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Reshaping education in the era of artificial intelligence: insights from Situated Learning related literature

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Abstract

This review explores how artificial intelligence (AI henceforth) can reshape education through insights from situated learning literature. The objective was to critically examine opportunities and challenges of situated learning, and how AI could augment strengths while overcoming obstacles. A systematic review using the PRISMA method analyzed 60 articles from peer-reviewed journals over three decades. Key concepts associated with situated learning were extracted and analyzed qualitatively and quantitatively. Findings identified major obstacles: the traditional school system's one-way passive learning; the predominant educational approach fixated on predefined outcomes; and teachers' lack of contextual knowledge. AI presents solutions including adaptive systems tailored to students' evolving needs; intelligent tutoring situated in authentic scenarios; automation of administrative tasks; and data-driven teacher support. When implemented thoughtfully, AI has the potential to enhance situated learning through increased personalization, interactivity, and real-world connections. This promises a better effective, adaptive education - but human guidance remains essential for ethical grounding. This review offers teachers, researchers, and policymakers valuable insights on integrating both AI and situated learning to keep education relevant in an interconnected world.

Keywords: *Situated learning, education 4.0, artificial intelligence, communities of practice, 21st century education.*

Introduction

We currently live in a world framed by trends of globalization, high and increasing technological mediation, and interconnectivity as has never been seen before in human history (Trachana & Cacsire-Grimaldos, 2021; Yol & Yoon, 2020). This has generated great tensions between the global nature of our time and recognizing the importance of the local context for learning at different educational levels (Hayati et al., 2020; Qi et al., 2022).

In that sense, we must recognize that learning in a globalized context overwhelms the timely and adequate response capacity of the current school model and consequently, it needs to be seen from

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a perspective of cultural diversity (Sanchez, 2018). In addition to the above, it is advisable to consider that knowledge is not situated or learned exclusively through the formal school system, but rather in the convergence of spaces of daily social interaction, in migrant communities, in the neighborhood, on the street, in the countryside and the city, in short, in spaces where deep cultural relationships occur, although often invisible (Matsko et al., 2022).

This means retaking and claiming an educational concept formulated several decades ago and which currently has enormous relevance: situated learning. It is worth studying its implications and possibilities based on current educational needs, which are undoubtedly different from those existing at the time of its initial formulation in the early 1990s (Lave & Wenger, 1991).

Understanding then that Situated Learning is not a new concept, we must also recognize that the general panorama of educational research shows at least two interesting issues reflected in Figure 1. First, that interest in this topic has been growing over time. Second, within this interest, its research production has not been as numerous as expected, with an average of only 140 articles per year in the last 10 years, and with a tendency to stagnate in its growth for that same period.

