

Senka Žižanović, Katarina Bogatić and Sanja Simel Pranjić

Understanding embodied learning: A qualitative study with pedagogy students in Croatia

Abstract: The dialectical relationship between body and mind in learning requires a re-examination of both teaching practices and the broader aims of education. Although studies have consistently demonstrated the benefits of embodied approaches for deeper and more sustainable learning, these approaches remain insufficiently integrated into educational practice. This gap highlights the need to consider how future pedagogues (and teachers) can be supported in developing these approaches during their initial education. The aim of this study was to gain insight into how students double majoring in pedagogy understand embodied learning within the context of initial teacher and pedagogue education in Croatia. Three methods were employed: analysis of study programmes, a student-led classroom tour, and a focus group with eight undergraduate students double majoring in pedagogy. Data sources included recordings, notes, and photographs from the tour, as well as transcriptions of the focus group discussion, all of which were subjected to thematic analysis. The findings revealed that students recognised embodied learning as valuable but continued to perceive the classroom space as sedentary. The study also identified challenges related to students' bodily self-perception in relation to learning and movement, which may influence their ability to apply embodied learning approaches in practice. Particular attention should therefore be given to preparing future pedagogues and teachers through experiential learning situated within their sociocultural context as a necessary foundation for meaningful changes in practice.

Keywords: body-mind dialectic, learning experiences, undergraduate student perspective, student-led tour

UDC: 37.015.3

Scientific Article



<https://doi.org/10.63384/spB62z889a>

Senka Žižanović, PhD, Assistant Professor, J. J. Strossmayer University of Osijek, Faculty of Humanities and Social Sciences, Lorenza Jägera 9, 31000 Osijek, Croatia; sgazibara@ffos.hr ©

Katarina Bogatić, PhD, Postdoctoral Researcher, J. J. Strossmayer University of Osijek, Faculty of Humanities and Social Sciences, Lorenza Jägera 9, 31000 Osijek, Croatia; krengel@ffos.hr ©

Sanja Simel Pranjić, PhD, Assistant Professor, J. J. Strossmayer University of Osijek, Faculty of Humanities and Social Sciences, Lorenza Jägera 9, 31000 Osijek, Croatia; ssimel@ffos.hr ©

Introduction

The concept of embodied learning has increasingly come to the forefront of theoretical and empirical research in the field of education, with a growing emphasis on the active role of the body in both learning and teaching processes. This shift has been driven by emerging insights from cognitive psychology and neuroscience, which challenge traditional learning theories grounded in rationalist and dualistic understandings of the mind (Allen et al. 2023). Embodied learning is understood as a holistic process that integrates bodily dimensions and unfolds through interactions with the social and material environment in which it takes place (Jusslin et al. 2022; Nathan 2021). The notion of embodiment stands in contrast to the dualism of the mind and body, positioning them instead as a unified, interdependent entity. Rooted in Cartesian dualism, body–mind separation has long dominated educational practice, and its enduring influence is evident in the prioritisation of the cognitive domain of learning, memorisation, content reproduction, and educational achievement measured using standardised tests (Macrine and Fugate 2022; Sullivan 2018).

Despite the growing number of studies demonstrating the value of embodied learning, its implementation and development within educational practice continues to lag (Macedonia 2019; Re 2025). This gap is particularly evident in higher education, where insufficient practical application is accompanied by a lack of research on this topic (Allen et al. 2025; Puoti et al. 2025). Accordingly, scholars have highlighted the need to consider how future teachers and educational professionals can be systematically supported in developing embodied learning during their initial education. Puoti et al. (ibid.) argued that integrating embodied learning approaches into teacher education may help address several challenges facing contemporary education systems, including increasing bureaucratisation, the risk of emotional burnout, the complexity of multicultural classrooms, and the persistent theory–practice gap. The Organisation for Economic Co-operation and Development (OECD) has identified embodied learning as one of six emerging approaches to teaching and learning in the twenty-first century (Paniagua and Istance 2018). Against this background, the present study aimed to gain insight into how students double majoring in pedagogy understand embodied learning within the context of initial teacher and pedagogue education in Croatia.

Theoretical framework of embodied learning

The theoretical framework of embodied learning requires an interdisciplinary approach to enable a comprehensive understanding of the concept in its educational context. This framework draws on philosophical foundations and insights from cognitive science and neuroscience, particularly embodied cognition theory. These foundations are further complemented by constructivist and pedagogical perspectives, which highlight the importance of applying embodied learning in educational practice.

