THE IMPACT OF FLEXIBLE CLASSROOMS ON LEARNING: RESEARCH PERSPECTIVES

L'IMPATTO DELLE AULE FLESSIBILI SULL'APPRENDIMENTO: PROSPETTIVE DI RICERCA

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ABSTRACT
This study explores research perspectives on the impact of flexible classrooms on learning. Through an overview of the scientific literature, we analyze the dynamics of learning processes in these environments; the results of existing empirical studies indicate a significant improvement in student engagement and teacher adaptability: innovation in space design and flexibility in furniture promote creativity and collaboration. As flexible classrooms represent a positive change, further research is needed to fully understand the long-term impacts and to develop effective guidelines for creating layouts for innovative and inclusive educational environments.

Questo studio esplora le prospettive di ricerca relative all'impatto delle aule flessibili sull'apprendimento. Attraverso una panoramica della letteratura scientifica, analizziamo le dinamiche dei processi didattici in questi ambienti; i risultati di studi empirici esistenti indicano un significativo miglioramento nell'engagement degli studenti e nell'adattabilità degli insegnanti: l'innovazione nella progettazione degli spazi e la flessibilità degli arredi e promuovono la creatività e la collaborazione. Poiché le aule flessibili rappresentano una svolta positiva, ulteriori ricerche sono necessarie per comprendere appieno gli impatti a lungo termine e per sviluppare linee guida efficaci nella creazione di layout per ambienti educativi innovativi e inclusivi.

KEYWORDS
Flexible classroom; Educational spaces; Engagement; Learning; Inclusion.
Flexible classroom; Spazi educativi; Impegno; Learning; Inclusion.

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Introduction[1]

The contemporary educational landscape is constantly evolving, driven by a growing awareness of the importance of learning environments in the education of students (Stadler-Altmann, 2018). Among the new proposals that have gained notoriety, 'flexible classrooms' emerge as an innovative response to the challenges of traditional classroom layout. This concept does not merely redefine physical space but underlines a revolution in the very approach to teaching and learning.

Traditional classrooms, characterized by rows of desks and aligned desks, are giving way to a more adaptable, student-centered approach. At a time when diversity in teaching methodologies demands an equally active environment, flexible classrooms present themselves as a catalyst for change. Their design (Weyland, B. C., & Attia,2015) aims to create a dynamic space that not only conforms to but anticipates teaching needs, promoting more active participation and effective learning.

This article aims to probe the impact of flexible classrooms on learning from an inclusive perspective (Todino, Aiello, Sibilio, 2016), paying particular attention to the research perspectives that are shaping the future of this educational innovation. Through an in-depth analysis of the scientific literature, we intend to highlight the main trends, challenges, and opportunities that characterize the use of flexible classrooms, providing a reflective guide for educators, designers, and researchers.

We will begin by outlining the very concept of flexible classrooms and the evolution of their role in contemporary education. Next, we will explore the underlying reasons for the increasing adoption of such spaces, focusing on their ability to adapt to the changing needs of teachers and students. Moving forward, we will examine the evidence and reflections emerging from the literature, focusing on student engagement, teacher flexibility, and learning dynamics. We will conclude with a look into the future, outlining the challenges that await research in this evolving field and the prospects that promise to enrich the educational landscape further.

[1] **Dr. Vincenza Barra** is the author of the article.
Prof. Felice Corona is the Scientific Supervisor of the research.

1. Flexibility as new learning design in the classroom: an overview

The structure of school buildings and the design of classrooms that have an impact on teaching and education? According to Kahlert, Nitsche, and Zierer (2013), attention to the structural conditions of schools and classrooms has been marginalized in German and international educational research. Few studies focus specifically on the interaction between teachers and students in school settings, as highlighted by Woolner (2010) and Higgins et al. (2005), which conclude teaching and learning from their observations. Previous studies, such as those of Moos (1979), Steele (1973), and Bronfenbrenner (1981; 2005), which explore this report from different perspectives, continue to exert influence. These papers present models that clarify the connections between the learning environment and the educational development of students, providing crucial foundations for understanding such relationships.

