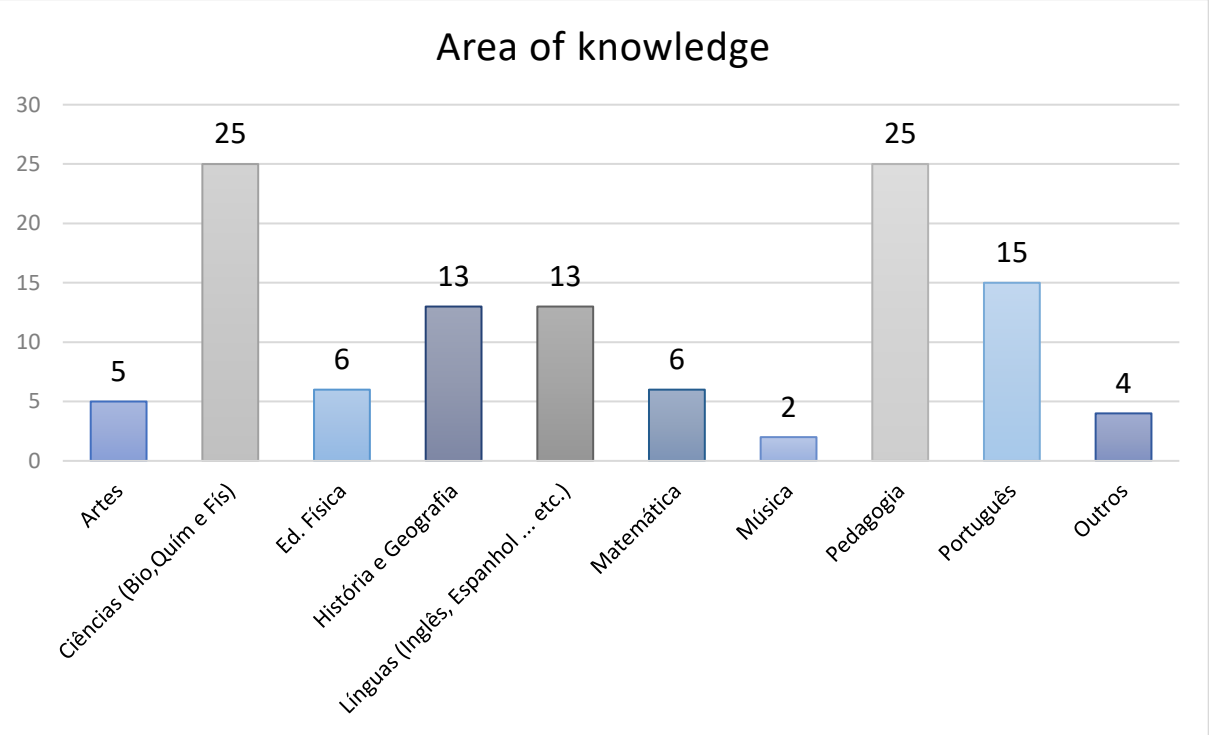
Results and Discussion

Of the 114 respondents to the survey, 82 are female, representing 71.9%. The remaining 32 participants (28.1%) are male. These data confirm the empirical observation of the significant presence of females in basic education. The training program was offered to both teachers and school administration professionals, resulting in a diverse range of participants' areas of expertise.

[4] Available at: https://drive.google.com/file/d/1p_kQ2nJs3L03yDnmanYzXIrPjDQyz0cW/view?usp=sharing.

In Graph 1, it can be observed that the majority of participants are from the Sciences, which includes three disciplines: Biology, Chemistry, and Physics. This group primarily serves students at the Middle School and High School levels. Equally represented is the group from Pedagogy, which mostly caters to students in Early Childhood Education and the early years of Elementary School. This group also works in administrative roles such as Pedagogical Coordination and Educational Counseling. Representation from other areas was lower, as illustrated in Graph 1, with some areas having only one representative.

Graph 1 - Field of Knowledge of Participants' Initial Training



Source: Prepared by the authors.

The third item of characterization presents the age range of participants in years, aiming to analyze whether the age or generation of the respondents influenced their engagement and understanding of the course.

