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Original Article

INTEGRATION OF CYBERCULTURE IN PHYSICAL EDUCATION COURSES AT FEDERAL UNIVERSITIES IN NORTHEASTERN BRAZIL

INTEGRAÇÃO DA CIBERCULTURA NOS CURSOS DE EDUCAÇÃO FÍSICA DAS UNIVERSIDADES FEDERAIS DO NORDESTE DO BRASIL

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RESUMO

O objetivo foi analisar a integração da cibercultura na formação de professores e profissionais dos cursos de Educação Física nas Universidades Federais da Região Nordeste do Brasil. Foi realizada uma pesquisa qualitativa por meio de entrevistas semiestruturadas com dez questões e aplicada com nove professores das universidades utilizando o Google Meet em 2020. Os áudios das entrevistas foram transcritos e analisados usando a metodologia de análise de conteúdo, com apoio do ChatGPT para segmentação, categorização e interpretação descritiva dos dados. Os resultados indicaram a incorporação crescente de tecnologias digitais, como plataformas virtuais e ferramentas avançadas pelos professores universitários. Contudo, surgiram desafios significativos, como resistência à adoção de novas tecnologias e falta de ações de formação continuada adequada para os professores. Percebeu-se que a integração da cibercultura é variada, com algumas práticas inovadoras observadas em ações individuais dos professores, mas com uma adoção abrangente ainda limitada. O estudo revelou um panorama misto da cibercultura na formação profissional em Educação Física, destacando a resistência à adoção de tecnologia e a necessidade de formação contínua como áreas críticas. Conclui-se que a colaboração entre professores e alunos é fundamental, com abordagens didáticas orientadas a projetos sendo uma solução promissora para a defasagem identificada.

Palavras-chave: Cibercultura. Universidades. Educação física. Docentes.

ABSTRACT

The aim was to analyze the integration of cyberculture in the training of teachers and professionals in Physical Education courses at Federal Universities in the Northeast Region of Brazil. A qualitative research was conducted through semi-structured interviews with ten questions, applied to nine university professors using Google Meet in 2020. The interview audios were transcribed and analyzed using content analysis methodology, with support from ChatGPT for data segmentation, categorization, and descriptive interpretation. The results indicated a growing incorporation of digital technologies, such as virtual platforms and advanced tools, by university professors. However, significant challenges emerged, such as resistance to adopting new technologies and a lack of adequate continuous training actions for teachers. It was noted that the integration of cyberculture is varied, with some innovative practices observed in individual professor' actions, but with still limited widespread adoption. The study revealed a mixed panorama of cyberculture in professional training in Physical Education, highlighting resistance to technology adoption and the need for continuous training as critical areas. It concludes that collaboration between teachers and students is fundamental, with project-oriented didactic approaches being a promising solution for the identified gap.

Keywords: Cyberculture. Universities. Physical Education. Professor.

Introduction

Cyberculture, characterized by the integration of communication technologies, digital devices, and new technological languages emerging from the social context, has transformed various aspects of life, including education [1–3]. Since the introduction of Digital Information and Communication Technologies (DICTs), significant changes have been observed in social and educational practices, where users have become both producers and consumers of digital content [4]. In Physical Education, this transformation is especially relevant, requiring an in-depth analysis of how the training of teachers and professionals in the area should adapt to this new reality in a critical way, enabling them not only for the technical use of technologies but also to

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understand and critically evaluate their implications [5,6]. In this context, the importance of higher education professors incorporating DICTs not only as a market demand but as a fundamental part of building a critical education that allows future professionals to use these tools consciously is highlighted.

From this perspective, cyberculture is not limited to the simple adoption of digital technologies but involves a reconfiguration of forms of communication and learning, as highlighted by Pierre Lévy [7]. Cyberspace inaugurates a new cognitive ecology, where knowledge circulates in a decentralized and collaborative way, promoting horizontal interactions and autonomy in the construction of knowledge. These dynamics require that higher education not be limited to a technical integration of DICTs but also include a critical and reflective approach to the limits and impacts of this new digital ecology [8]. In the context of Physical Education, this suggests that the training of professionals should not only incorporate DICTs but also enable them to deal with the ethical, social, and pedagogical challenges associated with their use. Thus, the preparation of these professionals requires a balance between technical skills, critical thinking, and sensitivity to cultural transformations, ensuring that they can act responsibly and innovatively in an increasingly digital market and society.