The philosophical conception of embodiment highlights the central role of the body in relation to mind and being and is grounded primarily in the work of Maurice Merleau-Ponty, the founder of the phenomenology of the body. According to Merleau-Ponty (1945/2012), humans apprehend the world primarily through the *lived body* (fr. *corps propre*), a notion he further elaborated through the concept of *flesh* (fr. *la chair*) as an ontological category positioned in opposition to Cartesian dualism; in this way, he emphasised the unity of the body's material and subjective dimensions. From this perspective, the body is not merely an instrument of movement but the primary locus through which individuals »inhabit« the world, come to understand it, and assign meaning to it. The body thus mediates perception, interpretation, and action across physical, social, spatial, temporal, and emotional experiences (ibid.), constituting a holistic and embodied process of understanding and meaning-making.

Over recent decades, these philosophical foundations of embodiment have informed the development of embodied cognition theory within the cognitive sciences, establishing a contemporary approach to learning. Because this theory has evolved across diverse disciplinary and theoretical contexts, no universally accepted definition of embodied cognition exists (Fugate et al. 2018; Macrine and Fugate 2022; Shapiro 2019). Nevertheless, most authors agree that thought and knowledge are rooted in bodily experience and interaction with the environment (Macrine and Fugate 2022; Varela et al. 1993). Cognition is therefore understood as the result of a dynamic interplay between the body, the mind, and the environment (Barsalou 2008; Clark 2008; Shapiro 2019). In recent years, embodied cognition has expanded into the 4E paradigm, which posits that cognitive processes are not only *embodied*, but also *embedded* within specific physical, social, and cultural contexts, *enactive*, that is, enacted through action, and *extended* by the environment and digital technologies (Barsalou 2020; Lebert and Vilarroya 2024; Macrine and Fugate 2022; Schilhab and Groth 2024). »From the 4E perspective, cognition, affect, and behaviour emerge from the *body* being *embedded* in environments that *extend* cognition, as agents *enact* situated action reflecting their current cognitive and affective states«. (Barsalou 2020, p. 2) In this context, embodied learning is understood as a holistic process that extends beyond learning through movement, acknowledging an individual's bodily capacities while connecting learning with the surrounding environment (Jusslin et al. 2022). Neuroscientific research provides the biological foundation for embodied cognition, demonstrating the functional interdependence of motor and cognitive systems in the brain. Damasio et al. (1996), through the

somatic marker hypothesis, emphasise that emotions and bodily reactions guide decision-making and judgement based on prior experiences. The connection between perception and action was further demonstrated by Rizzolatti and Craighero (2004) through their research on mirror neurons, showing that motor regions of the brain are activated not only when performing actions but also when observing them.

Embodied cognition provides the theoretical foundation for understanding and developing the concept of embodied learning. Puoti et al. (2025) described it as a transformative paradigm that promotes learning in which the body, cognition, and context are interconnected through experiential, somatic, relational, and reflective methodologies. The principles of embodied learning encompass sensorimotor activity, the use of gestures and movements that serve learning content, and learners' emotional engagement, whereby the inclusion of the body in educational practice involves integrating the physical body, the senses, and the mind (Lindgren and Johnson-Glenberg 2013). The learner is thus understood as an embodied subject who apprehends the world through sensory, motor, and emotional experiences (Macrine and Fugate 2022). The constructivist approach to learning aligns closely with embodied cognition, emphasising that knowledge is constructed when individuals' actively engage and interact with their environment. Sensory and bodily involvement are essential for the development of cognitive abilities (Mavivildi et al. 2022). Socioconstructivist perspectives further underscore the importance of the sociocultural environment, as meaning is created through dialogue and shared activity with others (Lebert and Vilarroya 2024).

