Bridging technology and humanity: humanizing online pedagogy in digital environments

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Article Info

ABSTRACT

Comprehensive analyses on incorporating the intersection of online education, humanizing teaching approaches, and digital tools remain scarce. To the best of the authors' knowledge, limited comprehensive studies integrate online pedagogy and digital tools to humanize teaching methods, enabling students to become engaged and personalized learners, while fostering empathy among educators. A systematic literature review (SLR) was conducted, utilizing databases from the Scopus, Web of Science (WoS), and Google Scholar. The study employed content and comparative analysis and advocated a grounded theory approach to inductively analyses and navigate the articles' data for addressing three research questions. Based on a set of criteria for inclusion and exclusion, 34 research articles written in English between 2010 and 2024 were reviewed. Results indicated the community of inquiry (CoI) framework has been prominent over the past two decades and is considered suitable for integration with any digital tools when investigating pedagogical strategies at all education levels, aiming to make online learning student-centered or human-centered with the principle of 'no child left behind'. The review offers significant implications for humanizing online learning to the educational technology community, particularly for policymakers and practitioners, to strategies, reflect on, and, if necessary, improve their practices for future sustainable education and efficient pedagogical performance.

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1. INTRODUCTION

Online pedagogy has become a vital element of the educational ecosystem, providing learners worldwide with unparalleled flexibility and accessibility. It enables students to access educational resources and instruction irrespective of their geographical location. Recently, online pedagogy has been defined as a flexible teaching method and practice in online environments, catering to diverse learners, including those with disabilities and inclusive groups. Also referred to as low-cost learning, online pedagogy offers personalized learning that demands a significant commitment from learners to develop and maintain effective

self-regulated learning strategies, an in-depth research aptitude, reflexive capacity, and a high level of personal autonomy, exemplified by massive open online courses (MOOCs). MOOCs enable learners to manage their time at their own pace and place, offer opportunities for social learning, and provide chances to acquire new skills and knowledge [1]. According to Hillaire *et al.* [1] the design of MOOCs should take into account each learner's abilities, learning goals, the environment where learning occurs, and the specific devices used by the learner.

The transition from traditional face-to-face teaching to online pedagogy has brought both benefits and challenges. Online pedagogy provides numerous benefits, including expanded access to learning opportunities and the ability to accommodate different learning styles [2]. However, the shift to online learning also presents several challenges, such as maintaining student engagement, fostering a sense of community, and ensuring the quality of interaction between students and educators. According to Pei and Wu [2], while online pedagogy has expanded access to learning opportunities, it has also highlighted the need for innovative pedagogical strategies that can address these challenges and keep students motivated and involved. The lack of physical presence can lead to feelings of isolation and disconnection among students, making it essential to develop approaches that can effectively engage and support learners in an online environment. Effective online pedagogy requires the integration of various digital tools and techniques for interactive learning experiences. The role of the educator in an online setting shifts from being a source of information to a facilitator of learning, guiding students through their educational journey and helping them make meaningful connections with the content, their peers, and the instructor [3]. Thus, the learning becomes an engaging, personalizing, and empathizing learning environment, so-called humanizing teaching approaches.

In the context of education, humanizing involves creating learning environments that are engaging, empathetic, and supportive. It focuses on fostering interpersonal connections and making the learning experience more personal and meaningful for students. In the context of online learning, humanizing teaching approaches are particularly important to counteract the potential feelings of isolation and disconnection that can arise from the lack of physical presence. This term refers to a method aimed at making online education more personal, engaging, and effective for learners. Three key elements of humanizing education, namely, personalized feedback, interactive learning activities, and building a sense of community. To begin with, personalized feedback can be defined as educators providing individualized feedback to address each student's unique learning needs and promote deeper understanding. Personalized feedback significantly enhances student engagement and academic success, particularly in online settings where direct interaction is limited [4]. Meanwhile, interactive learning activities can be defined as educators' design activities that promote active participation and collaboration to enhance student engagement and learning outcomes. Martin and Bolliger [3] emphasize that online learning environments should incorporate both synchronous (real-time) and asynchronous (self-paced) activities to encourage interaction among students. These activities help to create a dynamic and interactive online classroom. Furthermore, building community refers to the establishment of a sense of community in online courses for student satisfaction and retention. The students who experience a strong sense of community are more likely to persist in their studies and report higher levels of satisfaction with their learning experiences. Strategies to build community include virtual group projects, discussion forums, and social media integration. These types of digital tools are essential for educators to interact with learners to enhance meaningful learning [5].

Digital tools are essential for supporting and enhancing humanizing teaching approaches in online education. These tools offer various functionalities that help create more engaging and personalized learning experiences. Four key digital tools include learning management systems (LMS), video conferencing platforms, interactive content creation tools, and communication and collaboration platforms. To begin with, LMS platforms provide a centralized location for course materials, assignments, and assessments. They offer features such as grade books, discussion forums, and analytics to help instructors monitor student progress and provide timely feedback. According to Borup *et al.* [4] LMS platforms can improve the organization and delivery of online courses, making it easier for educators to manage their classes and for students to access resources. Video conferencing tools, such as Zoom, Microsoft Teams, and Google Meet, enable real-time interaction between students and instructors. These platforms support synchronous learning activities, such as lectures, discussions, and group work, which are essential for maintaining engagement and building a sense of community. Pei and Wu [2] note that video conferencing can help replicate the immediacy and interactivity of face-to-face instruction. Interactive content creation tools, such as H5P, Nearpod, and Kahoot, allow educators to create interactive and multimedia-rich learning materials. These tools can enhance the learning experience by making content more engaging and interactive. Martin and Bolliger [3] emphasize that interactive content can help maintain student interest and motivation. Communication and collaboration platforms, such as Slack, Microsoft Teams, and Discord, facilitate communication and collaboration among students and between students and instructors. These tools support asynchronous interactions, such as group

discussions and project work, which are crucial for building community in online courses. Borup *et al* [4] highlight the importance of communication and collaboration in fostering a supportive and connected learning environment.

Recently, artificial intelligence (AI) has also been considered one of the types of digital tools. AI has the potential to transform online education by enhancing humanizing teaching approaches and providing new tools for personalization and support. AI applications in education include adaptive learning systems, intelligent tutoring systems, chatbots, and predictive analytics. AI-driven adaptive learning systems tailor educational content to individual students' needs, preferences, and performance. A recent study by Borup *et al* [4] found that adaptive learning technologies can improve learning outcomes by providing customized instruction and resources that meet each student's unique needs. AI-powered tutoring systems offer personalized assistance and guidance, helping students master complex concepts and skills. Intelligent tutoring systems can be as effective as human tutors in certain contexts, providing immediate feedback and support [6]. AI chatbots and virtual assistants provide real-time support to students, answering questions and offering guidance on various aspects of their learning experience. For example, the existence of generative AI such as ChatGPT can assist students in solving problems by using logical thinking in interactions, solely through conversational language, and the machine responds to questions by generating text, code, and tables according to the learners' requests. These tools can enhance accessibility and reduce response times, making support more readily available to students [7]. AI algorithms analyze student data to identify patterns and predict academic performance, enabling educators to intervene proactively. Early warning systems powered by predictive analytics can help identify at-risk students and provide targeted support to improve their academic outcomes [8].