A relatively small number of participants are over 50 years old, categorized as the Baby Boomer generation, which was born before the technological revolution (Cordeiro *et al.* 2012). As shown in Graph 2, 37.7% of respondents, or 43 participants, are between 40 and 50 years old, belonging to Generation X, which had to adapt to the digital age (Cordeiro *et al.* 2012). Meanwhile, 34.2%, or 39 respondents, are between 30 and 40 years old, fitting into Generation Y, which was born during a period of technological advancement, theoretically making this

group more familiar with technological resources (Martin; Tulgan, 2001). The representation of Generation Z is significantly lower, with 14% of participants aged 25 to 30 years and an additional 2% aged 20 to 25 years, totaling 19 respondents. This generation is known as digital natives (Toledo; Albuquerque; Magalhães, 2012), although it is debated that the concept of digital natives may be a myth perpetuated and reinforced in various dimensions of educational research and society (Desmurget, 2020).

Graph 2 - Age and Years of Participants[5]

Source: Prepared by the authors.

The fourth item of characterization addresses the years of service in the educational field. As shown in Graph 3, 34% of participants have significant experience, exceeding 15 years in the field. In contrast, the second largest group, comprising 25% of participants, has between 0 and 5 years of experience. The groups with 5 to 10 years and 10 to 15 years of experience are closely aligned, representing 21% and 20%, respectively.

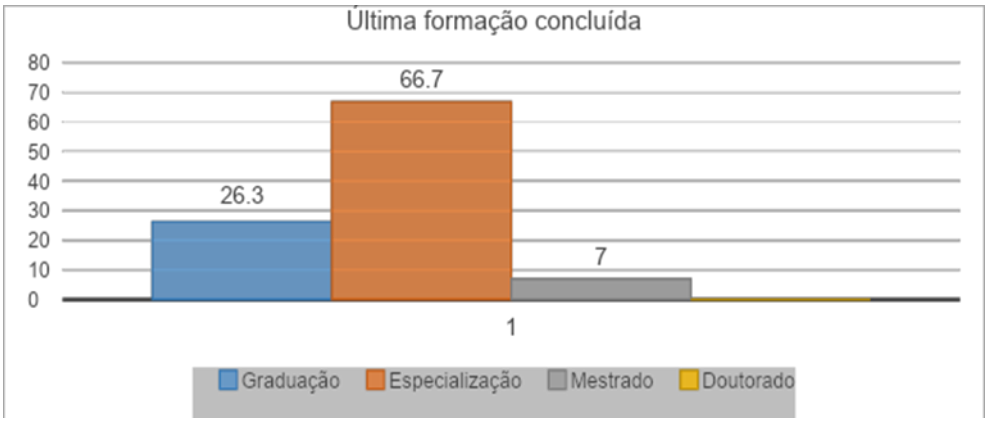
[5] Translation of the writings: Age in years.

Graph 3 - Years of Service in the Educational Field of Participants[6]

Source: Prepared by the authors.

Lastly, the question regarding the participant's most recent qualification is examined. As illustrated in Graph 4, 66.7% of participants have a specialization as their most recent qualification. In comparison, a significantly lower percentage, but still notable, holds an undergraduate degree at 26.3%. The number of participants with a master's degree is considerably smaller, at only 7%, corresponding to just 8 professionals out of the 114 who completed the questionnaire. No respondents held a doctoral title.

Graph 4 - Most Recent Qualification Completed by Participants[7]



Source: Prepared by the authors.

Concluding the important characterization of the respondents' profiles, we highlight the questions directly associated with the primary objective of this article. Questions 7 through 10

[6] Translation of the writings: Years in service.
[7] Translation of the writings: Ultima formación concluida. Blue: Bachelor's degree; Orange: Specialization; Grey: Master's degree.

of the questionnaire specifically addressed the analysis of continuing education concerning the technologies used in the training and their evaluation. Question 7 includes 19 variables with a Likert scale (See Appendix 1)[8].