The pedagogical antecedents of embodied learning can be identified in the work of John Dewey and Maria Montessori, as well as in Kolb's experiential learning model and Gardner's theory of multiple intelligences, each of which positions bodily experience as integral to knowledge construction. Dewey emphasised the unity of mind and body, stating that intellectual life arises from basic bodily functions (Shusterman 2008), while sensory experiences and action play an active role in the construction of knowledge (Nguyen and Larson 2015). Montessori (1949/1995) likewise highlighted that cognitive development unfolds through bodily activity and direct experiences within the environment. Kolb (1984), in his experiential learning model, argued that higher-order thinking develops on the basis of concrete, bodily, and sensory experiences. Gardner's theory of multiple intelligences further contributes to this perspective, particularly through bodily-kinesthetic intelligence, which posits that ideas, emotions, and problem-solving can be expressed through the body (Gardner 1993). Taken together, these pedagogical perspectives converge in conceptualising learning as a process that occurs *through* and *with* the body, enabling learners to express, simulate, interpret, or remember content through bodily engagement. Within pedagogical practice, embodied learning can be formed through learners' engagement with learning environments in which bodily experience plays a constitutive role in the development of understanding. As learners interact with and move within these environments, learning unfolds through exploration, interpretation, and reflection grounded in lived bodily

experience; in this way, understanding is gradually formed through embodied engagement. In this process, the teacher's role is to create learning conditions that allow bodily engagement to contribute meaningfully to understanding.

Embodied learning in higher education

Initial education forms the foundation of every individual's professional development and plays a crucial role in shaping future work and growth. In the context of educating future pedagogues and teachers, it encompasses not only the development of subject-specific, pedagogical, and didactic-methodological competences but also the capacity to act as agents of change and to foster transformative shifts in education (Flores 2016). Over the past decade, increasing emphasis has been placed on integrating embodied learning into initial education to enable future pedagogues and teachers to develop the competences necessary for transformative educational practice. In this context, Green and Hopwood (2015) highlighted the need to critically reflect on the teacher's body; specifically, how a competent teacher uses their body within learning and teaching processes and in educational practice, an aspect that is often overlooked in initial teacher education (Mathewson Mitchell and Reid 2017; Puoti et al. 2025). Sullivan (2018) further stressed that understanding the relationship between teacher movement and students' acquisition of abstract concepts is essential for improving educational practice. In initial teacher education, this perspective draws attention to embodied approaches to learning as not only a means of supporting learning but also an opportunity for future teachers to reflect on their own learning and professional development. Thus, embodied approaches to learning contribute to the development of professional identity by encouraging self-reflection and personal transformation among students (Puoti et al. 2025).

European research supports this perspective. In their study of dance education in Nordic schools, Anttila and Svendler Nielsen (2019) found that dance as an embodied practice fosters body consciousness, creativity, and social relations, contributing to the overall quality of school life. Importantly, the capabilities developed through such practices extend beyond academic subjects to include collaboration, self-acceptance, and community participation. Geršak and Tancig (2018) examined 112 teachers from various regions of Slovenia who participated in a continuing professional development programme focused on creative movement as a teaching and learning approach emphasising movement and dance. Following the programme, teachers' attitudes shifted towards holistic and experiential teaching and learning, while they also reported positive effects of creative movement on students' social-emotional and cognitive development and improvements in their own well-being. In a pilot study examining the integration of creative movement into online learning environments, Rupnik and Geršak (2022) demonstrated that creative movement-based workshops created opportunities for social interaction otherwise limited in distance education while also improving learning content understanding. Geršak et al. (2025) examined the integration of embodied learning and creative movement in higher education

and highlighted their potential to support student engagement. They also noted that beyond programmes for professional dancers, such approaches are rarely embedded systematically in higher education curricula and more often appear as isolated interventions, projects, workshops, or components of individual courses. Despite this fragmented implementation, students across studies have described embodied and performative practices as supporting their understanding of learning content, fostering a sense of safety and mutual support, and contributing to both personal and professional development, even when initial hesitation towards these approaches was reported (*ibid.*). In the Croatian context, Žižanović and Blažević (2021) suggest that integrating creative dance workshops into the initial education of future teachers supports students' understanding of the role of the body and movement in teaching while fostering creative and innovative approaches to instructional practice. The authors further indicated that such practices contribute to the development of students' professional competences and pointed to the need for a more systematic inclusion of embodied approaches within higher education curricula.