As educational technologists, the authors look at the potential and impact of digital tools in online pedagogy that is given from literature as researchers studied digital tools in teaching and learning for several decades with a primary focus on flexibility and accessibility, and the specific difficulties faced in different contexts (e.g., technological limitations, communication issues). Therefore, the authors are interested in evaluating the relationship between digital tools and educators that exists in the current literature with regards to the successful humanizing of online pedagogy in the classroom as this issue is still limited exploration. One of the reasons for triggering our interest in humanizing online pedagogy likely extends from the integrative review on 'humanizing the academic advising experience with technology' [9]. This literature acknowledges that advanced technologies can be leveraged to reach and support students and "argue the academic advising process needs to put human beings at the center of the student" [9]. Unfortunately, this integrative review missed attention to the current trends, challenges, digital tools, and pedagogical strategies supporting online pedagogy, which can claim a large stake in the success of the humanized online teaching in digital environments. Additionally, this review seeks to identify gaps in current research and provide recommendations for future studies. Therefore, the current systematic literature review (SLR) is based on the following research questions:

– RQ1: what are the current trends and challenges in online pedagogy research?
– RQ2: how do digital tools and pedagogical strategies contribute to supporting humanizing teaching approaches in online education?
– RQ3: what gaps exist in current research regarding the integration of digital tools and humanizing approaches in online education, and what areas should be prioritized for future investigation?

In conclusion, to illuminate and contribute to the study of humanizing online pedagogy in digital environments, the primary purpose of this SLR is to identify and synthesize effective strategies for humanizing online pedagogy in digital environments. By reviewing recent scholarly literature, this review aims to highlight how digital tools can support and enhance humanizing teaching approaches in online education that can foster a more connected, empathetic, and inclusive learning environment. Additionally, this review seeks to identify gaps in current research and provide recommendations for future studies. Moreover, the synthesis of scholarly discourse in this SLR serves as fundamental knowledge for the need to humanize teaching approaches with digital tools in digital environments. Such aspiration is possible with collaboration and practice based on evidence, where the stakeholders could aspire to realize a generation of digitally competent and ethically responsible people, set to face the challenges in the digital domain and contribute to the most progressive and prosperous life and well-being of the society.

2. RELATED WORK
2.1. Online distance learning environment

The role of online distance learning (ODL) extends beyond being a mere communication tool; it integrates with the internet, computers, phones, videos, audio, and other technologies to assist educators in delivering virtual teaching [10]. An ODL environment leverages digital tools that enable educators to be

innovative and effective in their teaching, while allowing students to learn at their own pace. ODL transcends the traditional classroom setting, thanks to technologies that connect students with educators, peers, and experts across vast distances and at any time of the day. Students can communicate and collaborate through social media platforms like Facebook and Twitter, and participate in online video conferencing via Webex, Zoom, and Google Meet. Additionally, students can access educational resources, such as interactive subject content, through LMS like Google Classroom [11]. With the continuous advancement of web technologies, the ODL environment has evolved. The advent of Web 3.0 tools, such as augmented reality (AR), 3D visualization, 3D wikis, and the virtual world, is poised to transform the way online teaching is conducted [12]. Thus, ODL supports educators in employing innovative teaching methods and enables students to learn anywhere and anytime, facilitating personalized learning.

One of the most influential environments for ODL is active participation. According to technology integration matrix [13], active learning refers to human activity and interaction. Students are engaged in learning from one another, which can be gained from digital tools to acquire life-long learners [14]. Active learning activities can be successfully implemented into a course even when educators are not in the same physical classroom as students via the emerging digital tools with synchronous distance education [15]. Active learning can also increase student knowledge retention and motivate students to learn [16].

ODL has become a norm since the pandemic COVID-19 struck the world of education in early 2021. Those who had a phobia of e-learning and technologies did not have other choices but to acquire new knowledge and skills on how to conduct e-learning and teaching. The challenges of online learning are mainly due to not knowing the technical aspects and not having the technological gadgets, dealing with technical issues such as internet connections, choice of platforms, and software [17]. In addition, managing time with e-learning can be a daunting task for educators. Lack of communication for those uncomfortable with virtual communication can also interfere with effective learning. Educators should decide the best strategies to teach to students, taking into consideration the subject matter, students' demographics and abilities, and IT facilities. Thus, choosing the most suitable types of digital tools is also a tricky challenge that may raise questions about the innovation of educators to deliver the content that leads to deep and lifelong learners.

2.2. Humanizing education

Humanizing refers to the lived experiences of individuals within a community, engaging them in collective decision-making within an organization. In this context, humanization requires collaboration through dialogue [18]. Freire suggested that true dialogue, which occurs under conditions of deep love for the world and humankind, humility towards one another, reciprocal trust among participants, and the ability to think critically, would help transform the world into a humanized place [19]. In education, humanization involves fostering the "human" values of students, the teacher's ability to understand their students, the teacher's attention to the feelings and emotions of students, and the involvement of students in the knowledge acquisition process [20]. Humanization in pedagogy is rooted in the constructivist notion that learners create meaning and communicate understanding through engagement and discourse [21]. The community of inquiry (CoI) framework, developed by Yang *et al.* [14], emphasizes meaning-making and discourse within "a cohesive and interactive community of learners whose purpose is to critically analyses, construct, and confirm worthwhile knowledge" [14]. CoIs form when individuals are united by a shared academic purpose and a collaborative pursuit of defined learning goals, often within formal or institutional settings. The CoI framework comprises three overlapping components: cognitive presence, teaching presence, and social presence, which facilitate learners' engagement and discourse-based knowledge construction in online or blended courses [22]. In digital environments and online pedagogy, the realization of the humanistic trend is particularly pronounced. This encompasses issues related to the development of the student's personality in the modern educational environment, including both the positive and negative impacts of the digital environment on the student. Additionally, it addresses the qualities that need to be cultivated in students within digital education. Moreover, human-centered skills, such as cross-disciplinary thinking, leadership, communication, and problem-solving, are becoming more crucial for success and adaptability than digital literacy and technical know-how [23].