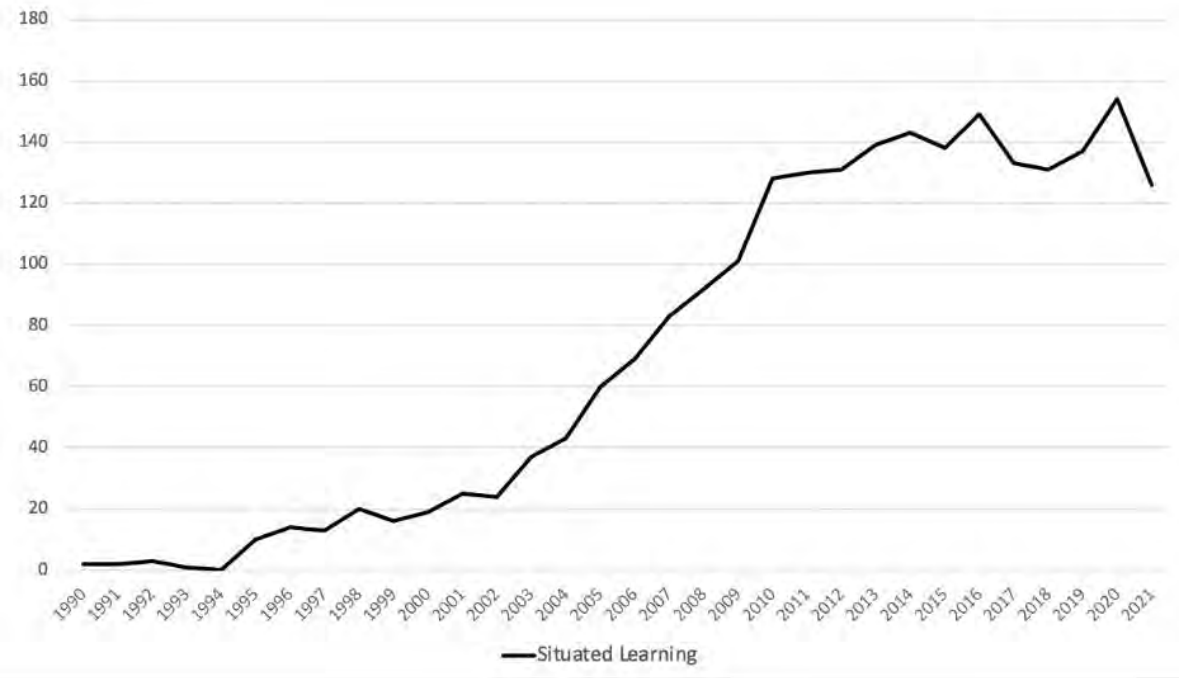

Figure 1. Publications on Situated Learning in Scopus-indexed journals

Literature Review

About Situated Learning

Since the early 1990s, some social scientists like Jean Lave and Etienne Wenger have argued that learning should not take place in isolated settings, but within authentic activities, contexts, and cultures. From this point of view, educational theory has been developed emphasizing learning as a social process whereby knowledge is co-constructed by learners and their peers in communities of practitioners, sharing in the cultural forms of activity of that community (Miner & Nicodemus, 2021). Besides the above, Situated Learning theory declares that learning occurs through legitimate peripheral participation as novices enter into the community and absorb the culture, language, and practices of expert members, becoming more competent as they move from the periphery of a community to its center. Thus, the emphasis is on learning by doing within an authentic context where learners apply knowledge and skills in real-world situations, and where assessment is seamless and emerges from the task, not separate from it (Herrington & Oliver, 2000).

Generally, Situated Learning can be understood as a discursive unit that confronts traditional and standardized education models, revealing the importance of the student's sociocultural context as a key element for acquiring skills and appropriating knowledge relevant to their reality (Lave & Wenger, 1991; Pederson, 2012; Spanellis et al., 2022; Zhang & Shang, 2016).

In addition, although the formulation of Situated Learning takes up concepts already addressed by Vygotsky concerning the social construction of reality and the need to interact with other people as levers for learning, it has included over the years some elements that have ended up characterizing its current understanding, for example, the importance of the intimate integration between "doing" and "learning" (De Pietro & Frontera, 2012) and the relevance of learning and practice communities (Handley et al., 2006). In this sense, Sagástegui (2004) affirms that "situated learning, by conceiving activity in context as the key factor in all learning, places education as an integral and inseparable part of the various practices of daily life" (p.30).

On the other hand, authors such as Li et al. (2017), Kim et al. (2020), Kang et al. (2018), or Moyo (2022) to name but a few, have stated that the current world is going through what has been called the fourth industrial revolution, where technologies with great disruptive capacity such as the Internet of Things and Big Data or artificial intelligence, have begun to take an increasingly leading role in various dimensions of human life.

About Education 4.0

From an educational perspective, the fourth industrial revolution has given way to what is known as Education 4.0, a concept in which education takes place in the context of the implementation of disrupted technologies such as Internet of Things (IoT), 3D impression, advanced cluod computing and robotics, and mainly, Artificial Intelligence (Chituc, 2021; Verma et al., 2021). Also, Education 4.0 is considered a new paradigm characterized by a shift away from traditional classroom teaching towards more personalized, technology-driven learning experiences.

A very characteristic aspect of the fourth industrial revolution that manifests itself in the complexities of Education 4.0 is the presence of three major drivers of change. On one hand, there will be a loss of certain educational products and processes. On the other hand, many of those currently in operation will be transformed, and finally, new products, processes, services and educational structures that will make use of artificial intelligence will be incorporated. The confluence of these three factors gives rise to numerous and profound changes in the educational field.

According to Ramirez-Montoya et al. (2022), in Education 4.0 the role of educators will evolve from delivering information to curating learning resources and guiding students in developing soft skills like creativity, critical thinking, and collaboration. In such context, academic programs will become more interdisciplinary to prepare students for increasingly complex real-world problems. In this sense, implementing Education 4.0 successfully will require updated teacher training, redesigned physical and digital infrastructure, and a willingness to abandon outdated practices in favor of learner-driven education empowered by technology.

Now, based on what has been expressed concerning Education 4.0, it is very worrying that in a social context of permanent change, the education system persists in the application of traditional models that reflect a very different reality from the one we live in today.

In that sense, Naz and Murad (2017) point out that it is necessary to encourage future teachers to propose different educational approaches since they tend to replicate the teaching models they have experienced as students.

According to Boud and Solomon (2001), embedding practice in authentic professional scenarios requires students to make decisions regarding varied theoretical approaches, methodologies, and technologies. This emphasis on real-world application underlines the necessity of crafting

authentic educational experiences as a route to aligning education with the needs of contemporary society.

Considering that, in addition to the previously mentioned authors who have conceptually addressed situated learning, there are various interpretations of this concept in the published literature. This variety of perspectives can pose complications and obstacles when trying to outline collaborative processes of research and development in the field of situated education, especially in a complex environment like that of the fourth industrial revolution. In this sense, it is crucial to explore this diversity and to recognize the different conceptual variations associated with situated learning to design authentic 4.0 learning experiences. That way, it is not only relevant to revisit the conceptual scope of situated learning in the light of a world with dynamics as unique as the present, but it is imperative to acknowledge the educational challenges that stem from this.

Now, to address these and other relevant issues in this matter, it has been proposed to carry out a systematic review of the literature that allows the identification of concepts, main drivers or strengths as well as main barriers related to Situated Learning.

Regarding the above, three research guiding questions were formulated, which allowed us to systematically conduct the search and organization of information:

- From an educational research perspective, what concepts have been associated with Situated Learning throughout its history?
- What are the main barriers to achieving Situated Learning?
- And finally, what are the main challenges related to achieving it?

Thus, considering the results extracted from the literature related to these questions, it becomes interesting to build some critical reflections about the ways Situated Learning could be developed in the education 4.0 context, and how this could help to reshape education.