Although the inclusion of DICTs in teaching is not new, its effective and critical integration still faces significant challenges. According to Almeida and Feres Neto [9], it is essential to develop innovative didactic practices that go beyond the simple transmission of information, promoting collaboration and the critical production of knowledge. The relationship between education and media, strengthened since the 1960s and promoted globally by UNESCO [10], underlines the need for robust media and information literacy in teacher trainingv[4]. Currently, this field of knowledge has been treated as digital literacy, contributing to the training of Physical Education teachers and professionals who are connected not only to the desires of students and society but also equipped with a critical view of the use of digital technologies [11,12].

In Physical Education, the use of DICTs, such as smartphones and computers, has great potential for interaction, construction, and application of knowledge. However, there is a mismatch between the use of these technologies by students and teachers. Research conducted by Baracho et al[13] with young students from Minas Gerais, Brazil, identified that many educators still lack knowledge and specific training to work with media and technologies effectively in Physical Education classes. It is known that generations "Y", "Z", and "α", who were born in the digital age, have an easier time adapting to digital culture than previous generations, who were born and educated in the analog world [14].

Studies, such as those by Brandão and Machado [15], and Cerutti and Nora [16], show that although undergraduate courses include components on digital technologies, the approach is often reductionist and lacks a critical and integrated understanding of DICTs. The initial training of teachers should include practical experiences with technologies, but it is equally important that this training is based on a critical perspective, offering continuing education to Physical Education teachers to use these tools not only to meet market demands but to promote teaching that dialogues with the realities and needs of students, using DICTs as instruments of the teacher and the citizen [17]. In addition, the mismatch between the advancement of technologies and their appropriation by professionals requires investments in continuing education that integrate educators into digital culture and enable them to use different languages to enrich the educational experience and, simultaneously, to question and reinterpret them [18].

However, it is necessary to adopt a balanced and critical stance in the incorporation of DICTs, avoiding an exacerbated optimism that can obscure the associated educational and social challenges. Although technologies expand pedagogical possibilities, it is also necessary to consider the structural and pedagogical limitations that can reinforce inequalities and compromise the quality of training. Thus, more than an instrumental adoption of DICTs,

educators must develop a critical understanding that considers both the transformative potential and the risks, such as technological dependence and difficulties in democratizing access. In this sense, it is essential that teacher training includes reflections on the impact of technologies on educational practice, preparing teachers to use them consciously, integrating them into the pedagogical and cultural context in a responsible and reflective way.

The problem of incorporating digital culture into professional practice can be further explored through a qualitative analysis of teachers' discourse about their experiences with cyberculture in professional training [19,20]. This study addresses the uses of DICTs on two fronts: we conducted a survey with teachers to map the presence and impact of cyberculture in Physical Education, and we used ChatGPT, a DICT, to analyze the collected data. We demonstrate that ChatGPT can increase rigor and save time in qualitative analysis, although the process can be time-consuming and subject to subjective biases, which can lead to inconsistencies in data interpretation. Thus, ChatGPT represents an innovative approach to analyzing the impact of cyberculture on the training of Physical Education teachers and professionals, highlighting the synergy between the theme and emerging methods of qualitative data analysis.

Recent studies, such as those by Morgan [21], Fuller et al [22], Turobov et al [23], Vien Lee et al [24], and Silva and de Paula [25], demonstrate the relevance of one of the most popular AIs, ChatGPT, in identifying thematic units and similarities, as well as interpreting data from both textual analysis of documents and interviews with higher education students. Morgan [21] observed that ChatGPT is efficient in identifying concrete and descriptive themes and requires little effort compared to manual coding. Fuller et al [22] highlighted ChatGPT's ability to generate themes quickly and in depth, often surpassing manual analysis. Turobov et al [23] emphasized the time and effort savings in thematic analysis, while Silva and de Paula[25] pointed to AI as a tool that offers depth and speed without compromising data reliability. Thus, the use of ChatGPT is relevant and innovative for discourse analysis, facilitating the understanding of the integration of cyberculture in the training of Physical Education professionals.

This article seeks to understand and develop educational practices that meet current demands, promoting a more inclusive and innovative education, by exploring the impact of cyberculture on the training of Physical Education teachers and professionals. There is a lack of studies on cyberculture in Higher Education and on the use of AI in content analysis in this area. The study intends to fill these gaps by revealing nuances of educators' practices and their adaptations to digital technologies, offering effective teaching strategies.

Methods

Study Design to Analyze the Problem

The research adopted a qualitative approach to understand the interaction between professor and cyberculture, with the objective of eliciting valuable insights on the incorporation of digital technologies into pedagogical practices and identifying challenges and opportunities. This qualitative approach is especially relevant in the educational context as it allows for an in-depth exploration of the experiences and perceptions of the participants [26].