2.3. Digital tools in education

Digitalization in education has many benefits and challenges that need to be considered. For example, in the context of AI, the tools can improve learning outcomes by providing personalized and adaptive learning, feedback, and assessment, based on the learners' needs, preferences, and progress [24]. AI tools can also improve efficiency and accessibility by automating and optimizing various tasks, such as grading, scheduling, and content generation, and by enabling learners to access education anytime and anywhere, regardless of their location, time zone, or device [25]. AI tools can also improve inclusion and diversity by supporting students with special needs, such as those with disabilities, learning difficulties, or language barriers, and by providing

culturally and linguistically relevant content and pedagogy [26]. However, AI in education also poses many challenges, such as ethical, social, technical, and pedagogical issues. Ethical issues include privacy, security, bias, and accountability, as AI tools collect, store, and process large amounts of personal and sensitive data, which may be vulnerable to breaches, misuse, or manipulation, and may reflect or reinforce existing inequalities or prejudices [27]. Social issues include the impact of AI on human relationships, values, and emotions, such as how AI tools may affect teacher-student interaction, the sense of belonging, motivation, and the well-being of the learners and educators [26]. Technical issues include AI tools' quality, reliability, and validity, such as how AI tools may have errors, limitations, or inconsistencies and require constant maintenance, updates, and evaluation [25]. Pedagogical issues include the alignment, integration, and evaluation of AI tools with the curriculum, the learning objectives, and the assessment criteria, and how AI tools may require new skills, competencies, and literacies for both learners and educators [24].

3. METHOD
3.1. Systematic review

A systematic review of research articles, particularly in digitalization, should be conducted within five years to ensure the data remains current and relevant, providing reliable references for future researchers. However, this systematic review spans from 2010 to 2024 and pertains to humanizing online pedagogy in digital environments due to the limited research on this topic. The authors considered the perspectives of researchers before the COVID-19 pandemic as essential. Studies were further reviewed based on their relevance to the topic and their eligibility. Inclusion and exclusion criteria were applied by reading abstracts to eliminate articles that did not meet the required standards. The authors employed a constant comparative technique to examine published empirical research, enabling a comparison of results. The findings were reported after identifying research gaps, thereby providing direction for future research.

3.2. Search strategy and data collection

The authors employed a structured search technique to retrieve peer-reviewed articles from the Scopus, Web of Science (WoS), and Google Scholar databases, as well as reputable publishers including Emerald, Springer, Elsevier, Routledge, and SAGE. These well-known publishers were chosen because their publications would contribute to producing a review with valid and reliable findings. All included articles were qualitative, mixed-method, or quantitative studies published between 2010 and 2024, and written in English. The authors established three inclusion and three exclusion criteria for the review. As shown in Table 1, each article had to meet the inclusion and exclusion criteria of the search technique. The authors applied the "AND" and "OR" operators to create word combinations, as shown in Table 2. They initiated the search and accessed all the articles on 18th December 2023, continuing until they had thoroughly exhausted all possible combinations (i.e., locating similar articles using various search term combinations).

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
a. English articles documenting the studies conducted in all levels of education settings. The sample in the study can be from primary, secondary schools, and higher education institutions.	a. English articles that were not peer-reviewed, as it is important for the review to obtain results from credible research.
b. Published research articles or original articles that were peer-reviewed, allowing for the comparison of results among studies and the development of higher-order thematic classifications.	b. Articles that did not report an explicit method of data collection was reported.
c. The sample could include teachers, students, and administrators, as the study focused on humanizing online pedagogy in digital environments.	c. Research articles published outside the 2010 and 2024 range, to ensure the data is current and on-trend.

Table 2. Boolean operator for search strategy

Types of databases	Boolean operator
Scopus, WOS, and Google Scholar databases. Accessed date begins on 18th December 2023	("Bridging technology and humanity" OR "Integration of technology and human aspects" OR "Tech-human collaboration" OR "Technological integration" OR "Humanistic technology") AND
	("STREAM integration" OR "STEM integration" OR "Science, Technology, Engineering, Arts, and Mathematics integration" OR "Interdisciplinary education" OR "Cross-disciplinary learning") AND
	("Malaysian universities" OR "Higher education in Malaysia" OR "University education in Malaysia" OR "Malaysian academic institutions") AND
	("Online pedagogy" OR "E-learning" OR "Digital education" OR "Online teaching methods" OR "Virtual learning") AND
	("Systematic review" OR "Comprehensive review" OR "Synthesis of literature" OR "Meta-analysis")

Following the database search, the abstracts of each article were evaluated to ensure their potential relevance to humanizing online pedagogy in digital environments. As mentioned, the authors collected all potential articles and then examined them individually for any focus pertinent to the study. Figure 1 illustrates the detailed flow diagram of the systematic review for the article search. The flow diagram indicated that 560 articles were identified in the initial search. These 560 articles were further screened to eliminate duplicates and irrelevant studies, resulting in 426 articles relevant to humanizing online pedagogy in digital environments. A subsequent screening of the 426 articles was conducted, and 152 research articles met the inclusion and exclusion criteria for digital transformation. However, only 34 research articles were examined in detail, as 100 articles focused on kindergartens, preschools, and toddlers, which were beyond the scope of this systematic review. This review specifically focuses on research articles from primary schools to higher education.
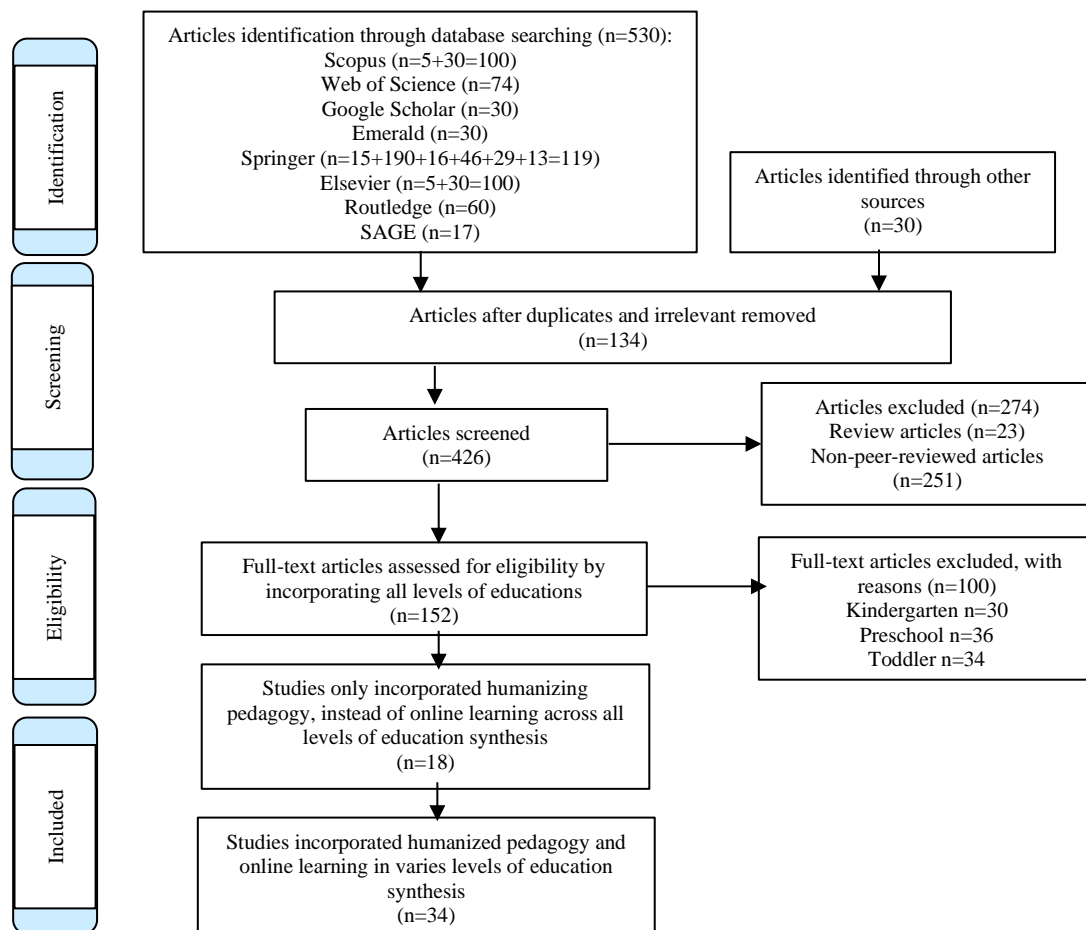
Figure 1. Systematic review flow diagram of the articles search