Faella et al. (2025), in their scoping review of embodied learning approaches in schools, concluded that research demonstrates how embodied learning interventions contribute to enhanced motivation, bodily awareness, cognitive engagement, and interdisciplinary integration, along with additional benefits in the areas of social skills, self-perception, and critical attitudes towards bodily ideals. They also caution that a deeper understanding of the long-term effects of embodied learning requires methodologically more consistent and culturally diverse studies, including broader age groups and longitudinal designs. In a 6-month ethnographic study conducted at a U.S. university with preservice teachers, Zhang (2022) observed that embodied activities can help students from diverse cultural backgrounds connect theory and practice with their own experiences and identities. The findings further indicate that such activities create critical and dialogical spaces that allow students to question dominant discourses within educational and broader societal contexts. In a study involving teachers at the University of Technology Sydney, Allen et al. (2025, pp. 1468–1469) demonstrated that embodied approaches in higher education unfold through four dimensions of practice: transdisciplinary sensemaking (paying attention to the body for enhancing reflexive transdisciplinary understanding), emotion-driven creativity (engaging emotions in transdisciplinary learning to enhance creativity), empathetic enactment (using enactment to cultivate situated knowledge and empathy for addressing complex challenges), and embodied boundary spanning (developing an aptitude for boundary spanning through the body). Identified through autoethnographic analysis of practice and collaborative, embodied sensemaking, these dimensions are proposed as guidelines for implementing embodied approaches aimed at developing systemic awareness, empathy, and students' capacity to navigate complex problems and contribute to long-term social change.

In their meta-analysis examining the effects of embodied learning on learning performance, Liu et al. (2025) concluded that greater engagement of secondary school and university students in embodied activities can be achieved

by integrating digital technologies such as virtual reality and motion-tracking tools. Drawing on their systematic review of empirical research on embodied teaching and learning in higher education, Hegna and Ørbæk (2021) noted that existing studies predominantly focus on the cognitive and discursive dimensions of embodiment, whereas sensory, bodily, and intersubjective experiences remain insufficiently explored. They concluded that research on embodied learning represents a potentially emerging field that remains fragmented and insufficiently integrated.

Thus, despite growing interest in embodied learning, research in higher education remains theoretically and methodologically fragmented, with embodied approaches often implemented in isolated and context-specific ways. In particular, there is a limited insight into how future pedagogues (and teachers) themselves understand, interpret, and make sense of embodied learning during their initial education, with such research being especially scarce in the Croatian context. Therefore, the present research focused on future pedagogues and their understanding of embodied learning.

Methodology

This study aimed to gain insight into how students double majoring in pedagogy understand embodied learning within the context of initial teacher and pedagogue education in Croatia. Specifically, it explored how future pedagogues¹ (and teachers) conceptualise and experience learning as an embodied process, situated within spatial, material, and relational contexts of their learning environment. The following research questions were formulated:

- RQ1: How do undergraduate students double majoring in pedagogy conceptualise embodied learning?
- RQ2: What are their experiences with embodied learning within higher education?
- RQ3: How do they perceive classroom space in the context of embodied learning?
- RQ4: What are the challenges related to embodied learning from the students' perspective?

¹ A pedagogue, in the Croatian educational system, is a professional with a master degree in education who works within schools and other educational institutions. The role of the pedagogue is defined through a comprehensive framework that integrates professional, pedagogical, organizational, and administrative functions. Their work includes planning and supporting the implementation of the curriculum; participating in educational processes (e.g. enrolling students and organizing class groups, developing and implementing new educational programmes and innovations, providing support for children and students with differentiated needs); and providing counselling to students, teachers, and parents. Pedagogues are also responsible for monitoring and evaluating educational practices and outcomes, coordinating professional development for educational staff, and managing information and documentation related to student progress. Through these multifaceted responsibilities, they contribute to the continuous improvement of educational quality and institutional development (Jurić 2004; Staničić 2005).

Participants

This study involved eight female students enrolled at a public university in Croatia, all in their third year of an undergraduate double major programme in pedagogy combined with English language and literature (three students), Croatian language and literature (two students), history (one student), philosophy (one student), or sociology (one student). Participants were recruited by one of the researchers during a regular class session. After receiving detailed information about study aims and procedures, eight students volunteered to participate. Participation was voluntary and based on informed choice, and the students were made aware of their right to withdraw from the study at any time, thus conceptualising their consent to participate in the research as a continuous process (Klykken 2021). Confidentiality was ensured through the anonymisation of all collected data. Ethical principles were upheld throughout the planning, implementation, and analysis phases of the study.

Research methods and procedure

This study employed a qualitative, interpretative, and phenomenological approach, grounded in an »epistemological view« that was »concerned with meaning« in terms of »how individuals make sense of the world, how they experience events, what meaning they attribute to phenomena« (Pietkiewicz and Smith 2014, p. 7), that is, »how individuals make sense of their experiences« (ibid., p. 8). To achieve the study aims, three complementary methods were employed.