Method

Research Design

According to Grant and Booth (2009), there are at least 14 types of literature reviews that use different methods corresponding to the purpose and characteristics of each review and consequently require methodological designs adapted to the aforementioned. In accordance with

the above, the review was conducted based on the components of a Comprehensive Literature Review (Onwuegbuzie & Frels, 2016), following the main guidelines of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement, specifically applied on data collection and analysis, as presented in Figure 2. Furthermore, to be consistent with the guiding questions previously mentioned, it was considered that a descriptive-comprehensive systematic review was the most appropriate type of review for this case. Regarding this, Sánchez-Meca (2010, p. 54), indicates that "Systematic reviews are a type of scientific research in which the scientific literature on a topic is reviewed based on a clearly and objectively formulated question, using systematic and explicit methods to locate, select and critically assess the research relevant to said question, and applying systematic protocols for data and information collection from said research, with the aim of reaching valid and objective conclusions about what the evidence says regarding the topic."

The research method is described as follows:

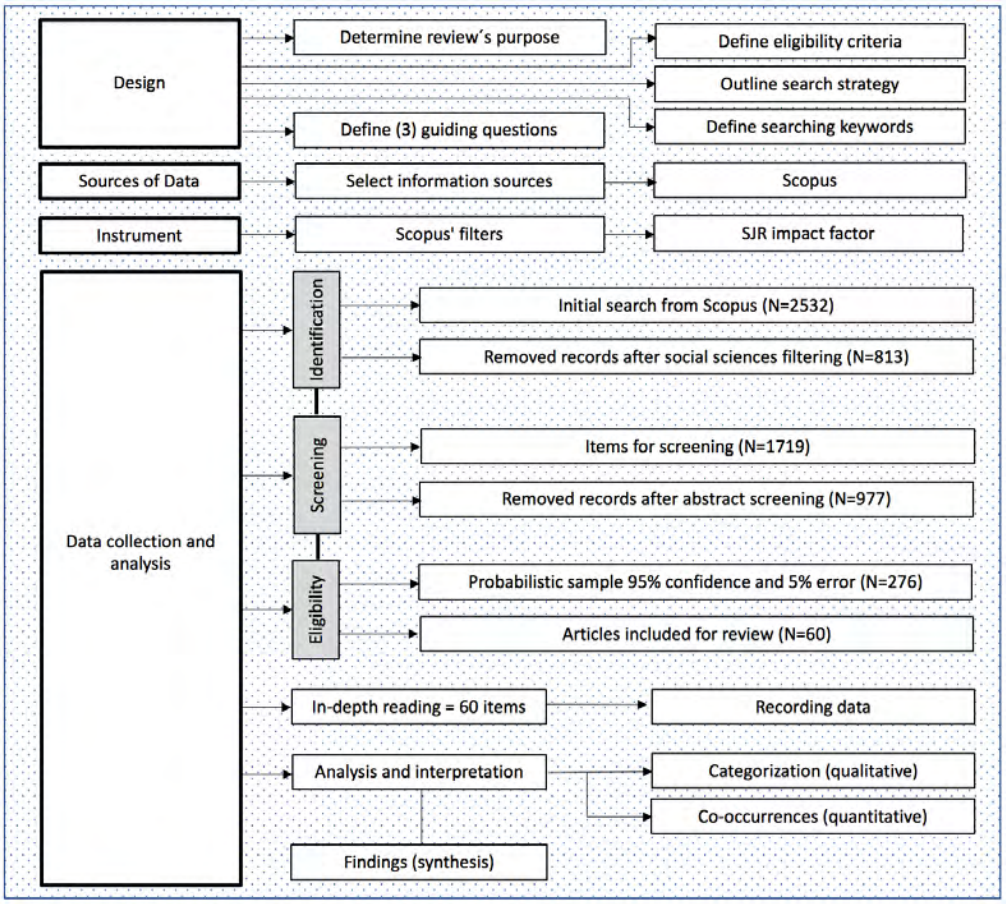

Figure 2. Review process

Determining the review´s purpose

In this phase, the scope of the review's guiding questions was determined, thereby ensuring that the previously stated purpose was adequately preserved.

Eligibility criteria

To make decisions about the studies selected and those excluded from the review, two main criteria were formulated: (1) Only articles presenting research results are included and other types of documents such as reviews, letters to the editor, editorials, reflective texts, books, and book chapters are excluded; and (2) the articles must mention, either explicitly or implicitly, in the title or abstract the review topic.

Search strategy

In defining the search strategy, an initial process of term homogenization was carried out, to include keywords that had a similar meaning and thus obtain broader and more comparable results. As a result of this process, the following search chain was established: TITLE-ABS-KEY "situated learning" or "aprendizaje situado".

Sources of Data

Considering what was mentioned by Oliveira et al. (2018) and Chaparro (2016), due to its various analytics, filtering, and data visualization tools, Scopus was used as the main source of access to the articles under review given its global academic recognition regarding reliability, coverage, and rigor in peer review and editorial processes.

Instrument

Scopus, a comprehensive abstract and citation database, provides sophisticated filtering and search tools that were leveraged to aid the screening and selection of studies for this literature review. To ensure only high-quality studies were included, several of Scopus' filters were applied during the database search process including limiting results to articles published in reputable peer-reviewed journals in relevant subject areas. Additionally, the quality of the final set of eligible studies was further evaluated by considering their Scientific Journal Rankings (SJR) score as provided by

Scopus. SJR is a citation impact index calculated based on the number and quality of citations a journal receives over 3 years. By reviewing the SJR values, we were able to effectively gauge the influence and reputation of the publications reporting the selected studies.