3.3. Data analysis

The analysis was conducted concurrently with data collection, as the processes of data collection, data analysis, and report authoring are all interrelated and occur simultaneously [28]. Selected articles were retrieved from various databases on 18 December 2023, and the necessary data for the SLR were obtained and extracted. NVIVO version 12 software, Google Docs and Microsoft Excel were used to organize, analyze, and visualize the selected empirical results. Content analysis, the constant comparative technique, and the grounded theory of Corbin and Strauss [29], were employed to inductively navigate the articles' data during the coding procedure to answer two research questions. During 'Open coding', the data from the transcripts were read and analyzed line by line to identify similarities and differences in each selected article. The authors grouped similar codes and repeated the analysis process for all the data in the research articles. The codes were reviewed by three different researchers to ensure the validity of the emerging themes [28]. The authors noticed that similar words and phrases were used in different research articles addressing similar ideas. This recurring pattern of ideas became a theme. Using NVIVO version 12 software's node unit, the authors could navigate through phrases, quotes, codes, and memos. During this grounded theory procedure, the authors analyzed the

data to uncover the comprehensive insights of each article. It is hoped that the analysis can explain not only the drawbacks and challenges of the phenomena but also the strategies implemented by school stakeholders to resolve issues related to humanize online pedagogy implementation in institutions.

4. RESULTS AND DISCUSSION

This SLR addresses the growing need for humanizing online pedagogy in response to the rapid expansion of digital learning environments. To date, it has become apparent that while technology has advanced, there remains a critical need to ensure that online education remains empathetic, engaging, and effective. The aim was to bridge gaps in existing research and provide a comprehensive understanding of how digital tools and pedagogical strategies can be optimized to enhance human connection and student engagement in online settings. Following specific inclusion and exclusion criteria, the authors obtained 34 articles from various journals published between 2010 and 2024 to capture the implementation of humanizing online pedagogy. The review involved examining various research methodologies, geographical contexts, and educational levels to identify trends, challenges, and effective strategies for integrating digital tools with pedagogical practices that enhance human interaction and student engagement. The approach used was a SLR, guided by a rigorous set of inclusion and exclusion criteria. This approach involved collecting, analyzing, and synthesizing data from a diverse range of studies to provide a comprehensive overview of how humanizing online pedagogy is being implemented and researched. The review utilized both quantitative and qualitative analyses to explore the effectiveness of different digital tools and pedagogical strategies within various educational contexts.

The systematic review (accessible via this link: https://docs.google.com/spreadsheets/d/1hf7776R2YW_nqBfMBY7FXqRyT8lNuUO8/edit?usp=sharing&ou id=112351136387489882683&rtpof=true&sd=true) revealed that 53% (n=18) of the articles originated from developed countries such as Australia, Italy, China, and the US, while 47% (n=16) came from developing nations including South Africa, Malaysia, India, Indonesia, Brazil, Turkey, Russia, Thailand, and Saudi Arabia. The number of publications fluctuated significantly over the years: 2010 (n=1), 2019 (n=3), 2020 (n=8), 2021 (n=10), 2022 (n=5), 2023 (n=6), and 2024 (n=1). This fluctuation suggests the increasing importance of online pedagogy in education across all levels, particularly during crises like pandemics or natural disasters when physical attendance is challenging. Regarding educational levels, 9% (n=3) of the articles focused on primary and secondary schools, while the majority (91%, n=31) centered on higher education. This shift towards online learning in higher education post-COVID-19 allows students to study from home, reducing living costs. Quantitative methods, particularly surveys (n=10, 29%), were the most common research approach, followed by qualitative methods such as interviews, observations, and focus group discussions (n=18, 53%). A smaller proportion employed mixed-methods (n=6, 18%).

From an initial pool of 530 articles, 426 were screened for duplication and relevance based on predefined criteria (Table 1). Ultimately, 34 articles met the criteria after excluding 274 review studies and non-peer-reviewed articles. An additional 152 studies were excluded as they focused on kindergarten, preschool, or toddler education, which is less conducive to online pedagogy. Finally, 18 studies were rejected because they discussed humanizing pedagogy without incorporating online learning. Using a constant comparative technique for analysis, the authors segmented their findings into three subsections addressing specific research questions based on their dataset.

4.1. Research question 1

Based on the SLR dataset as demonstrated in the spreadsheets titled "Humanize online learning" (see the link provided in the result and discussion section), the results answered research question 1 on the current trends in online pedagogy research. The trend analysis in the line graph manifests the trend in the number of articles published over the years and popular journals over the years as shown in Figures 2 and 3. These figures indicate the evolution and growing interest in the topic and the primary sources of published research. Geographical analysis in the bar chart compares the number of studies conducted in developed countries versus developing countries in the bar chart of Figure 4, illustrates the research's global spread and focus areas. In Figure 5, the bar chart indicates the methodological analysis of the distribution of quantitative, qualitative, and mixed-method studies, indicating the balance and preference for different research methodologies. Figure 6 also shows the methodological analysis of the studies' most commonly employed pedagogical strategies.