Analysis of the participants' study programmes based on predetermined keywords

Six study programmes (pedagogy, Croatian language and literature, English language and literature, history, philosophy, and sociology) were analysed using ten predefined keywords related to embodied learning and derived from relevant theoretical and empirical literature discussed in the previous section. The keywords were selected based on recurring concepts and notions used to describe embodied learning, including those that pertain to bodily engagement, movement, activity, and the environmental physical and symbolic contexts in which these are embedded. At the same time, examining such broad concepts through a keyword-based analysis alone can be problematic (Weismayer and Pezenka 2017); which is a consideration that informed the use of multiple, complementary methods (Gross 2018; Owen 2014). All keywords were searched in their root forms to account for different grammatical inflections. The keywords were as follows (*Croatian keyword* followed by its English translation): *učenje* – learning, *tijelo* – body, *kretanje* – movement, *aktivnost* – activity, *okruženje* – environment, *okolina* – surroundings, *ozračje* – atmosphere, *atmosfera* – atmosphere, *klima* – climate, and *prostor* – space. A keyword-based study programme search cannot capture implicit (pedagogical) meanings or actual lived practices and may exclude certain aspects of the phenomenon being researched

if relevant terms are not selected; however, it can serve as an initial analytical lens for identifying how embodied learning is represented in study programmes. To address some of the limitations, each occurrence of a keyword was examined within its immediate context, the specific section of the programme, the course, and the year of study in which it appeared. This contextualisation enabled an interpretative, qualitative analysis that went beyond simple frequency counts and focused on how embodied learning-related concepts are positioned within the curricula (Fingold et al. 2025).

Student-led classroom tour

If (educational) space is conceptualised as a co-construction negotiated and produced through everyday interactions with its geography, architecture, artefacts, and social participants, encompassing all its physical, social, and cultural elements, as well as the meanings that emerge through these interactions (Marojević 2023; Vuorisalo et al. 2014), then researching the embodied nature of learning within this conceptualisation of space requires specific methodological approaches. A method described as the »tour« (Clark and Moss 2011, p. 28; Groundwater-Smith et al. 2015), »guided tour« (Everett and Barrett 2012, p. 32), »walking interview« (Kinney 2021, p. 65), or »mobile interview« (Finlay and Bowman 2016, p. 263) could particularly allow for these meanings to be expressed. Although terminology differs across disciplines, this method can provide insight into data that is »spatially grounded and place-specific« and it has potential to reveal nuanced and layered individual and collective meanings of place enabling greater insight into the »co-constitutive relationship between self and place« (ibid., p. 263). Clark and Moss (2011) emphasised the value of physicality and mobility in not only building stronger *rapport* with the participants by mitigating asymmetrical power relations between the researcher and the participants (Finlay and Bowman 2016) but also enabling the embodied nature of meaning-making to come to the forefront. Tour as a method by virtue of its distinctive blend of »showing and sharing«, enables researchers to access subtle layers of meaning that are difficult to fully articulate through language alone (Thomson 2018, p. 512). Certain forms of knowledge remain inherently tied to embodied practices and situated performances, manifesting only through participants' physical actions. Such dimensions of experience often resist direct textual expression, becoming visible primarily when individuals move through and interact with their everyday environments (ibid.; see also Everett and Barrett 2012).

Building on these theoretical foundations, the participants in this research individually assumed the role of guides, leading one of the researchers through Classroom 32², a classroom in which they attend most of their pedagogy courses

2 The classroom layout (*Illustration 1*) comprises six big round tables around which students are seated. Whiteboards, used both by the teacher and for displaying student work, are mounted on sections of three walls, while two walls (also) contain cupboards with open shelves holding books and other instructional materials. A teacher's desk and a computer connected to a projector are placed at the front of the room.

and which has a distinctive spatial arrangement. Prior to the tours, the first researcher drew on her previously established *rapport* with the participants and facilitated a brief activity designed to heighten their bodily awareness and encourage movement through the space. While the other two researchers adopted an observational role, taking notes documenting nonverbal behaviour³ and taking photographs, the first researcher audio-recorded the tour and accompanied participants as they moved through the room, engaging with its space, while describing and reflecting on it. The participants individually described the classroom's spatial features and reflected on the thoughts, emotions, and bodily experiences it evoked. They recalled learning activities involving movement, gesture, manipulation of objects, and sensory engagement, providing insight into how they inhabit and make meaning of different areas of the classroom. The first researcher was subtly following the participant's emergent narrative with contextualised questions⁴ only occasionally, aiming to encourage deeper reflection while preserving the authenticity of the participant's perspective. By positioning the participant as a narrator and guide, the tour emphasised the interplay between subjective experience and the spatial–material dimensions of their (primary) learning environment, elucidating how classroom space and meaning-making interconnect.