Data collection

Identification

From the application of the search chain in Scopus, an initial set of documents was generated (n=2532), which was filtered by area of knowledge (Social Sciences and education), and reduced to 1719 items.

Screening

After applying the inclusion and exclusion criteria, through a process of reviewing the title and abstract, the set of documents was reduced to 977 items. From this process and to configure a manageable set of texts to analyze in-depth, a probabilistic sample was prepared with parameters of 95% confidence and 5% error, thus preparing a refined set of 276 documents.

Eligibility

On this sample, again applying the inclusion criteria, a final set of documents was obtained to proceed with the in-depth reading of 60 articles.

Next, an in-depth reading was made of the articles that finally made up the last set of documents. Systematically, data relevant to the guiding questions of the review was extracted, which was recorded in a documentation matrix for later analysis.

Data analysis

The analysis of the data collected in this review was carried out in two complementary and coordinated stages. First, a qualitative analysis was conducted through a process of grouping and categorizing the main findings extracted from the reviewed studies. This allowed us to identify common themes and patterns in the data, as well as develop a framework of categories based on the key concepts that emerged from the literature review. In a second stage, a quantitative analysis

was carried out examining the frequency of appearance of certain terms and concepts throughout the studies reviewed. This provided a complementary view to the qualitative categories, highlighting which themes and keywords were mentioned most frequently in the literature.

Qualitative analysis using thematic grouping revealed 13 main categories related to the three research questions. Regarding the first review question, 4 categories of analysis were found: Workplace, communities, mobile and gaming and Education 4.0. Also, 3 categories of analysis related to the second review question were found: traditional school system, traditional educational approach, and teacher training and practice. Finally, considering the third review question, 6 categories of analysis were found: art as a key topic, critical thinking and context awareness, active agents, practice and environment, teaching and learning relationship, and context.

For its part, the complementary frequency analysis showed that the terms and concepts mentioned with the greatest recurrence throughout the 60 studies analyzed, which are shown in Figure 3, agree with and reinforce the qualitative categories previously developed. The combination of qualitative and quantitative analysis of the data collected in this review allowed us to obtain a comprehensive understanding of the key concepts and subjects that characterize the existing literature on the topic.

Findings

The purpose of this first following subsection of results is only to provide information on the quality of the sources consulted. Thus, the results related to the three guiding questions of the review are presented in the subsequent subsections.

Bibliometric Results

The 60 reviewed articles were published in several peer-reviewed journals or proceedings, in a fairly homogeneous distribution. The quality of information sources was determined by considering their SJR impact factor and quartile ranking. In this regard, the top 10 journals that addressed research about “situated learning” are shown in Table 1."

Table 1

Top 10 peer-reviewed journals regarding research about "situated learning"

Journal Name	% Articles	Impact factor	SJR quartile
Frontiers in Education Conference	1.1%	0.221	Q3
Computers and Education	1.0%	3.676	Q1
Interpreter and Translator Trainer	1.0%	1.377	Q1
Educational Technology and Society	1.0%	1.311	Q1
Teaching and Teacher Education	1.0%	1.945	Q1
Advances in Health Sciences Education	0.8%	1.010	Q1
Interactive Learning Environments	0.8%	1.165	Q1
BMC Medical Education	0.7%	0.744	Q1
Educational Technology Research and Development	0.7%	1.718	Q1
Journal of Workplace Learning	0.6%	0.497	Q2

Source: Own elaboration based on Scopus data

Results Regarding The First Review Question: Situated Learning As A Dynamic Concept

The development of this second results section was based on finding answers to the first research question, which was: What have been the concepts associated with Situated Learning throughout its history? Initially, through a literature review, it is possible to find that understanding Situated Learning acknowledges the importance of the context in the learning process. However, there are slight variations in emphasis from different influential authors, such as Lave and Wenger (1991), Brown and Duguid (2017), and even in connection with well-established learning theories like Bruner (2000), Vygotsky (Hung & Chen, 2001), or Perkins (Daly et al., 2013). Moreover, from the perspective of data analysis extracted in the review, it was found that, while Situated Learning has maintained the central idea of 'learning in context' over the years, this idea has involved the integration of various elements at different points in its history. For this purpose, an analysis was conducted on the data extracted from four time periods, corresponding to the 1990s, the 2000s, the 2010s, and the last three years of this review, up to the year 2022. The most representative elements of these four eras are summarized in Figure 3."