The model proposed by Moos emphasizes the crucial role of environmental conditions, with particular emphasis on material conditions. Moos states that "architecture and physical design can influence psychological states and social behavior" (Moos, 1979), distinguishing himself as one of the pioneers in highlighting this connection. Thanks to his model, he has greatly influenced research in the field of architecture psychology and educational sciences, paving the way for a potential further impact on the teaching-learning environment over time.

In parallel, Steele (1973) conducted an in-depth analysis of the fundamental functions of school architecture and classroom design. Five of these functions have become recurring pillars in educational contexts, as also pointed out by Weinstein (2007) and Weinstein et al. (2011): safety and shelter, pleasure, symbolic identification, task instrumentality and social contact. By the considerations of Steele, Weinstein and others, these basic needs for successful teaching and learning must be adequately met, especially when evaluating the learning environment in the classroom.

Bronfenbrenner (1981; 2005) focuses his attention on socio-ecological conditions in schools and teaching. His perspective goes beyond purely material factors, considering the learning environment as a social space. His works are a catalyst for educational theory on the design of learning environments, with a significant reworking in works such as the "Didaktik der Lernökologie" by Werner Sacher (2006).

Higgins et al. (2005) raise fundamental questions about the strengths and weaknesses of the design of school buildings and classrooms. Questions about

classroom design differ slightly, as they focus on investigating the impact of materials and the environment on well-being, teaching, learning, and performance. In this context, research on the learning environment often focuses on specific details, neglecting wider dynamics and correlations, as critically highlighted by Gislason (2011), Higgins et al. (2005) and Kahlert et al. (2013) in their respective research areas. This criticism is particularly directed towards empirical works in the psychology of architecture and the sciences of education.

According to Higgins et al. (2005, p. 6), «Existing empirical research on the impacts of the environment on teaching and learning tends to focus more on certain elements (for example, noise) and not to synthesize understandings (for example, the implications of noise and temperature research tend to conflict). Cultural and geographical differences also highlight the importance of context sensitivity. For these reasons, it is very difficult to make judgments on which areas are 'worthy' of attention». This quote highlights the challenges in synthesizing and understanding the complex impacts of the environment on teaching and learning.

Traditional classrooms with fixed seating tend to promote a linear, one-way learning and teaching process. In response to this limitation, numerous educational institutions are embracing the approach of flexible classes, integrated with technologies and Internet connections (Neill, 2008; Eryilmaz, Adalar & Icinak, 2015). Pedagogically, learning environments should serve as spaces where teachers and students collaborate in exploring knowledge. An effective learning environment must be flexible enough to allow the design of multiple teaching approaches, such as individual work and reflection, one-on-one teaching, peer discussion, working in small groups, direct education by teachers, student presentations, and so on.

Traditional classrooms, with fixed seating arrangements, limit teaching and learning to predefined directional flows. To highlight this connection between space and learning, many institutions are experimenting with the implementation of flexible classrooms. According to Rydeen (1993), schools should be flexible enough to support the diversity of evolving educational strategies. Rydeen proposes that elements such as folding partition walls, conference rooms for large groups, spaces for small groups and staff offices are integrated into the design to ensure greater adaptability and functionality.

In flexibly designed learning environments, students engage in various activities, which may include studying lying on the mat, sitting on low tables, cushions or beanbags. Students have the freedom to work both individually and in groups, allowing the simultaneous performance of different educational activities.

Effective use of flexible classroom environments requires high environmental competence from teachers. This competence implies the awareness of the physical characteristics of the environment and the ability to control or modify the environment itself. Lackney (2008) stressed that the lack of environmental competence could lead to a teacher-centered pedagogical approach in flexible learning environments. However, understanding the impact of the environment often depends on direct experience rather than formal instructions (Horne-Martin, 2002), and a recent study found that teachers' discoveries in a flexible learning environment are of great value to building trust (Frith, 2015).