Focus group

Following completion of the tours, a focus group was conducted with the same eight students. The discussion was led by one researcher using a semistructured protocol⁵, while two other researchers took notes and recorded the session. The focus group provided space for collective reflection and enabled participants to compare their experiences that had emerged during the tours.

This multimethod design enabled the exploration of embodied learning at the curricular (through programme analysis) and experiential (through participatory and narrative methods with students) levels.

³ The notes comprised two components completed simultaneously. Researchers filled out a table for each participant, recording nonverbal reactions, movement through the space, interactions with objects, and spontaneous gestures or expressions, while also using a classroom layout sketch to map participants' movements, indicating the directions they took and areas where they spent more time, as well as noting salient statements or nonverbal cues.

⁴ These questions invited participants to reflect on their experiences within different areas of the classroom, including how they felt, how they interacted with the space, and when learning involved full bodily engagement. They were also asked to recall specific activities, consider how movement supported or hindered learning, and express memorable gestures or postures that captured their embodied learning experiences.

⁵ The questions in the semistructured protocol explored participants' understandings of learning, the various ways in which learning occurs, and their interpretations of embodiment and embodied learning. Participants were invited to reflect on their own experiences of using the body in learning, in the sense of identifying which bodily actions and senses were involved, how these experiences felt, and which specific activities exemplified such engagement. Finally, they considered the personal significance of embodied learning, its potential role in their future professional practice, and the conditions that support or constrain the use of embodied approaches.

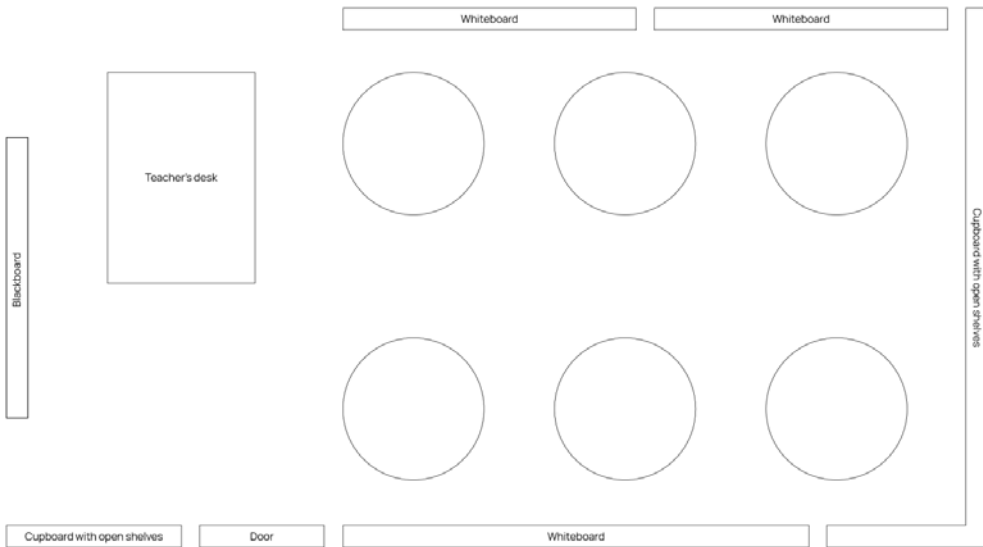


Illustration 1: Layout of Classroom 32

Data analysis

All collected materials were analysed using thematic analysis (Cohen et al. 2018; Halimi 2005). The data consisted of transcribed audio recordings from both the student-led classroom tours and focus group discussion, researchers' field notes documenting nonverbal behaviours and spatial interactions, as well as photographs taken during the tours to support the interpretation of participants' embodied engagement with the classroom space.