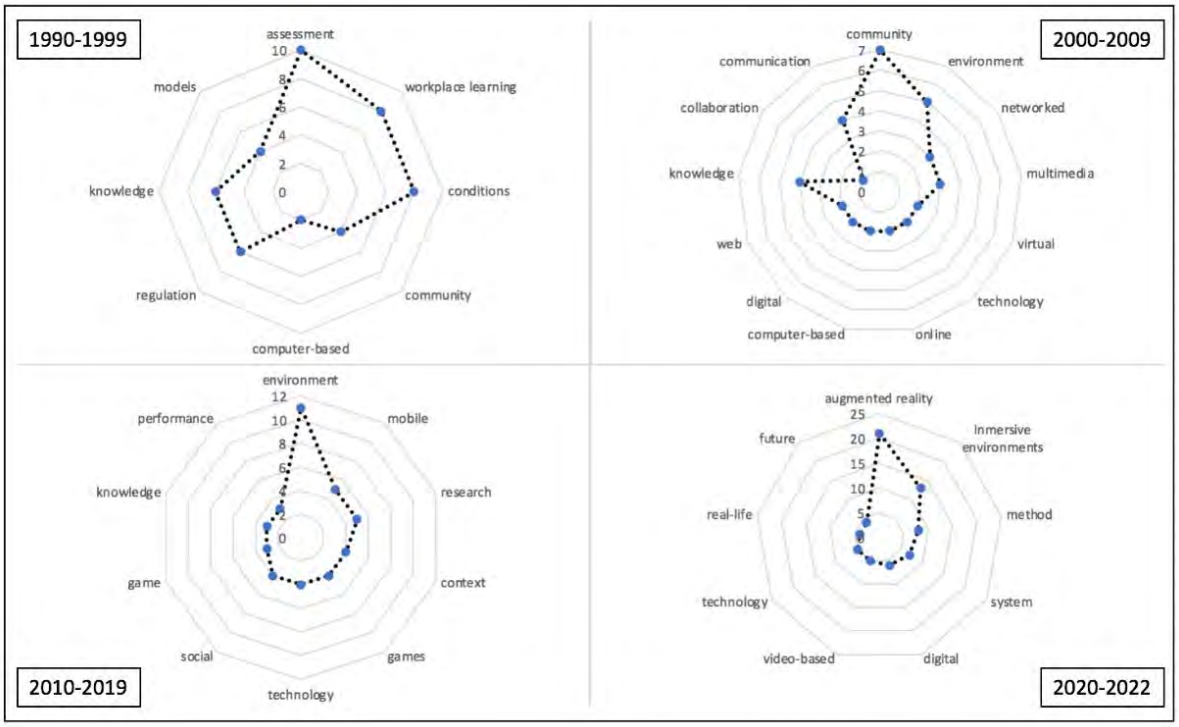

Figure 3. Comparative timeline about concepts related to Situated learning

The 90s: Situated Learning in the Workplace

At the top left of Figure 3, the concepts most frequently associated with Situated Learning in the reviewed articles from the 1990s are presented. The concept with the highest frequency (n=10; 0.94%) was "assessment," followed by "workplace learning" (n=8; 0.75%) and two others related to this same concept, such as "conditions" (n=8; 0.75%) and "community" (n=7; 0.75%). The frequency of these concepts, based on the review of the articles they come from, suggests that the central focus of research and reflection on Situated Learning is clearly on the context, but a very particular context: the workplace as a learning environment, the conditions that exist in these environments, and the sense of community that can be developed within them. In addition to this, the question of developing learning assessment processes in this environment at issue has been particularly relevant.

Examples of the above can be found in Freedman and Relan (1990), Biemans and Simons (1992), Young (1993), and Khan et al. (1998).

The 2000s: ICT-Based Communities of Practice

During this period, the reviewed studies on Situated Learning showed a special emphasis on the construction of authentic learning environments, mediated by digital technologies and particularly nuanced through communities of practice.

The extracted data shows two groups of elements related to Situated Learning. The first group consists of only two elements, but they are the most frequently mentioned: "community" (n=7; 0.65%) and "environment" (n=5; 0.47%). The second group comprises numerous elements with lower frequencies but focused on a common theme: the use of digital technologies. In this sense, the appearance of terms like "networked" and "multimedia" (n=3; 0.28%) and "virtual," "technology," "online," "computer-based," "digital," and "web" (n=2; 0.19%) is highlighted.

It is interesting to note that the sense of community, which in previous years was referenced as a fundamental aspect of the "context," expands itself during this period to settings beyond face-to-face student interaction, including their family or people in their vicinity. Thus, communities that support and enrich student interaction also begin to develop in virtual settings, enabling the participation of individuals with diverse cultural and social backgrounds, quite different from the student's place of origin. In this sense, being part of an online community of practice or learning means transcending the barriers of one's own physical and political borders, thereby opening up the possibilities of becoming a global citizen who learns in an environment that combines the local and the global – the best of both worlds.

Examples of the above can be found in Herrington and Oliver (2000), Johnson (2001), Ben-Ari (2004), Raudaskoski (2006), and Sense (2007).

The 2010s: The Mobile and Gaming Revolution

As an evolution of what happened in the previous decade, the early years of the new millennium show a dynamic shift in Situated Learning, involving a set of technologies that give a distinct character to the learning experiences, particularly focused on digital immersion and mobility.

The main elements associated with Situated Learning during this decade are "environment" (n=11; 0.53%), "mobile" (n=5; 0.24%), and a variety of elements like "social," "games," "context," or "performance" (n=4; 0.94%).

Based on what was found, it should be noted that the development of mobile technologies, the expansion of cellular networks, and the increasing availability of mobile devices with greater

capabilities and functionalities at a lower cost make it possible to learn in a wide range of contexts. These technologies shift the learning context as students also move, and they enable an organic integration of gamification elements, adding interest, fun, and engagement to the learning experience.

Examples of the above can be found in Ovens et al. (2013), Cain and Piascik (2015), Berkhout et al. (2018), and Goodyear et al. (2019).