In addition, a significant feature of flexible learning environments is their size large enough to support a wide range of educational activities. These dimensions allow the adoption of different grouping strategies, including classes for the whole class, teaching in mixed classes, working in small groups and individual study (Gump, 1987), adaptable to the specific type of course (Folkins, Friberg & Cesarini, 2015). A class of this type is also suitable for a student who needs assistance with individual lessons with the teacher or a companion, ensuring an environment in which he is not disturbed by other students (Clark, 2002; McAllister & Hadjri, 2013).

2. Flexibility in distance education: flexible delivery and flexible learning

To outline flexibility in this context, two concepts are commonly referred to: flexible delivery and flexible learning. Flexible delivery focuses on pupil access options, including the "what", the "where" and the "when" of learning. This approach is primarily associated with the management and administration of access, content, delivery style, logistics, and productivity (Smith, 2000; Taylor, 2000).

In contrast, flexible learning focuses on possibilities regarding the way learning takes place, namely the process of acquiring knowledge. This approach is primarily concerned with facilitating the specific learning process of each student, to offer high-quality learning experiences. This facilitation takes place through consideration of the student's personal characteristics, learning styles, job responsibilities, learning needs and desires and personal circumstances (Nikolova & Collis, 1998; Nunan, George, & McCausland, 2000; Smith, 2001).

The concept of flexibility in distance learning is nothing new. In Australia, educators have long implemented a flexible delivery model to guide their distance learning practices (Evans, 1999). Similarly, other countries, such as the UK Open University, have worked to integrate a flexible delivery model into their distance learning initiatives. Despite the positive intentions, the reception of this approach remains varied and the results in terms of impact remain uncertain (Owston, 2000). An

analysis of the key principles associated with flexibility can contribute to a deeper understanding of what is needed to implement flexibility. In addition, exploring the delivery of flexibility and flexible learning can provide valuable insights into what is needed to establish a solid foundation for distance learning.

One of the distinctive aspects of flexibility in learning is the recognition of the diversity present in our learning aspirations. These differences relate to what we want to learn when we need to learn, where we need access to learning resources, why we want to learn and how we prefer to learn, whether in collaboration with others or in an individual way. Educators can help meet these differences by recognizing the individual needs of students and adapting flexibility to meet those needs. A fundamental goal of flexibility in educational settings is to facilitate the integration of learning into people's lives, which is often quite complex. Flexibility can be implemented in a variety of ways, offering various options to address these differences through a variety of constructive approaches.

First, you can make a selection about what to learn. Content flexibility can take many different forms, from the complete openness in which the student makes all decisions, to the provision of options within a specific framework defined by the teacher. Flexibility in what to learn and who to learn is a basic principle of constructive learning (Duffy, Lowyck, & Jonassen, 1993). Allowing students to select content can play a significant role in their overall satisfaction, especially for adult students. Finding ways to support content selection can help increase the flexibility of the learning experience.

3. Designing classrooms for success: environmental considerations and student feedback in the 21st century

The physical configuration of the classrooms continues to evolve, moving away from the traditional arrangement with benches facing the front. In conventional educational contexts, students usually occupy front-facing benches where the teacher or podium is placed frontally (Sawers, Wicks, Mvududu, Seeley, & Copeland, 2016). Currently, there is a transition to a design that adopts flexible seating, allowing students more freedom of choice and options. The idea of incorporating flexible seating recalls the atmosphere of a café or a "Starbucks" environment, where students can work freely within the space (Havig, 2017). The physical environment of classrooms plays a crucial role in influencing students' enthusiasm and academic performance. Education professionals are actively exploring ways to continue this trajectory to ensure students' success (Dotterer & Lowe, 2011). Student comfort in the learning environment is essential for them to

engage fully. This, in turn, will foster greater engagement, making students more likely to participate in discussions and contribute to a more meaningful and impactful learning experience (Reyes, Brackett, Rivers, White, & Salovey, 2012).