Online pedagogy refers to the methods and practices employed in teaching within digital environments. One of the primary trends in online pedagogy is the increasing emphasis on flexibility and accessibility. Online education allows learners to access course materials and participate in learning activities regardless of their geographic location or time constraints. According to Pei and Wu [2] this flexibility is a significant advantage, enabling a broader range of students to pursue education. However, online pedagogy

also presents several challenges. Western and Asian scholars have found that educators, students, and administrators face challenges in implementing online pedagogy in the cutting-edge advancement of technology [1], [4], [26], [27], [30]. For example, a quantitative study, using an online survey of 101 International STEM faculty members in developed countries, namely Italy, uncovered that online evaluation and pedagogy were the most disrupted dimensions of e-learning when instructors struggled to re-orchestrate their teaching during such an unprecedented event.

Problem-based learning in digital environments presents significant challenges, notably related to technology accessibility [31]. These scholars also highlighted communication issues in online settings, attributing them to the delayed feedback from students to instructors. In a quantitative study conducted in the U.S., Hillaire *et al.* [1] focused on assistive technology, particularly text-to-speech (TTS) systems in MOOCs. They discovered that approximately 35% of sentences contained emotional text, yet existing TTS voices often failed to accurately convey emotional nuances, with synthetic voices frequently exhibiting overly negative tones compared to the neutral emotional content of the text.

Similarly, Borup *et al* [4] conducted a quantitative study involving 68 online mathematics teachers in the U.S. They found that over 50% of learning activities took place online, revealing challenges in both technological and pedagogical aspects. These challenges included formulating effective tasks and discussion prompts conducive to online interaction, selecting tasks compatible with online environments and relevant technologies, providing timely feedback on participant posts, organizing online groups, engaging participants from diverse backgrounds, choosing appropriate online tools and mathematical technologies, and ensuring participants effectively utilize these technologies.

A qualitative study conducted in China explored live video streaming (LVS) in online pedagogy involving 15 teachers and 18 students across various educational levels [32]. The study identified three categories of challenges: shared challenges experienced by both teachers and students during LVS sessions, conflicting challenges where both parties held differing views and attitudes, and unique challenges specific to each group. Shared challenges included issues of trust, privacy concerns, the impact of leaving digital footprints, difficulties in interpreting eye contact and body language, and managing impressions. Conflicting challenges encompassed disagreements over switching between multiple platforms, varying expectations regarding student engagement, and striking a balance between entertainment and educational content. Unique challenges faced by teachers included handling real-time mistakes under pressure, overcoming learning curves for senior educators, and managing mood swings. On the other hand, students faced unique challenges such as a perceived lack of peer presence.

In developing countries like Indonesia, a study focusing on simulation and gamification in tourism education [33]. This qualitative research identified three main challenges affecting lecturers, students, and tourism industry practitioners. One lecturer encountered difficulties in ensuring all students had access to necessary digital tools. To address this, they established computer labs, provided loaner devices to students in need, and offered flexible learning options tailored to varying levels of digital literacy among students. Some students struggled with the learning curve associated with new technologies. Meanwhile, tourism industry practitioners faced challenges in adapting educational programmed to keep pace with rapidly evolving digital technologies. However, this situation also presented an opportunity for closer collaboration between industry and education sectors, aiming to prepare a workforce capable of thriving in the digital era.
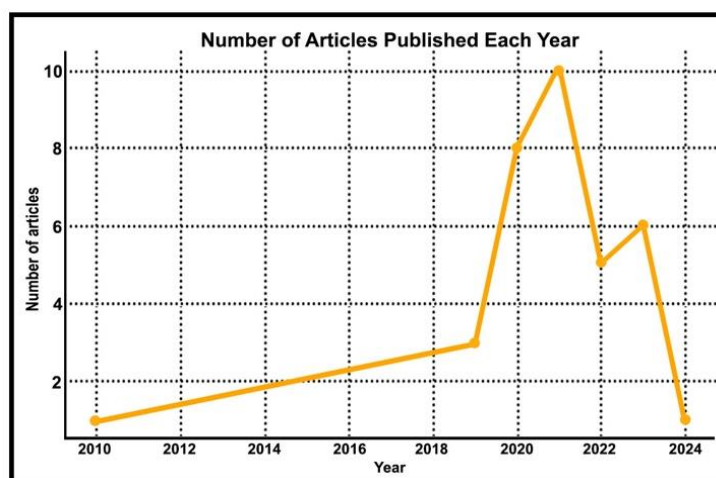

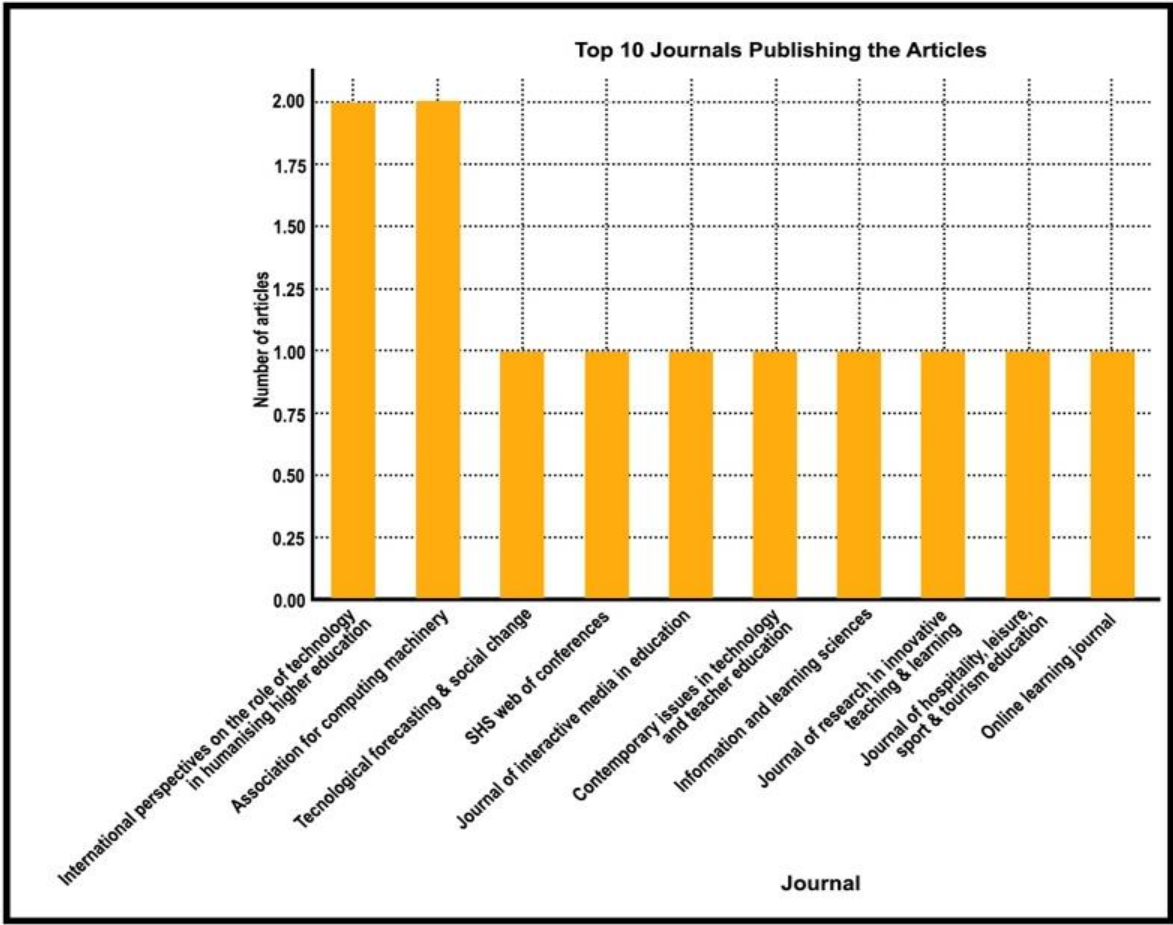Figure 2. Line graph of the number of articles published each year between 2010-2024 on online pedagogy