The Recent Years (2020 to 2023): Learning in the 4.0 context

The last three years of this review yielded results focused on analyzing Situated Learning within the context of the Fourth Industrial Revolution, which proposes a learning environment mediated by a package of technologies with a high potential for disruption. As a result, there is a marked focus on simulations, immersive environments, the use of AI, the Internet of Things, and educational robotics.

The main elements associated with Situated Learning during this period are "augmented reality" (n=21; 4.08%), "immersive environments" (n=13; 2.76%), "system" (n=7; 1.65%), "digital," "video-based" (n=5; 1.18%), and a variety of elements like "technology," "real-life," or "future" (n=4; 0.94%).

Examples of the above can be found in Ledger and Fischetti (2020), Parsons and MacCallum (2021), Shih et al. (2021), and Al-Hakim et al. (2022).

The results that have been found, especially since the 2000s to date, point to an educational reshaping, especially towards the implementation of virtual communities of practice, which are presented as an alternative that favors accessibility and relevance. Regarding the above, Situated Learning powered by AI is scalable and cost-effective, making these engaging learning experiences accessible to a greater number of students. In such a way, learning becomes grounded in professional contexts and focused on building skills that help the transfer to real-life applications.

Results Regarding The Second Review Question: About Barriers Related To Situated Learning

To address possible answers to the second review question which is: What are the main barriers to achieving Situated Learning?, the data extracted from the articles reviewed and subsequently

analyzed allowed us to identify three main categories of obstacles to the effective implementation of Situated Learning, which are described below.

Obstacles Related to the Traditional School System

One of the aspects that generates tension and is heavily questioned in the review articles is the traditional school system, characterized as hegemonic and centralizing knowledge, with little connection to real learning contexts. Authors such as Matsko (2022), Chou (2007), Garritz (2010), McKoy (2013), and Salvà-Tomàs et al. (2019) strongly criticize the traditional school system for maintaining a vertical, one-way teaching approach, focused solely on the presentation of information to a captive and passive audience, with no opportunity for interaction or connection with the real context. As a result, this significantly limits students' and teachers' ability to understand critically their environment, to socialize, and to construct knowledge in their everyday backgrounds.

Obstacles Related to the Traditional Educational Approach

Another concern among educational researchers related to situated learning is that the traditional system does not deal with education from the perspective of social and political practice. It mainly focuses on predefined outcomes, competencies, and content, largely excluding the knowledge, interests, and needs of both students and teachers. In this regard, Muñoz Solís (2015) emphasizes the need to understand learning as an evolutionary, constructive, and situated process that develops itself through interaction in the real and everyday context of students. This is the primary limitation of the traditional educational approach, as it fails to conceptualize learning as a cognitive, social, and behavioral process embedded in the realities and specific environments of learners.

Obstacles Related to Teacher Training and Practice

In addition to the above, Chou (2007) mentions that teachers often lack an understanding of current social issues, and the cultural diversity of their students, and have limited sensitivity to the contexts in which students operate. Authors like Amatea et al. (2012) describe frequent cultural clashes and highlight the need for teaching experiences in real contexts rather than simulated classroom settings. On the other hand, Hernández-Selles et al. (2015) strongly criticize the one-way transmission of abstract and outdated content prevalent in the traditional academic system. In this

sense, most documented experiences in situated learning do not extend beyond the classroom, with no real-world connection or impact.

According to it, the roles of teachers in situated learning should create flexible, organized, and innovative learning spaces that connect the classroom with the real context. However, according to Berbel Gómez et al. (2020) and other authors, most teachers have very limited knowledge of social issues and the cultural diversity of their students alike. Therefore, situated learning and its approach should be deeply integrated into teaching practices, facilitating the application of skills by allowing autonomous situated decision-making.

Data found in the review regarding the above results focuses primarily on educational reshaping in terms of personalization and student agency. In this sense, AI has the potential to make learning highly personalized and adaptable based on the unique needs, abilities, and interests of each student, which would allow progress in the transformation of the current educational system of an industrial nature and designed for massification. Moreover, Learners can have more control over their learning pathway, co-directing it in collaboration with intelligent agents.

Results Regarding The Third Review Question: About The Challenges Of Implementing Situated Learning

To address possible answers to the third review question, which is: what are the main challenges related to the achievement of Situated Learning?, the data extracted from the articles reviewed and subsequently analyzed allowed us to identify six main categories of challenges related to the implementation of Situated Learning. Below are the highlights related to these results.

Challenge #1: Linking Art in Teaching and Learning Processes

Authors such as Berbel Gómez et al. (2020) strongly advocate for collaborative work in artistic and musical settings within educational institutions. They argue that these creative approaches can contribute students to confronting uncertainty, the unexpected, and the unknown, thereby increasing their ability to effect valuable changes in their environments. Furthermore, they recognize the urgent need to transform traditional teaching and learning models to make use of new pedagogical approaches, that foster situated learning from a creative and collaborative perspective (Harris, 2014). Integrating art in education allows for the development of creativity, and collaboration, and prepares students to navigate into a complex and uncertain world. However,

it is essential to go beyond isolated classroom experiences and to incorporate systematically art into the educational process for a real impact.