Funding has recently emerged as a major concern, as policymakers have adopted performance-based models to distribute resources. This change has led researchers to devote more time and energy to the analysis of the factors that characterize the ideal educational experiences (Granito & Santana, 2016). In result-based models, the primary goal is student success. To ensure that students reach their full potential, it is essential to examine the factors that influence their outcomes. Among these, student engagement emerges as a key element, defined as the amount of time and energy students devote to studying. This has been linked to cognitive skills, university adaptation and personal growth, all factors contributing to student success» (Granito & Santana, 2016). Levels of commitment in the classroom are directly reflected in student success. Because engagement is related to students' attitudes and perceptions, the learning environment must be designed to meet their needs. In addition, environmental conditions such as temperature, wall color, lighting, air quality and acoustics can affect students' learning (Granito & Santana, 2016). By carefully analyzing the classroom environment, educators can determine how to structure effective learning spaces to foster student success.

Within current classroom environments, teachers persist in promoting change to shape the most effective learning environment for students. Gaining an in-depth understanding of this environment is beneficial both for student outcomes and for the relationship dynamics between teachers and students in the classroom. In assessing the most favorable context for students, it is essential to consider a variety of factors that contribute to their success. This includes not only the physical design of the classroom but also the decor of the walls, seating options, the possibility of choice by students and the use of technologies. In an ever-changing world, classrooms are constantly distancing themselves from the traditional structure. The ability to thoroughly understand how to create an optimal learning environment for students is crucial to ensuring their success.

School engagement is defined through a clear understanding of students' behaviors, thoughts and feelings concerning their classroom experiences (Dotterer & Lowe, 2011). The current educational trend moves away from the traditional and rigid structure of classrooms to create environments conducive to student collaboration. 21st-century classrooms feature «work tables and rotating chairs that can be arranged as needed for collaborative and group projects, teacher-led workshops, design workshops and student presentations» (Adedokun, Burgess, Henke, & Parker, 2017). Exploring how teachers can manipulate and structure the

classroom environment to fit the needs of 21st century students comes as a key to promoting student success and achievement.

To create a school environment specifically designed to fit the needs of all students, educators need to consider several elements, including the effects of the «Social, educational and organizational climate of schools on both the engagement of students and their academic achievements» (Dotterer & Lowe, 2011, p. 1650). To meet the various learning needs of students, teachers must also consider the physical environment since «Students react differently to the immediate learning environment during concentration: sound versus silence, brightness versus soft lighting, warm versus cool versus formal versus informal seating» (Burke & Burke-Samide, 2004). Careful attention to environmental factors will guide educators in the targeted design of classrooms, thus creating contexts that foster learning significantly.

Identifying key factors for student success in the classroom is crucial, and the classroom environment plays a crucial role in this context. The physical design of classrooms is concretely translated into educational theories, philosophies and values (Rands & Gansemer-Topf, 2017). Classrooms that prioritize concepts such as seating and open workspaces foster collaboration, transforming the classroom into an open space dedicated to learning, away from the austere traditional environment. Open spaces offer benefits to both students and teachers. They allow teachers to interact with groups of students more naturally, favoring a more comfortable discussion. In addition, flexible classroom design promotes interaction, helping to create closer links between teachers and students (Rands & Gansemer-Topf, 2017). Open spaces also facilitate active learning, which has become an integral part of the student's learning experience, offering them the opportunity to be protagonists of their educational path (Rands & Gansemer-Topf, 2017).

4. **Does flexibility in seating and choice of workplace have an impact on student engagement**?

Currently, classroom configurations are undergoing a series of transformations, including the renovation of traditional classrooms to better fit the learning needs of the 21st century. The learning environment plays a crucial role in the student experience (Beard & Wilson, 2013). The layout of the classrooms, the teachers, the sounds, the light, the temperature and the decorations help to define the learning atmosphere. With these evolutions, many classrooms are evolving from mere "classes" to "learning centers" (Beard & Wilson, 2013). These changes are often

stimulated by the adoption of the Internet and an increasing use of multimedia options. The concept of "dynamic teaching space" offers students the opportunity to work in pairs, in groups and to collaborate during the day (Kuuskorpi & Gonzalez, 2011). Not only are classrooms changing, but teachers' roles are also undergoing radical change.