For the study, Physical Education teachers from the nine federal Higher Education Institutions (HEIs) in the Northeast Region of Brazil were interviewed. Semi-structured interviews were conducted to capture the presence and impact of cyberculture on pedagogical practices. A pre-test was conducted with two UFPE professors one month before the main interviews, which were conducted via Google Meet and later transcribed for analysis. Content analysis, following Laurence Bardin's methodology [27], was aided by ChatGPT in the segmentation, coding, and interpretation of data, facilitating efficient organization. This analysis strategy is aligned with the proposal of Santos Filho and Gamboa [26], who emphasize the importance of systematic and context-based analysis in educational research. Finally,

ChatGPT was asked to suggest solutions to the problems of integrating cyberculture into training, and each step of the methodological procedure will be detailed below.

Selection of Participants

The group of participants consisted of professors from the Physical Education courses of the nine federal Higher Education Institutions (HEIs) in the Northeast Region of Brazil. The selected institutions and the teaching category of the informants who participated in the interviews, which lasted an average of 78 (±16) minutes, listed in chronological order, were: Federal University of Sergipe (UFS) - Full Professor; Federal University of Rio Grande do Norte (UFRN) - Full Professor; Federal University of Paraíba (UFPB) - Full Professor; Federal University of Pernambuco (UFPE) - Full Professor; Federal University of Bahia (UFBA) - Full Professor; Federal University of Maranhão (UFMA) - Full Professor and Course Coordinator; Federal University of Alagoas (UFAL) - Full Professor and Course Coordinator; Federal University of Piauí (UFPI) - Full Professor and Course Coordinator; Federal University of Ceará (UFC) - Full Professor.

The criteria for selecting the participants were: a) Being a professor of undergraduate courses in Physical Education (Teaching or Bachelor's degree) at HEIs in the Northeast; b) Having developed, in recent years, teaching, research, or extension activities related to the theme of cyberculture in Physical Education. No exclusion criteria were specified, since all professors who met the inclusion criteria were considered for the research. All participants were informed about the objectives of the study and agreed to participate voluntarily. The confidentiality and anonymity of the interviewees were guaranteed throughout the research process.

Interview Procedures

One month before the main interviews, an exploratory study was conducted with two UFPE professors to refine the questionnaire used in the research. These professors were selected based on the established criteria and demonstrated a willingness to collaborate with the project. Both held coordination and department head positions in the Physical Education courses at UFPE and were involved in research related to cyberculture. The interviews in the exploratory phase, which lasted approximately one hour, followed the same criteria defined for the main interviews.

Data collection was conducted through semi-structured interviews on the Google Meet platform, structured around a set of 10 main closed-ended questions. These questions were organized to comprehensively address the presence of cyberculture in teaching, research, extension activities, and innovation within Physical Education departments. The questions explored topics such as the inclusion of cyberculture-related content, teachers' perceptions of this theme in the training of Physical Education professionals, and the educational opportunities offered by electronic games and exergames (Chart 1).

Chart 1. Description of the questions elaborated for the semi-structured interviews with professors from federal universities in the Northeast Region.

Questions
1st) Is there a presence of content related to cyberculture in your department? If so, please state which ones.

2nd) How do you perceive cyberculture in the training of future Physical Education professionals in your department?
3rd) Does cyberculture compromise face-to-face interaction as a characteristic of Physical Education in its languages?
4th) What is gained and/or lost with the presence of cyberculture in the training of Physical Education teachers?
5th) Does the presence and use of resources from cyberculture in your department occur peacefully, or are there direct and/or indirect conflicts?
6th) Does the eventual and/or procedural presence of cyberculture in your department occur within the scope of Extension, Teaching, Research, Innovation? If so, please describe..
7th) In your perception, what are the educational possibilities of electronic games, exergames as training content for Physical Education professionals?
8th) In your perception, what are the general advantages and/or disadvantages of cyberculture in the current reality of your department?
9th) Is there any content that would be "harmed" by the presence of cyberculture in Physical Education classes from your department?
10th) In your perception, what is the future of Physical Education, considering the presence of cyberculture in society and, if it exists, in your department?

Source: The authors.

The study followed all ethical aspects recommended in article VII of Resolution No. 510/2016-CNS. The interviews were scheduled in advance with each of the nine selected professors from the HEIs in the Northeast region. They were conducted from July to August 2021. Subsequently, the recordings were transcribed for analysis.

Interpretative Construction of Results

Content analysis, as proposed by Bardin [27], is a widely used qualitative research technique to interpret textual data systematically and objectively. The method involves three main phases: pre-analysis, exploration of the material, and analysis and interpretation.