Challenge #2: Shaping Critical and Context-Aware Individuals

The primary educational challenge throughout history has been actively contributing to the formation of individuals with a strong ethical and moral capacity, enabling them to identify viable solutions to the complex problems they encounter in their environment and context (Garritz, 2010). In this regard, as stated by Sagástegui (2004), situated learning allows us to recognize that every reality is multifaceted and multicausal, requiring students to be prepared to address this complexity. The formation of critical, ethical individuals capable of positively transforming their contexts is fundamental and can be achieved mainly by connecting education to the real issues students face.

Challenge #3: Recognizing Students and Teachers as Active Agents

According to Hevia & Fueyo (2018), 21st-century education invites us to view all members of the educational communities as rights-holders and, above all, as active agents of change, both individually and collectively within their specific contexts. This demands strong stimulation of their ability to anticipate, formulate, and solve problems within their concrete realities. From this perspective, it is crucial to leave behind the passive view and to acknowledge the active role of students and teachers as knowledge constructors situated in their contexts, as well as transformers of their realities. This requires the provision of spaces for the real exercise of this change agency.

Challenge #4: Understanding Situated Learning Beyond Practice

Achieving situated learning is not an easy task. It proves to be a challenging endeavor as it entails intentionally situating various educational agents within their real contexts, from which they acquire and transmit situated knowledge (Miner & Nicodemus, 2021). As Pederson (2012) points out, communities learn precisely through the interaction between individuals, contexts, and relationships. To ensure this is genuinely achieved, it is essential that learning goes beyond the procedural or practical aspects, as practice naturally occurs in a real environment. This aims for a higher level of understanding of learning in all its dimensions, which is socially constructed and

rooted in the real context, by considering a paradigm shift that conceives knowledge in a dialectical relationship between the community, the individual, and their environment.

Challenge #5: Rethinking Teaching-Learning Processes

From a didactic perspective, the primary challenge is to fully recognize the inherently dynamic and changing nature of situated learning and to move away from the traditional linear, static approach to teaching (Nai & Hassan, 2022). Urgent deep rethinking of formative processes is required to overcome the vertical and static logic of traditional teaching, thus transitioning towards situated, dynamic, and horizontal models instead where participants and their contexts may be the focus of learning. The active participation of students and teachers as agents of change is essential for this transformation (Sagástegui, 2004).

Challenge #6: Recognizing Context as a Facilitator of Expression

Strong belonging and identity within specific communities of practice are also experienced in the everyday cultural and leisure activities of learners. Therefore, it is crucial to provide real space for the expressions and unique characteristics of diverse educational communities (Niemeyer, 2006). Against this background, it is essential to validate and pedagogically leverage situated knowledge based on everyday contexts, as well as cultural expressions and informal exchange spaces, as they reflect the identity of the context and facilitate learning (Duggan et al., 2020).

This review highlights two key areas in which the integration of AI and situated learning paradigms promotes the re-shaping of education: enhancing authenticity and transforming evaluation. Firstly, simulated environments and intelligent agents allow learners to participate in authentic professional practices and engage with complex, real-world problems (Baker et al., 2016). This promotes the development of practical skills and expertise through experiential learning. Secondly, AI's data analytics capabilities facilitate competency-based assessment intricately woven into the learning process rather than as an external audit of knowledge (Ingkavara et al., 2022). Assessment becomes fully integrated within situated learning activities. In these two critical ways, AI-driven situated learning enables the re-imagining of education to be more authentic and better connected to skill application in professional contexts.

Discussion

In this section, our aim is to offer some insights on the ramifications of the findings derived from this review, as they relate to an educational landscape that is progressively influenced by fourth industrial revolution technologies, with a particular emphasis on artificial intelligence.

Considering the main concepts found in recent years´ publications about situated learning, which are related to immersive and augmented context, it is very suggestive to refer to the image of 'augmented education' presented by Bellomo (2023) in his recent work on the impact of AI on education. Applying the notion of 'augmented reality' to 'situated learning' is a promising line with an interesting conceptual implication. Its components highlight the idea of contact with reality and that of 'augmenting it', which could be translated as an enrichment of the educational experience. It can be thought that to some extent the dimension of the 'situated' is strengthened and therefore can be a stimulus for better and greater learning. In the same direction, Hamilton et al., (2021) point out that technologies like 'virtual reality' should be seen as a reinforcement, not a substitute for the original educational action.

The findings from this review reveal several implications that may pose as obstacles to successfully implementing situated learning within the context of Education 4.0. It's been said that the traditional conception of the educational system is top-down from the ministerial and administrative authorities to the classroom as a unidirectional type of educational process. Technological hybridization and the irruption of AI in the classroom cast doubt upon this single and vertical direction and horizontalize relationships in the classroom and the system altogether. In this context, the dictation of guidelines from heavy central structures is unsustainable (Peters, 2009).

Another conceptual implication is related to the traditional conception of learning, which stresses the individual dimension of learning and ignores the key educational weight of the student´s social dimension. In this regard, Daura and Durand (2022) point out that 'situated personalization' has become a requirement and condition for the achievement of diverse and not uniformly learning outcomes, as expected in 21st-century education.

The third implication highlights the need for a fundamental shift in teacher training approaches in order to reduce the emphasis on content mastery and instead focus on developing educators' abilities to critically curate and assimilate content. This policy change poses a major challenge to teacher training practices (OECD, 2023).