Regarding the Training Overall (Questions 7.1 to 7.4)

The objective of the first variable was to assess whether the **training met the participants' personal goals** (See Appendix 1, Question 7.1). In this aspect, 57.89% agreed that they were able to achieve their goals through the training, with an additional 14% fully agreeing, resulting in a total agreement rate of 71.89%. However, there was a percentage of participants who were either unsure or disagreed, accounting for 11.40% and 16.66%, respectively.

When asked whether the training was **sufficient to transfer the content to their educational practice** (See Appendix 1, Question 7.2), 7% of respondents were unsure, while 72.81% agreed or fully agreed, a percentage similar to those who considered that the course met their personal goals. These figures indicate that, even if some participants did not achieve their personal objectives, the majority agreed that the training was sufficient to be implemented in practice in the future.

A significant number of **participants considered themselves active in the practical activities of the training** (See Appendix 1, Question 7.3), with a total agreement rate of 79.8%. Finally, regarding Question 7.4, "**The study program was developed according to the established plan**," this first section of characterizing the participants' opinions concludes with a total agreement rate of 73.68%.

Regarding the Support and Tutoring of the Training

Specifically addressing the **support provided** by the tutor during the training (See Appendix 1, Questions 7.5, 7.6, and 7.7), a considerable 22.8% were unsure about the influence of the tutor's work. However, more than half of the participants found the tutor's role to be relevant for understanding and assimilating the content, with an average agreement rate of 66.6% (combined agreement and full agreement). This result indicates that, generally, trainees still require specific support during this type of training. Accordingly, these participants

[8] Available at: https://drive.google.com/file/d/1p_kQ2nJs3L03yDnmanYzXIrPjDQyz0cW/view?usp=sharing

expressed agreement (over 63%) that: 7.5. Tutoring support facilitated comprehension and assimilation; 7.6. The support provided by my group tutor was essential; and 7.7. The technical support offered to the trainees was useful (See Appendix 1).

Learning, Resources, and Tools of the Training

When asked if the resources used in the **training and the sources suggested** for completing the **activities were sufficient**, the combined agreement rate (agree and strongly agree) was 72.8%. Conversely, 16.7% of participants disagreed (See Appendix 1, Question 7.8). Additionally, participants agreed that the balance between time and task demands was appropriate (Question 7.9, 61.4%).

Questions 7.10, 7.11, and 7.12 addressed participants' learning of knowledge and skills. Regarding the acquisition of **new knowledge useful** for their professional practice, 80.6% agreed (See Appendix 1, Question 7.12). Similarly, 80.4% of participants agreed that they would be able to apply the knowledge gained during the training in their practice (Question 7.11). This percentage aligns with those who agreed that the **knowledge and skills acquired** could serve as a motivating factor for the actors in the educational process, corresponding to 80% of respondents (See Appendix 1, Question 7.10), as well as those who found the training topics useful and relevant to their professional practice, also totaling 80% (See Appendix 1, Question 7.11).

Regarding the specific concepts covered in the **training on the use of technological tools** and applications such as digital whiteboards, Google Docs, and Prezi, various variables were addressed (See Appendix 1, Questions 7.15 to 7.19). Concerning the relevance of digital whiteboard resources, 62.3% of participants agreed, but only 27% had used a digital whiteboard before the course (Questions 7.14 and 7.15). Only 31% of participants had used Prezi before the training. These perceptions and relationships with the resources introduced during the training changed, making them more common and easier to use in the classroom.

To identify whether participants experienced greater **difficulty with the theoretical or practical aspects of the training**, Question 8 of the questionnaire was formulated: "Which aspect of the training did you find more challenging: the theoretical or practical part?" The results show that 72.8% reported difficulty with the practical part, while 27.2% found the theoretical part challenging. These results indicate that applying the activities and knowledge acquired is always considered a challenge with greater difficulties. Given that some of these

resources were unfamiliar to the participants, this may explain the challenges encountered in implementing them in practice.

Following the data analysis, the next section will present the **multivariate analysis**, comparing the questions specifically related to training involving technologies. The validation tests for the multiple linear regression were deemed satisfactory, as presented in Appendix 22[9].