Figure 3. Bar chart of top 10 journals publishing the article between 2010-2024 on online pedagogy
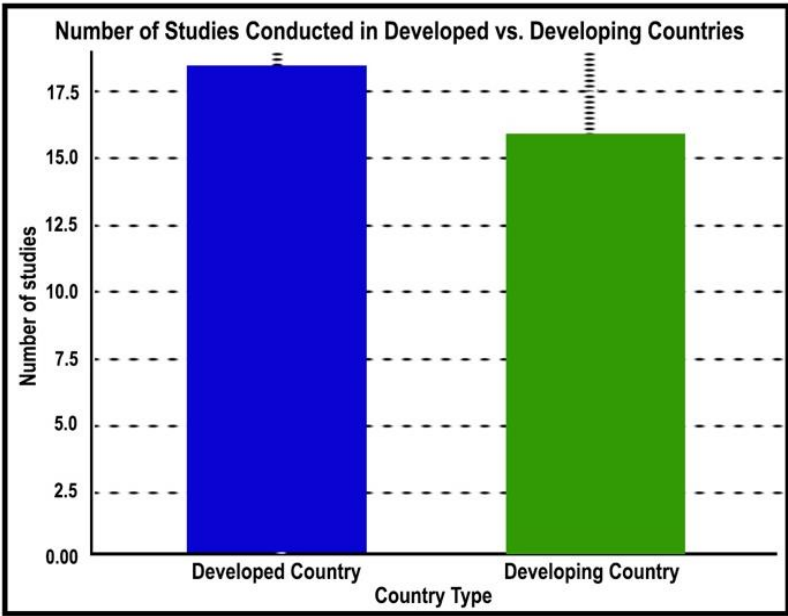

Figure 4. Bar chart of the number of studies conducted in developed and developing countries between 2010-2024 on online pedagogy
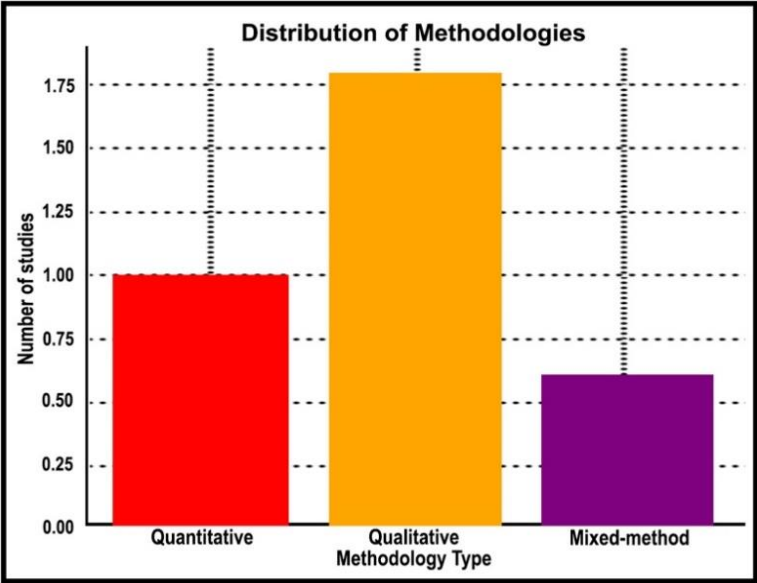
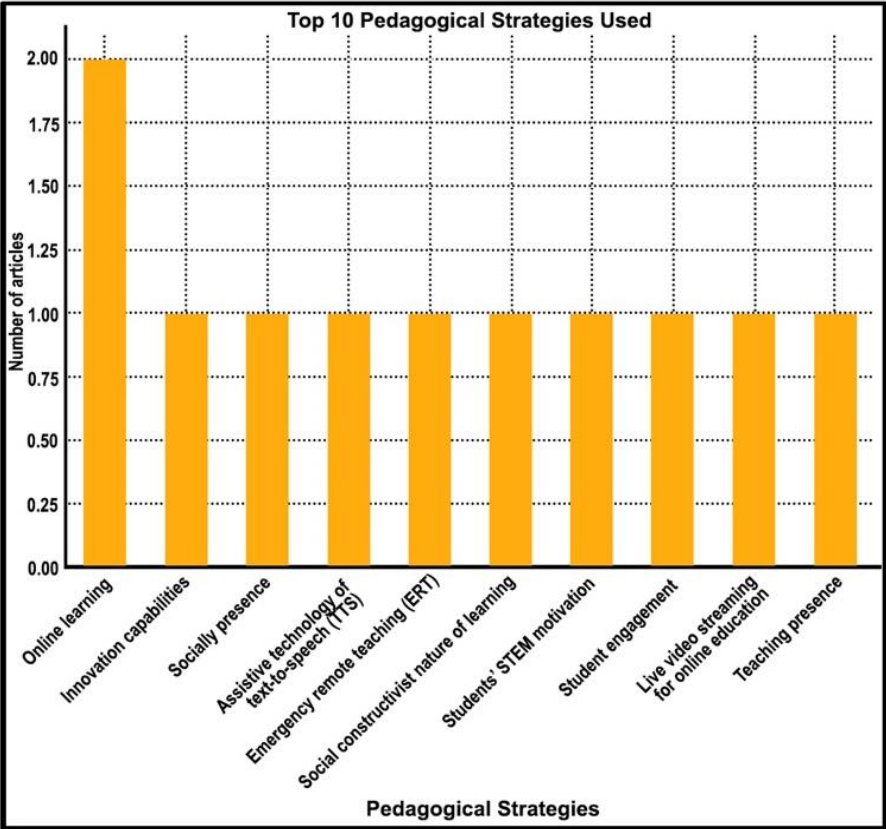Figure 5. Number of distribution methodologies in studies between 2010-2024 on online pedagogy