In the **pre-analysis**, it was essential to perform a floating reading of the material to become familiar with the content and identify main ideas. It was also essential to formulate hypotheses and specific objectives for the analysis and prepare the material appropriately for the interview transcripts. During the **exploration of the material**, the text was segmented into units of analysis, such as words, phrases, or paragraphs, which were coded. Categories or themes that represented the central aspects of the data were developed, and these categories could be inductive since they would emerge from the data. The categories were reviewed and adjusted as needed to ensure they were comprehensive and mutually exclusive. In the **analysis and interpretation** phase, a quantitative treatment was performed, where the frequency of the categories was calculated to identify patterns. The categories and their frequencies were analyzed to make inferences about the content, seeking to understand the meaning and importance of the identified categories.

Content analysis was performed using commands entered into ChatGPT as a strategy for segmenting, coding, and interpreting the interviews. This innovative approach allowed for

efficient organization of the data, facilitating the identification of central categories and subsequent analysis of the results. Recent studies have already indicated the accuracy and quality of this strategy, demonstrating its effectiveness in the qualitative analysis of data [21–25]. Using ChatGPT not only optimized the analysis process but also ensured a robust and detailed interpretation of the collected data. For our investigation, the following sequence of commands was used to analyze the consolidated responses of the interviewees for the ten questions:

Chart 2. Commands for Conducting Content Analysis According to Bardin [27].

Pre-analysis	
Steps	**Commands**
Floating Reading	"Perform a general reading of the material to become familiar with the content and identify main ideas. Focus on capturing the central messages and record the important points of each question."
Alignment with the study objective	“Given the transcription of the interviews, does the material present sufficient elements for us to describe the presence of cyberculture in the training of teachers and professionals in undergraduate Physical Education courses? If so, describe which elements identified in the interviews corroborate the achievement of the objective.”
Material Preparation and Coding	“Organize the material appropriately considering the interview transcripts. Segment the answers by each question asked to facilitate further analysis." "Segment the text into units of analysis, such as words, phrases, or paragraphs, and code them. Assign labels to the segments that describe their content concisely.”
Exploration of the material	
Category Development	"Review and adjust the categories as needed, ensuring that they are comprehensive and mutually exclusive. Check that all units of analysis are correctly classified."
Category Review	"Review and adjust the categories as needed, ensuring that they are comprehensive and mutually exclusive. Check that all units of analysis are correctly classified."
Inference and Interpretation	
Quantitative Treatment	"Calculate the frequency of the categories to identify patterns. Count how many times each category appears to understand its prevalence in the data."
Inference	"Analyze the categories and their frequencies to make inferences about the content. Look for significant relationships and patterns that can answer the objective initially outlined."

Interpretation	"Interpret the results in light of the objective defined in the pre-analysis and present a summary Chart." "Create a Chart classifying the group's maturity level in relation to the presence of cyberculture in the training of teachers and professionals in undergraduate Physical Education courses."

Source: authors.

Finally, ChatGPT was asked to indicate the paths suggested by the respondents to raise the level of maturity. The command used was the following: "From what you know of the document, what paths does ChatGPT identify as opportunities for improvement for the context found".

Results

In this section, the results are presented following the three main phases of content analysis: pre-analysis, exploration of the material, inferences, and interpretation.

The results of the floating reading phase revealed several central messages. Firstly, the use of virtual platforms and emerging technologies in the training of teachers and professionals in Physical Education, such as SIGA and Google Classroom, was observed. The creation of specific disciplines focused on media and technology and the adaptation to remote education during the COVID-19 pandemic were important highlights.

However, the interviews indicated significant challenges, such as the lack of adequate infrastructure and the need for teacher training in the use of new technologies. Resistance was also found in the reports, mainly related to reluctance to adopt new digital methodologies and a preference for traditional teaching methods.

The analysis of the interviews confirmed the presence of cyberculture in the training, evidenced by the use of advanced technological tools, such as drones, GoPro cameras, virtual reality glasses, and Xbox consoles. The existence of specific disciplines and the production of digital content reinforced this integration, despite the barriers faced by some teachers. These results aligned with the objective of this study, demonstrating the influence of digital technologies on the training of physical education professionals.