The last three lines of Appendix 2 (N, Prob>F, and R^2) present the validation factors of the equation used. The sample "N" varies depending on each variable since the questionnaire included the option "No opinion" for respondents who did not feel capable of assessing the statement. These responses were excluded from the regression calculation. The Prob>F indicator measures the significance of the variable as a whole, with values closer to zero indicating a better probability.

The R^2 measures the explanatory power of the variable, i.e., how much the independent variables X explain the variation in Y, the dependent variable (Fávero *et al.* 2009). The R^2 can range from 0 to 1 (0 to 100%). In the variables studied, the R^2 values ranged from 71.7% to 84.6%, meaning that each variable explains this percentage of the dependent variables. This figure is quite representative, considering that many other factors not listed in these equations contributed to professional identity, productivity, and the ability to define one's role.

The indicator found can be considered very high, considering that Green (1999) deems an R^2 of 0.5 relatively high. It is important to note that the R^2 should not be overly weighted in econometric variables, as it is subject to considerable debate among different authors (Fávero *et al.* 2009). According to Gujarati (2003), the R^2 plays a modest role in regression analysis, serving as a measure of the quality of the fit of a sample. Therefore, a high R^2 is not necessarily evidence in favor of the model, nor is a low R^2 evidence against it.

Column 1 of Annex 2, labeled "**Objectives**," presents the relationship between the independent variables and the **participants' achievement** of the objectives related to the training program. The variables related to the resources and sources used in training (0.6843), the balance between time and **task demands** (0.3196), the use of **mind maps** (0.6774), and the use of **tools** (0.5187) for teaching were statistically significant. This reveals that the greater the participants' agreement with these assertions, the greater the sense of achieving the training objectives. Prior **knowledge of the teaching tools was also relevant**, but with a negative coefficient of -0.1902, indicating that the greater the prior knowledge, the lesser the sense of achieving the training objectives.

[9]Available at: https://drive.google.com/file/d/1p_kQ2nJs3L03yDnmanYzXIrPjDQyz0cW/view?usp=sharing

The finding that these variables contributed to the respondent feeling that the objectives were achieved may be linked to the fact that when participants appropriate the available resources presented during the course and have the necessary time to explore them, they integrate with the technologies, undergoing a process of digital literacy. This is especially relevant considering that literacy is more associated with the application of acquired knowledge rather than just understanding it (Moreira, 2012).

On the other hand, the fact that such knowledge and technological approaches are more common in the educational environment leads some participants with prior knowledge to experience demotivation. Tardif (2014) emphasizes the importance of considering the teacher's prior knowledge before designing a training program to ensure that the training provided is not only more engaging but also more beneficial for professional practice. In the training analyzed here, two groups of teachers can be identified: i) those who did not have knowledge of the proposed content and therefore had a more satisfactory learning experience, and ii) those who already possessed this knowledge and, as a result, did not perceive any new knowledge to be learned.

Column 2 of Annex 1 includes the variable "**Sufficient**," which is designated to study the sufficiency of the training for the transfer of knowledge to teaching practice. This variable was analyzed based on the assertion that the training received was sufficient for participants to transfer the formative content into educational practice in the future. For this item, the demographic variable "age" was statistically significant with a coefficient of 0.1656, indicating that the older the participant, the greater the perception that the content was sufficient. Regarding the assertions, the variables on the adequate planning of the program (0.5785), the fundamental role of the tutor (0.5856), and the balance between time and task demands in using mind maps (0.6358) were all significant. Once again, prior **knowledge of the tools** was also relevant but with a negative coefficient of -0.2521, indicating that the greater the prior knowledge, the lesser the perception of achieving the training objectives. This is likely because those with prior knowledge did not feel they had learned anything entirely new.

The **age factor** was significant, considering that older participants received the content with greater relevance (see Annex 2). This data may have been influenced by the fact that older individuals were not born in a technological era (Bauman, 2011). As observed in the previous analysis through Graph 2, a significant number of participants belong to the generation that did not experience the technological revolution firsthand but had to understand and integrate into it without needing further knowledge acquisition. In contrast, Generations Y and Z view digital

technologies as everyday tools. Notably, Generation Z is unfamiliar with a world without digital tools and the internet (Neto; Franco, 2010).