Current classrooms require more flexibility to foster student-centered teaching practices, involving both students and teachers in more collaborative dynamics. The use of mobile furniture, such as work tables and rotating chairs, allows students to participate in more collaborative activities and take greater responsibility for their learning (Adedokun, Henke, Parker, & Burgess, 2017). Technological, cultural and social evolutions continue to shape teachers' expectations of the physical classroom environment (Kuuskorpi & Gonzalez, 201). In addition to teachers, architects and educational planners are investigating the impact of the school environment on student engagement. These professionals conduct specific research to understand how various designs can influence student behavior and outcomes, focusing in particular on learning dynamics (Tanner, 2009).

Evolution in education has transformed the concept of learning from an individual process to a collaborative effort. To adapt to this transformation, it becomes essential to incorporate chairs and sitting styles as tools in the school context to enhance engagement and attention in learning (Harvey & Kenyon, 2013). Flexible seating and adaptable learning spaces encourage movement within the classroom. Movement is crucial, as brain activity decreases when the body is inactive, preventing students from standing still and embarking on the learning process (Harvey & Kenyon, 2013). Flexibility within classrooms is a valuable element in 21st-century educational contexts, allowing students to engage in collaborative group activities, an increasingly common practice in modern classrooms. Flexible learning spaces offer the possibility to adapt the seating arrangement to the specific needs of students.

In the learning environment, classrooms must reflect the specific learning styles of each student (Burke & Burke-Samide, 2004). Each individual has a unique learning style, and therefore, classrooms should be able to adapt to such styles to foster student engagement. Modern classrooms are undergoing significant changes compared to the past, as it is recognized that traditional design could hinder student growth (Burke & Burke-Samide, 2004). The traditional use of classroom bench files, originally designed to maximize student behavior focused on the task, is now being reassessed as it does not align with the new perspective of creating student-centered environments, where collaborative work is a fundamental part of learning. Environmental elements such as design, sound, light and temperature

have a significant impact on student outcomes and growth (Burke & Burke-Samide, 2004). For example, if students find themselves uncomfortable due to the temperature of the classroom, their concentration may be impaired, negatively affecting their school success.

The class must not only be designed to fit the learning styles of all students but must also serve as a social place where students can participate in a positive social environment. Creating such an environment requires different skills, such as the ability to solve problems, collaborate with peers, respect different perspectives and interact with the tools in the classroom (Roskos & Neuman, 2018). In the current educational context, classrooms must be able to reach and support all students in their learning paths.

Previous research has reported similar results, pointing out that the type of learning space can affect creative thinking, arouse emotions in both students and teachers, and improve teaching and learning experiences (Sawers, Wicks, Mvududu, Seeley, & Copeland, 2016). It is expected that the learning spaces of the future will be characterized by greater flexibility and mobility of people, knowledge, furniture and other artifacts (Beard & Wilson, 2013). Teachers are introducing elements such as tables, cushions, sofas, bag chairs and therapeutic balls into the classrooms to move away from the conventional class style, providing flexible seating options that can enhance the learning experience through the surroundings (Havig, 2017).

A key aspect integrated into flexible seating is the connection between classroom design and a specific purpose. At an elementary level, seating flexibility allows for different configurations for whole groups, small groups and partners, facilitating activities such as conversations, listening, reading, writing, playing and learning (Roskos & Neuman, 2018). The flexible learning environment, together with the flexible seating, is characterized by its fluid and non-rigid nature. The main goal of seating flexibility is to allow students to choose workspaces that suit their learning needs, thus maximizing their success. Students are not bound to specific places or spaces but can adapt to their preferences. The use of seating flexibility can promote positive behavior and prevent opposing behavior (Havig, 2017).