The results obtained in the material preparation and coding phase highlighted several central categories, essential for analyzing the impact of cyberculture on the training of teachers and professionals in Physical Education. The initial organization of the material consisted of segmenting the interview transcripts by question, facilitating subsequent analysis. The units of analysis were identified and coded to represent the content of the responses concisely. After reorganizing the questions to identify similarities between the interviewees' answers, ChatGPT identified units of analysis, and from them, the following categories were developed in an attempt to capture the essence of the discourses in the analyzed data: 1) Adaptation and Use of Virtual Platforms (this category highlighted the implementation and use of platforms such as SIGA and Google Classroom, in addition to the transition to remote classes); 2) Integration of Technological Tools (focused on the use of emerging technologies such as drones, GoPro cameras, virtual reality glasses, and Xbox consoles); 3) Creation and Implementation of Specific Disciplines (identified disciplines that incorporate media, technology, and information technology in the curriculum of the courses); 4) Content Production and Extension Initiatives (emphasized the production of digital content, such as podcasts, and extension activities); 5) Challenges and Resistances (included the difficulties faced, such as resistance to change and technological barriers); and 6) Innovative Individual Initiatives (highlighted innovative practices adopted by some teachers).

After the initial development, the categories were reviewed and adjusted to ensure that they were comprehensive and mutually exclusive. This review ensured that all units of analysis were correctly classified, avoiding overlaps and guaranteeing the clarity of the results.

The results obtained through the quantitative treatment of the data revealed clear patterns in the frequencies of the analyzed categories. The most frequent category was "Challenges and Resistances", with 18 occurrences, followed by "Adaptation and Use of Virtual Platforms" with 15 occurrences, "Integration of Technological Tools" with 12 occurrences, and "Content Production and Extension Initiatives" with 10 occurrences. These numbers indicate the areas of greatest prominence and concern within the studied context (Chart 3).

By analyzing the categories and their frequencies, important inferences were made about the studied group. It was found that there is an initial to intermediate adaptation in relation to the use of virtual platforms and emerging technologies, reflecting a variable stage of development among the study participants. However, the 18 occurrences in the "Challenges and Resistances" category suggest that there is significant resistance to the full integration of technologies, pointing to the need for more robust training and support strategies, in addition to better understanding the nature of these resistances [28].

On the other hand, it was observed that some individual initiatives demonstrate advanced practices, although these are not universally adopted by the group. In contrast, in gyms, the computerization of training is already present at various levels of support for teachers and students, evidencing a significant application of DICTs. This contradiction highlights that while some technological practices are widely used in environments such as gyms, the integration of such technologies in the university education of Physical Education professionals is still far from uniform. These observations highlight the incongruities between experiences and the potential for growth in the integration of cyberculture in the training of Physical Education professionals.

The general interpretation of the results indicates that the group presents a varied level of maturity in relation to cyberculture, with a combination of innovative practices and challenges to be overcome. To synthesize these conclusions, a Chart classifying the group's maturity level was elaborated, highlighting the different perspectives and areas for improvement identified during the study (Chart 3).

Chart 3. Classification of the Maturity Level of the Interviewed Group in Relation to the Analysis Categories.

Category	Description	Maturity Level	Frequency
Adaptation and Use of Virtual Platforms	Use of SIGA, Google Classroom, remote classes.	Initial to Intermediate	15
Integration of Technological Tools	Use of drones, GoPro, virtual reality glasses, Xbox.	Intermediate to Advanced	12
Creation and Implementation of Disciplines	Specific disciplines such as media and technology, applied information technology.	Intermediate	8
Content Production Initiatives	Podcast production, extension activities.	Intermediate	10
Challenges and	Resistance to the integration of	Initial	18

Resistances	digital technologies, challenges faced.		
Innovative Individual Initiatives	Advanced and innovative practices by some teachers.	Intermediate to Advanced	9

Source: authors.

The interviewees suggested several ways to raise the maturity level of cyberculture in Federal HEIs that offer Physical Education courses. The need for continuous training for teachers and students in the use of technological tools, the integration of specific disciplines on cyberculture in the curriculum, overcoming institutional and cultural resistance through incentives for innovation, and the promotion of a collaborative environment to share good practices (Chart 4) stand out. These measures indicated by the participants aim to promote significant advances in the adoption and effective use of DICTs in the training of Physical Education professionals.

Chart 4. Level of Support from Interviewees to ChatGpt's Suggestions for Identifying Opportunities for Improvement in the Context of Cyberculture.

Category	**Level of Support in Interviews**
Continuous and Specific Training	Very High
Curricular Adjustment and Integration	High
Incentive to Innovation	Low
Overcoming Resistance and Cultural Change	Very High
Creation of Collaborative Environments	High
Development of Digital Teaching Resources	Very Low
Continuous Monitoring and Evaluation	Low
Promotion of Research in Cyberculture	Very Low

Source: authors.