Thematic analysis was inductive and interpretative, with themes developed gradually from the data. The analysis began with repeated readings of transcripts, field notes, and visual materials to develop a holistic understanding of participants' experiences. Next, meaningful units were identified and assigned codes that closely reflected the participants' expressions and experiences related to space, the body, emotions, movement, and learning. Codes were continuously compared and grouped into subthemes that captured recurring patterns of meaning. The subthemes were then integrated into broader themes representing key dimensions of students' experiences of embodied learning. Throughout the process, the analysis was iterative, involving constant movement back and forth between the data and emerging thematic structure to ensure coherence and clarity. The credibility of the findings was supported through collaborative discussion and alignment of interpretations within the research team as well as by comparing insights across multiple data sources. Only themes consistently grounded in participants' experiences were retained.

The results and discussion are organised to reflect the multiple methods employed in this research. The first part outlines findings from the analysis of the participants' study programmes based on the predetermined keywords, followed by findings derived from the student-led tours and focus group discussions.

Results from the analysis of the participants' study programmes based on predetermined keywords

The analysis of the six study programmes using the 10 predefined keyword roots related to embodied learning provided an overview of how references to embodied learning-related concepts are articulated within the analysed study programmes.

At the level of the examined documents, the analysis suggests a relatively limited and uneven representation of embodied approaches to learning. Such references are most visible within the pedagogy study programme, for example, in learning outcomes related to instructional climate, school culture, and educational ecology in the mandatory course on didactics (*»to interpret fundamental concepts of didactics, various didactic theories, approaches, and models, as well as the factors that influence the instructional climate, school culture, and educational ecology«*) or to multimodal and interactive learning in the elective course on multimedia training (*»to explain multimedia, multimodal, and interactive learning«*). In the remaining programmes, references to embodied learning-related concepts appear predominantly within the mandatory physical education course offered to all first- and second-year undergraduate students; this course focuses on bodily movement and sensory awareness. For example, one of the aims of physical education is to *»develop an awareness of the spatial, temporal, and energetic elements of movement, as well as cultivating the senses of hearing, sight, and balance«*. Beyond these cross-departmental courses, embodied learning-related content appears only sporadically in elective courses, such as nonverbal communication within the English language and literature study programme; the course description of the nonverbal communication course includes the following:

»The course content focuses on the active analysis of the role of nonverbal signs in communication as a set of signals that participate in the speech act without being spoken language. Students will learn to identify and describe concrete instances of nonverbal acts (gestures, posture, appearance, gaze, proxemics) and analyse their specific characteristics.«

Taken together, these findings suggest that embodied learning does not appear to be systematically articulated within the study programmes' core curricula at the programme documentation level. However, this observation cannot determine how embodied learning may be enacted in teaching practice or the extent to which such approaches are addressed within individual courses.

The patterns identified through programme analysis are broadly aligned with insights obtained through the other methods employed in this research, while also indicating that the enactment of embodied approaches in practice may depend on teachers' individual pedagogical orientations and preferences.

Results from the student-led classroom tour and focus group

The results primarily draw on data collected during the student-led classroom tours, whereas the focus group served to deepen and further interpret the students' experiences. Thematic analysis of the tour transcripts led to the identification of key themes and subthemes, together with corresponding codes and illustrative excerpts. Table 1 thus demonstrates the analytical progression from codes to subthemes and overarching themes, grounding higher-order interpretations in participants' accounts.

Theme	Subtheme	Codes	Brief description of sub-theme	Illustrative example from transcript
Spatial and material dimensions of embodied learning	The classroom as a physical and sensory landscape	Tidiness, professionalism, furniture arrangement, spatial obstacles	Students perceive tidiness and functionality of the classroom as essential for relaxation, comfort, and concentration during lessons.	»There are too many things in here that don't really belong, it all feels a bit cluttered [...] lots of papers and boxes, I'd probably remove some of that.«
	Personal and emotional anchoring within familiar places	Safety, habit, comfort, favourite spot	Safety, stability, and emotional comfort are associated with the habit of sitting in familiar spots, being close to friends, and having a personal space.	»I always sit in the same spot, with my friends – it's kind of my safe zone.« »The middle feels best [...] sort of the golden middle [...] better than sitting in the front rows.«
	Spatial configurations of belonging and collaboration	Togetherness, collaboration, central part of the classroom as a space of activity	Students describe circular seating arrangements as important for a sense of belonging and collaboration and view the central part of the classroom as a space where most interaction occurs.	»I like that we can sit in small groups because we can see and hear each other better and talk more. We collaborate better – probably because we sit in a circle and can make eye contact.«
	Material artefacts as representations of collective meaning	Visual traces of learning, sense of pride, togetherness	The classroom is perceived as a shared space that reflects group identity.	»It shows all our work to other students who come after us.«
Embodiment and learning engagement	Movement as a means of release and self-awareness	Movement, openness in group, spontaneity, relaxation	Movement in class helps reduce discomfort, fosters a sense of freedom, motivation, and enjoyment in learning.	»I feel that activities involving movement help us open up [...] even those who are usually reserved [...] it helps them participate more and feel freer.«
	Movement as a means of engagement	Lesson interest, linking movement and learning, presence, focus, content retention	Students perceive bodily movement as linking physical and cognitive aspects of learning.	»As soon as movement is involved, I think more about what I'm doing – it helps me focus on the learning itself.«