It is crucial to understand that these furnishings provide an opportunity for students to develop a greater sense of purpose and community within the classroom (Waldock, Rowlett, Cornock, Robinson, & Bartholomew, 2017). Providing students with the tools to collaborate, it fosters the development of relationships between them and with class teachers. To further enhance the sense of community, desks should be placed face to face, ensuring that no student is isolated or separated from any form of learning, an essential element for the success of all students (Mott, Thomas, & Burnette, 2014). The opportunities that these changes offer students,

allowing them to improve and develop learning through meaningful connections, can have a significant impact on their educational experiences.

Research on flexible seating is constantly evolving, and the effect of such seating on students is becoming clearer in the classroom. Current studies focus primarily on innovative pedagogy and the learning space needed to implement these practices. However, much research is limited, as the assessment of student learning is often based on standardized test scores (Adedokun, Henke, Parker, & Burgess, 2017). Although many teachers and school districts are introducing flexible seating, some may do so without a research-based justification, but rather following current educational trends. This lack of knowledge creates a gap in information on understanding how the learning space affects the educational process and student outcomes.

5. Educational implications and future research perspectives

The adoption of flexible learning spaces has several educational implications that can positively influence the learning experience of students. Flexible spaces foster student-centered learning approaches, allowing them to make autonomous choices about where and how to learn. The design of open work areas facilitates collaboration between students, promoting active learning. Learning personalization becomes more accessible, allowing teachers to adapt spaces to meet the individual needs of students. Flexible spaces encourage the development of 21st-century skills, such as creativity (Zollo, Kourkoutas & Sibilio, 2015), communication and critical thinking. The adaptability of the spaces also supports the flexibility of the curriculum, allowing teachers to integrate new teaching approaches, and promoting flipped methodologies (Corona, 2017; De Giuseppe, Corona, 2017) in an inclusive perspective. Designing attractive spaces helps keep students' attention high, increasing engagement. The use of flexible learning spaces can promote sustainable teaching practices, reducing waste and fostering a more adaptable and resource-efficient approach. Finally, flexible spaces can be adapted to support diverse learning styles and meet the needs of students with different skills, helping to create an inclusive environment that supports the success of all students (Booth, Ainscow, Black-Hawkins, Vaughan, Shaw, 2002).
It is of great importance to broaden the perspective of future research by including research into pedagogical methods and learning processes in classrooms that are flexible compared to those with fixed places. This in-depth analysis would help to better understand how classroom design affects children’s learning processes. For

a more comprehensive and inclusive vision, it would be stimulating to promote intercultural studies that compare the experiences of flexible classrooms in different cultural contexts. This approach could highlight how flexible classes can foster inclusive processes, especially for children with special educational needs.

Recommendations for building a solid evidence base include promoting interdisciplinary research that holistically examines the interactions between the built environment and the pedagogical approach in these innovative spaces. It also stresses the need for experimental or longitudinal studies that generate quality testing and decision-making on the furnishing of flexible learning spaces based on research evidence that goes beyond the educational implications, considering the movement and well-being of students. By reflecting critically on these findings, it is evident that the design of learning spaces (Aiello, Di Gennaro, Palumbo, Zollo & Sibilio, 2014) has a significant impact on the mental health and well-being of students, as well as their academic achievements. However, it is essential to conduct further research, especially considering gender differences and deepening the analysis of pedagogical methods and learning processes. The intercultural perspective adds an interesting level of complexity, as it highlights how flexible classrooms could play a crucial role in promoting inclusivity for students with special educational needs in different cultural contexts.

Lorenzoni (2014), based on these indications, suggests reflecting on the introduction of effective changes that can be implemented at lower costs to make the use of spaces more intelligent and flexible. He encourages designing interventions in indoor environments to transform schools into "small yards of spatial and educational innovation". Direct experience allows him to affirm that space is a fundamental part of the educational relationship and that the change in mutual positions contributes to changing the habits and attitudes of children, young people and teachers.