Further analyzing Annex 2 and considering columns three, "Motivation," and four, "Application," the variables focused on the concept that utilizing the knowledge or **skills developed during the training can enhance the motivation of all actors i**n the educational process, as well as the **application of the training** content to the teacher's didactic practice. The analysis questioned whether the participant would apply what they learned during the training in their professional practice.

In the initial analysis (see Annex 2), only the three variables regarding the identification of teachers from the early and final years of elementary education (I and II) or secondary education were statistically significant, all with negative coefficients (-.6384**, -.5858*, -.5092*). In other words, being a teacher increases disagreement with the variable concerning the improvement of motivation. For the "Application" variable, only the comparison with the variables regarding the consideration of the resources and sources used in the training as adequate for educational practice was relevant and positive (.4943**), indicating that greater agreement with this variable may imply a higher intention to apply the acquired knowledge in the future.

The intention to apply the training knowledge can be explained by numerous factors. However, considering the approach of this research, one possibility highlighted is the fact that students in basic education belong to a generation that is daily connected to digital technologies. In this case, whether for leisure or study, the former option was more frequently utilized, according to other studies (Desmurget, 2020). Thus, there is a greater likelihood that students are interested in lessons using such resources and have greater ease in using them generally (Bauman, 2011; Toledo; Albuquerque; Magalhães, 2012; Mandaji; Ribeiro, 2013). In this social context, schools feel the need to integrate technologies into the educational process. However, from the perspective of the teachers surveyed, this may not be a factor that changes the motivation or understanding of those involved in the process.

Technological innovations are understood as those resources, tools, and possibilities that the teacher is not yet familiar with. As Hughes (2005) comments, the integration of technologies in the educational context requires a learning mindset from teachers, especially considering that technologies are constantly changing. The need for continuous updates in this area becomes persistent, and this is yet another concept that the teacher will need to appropriate. It can also

be understood that some participants did not perceive the resources and tools presented in the course as new.

Through the analysis of this data, the importance of not only the training provided but also the need for continuous training that addresses different themes related to the integration of technology in education was recognized.

Final considerations

The motivating problem for conducting this research was the following question: What is the contribution of a continuing education program for primary education teachers regarding the integration of technologies into their teaching practice? To answer this question, the study sought to analyze a continuing education program for basic education teachers at a private religious educational institution, focusing on the integration of technologies into the teaching and learning process.

Regarding the need to understand the challenges in the training domains, we concluded that considering prior knowledge is essential for professionals before designing a continuing education program. This ensures the program is more efficient and valuable for participants, providing the knowledge that meets their interests and needs. Some conclusions from this work were: i) the majority agreed that they achieved their personal goals in training (71.89%); ii) the majority agreed that the training was sufficient to transfer the content to their educational practice (72.81%); iii) the majority agreed that they actively participated in the practical activities of the training (79.8%); iv) the majority agreed that the study program was developed according to the established plan (73.68%); v) more than half of the participants considered the tutor's role relevant for the understanding and assimilation of the content (66.6%); vi) the majority agreed that the resources used in training were sufficient (72.8%); vii) the majority agreed that the balance between the time and the demands of the tasks was adequate (61.4%); viii) the majority agreed that they acquired new knowledge useful for their professional practice (80.6%); ix) the majority agreed that they were able to apply the knowledge acquired during the training to their practice (80.4%); x) the use of resources such as mind maps, digital boards, and teaching tools had a positive relationship with the achievement of the training objectives; xi) the perception that the balance between the available time and the demands of the training tasks was adequate also contributed to the achievement of the goals; xii) the knowledge acquired about the use of technological programs and applications was considered relevant and

had a positive relationship with the achievement of the training objectives; xiii) the acquisition of new knowledge useful for professional practice and the ability to apply this knowledge in practice were perceived as motivating factors and had a positive relationship with the achievement of the objectives.

Finally, regarding the objective of analyzing the teachers' perceptions of the training, the results indicated that the respondents showed great interest in training involving technological resources. In the case of the analyzed training, some respondents preferred the development of other specific topics, but overall, the topics covered were satisfactory, and the participants expressed interest in learning more about and deepening their understanding of different resources, as addressed in the research.