Figure 6. Bar chart of the top 10 pedagogical strategies used between 2010-2024 on online pedagogy

4.2. Research question 2

In leveraging digital tools to support pedagogical strategies that promote empathy, engagement, and personalized feedback, ultimately aiming to create a more inclusive and responsive educational experience for enhancing human interaction and emotional connection within digital learning environments. Digital tools

offer various functionalities that strengthen pedagogical strategies to enhance constructive and collaborative experiences between educators and learners, and among learners. The study also found that while there is a growing interest in humanizing online pedagogy, significant challenges remain, including technological limitations, communication barriers, and varying levels of digital literacy that are similar to previous studies [34], [35]. The review also identified a shift in focus from primary and secondary education to higher education, particularly in response to the pandemic. Furthermore, it highlighted the importance of integrating digital tools with pedagogical strategies that promote empathy, engagement, and inclusivity.

As mentioned in the subsection "humanizing education" in the "related work" section, the theoretical underpinning that is mostly appropriate to guide the integration of digital tools in line with pedagogical strategies to humanize online pedagogy is the CoI framework [21], initiated by the constructivist perspectives. By aligning digital tools with constructs of cognitive, teaching, and social presence, the approach seeks to develop and refine methods that ensure technology enhances rather than detracts from the human aspects of teaching and learning [22]. Thus, to answer research question 2, the authors map digital tools, pedagogical strategies, theoretical framework, and focus of studies, respectively in Table 3 (in Appendix) [1], [20]–[23], [35]–[54]. Moreover, the element in Table 3 should be related to humanized theories or perspectives. The articles selected based on the authors mentioned all those elements required. One of the elements is missing, the articles are not eligible to be analyses and placed in Table 3.

Table 3 shows the digital tools and pedagogical strategies in line with the theoretical underpinning to humanize online pedagogy that is mostly employed in current studies. The use of constructivist stances has been prominent for the past twenty decades, particularly with the CoI framework [23] or social presence [22] as this CoI framework was established in 2000. CoI has been considered appropriate to be incorporated with any digital tools in investigating pedagogical strategies in any level of education for making online learning student-centered or human-centered with the principle of 'no child left behind'. Other related theories that are mostly employed to study humanization in online pedagogy such as constructivist learning [33], [36] and social constructivism [44], [46].

4.3. Research question 3

The comprehensive body of research on humanizing online learning has unveiled a rich tapestry of insights, reflecting the intricate interplay between technology and pedagogy in the digital age. Across diverse educational contexts and disciplines, the studies collectively underscore the imperative of fostering a human-centered approach to online education, one that prioritizes connectivity, like social presence [22], [23], collaboration [36], [42], and engagement [42], [43], [45], [46] that would bring empathy in teaching among educators toward learners.

Central to this discourse is the integration of AI tools [36] and adaptive technologies [43], which have been shown to significantly enhance interactivity and collaboration among learners. These technologies, when leveraged effectively, transform the virtual classroom into a dynamic learning environment where students feel more connected and engaged. AI-driven feedback mechanisms, in particular, play a crucial role in creating a personalized learning experience, allowing educators to address the unique needs of each student and foster a supportive learning community.

The importance of humanizing online learning is further highlighted by the emphasis on creating a sense of belonging and inclusivity within virtual classrooms [43]. Studies have consistently demonstrated that students who perceive a strong sense of connection to their instructors and peers are more likely to engage actively and perform better academically. This underscores the need for educators to adopt strategies that promote social presence, such as the use of video and voice-enabled platforms [46], synchronous interactions [44], and personalized feedback [26]. Moreover, the shift to online learning during the COVID-19 pandemic has amplified the challenges and opportunities associated with humanizing digital education. The pandemic has necessitated rapid adaptation to online teaching, revealing gaps in digital literacy and the need for ongoing professional development for educators. It has also highlighted the critical role of empathy and relational feedback in sustaining student motivation and engagement in a remote learning context.

Several studies have explored innovative approaches to humanizing online learning, such as the implementation of hybrid cloud-based environments [36], [46], and the integration of translanguaging practices [46]. These approaches not only support interdisciplinary learning but also cater to diverse linguistic and cultural backgrounds, further enhancing the inclusivity of online education. The research also delves into the ethical and pedagogical dimensions of online learning, advocating for a balanced approach that integrates technological advancements with humanistic values [20]. This balance ensures that while technology facilitates efficient and scalable education, the core elements of teaching-critical thinking, creativity, and human connection-remain central to the learning experience.

There has been significant progress in understanding the intersection of online education, humanizing teaching approaches, and the use of digital tools, but five gaps remain in current research. Addressing these gaps can provide deeper insights and improve the effectiveness of online education. First,

there is a need for more longitudinal studies to assess the long-term impact of humanizing approaches and digital tools on student outcomes. These studies can provide valuable data on the sustainability and effectiveness of various strategies over time. Second, research on the effectiveness of digital tools and humanizing approaches across diverse student populations is limited. Studies that examine how these strategies impact different demographic groups, including those from various cultural, socio-economic, and educational backgrounds, can help tailor approaches to meet diverse needs. Third, the ethical implications of using digital tools in education, particularly concerning data privacy, security, and transparency, require further exploration. Researchers should investigate how to balance the benefits of digital tools with the need to protect student rights and data. Fourth, more research is needed on how to seamlessly integrate digital tools into existing educational systems and practices. Identifying best practices for implementation can help educators and institutions maximize the benefits of technology. Last, the potential for collaboration between human instructors and AI systems in education is an emerging area of interest. Research on how AI can support and enhance the efforts of educators, rather than replace them, can provide valuable insights into the future of online education.

The authors would like to note that although an integrative review [9] reviewed the state of research with respect to humanizing the academic advising experience with technology that emphasizes the need to put human beings at the center of the student, the authors' study differs from the study Liu and Ammigan [9] in many ways. Even though the study Liu and Ammigan [9] undoubtedly made a valuable contribution, and is arguably among the first to open the educational technology discipline's eyes to the very relevant context, their study was not similar to this study, as this study is based on a systematic review of the existing literature that focuses on how digital tools can support and enhance humanizing teaching approaches in online education that can foster a more connected, empathetic, and inclusive learning environment. Yet, while there is a breadth of research on humanizing online pedagogy, limited studies to investigate educators from the CoI framework [21] as CoI is mostly appropriate to guide the integration of digital tools in line with pedagogical strategies to humanize online pedagogy.