Referring to the experience of the teacher Alberto Manzi, who in the '50s in Rome made the city’s terraces practicable to carry out experiments and observe the sky, Lorenzoni proposes concrete actions to start this process of change. These actions range from the opening of a wing of the building for afternoon use, to creating spaces dedicated to children and young people of all ages: well-kept and suitable environments, possibly enriched by a cheap parquet, which allows you to sit on the ground to talk, do theater, improvise music or listen to it. He urges schools to rethink the spaces to encourage a versatile use that facilitates concentration and listening to each other, overcoming the idea of forcing restless vital bodies to long hours sitting on uncomfortable benches.

The importance of the exchange of ideas between educators and architects also proposes the active involvement of the users themselves, namely children and young people. However, it emphasizes that this participation must be authentic and not only formal, prompting young people to reflect radically on the spaces they occupy increasingly extraneously. While acknowledging that the redefinition of school environments will be a challenging process, it is suggested that it could help solve a wider problem, namely the reformulation of education. He concludes by attributing to schools their true value, as fundamental places for prolonged collective meetings between generations, stressing that you can not tolerate that this delicate daily appointment takes place in schools characterized by degradation and ugliness. This challenge was met by the architect Renzo Piano, who collaborated with Lorenzoni to develop a prototype of an innovative school, initially conceived for the Falck area of Sesto San Giovanni, but subsequently proposed as a source of inspiration for the realization of innovative schools.

The "National indications for the curriculum" of the school from 3 to 14 years (which became the law of the State in November 2012) reads: The acquisition of knowledge requires a flexible use of space, starting from the same classroom, but also the availability of equipped places that facilitate operational approaches to knowledge for science, technology, Community languages, music production, the theater, the pictorial activities, the motricity. Particular importance is given to the school library, also in a multimedia perspective...». The quote emphasizing the importance of flexible and equipped spaces for operational approaches to knowledge highlights a growing awareness of contemporary educational needs.

It is undeniable that the application of good practice in existing schools can present challenges, both in terms of structural changes and economic resources. The customization of the walls of a classroom or the arrangement of the benches in groups are more accessible interventions, but the transformation of an already existing context could be more complex than the ex novo design.

Conclusions

The evolution of learning spaces, with particular attention to flexible seating, has aroused increasing interest in the educational context. Existing research suggests that the flexibility of seating can positively influence the learning experience of students, fostering collaboration, engagement and personalization of learning (Barra, Todino & Galdieri, 2021). However, empirical evidence and evaluation methodologies need to be further developed to fully understand the impact of these changes.

Future research perspectives address the impact on academic performance, understood as the deeper exploration of flexible seating, linking environmental variables to students' performance in specific subjects and teachers' experiences, that is to investigate how teachers perceive and manage the implementation of flexible seating, examining the challenges and opportunities that arise in daily practice; exploring different ages and school levels, since research could be extended to better understand how the flexible environment can adapt to the specific needs of different demographic groups; the development of guidelines, such as the development of practices for the design and implementation of flexible learning spaces; the exploration of psychological aspects, namely investigating emotional well-being and motivation, about the flexible learning environment. Continuing to explore these areas will expand our understanding of flexible seating and its impact on training, helping to improve the design of learning spaces for the future.

The overview of scientific literature has shown that, although it is still in an embryonic phase, research on flexible learning spaces shows promising results in terms of impact on health, well-being and educational outcomes. Studies of the effects of flexible learning environments indicate that schools can play a significant role in counteracting sedentary behavior during class and improving school performance. This can be achieved through: structural changes in the school environment, including the introduction of portable tables, writable walls and a polycentric layout; adaptations of the teaching approach, orienting it towards the student and giving them greater freedom and responsibility in choosing how and where to learn in class; implement an interdisciplinary research program that comprehensively examines the dynamics between the built environment and teaching methodologies in innovative learning contexts; conduct experimental or longitudinal studies that produce high quality evidence for a thorough understanding of the impacts of flexible learning spaces; to guide the design of flexible learning spaces through decision-making based on solid research evidence, considering aspects beyond the educational implications and paying attention to the movement and well-being of students; provide teachers with opportunities for specific vocational training on teaching methodologies and the effective use of flexible learning spaces, with targeted strategies to fully exploit the potential of such environments in improving movement, the well-being and learning of students.

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