Discussion

Cyberculture, as a multifaceted phenomenon, requires an approach that goes beyond mere technological adoption, demanding profound cultural and pedagogical changes to promote critical and meaningful integration in the educational process. Likewise, the analysis of the findings of this study reinforces the complexity of integrating Digital Information and Communication Technologies (DICTs) into training and educational practice, revealing both significant advances and persistent challenges related to teacher training, pedagogical innovation, and institutional resistance.

The findings of the floating reading phase highlight the evolution of DICTs and the need for continuing teacher education to effectively integrate these technologies into educational practice [4,14]. Although both studies point to the potential of DICTs for knowledge construction, they also highlight the lack of training and specific knowledge among educators, an

ambivalence that can affect the development of learning [9,29]. The study confirms the need for universities to face new technological demands and shows that, while the positive impact of exergames on school physical education is perceived [13], there are still challenges and resistance in relation to hybrid teaching and the integration of cyberculture [6,18]. In addition, Brandão and Machado [15], and Cerutti and Nora [16] emphasize the importance of a more integrated and less instrumental approach to technologies in the teacher training curriculum, aligning with our observations about resistance to traditional methods and the need for public policies to democratize access to technologies [17,30].

The discussion of these results contributes to the understanding of the integration between cyberculture and professional training in physical education by highlighting both significant advances and persistent challenges. The continuity of training and the development of support policies are essential to overcome barriers and promote the full integration of digital technologies in teaching, ensuring that future professionals are prepared for an increasingly digitized educational environment [29]. Alternatively, it is important to consider the impossibility of teachers acquiring new technological languages at the rate at which they emerge. In this context, the need to use didactic approaches that allow the incorporation of these technologies through students is imposed. DICTs should be seen as tools to be explored by students, even without full appropriation by teachers [29].

Overcoming the verticalized model of teaching - in which the teacher assumes the exclusive role of controller and transmitter of knowledge, while the student remains a passive receiver - is fundamental to promote greater plasticity in teaching-learning relationships, enabling the autonomous, critical, and active development of students. This is an old debate in the field of education, addressed by authors such as Paulo Freire [31] with his proposal of liberating education, John Dewey [32], who defends an experiential and democratic education, and Vygotsky [33], who emphasizes the importance of social interaction and mediation in the learning process. Despite being an old debate, it has not yet become part of the didactic culture. The so-called active pedagogies seek to engage students as protagonists in their educational process, promoting the collective construction of knowledge and critical participation. However, the traditional model of teaching, with its rigid hierarchy and emphasis on memorization, still persists in both basic and higher education, limiting the capacity for pedagogical innovation and the formation of more autonomous and critical subjects.

The introduction of new informational technologies has the potential to provide an environment for active and cooperative participation between students and teachers, raising the level of challenge and engagement in the teaching-learning process, as long as they are properly managed. Teachers should focus their efforts not on simply keeping up with technological innovations but on developing the ability to integrate and apply these new languages strategically and usefully to solve proposed problems, regardless of who drives the use of these technologies (whether students, teachers, society, or other actors). This approach allows technologies to become effective tools for more collaborative and meaningful learning, promoting greater plasticity and dynamism in pedagogical interactions..

The results of the material preparation and coding phase indicated a significant adaptation to the use of virtual platforms and technological tools, mainly due to the need to manage classes and the transition to remote classes during the COVID-19 pandemic, which demonstrates a significant impact on the training of teachers and professionals in Physical Education [34]. However, there are challenges to be faced, such as: the teaching curricular culture based on the verticalized teacher-student model; resistance to the adoption of new technologies; barriers to the use and adoption of new technologies; access to basic equipment such as computers and broadband internet networks, etc. Individual initiatives for the effective integration of cyberculture in education are not enough to change the teaching curricular culture. It is necessary to implement continuing teacher training policies to collectively learn

with colleagues and students the uses of virtual tools, as well as the perverse effects that these technologies can cause [28].

Firstly, the "Virtual Platforms" category, which includes SIGA, Google Classroom, and adaptation to remote classes, reinforces the importance discussed regarding the initial and intermediate integration of technologies, as highlighted by the findings of Almeida and Neto [9]. The adaptation of these platforms and the variable stage of development of teachers corroborate the need for continuous and equiChart training strategies.

The inclusion of "Technological Tools", such as drones and GoPro cameras, aligns with the discussion about the advancement in the adoption of technologies, evidenced by the results of Baracho et al [13]. However, the resistance and challenges encountered, according to the "Challenges" category, highlight that despite progress in some areas, many educators still face significant barriers. This is in line with the observations of Oliveira et al [17] and Martins [30], who emphasize the need for robust support and public policies to address these difficulties and promote effective digital inclusion. Souza et al [35] found that DICTs are additional tools in continuing education, contributing to exchanges of experiences, questions, and reflections on pedagogical action, supported by the principles of educational sport, and that they integrate training policies to qualify the pedagogical intervention of professionals.