The challenges associated with situated learning in the context of technological innovation, particularly related to artificial intelligence (AI), imply crucial considerations for effective integration. To meet these challenges, students and teachers must actively resist complacency and rote repetition, which can stem from the predictive capabilities of generative AI. By doing so, they can cultivate the skills needed for effective integration of situated learning and AI technology (Rouhiainen, 2019). This underscores the importance of fostering 'human originality' achieved through the strengthening of critical thinking and complex skills.

When applying AI in situated learning, it becomes apparent that simply replicating renowned works of art or relying on AI-generated content lacks sustained value. The emphasis should instead be on developing the capacity to think critically, analyze artistic works, pose meaningful problems, and engage in thoughtful interactions (Bellomo, 2023).

Regarding the practical implications of leveraging AI in situated learning, it is essential to move beyond passively consuming algorithmic outputs. Rather, the successful use of AI requires individuals to actively strengthen their critical thinking capacities by questioning results, challenging successive answers, and maintaining a nonconformist perspective. The key message is that AI proves most beneficial for situated learning when approached with an attitude centered on thoughtful inquiry, active interrogation of responses, and ongoing critical analysis.

Additionally, several pedagogical obstacles rooted in traditional school systems hinder implementing situated learning, particularly the one-way passive learning model fixated on transmitting abstract information without connecting students to real-world contexts. AI could help overcome these barriers through intelligent tutors and virtual coaches that deliver personalized, interactive feedback tailored to each student's situational needs and interests. Also, AI-enabled immersive simulations situate learning in authentic, relevant scenarios, bridging classroom and real-world environments.

Similarly, the predominant educational approach focuses on fixed outcomes, competencies and content while largely overlooking evolving student knowledge and realities. In contrast, adaptive AI systems can align instruction to developing student needs and interests rather than predefined curricula. Intelligent AI tutors also scaffold learning by targeting guidance to each learner's zone of proximal development as they interact with real or simulated settings.

Notably, AI emerges as an ideal ally for teachers who struggle to implement situated teaching approaches. The student's immediate context should be a core component of curriculum design

and instructional delivery, moving away from standardized one-size-fits-all content. In this vein, AI tools can aid teachers in surmounting barriers through labor-saving automation and data-driven insights – freeing time and energy for high-quality situated instruction. Specifically, AI can handle administrative and organizational tasks, while advanced analytics pinpoint precise areas where teachers require further contextual knowledge or training. Additionally, thoughtfully designed AI recommendation systems could suggest personalized, real-time resources to bolster teacher readiness in meeting the diverse situated needs of learners. Ultimately, AI enables focusing the curriculum and instruction on the particularities of each student's context rather than predefined, generalized content.

Conclusion

This systematic review reveals that situated learning's fundamental premise - that knowledge is socially constructed within authentic contexts - remains critically important for meaningful learning in today's complex interconnected society. However, findings confirm rigid educational models still dominate, propagating abstract, passive information transfer disconnected from students' realities.

With this in mind, AI presents a variety of tangible solutions to bridge this persistent disconnection through personalized, interactive intelligent tutoring; immersive simulated scenarios; automated administrative tasks; and data-driven teacher support. Integrating these innovations thoughtfully holds promise for enhanced contextualization, social knowledge construction, and real-world connections.

However, simply inserting technology falls short of actualizing situated learning's potential. Rather, seizing situated learning's promise in the dawning AI age makes education itself reimagined wholly. This entails framing students and teachers as empowered, creative agents actively co-constructing dynamic context-connected knowledge collaboratively.

Grounding this vision, learners and instructors should increasingly create participatory simulations combining virtual environments with real experience. Here, AI recommendation systems can suggest timely personalized resources, while analytics identify precise teacher support needs - freeing energy for quality situated instruction. However, human guidance remains essential, instilling ethical reasoning skills to question AI biases.

Additionally, instead of isolated projects, AI integration should permeate curricula enabling creative confrontation with uncertainty - increasing student agency to transform contexts.

Similarly, promoting active societal engagement leads to critical ethical citizenship central to situated learning's social change orientation.

This review equips stakeholders with evidence and insights on obstacles and opportunities for integrating situated learning through AI. Realizing education's full potential in an era of accelerating change obliges implementing policies, curricula, assessments, and teacher training that permeate contextualization, co-creation, and learner agency. Further research should continue exploring impactful AI integration that meaningfully augments human strengths while mitigating predictive limitations. Only by fully embracing situated learning, the education be relevant amidst evolving societal realities exponentially.

Beyond reimagined learning, the situated perspective also has implications for educational spaces themselves. Rather than confining learning to rigid classroom configurations, infrastructure, and design approaches, it should support a lot to reconfigure environments flexibly to match evolving learning activities.

Finally, fulfilling the potential of situated learning in the era of artificial intelligence necessitates holistic reshaping of educational interactions, content, contexts, and spaces. This systems-wide transformation, while ambitious, is imperative for empowering learners through context-connected, co-creative knowledge building amidst accelerating societal shifts. In such a context, AI provides the adaptive scaffolding and analytics to scale situated learning's advantages. Simultaneously, situated learning offers AI-driven education a meaningful grounding in real-world practices and complexity. These two approaches are profoundly complementary and demand the reinvention of learning ecosystems – from how learners and AI agents interact collaboratively to the authenticity of challenges undertaken. By enabling personalized apprenticeship into communities of practice, AI-enhanced situated learning can spearhead education's ongoing evolution, leading learners to thrive amidst transformational change by integrating thinking with dynamic context.

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