The interest in technological resources and tools in the educational process has developed over several decades, emphasizing the need for appropriate training for teaching professionals and the importance of moving beyond superficial knowledge to achieve digital literacy. This pursuit of knowledge will be constant in the technological field, as its changes and evolutions are continuous. Therefore, if this training were conducted now, we would certainly need to include the impact of artificial intelligence, such as ChatGPT, on the teaching and learning processes.

The research indicated that there is a wide scope and many possibilities for continuing education programs to help teachers integrate technologies into the educational process, and these will be of great relevance in an increasingly technological world. It is understood that further studies will be possible with the aim of analyzing and training teachers for new educational approaches involving technologies.

REFERENCES

BAUMAN, Z. **44 Cartas do mundo líquido moderno**. Rio de Janeiro: Zahar, 2011.

BEZERRA, A. C. S.; NERI DE SOUZA, F. Construção curricular partilhada da disciplina TIC e educação no ensino superior. **Currículo sem Fronteiras**, *[S. l.]*, v. 13, n. 1, p. 143-166, 2013.

BOONE JR., H. N., BOONE, D. A. Analyzing Likert Data. **Journal of Extension**, *[S. l.]*, v. 50, n. 2, 2012. Available at: https://archives.joe.org/joe/2012april/pdf/JOE_v50_2tt2.pdf. Accessed in: 15 July 2023.

BUENO, J. L. P. GOMES, M. A. O. Uma análise histórico-crítica da formação de professores com tecnologias de informação e comunicação. **Revista Cocar Belém**, *[S. l.]*, v. 5, n. 10, p.

53 - 64, 2011. Available at: https://periodicos.uepa.br/index.php/cocar/article/view/196. Accessed in:14 Nov. 2019.

COSTA, F. (Coord.). **Competências TIC. Estudo de Implementação.** v. I. Lisboa: GEPE-Ministério da Educação, 2008. Available at: https://repositorio.ul.pt/handle/10451/5928. Accessed in:14 Nov. 2019.

CORDEIRO, H. T. D. A questão das gerações no campo da gestão de pessoas: tema emergente? *In*: SEMINÁRIOS EM ADMINISTRAÇÃO, 2012, São Paulo. **Anais [...]**. São Paulo: SEMEAD, 2012.

DESMURGET, M. **A Fábrica de Cretinos Digitais**: Os Perigos das Telas para Nossas Crianças. Belo Horizonte: Vestígio, 2020.

FÁVERO, L. P.; BELFIORE, P.; SILVA, F. L.; CHAN, B. L. **Análise de Dados**: Modelagem Multivariada para Tomada de Decisões. Rio De Janeiro: Elsevier, 2009.

FÜTTERER, T.; SCHEITER, K.; STUMER, K. Will, skills, or conscientiousness: What predicts teachers' intentions to participate in technology-related professional development? **Computers & Education**, *[S. l]*, v. 198, 2023. DOI: 10.1016/j.compedu.2023.104756.

GOMEZ JUNIOR, F. C.; TRESPALACIOS, J.; HSU, Y. C.; YANG, D. Exploring Teachers' Technology Integration Self-Efficacythrough the 2017 ISTE Standards. **TechTrends**, *[S. l.]*, v. 66, p. 159–171, 2022. DOI: 10.1007/s11528-021-00639-z.

GREEN, W. H. **Econometric Analysis**. Madrid: Prentice Hall, 1999.

HUGHES, J. The Role of Teacher Knowledgeand Learning Experiences in Forming Technology-integrated Pedagogy. **JournaI of Technology and Teacher Education**, p. 277-302, 2005.

KASNECI, E.; SESSLER, K.; KUCHEMANN, S.; BANNERT, M.; DEMENTIEVA, D.; FISCHER, F.; GASSER, U.; GROH, G.; GUNNEMANN, S.; HULLERMEIER, E.; KRUSCHE, S.; KUTYIOK, G.; MICHAELI, T.; NERDEL, C.; PFEFFER, J.; POQUET, O.; SAILER, M.; SCHMIDT, A.; SEIDEL, T.; STADLER, M.; KASNECI, G. ChatGPT for good? On opportunities and challenges of large language models for education. **Learning and Individual Differences**, *[S. l.]*, v. 103, p. 102274, 2023.