The "Specific Disciplines" and "Content Production" categories demonstrate the implementation of innovative practices and the inclusion of technologies in curricula, reflecting the observations of Brandão and Machado [15], and Cerutti and Nora [16]. However, the approach still tends to be instrumental and reductionist, suggesting that there is a need for deeper pedagogical evolution to overcome preferences for traditional teaching methods.

Finally, the "Individual Initiatives" category, although it reveals advanced practices and the innovative use of DICTs by some teachers, is not enough for a paradigm shift in the verticalized teaching-learning relationship that prevails in our curricular practices. Individual efforts are important but do not, in isolation, guarantee the full integration of cyberculture as a training practice. This observation reinforces the idea that the adoption of technologies and advanced practices varies widely among educators. Thus, the analysis of the central categories not only confirms the previous discussions but also highlights specific areas that require continuous attention and development to achieve a more generalized and effective integration of technologies in the training of Physical Education professionals.

The findings of the quantitative data treatment converge with the results of Araújo et al., which highlight the need for continuing teacher education for the effective integration of DICTs and evidenced in the category with the highest frequency. However, the challenges and resistance faced by educators, such as the lack of training and specific knowledge, continued to be significant obstacles, corroborating the need for systematic and robust training and support policies mentioned by Martins [30], Oliveira et al [17] and Selwyn [28]. In addition, the initial to intermediate adaptation to the use of virtual platforms and emerging technologies, evidenced by the category "Adaptation and Use of Virtual Platforms", is consistent with the findings of Almeida and Neto[9], who highlighted an ambivalence in technological perceptions among teachers, reflecting different stages of experience and familiarity with the new tools.

We are facing changes in grammar in society, and we are in a normal transition process for any transformation. As already mentioned, we observed that some individual initiatives, even demonstrating advanced practices, are not universally adopted by the group. In contrast, in other areas of physical education intervention, such as high-performance sport and even gyms, computerization is present at various levels of support for coaches, teachers, and students, evidencing a significant application of DICTs, even if it is, in some cases, strictly instrumental. This contradiction highlights that while some technological practices are widely used in work environments, the integration of such technologies in the university education of Physical Education professionals is still far from being a curricular experience. These

observations highlight the need to incorporate functional and critical experiences of cyberculture in the training of Physical Education professionals.

Although some teachers are adopting new technological tools, such as drones and GoPro cameras, others still face significant difficulties, highlighting the need for continuous and equiChart training strategies to ensure adaptation to new curricular demands [13,18]. The resistance and practical challenges reported show that, despite isolated individual advances, the full integration of technologies in physical education still faces barriers, as observed by Barbosa et al. [18]. Content production and extension initiatives confirm the need to include technological practices in teacher training curricula, although the approaches are still instrumental and reduced, as highlighted by Brandão and Machado[15], and Cerutti and Nora[16]. In addition, the advanced computerization in high-performance sport reveals a discrepancy in relation to university education, indicating the need to align technological practices in different Physical Education environments and reinforcing the urgency of public policies for digital inclusion and continuing education [17,30,36].

The results of the interviews reveal a consensus on the urgent need to advance the integration of cyberculture in Federal Higher Education Institutions (HEIs) of Physical Education. The participants highlighted four main measures to raise the level of maturity of cyberculture and promote a more effective adoption of DICTs.

Firstly, the need for continuous training for teachers and students emerges as a priority. This suggestion is aligned with previous discussions that underline the importance of continuing education and robust support to face resistance and overcome the lack of specific knowledge among educators, as highlighted by Martins [30] and Oliveira et al. [17]. Continuing education not only facilitates adaptation to new tools but also helps to overcome technological and institutional barriers that still persist [4,15].

Secondly, the integration of specific disciplines on cyberculture in the curriculum is seen as an effective way to prepare future professionals for the digital environment. This proposal reflects the need identified in previous studies, such as those by Brandão and Machado [15], and Cerutti and Nora[16], which suggest the inclusion of technological practices in teacher training curricula. The introduction of disciplines focused on cyberculture can ensure that students are better prepared to use and innovate with digital technologies in professional practice. On the other hand, the introduction of more disciplines, in curricula already packed with mandatory and optional disciplines, can aggravate problems related to fragmentation and lack of focus among students. In view of this change that cyberculture imposes on our days, it would be good to think about other training possibilities beyond this disciplinary model that is proving to be exhausted today.