5. CONCLUSION

The intersection of online education, humanizing teaching approaches, and the use of digital tools to humanize learning represents a transformative opportunity for the educational landscape. By leveraging digital tools to support and enhance humanizing strategies, educators can create more effective, engaging, and personalized learning experiences. However, it is crucial to maintain a balance between technological advancements and human-centric approaches to ensure that education remains a deeply personal and impactful experience. As the educational landscape continues to evolve, it is essential to keep the focus on the human aspects of learning. Digital tools should be used as instruments to support and enhance the efforts of educators, rather than replace them. By prioritizing empathy, interaction, and community-building, educators can create online learning environments that are not only technologically advanced but also deeply human.

The focus on humanizing online learning represents a paradigm shift towards a more empathetic and student-centered approach to digital education. As educators and institutions continue to navigate the complexities of online learning, the insights from this study will be instrumental in shaping future practices and policies. By embracing both technological innovations and humanistic principles, the educational landscape can evolve to meet the needs of all learners, fostering a more inclusive, engaging, and effective online learning environment.

The study offers significant implications for both the field of online pedagogy and the broader educational community. For the field, they provide insights into effective strategies for humanizing online learning, highlighting the importance of aligning digital tools with pedagogical approaches that foster empathy and engagement. For the broader community, these findings emphasize the need for inclusive and accessible online education that can accommodate diverse learner needs. By addressing identified challenges and gaps, the results contribute to the development of more effective and supportive online learning environments, benefiting educators, students, and educational institutions.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization   I : **I**nvestigation   Vi : **Vi**sualization
M : **M**ethodology   R : **R**esources   Su : **Su**pervision
So : **So**ftware   D : **D**ata Curation   P : **P**roject administration
Va : **Va**lidation   O : Writing - **O**riginal Draft   Fu : **Fu**nding acquisition
Fo : **Fo**rmal analysis   E : Writing - Review & **E**diting

CONFLICT OF INTEREST STATEMENT

The author(s) declared no potential conflict of interest with respect to the research authorship and publication of this article.

DATA AVAILABILITY

The data that support the findings of this study are openly available in [Google Drive] at https://docs.google.com/spreadsheets/d/1hf7776R2YW_nqBfMBY7FXqRyT8lNuUO8/edit?usp=sharing&ou id=112351136387489882683&rtpof=true&sd=true).

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APPENDIX

Table 3. Distribution of prominent digital concerning humanizing online teaching from the selected articles

Study	Digital tool	Pedagogical strategies	Theoretical framework	Focus of study
[35]	AI tools	Choice based credit system (CBCS) model	Constructivist [36].	"Investigates the incorporation of AI tools in the English literature classroom at the undergraduate level in India, and scrutinizes their potential to enhance interactivity, efficacy, and collaboration among learners through case studies and interviews of practitioners" [35].
[37]	Audio or video	Technology enhanced feedback	Technology-enhanced feedback [38].	"Investigates socio-affective facilitates an awareness to student attitudes toward feedback and teacher self-expression; design empowers a consciousness of the logical arrangement and purpose of feedback to better prepare and engage students; and communication reflects the construction of a deliberate, empathetic message" [37].
[39]	Virtual forum	Forum interventions	Human care [40].	"Describe the experience of implementing the online training entitled "Humanization of the training processes in Nursing, care for all", targeted at Nursing teachers from a Chilean University" [39].
[41]	Online learning platform	Heutagogy-self-determined, paragogy-peer learning and cybergogy-creating engaged learning online	6 elements in heutagogical approach: explore, create, collaborate, connect, share, reflect [42].	"Discuss how to humanize students' learning experience and environment by observing how digitization of work-the-walk (WTW) promotes the sense of ownership through active learning" [41].
[43]	Live streaming platform	Live streaming learning	Remote collaboration and experience [44]	"Study on live streaming based education experience during the COVID-19 pandemic" [43].
[45]	Online learning platform	Online learning	Constructivist [36].	"Identify students' perceptions of the implementation of online learning during the COVID-19 pandemic" [45].
[22]	Video	Socially presence	Theory of social presence based on CoI framework [21].	"Investigates connectedness from two public higher education institutions: a four-year university and a large research university" [22].
[46]	3 tools: Icebreakers for student engagement; Discord for community building; VoiceThread for peer collaboration.	Construct community-cantered classroom environments	"A student should be able to feel whole as a person; to draw upon all of their cultural and linguistic resources" [47].	"Humanize our mathematics classrooms on how we teach" [46].

Table 3. Distribution of prominent digital concerning humanizing online teaching from the selected articles (*continued*)

Study	Digital tool	Pedagogical strategies	Theoretical framework	Focus of study
[48]	eLearning content in online courses	3 strategies: AR); virtual reality (VR); mixed reality (MR); AI	Normal student continues to dissipate as we see more with different abilities [44].	"Investigated how interactive and adaptive learning tools when implemented methodically, facilitate knowledge, skills, and cognitive development among today's digital-savvy students" [48].
[49]	Virtual library	Teaching presence	Social constructivism [36] and Teaching presence [21].	"Explores the integration of teaching presence to humanize virtual library instruction" [49].
[50]	Smartphone	Student engagement	Social learning theory [51].	"Determine the influence of smartphone usage among 150 secondary school students" [50].
[23]	The HumanMOOC	3 elements: social presence; teaching presence; cognitive presence	CoI framework [21].	"Study the MOOC effectiveness from issues of course completion and certification to the impact of these courses on participants' actual practices" [23].
[52]	Video- and voice-enabled discussion platforms	Cloud-based discussion	Social constructivism [36] and CoI framework [21] in the online context.	"Study the Video- and voice-enabled discussion platforms have the potential to increase student engagement, leading to student success" [52].
[1]	MOOC platforms: FutureLearn, edX and Coursera	Assistive technology of TTS	Universal design for learning (UDL)[53].	"Establish the potential variation on the emotional delivery of online educational resources through the use of a synthetic voice, which automatically articulates text into audio" [1].
[20]	Russian E-School (RESH) China: "distance class", "elite teacher class" and "elite cyber school", which expand the use of ICT in education	"7 basic skills: the ability to think critically and solve problems; the ability to collaborate and the presence of leadership qualities; flexibility and ability to adapt to constantly changing conditions; initiative and enterprise; the ability to communicate effectively in oral and written forms; the ability to find and analyze information; curiosity and imagination" [20].	Digital natives [54].	"Study the peculiarities of the realization of the humanistic trend in education in the conditions of electronic informational and educational environment" [20].

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
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