LUCAS, M.; MOREIRA, A. **DigCompEdu – Quadro Europeu de Competência Digital para Educadores.** Portugal: Universidade de Aveiro, 2018. Available at: https://www.academi a.edu/39607478/DigCompEdu_Quadro Europeu_de_Compet%C3%AAncia Digital_para_Educadores. Accessed in:14 Nov. 2019.

MARIOTTO, G. C. L. **Formação Continuada dos Professores para Integração das Tecnologias na Educação Básica**. 2020. Dissertação (Mestrado em Educação) - Centro Universitário Adventista de São Paulo, UNASP, Engenheiro Coelho, São Paulo, 2020.

MARTIN, C.; TULGAN, B. **Managing generation Y**: global citizens born in the late seventies and early eighties. Amberst: HRD Press, 2001.

MANDAJI, M.; RIBEIRO, R. A. Tecnologias de informação e comunicação: como utilizá-las para a colaboração nas práticas pedagógicas? **Práticas Pedagógicas: Registros e Reflexões**, *[S. l.]*, v. 2 n. 1, 2013. Available at: https://pesquisaeducacao.files.wordpress.com/2013/10/artigo-colaboracao.pdf. Accessed in: 25 Jan. 2016.

MEIRINHOS, M.; OSÓRIO, A. **Referenciais de competências digitais para a formação de professores**. Portugal: Universidade do Minho, 2019. p. 1001–1016.

MOREIRA, C. Letramento digital: do conceito pr tica. *In*: **Anais do SIELP**, v. 2, n. 1. Uberl ndia: EDUFU, 2012. Available at: http://www.ileel.ufu.br/anaisdosielp/wpcontent/uploads/2014/06/volume_2_artigo_051.pdf. Accessed in: 22 Sept. 2019.

NERI DE SOUZA, D.; COSTA, A. P.; NERI DE SOUZA, F. Desafio e inovação do estudo de caso com o apoio das tecnologias. *In*: NERI DE SOUZA, F.; NERI DE SOUZA, D.; COSTA, A. P. (org.). **Investigação Qualitativa Inovação, Dilemas e Desafios**. 2. ed. Aveiro: Ludomedia, 2015. v. 2, p. 7-170.

NETO, E. S.; FRANCO, E. S. Os professores e os desafios pedagógicos diante das novas gerações: considerações sobre o presente e o futuro. **Revista de Educação do COGEIME**, ano 19, n. 36, jan./jun. 2010. Available at: http://www.cogeime.org.br/revista/36Artigo01.pdf. Accessed in: 28 Jan. 2016.

NORMAN, G. Likert scales, levels of measurement and the "laws" of statistics. **Adv in Health Sci Educ,** *[S. l.]*, v. 15, p. 625–632, 2010. Available at: https://pubmed.ncbi.nlm.nih.gov/20146096/. Accessed in:15 July 2023.

PERRENOUD, P. **10 Competências para ensinar**. Porto Alegre: Artmed, 2000.

TARDIF, M. **Saberes Docentes e Formação de Professores**. 17. ed. Petrópolis, RJ: Vozes, 2014.

PÚBLIO JÚNIOR, C. O docente e o uso das tecnologias no processo de ensinar e aprender. **Revista Ibero-Americana de Estudos em Educação**, Araraquara, v. 13, n. 03, p. 1092-1105, 2018. Available at: https://periodicos.fclar.unesp.br/iberoamericana/article/view/11190. Accessed in:15 July 2023.

TOLEDO, P. B. F.; ALBUQUERQUE, R. A. F.; MAGALHÃES, A. R. **O comportamento da geração Z e a influência nas atitudes dos professores**. 2012. Available at: http://www.aedb.br/seget/arquivos/artigos12/38516548.pdf. Accessed in: 08 Feb. 2016.

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