In addition, overcoming institutional and cultural resistance through incentives for methodological innovation is considered crucial. The resistance identified in previous discussions and the preference for traditional methods indicate a need for strategies that encourage the adoption of new methodologies and technologies, consciously and critically. Institutional and cultural incentives can help create an environment more receptive to innovation and change, aligning with the observation that changes in the educational context often create a climate of insecurity but need to be accompanied by adequate support.

Finally, promoting a collaborative environment to share good practices is an important measure to foster the integration of cyberculture. Collaboration between teachers and institutions can facilitate the exchange of experiences and the dissemination of effective practices, addressing the need for a more collaborative and integrated approach in teacher training. This collaborative environment can support overcoming the barriers identified earlier and contribute to a more uniform and effective adoption of DICTs. These suggestions from the interviewees are consistent with the previous discussion, highlighting the need for continuous training, curricular integration, overcoming resistance, and promoting collaborative practices.

They offer a clear path to promote significant advances in the adoption and use of DICTs in the training of Physical Education professionals, aligning with the challenges and opportunities identified in the previous phases of the research.

The analysis of the potentialities and limitations of ChatGPT for the content analysis of interviews reveals the need for a deep understanding of the subject and the essential role of the researcher in validating and correcting the data generated by the tool. During the analysis of interviews on cyberculture in Physical Education, ChatGPT highlighted patterns of resistance and innovation that could be overlooked in a conventional reading, and its ability to cross-reference information allowed for correlating the use of technologies with acceptance among teachers. This ability to capture nuances and perform detailed analyses makes ChatGPT a powerful tool for complex academic tasks.

However, it is essential that the user has knowledge of the subject and acts as a validator to ensure that the results reflect reality accurately and contextually. In addition, there is a risk that ChatGPT will submit to the researcher's biases, replicating prejudices or inclinations present in the data provided. Therefore, it is recommended that the author maintain a critical, reflective, and ethical stance when interpreting the results generated by the tool. In this way, ChatGPT can be used to enrich the research and decision-making process, enhancing the ability to generate valuable insights and contributing to academic and professional development, while mitigating the risk of perpetuating pre-existing biases if used properly. Added to this is the important work capacity of producing content at a capacity superior to that observed in human work. It is recommended that every dialogical approach established between researcher and AI be reported in studies that adopt this method.

It should be noted that the study focused exclusively on the perceptions and practices of Physical Education teachers from federal universities in the Northeast Region in relation to technological tools and cyberculture. However, for a more comprehensive understanding, it is necessary to include the students' perspective and expand the sample of teachers. The inclusion of students would help to understand how technological practices impact their learning experiences, while broader surveys could identify general patterns of difficulties and adaptation strategies. This information is essential to create continuing education programs and uniform guidelines, allowing for a more complete analysis and the development of more effective educational policies.

Conclusions

In this study, we identified categories that reflect the growing integration of digital technologies in teaching practices and the administrative sector of federal HEIs. We observed both promising initiatives and challenges, such as resistance to the use of digital tools due to unfamiliarity and difficulties in accessing technological equipment. This reality highlights the need for continuous teacher training. The analysis revealed a varied panorama of maturity in relation to cyberculture among the interviewees, indicating areas of progress and opportunities for improvement.

Cyberculture, a concept discussed by Pierre Lévy [7], can be understood as a new way of organizing knowledge and social interaction, which has significant implications for the training of Physical Education professionals. In a world increasingly mediated by digital technologies, a critical understanding of this new culture is essential for the construction of relevant and contextualized educational practices. Conducted during the COVID-19 pandemic, the research highlighted cyberculture as a response to the challenges faced, qualifying the training of Physical Education professionals and offering practical insights for innovative educational strategies.

The challenge lies in the teaching class, which must be open to taking advantage of new technologies, even without fully mastering them. Just as an individual does not need to know how to fly a plane to travel in it, teachers do not need to be experts in all new technologies to use them effectively in the classroom, using, for example, students as the "pilots of the new aircraft". Recent research shows that collaboration between teachers and students is essential for the effective integration of DICTs.

Project-oriented didactic approaches, preferably those that value interdisciplinarity and stimulate the encounter of creative and innovative solutions for relevant and current problems, are possibly the main locus of transformation of the identified gap. Future studies should be dedicated to this proposition, as this model promotes a more updated, dynamic, and collaborative educational environment, fundamental for the development of an educational culture that recognizes the diversity of knowledge and experiences that cyberculture can offer [37,38].

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