Challenges in embodied learning	Vulnerability, self-presentation, and the culture of professionalism	Shyness, insecurity, need for acceptance, fear of judgement, self-criticism, fear of mistakes, professional support	Students sometimes experience shyness, insecurity, or fear of mistakes when expressing themselves physically, especially in front of the group.	»When our hands are involved, it's fine, but anything bigger feels a bit intimidating.« »If the environment and colleagues are more traditional, it's really hard to implement such practices [...]«.
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Table 1: Student's experience and conceptualisation of learning as an embodied process

Spatial and material dimensions of embodied learning

The classroom as a physical and sensory landscape

Students perceived the classroom as a space whose tidiness, organisation, and functionality directly influence the learning process and mutual collaboration. In their accounts, disorder and dysfunctionality, such as a cupboard in the corner of the classroom with overcrowded shelves, papers, and boxes, created a sense of confinement and pressure and undermined the impression of professionalism. They perceived such an environment as inducing discomfort and frustration and decreasing concentration. Although students expressed satisfaction with the circular seating arrangement, chairs facing away from the projector made it difficult to follow the lessons due to constant body turning. Students also positively emphasised the visual content on the whiteboards, especially posters and other outputs from their group work, which fostered a sense of belonging. During the focus group, one student highlighted the link between tidiness and clarity of thought: *»I can't study unless my room is cleaned up. [...] I need to organise everything first to be able to store all my thoughts properly.«* Similarly, Re (2025) emphasised the importance of shaping an environment that moves teachers away from passive learning to active content exploration that integrates body and environment for embodied learning. Allen et al. (2025) also highlighted the importance of flexible learning spaces and teaching resources as supports for embodied student engagement.

Personal and emotional anchoring within familiar places

During the tour, students described the classroom space in terms of the emotions it evoked, especially highlighting the importance of having their own safe place: *»The part of the classroom where I feel safest is my spot.«* They connected this feeling of security with their relaxation, openness, and greater engagement. Supporting this, students often started or ended their tour exactly in their safe space, physically touching the chairs or desks they usually occupy; some spontaneously approached their spot and continued their discussion with the researcher from there. Holley and Steiner (2005) described a safe classroom as a climate *»in which students are able to openly express their individuality, even if it differs dramatically from the norms set by the instructor, the profession,*

or other students« (ibid., p. 50). The presence of supportive peers during lessons further strengthens this sense of safety: *»This part of the classroom is my favourite because I sit with the girls I hang out with.«* Some described the *»golden middle«* as the ideal seating location that is not too close to the teacher, nor too far, located around the middle of the room. They associated this sitting choice with a desire to avoid excessive exposure in the front rows while also avoiding the distance and passivity typically associated with the back rows. Students perceived the front seats as the *»teacher's private space«*, whereas some chose the back rows due to a lack of interest or to avoid teacher interaction, which also lets them engage in other activities during their classes and be less engaged overall. This indicates that students feel secure in familiar places in the classroom they call *»their own«*, surrounded by close friends and peers, whereas feelings of exposure, vulnerability, lack of personal space, and intrusion into the teacher's space provoke discomfort and nervousness. In their systematic review of formal learning spaces in higher education, Leijon et al. (2022) indicated that space is closely linked to emotions, with students developing seating strategies to maintain control over their environment. Leijon (2016) emphasised that students and teachers alike interpret classroom space and shape their interactions accordingly, using spatial arrangement and resources to create an appropriate learning environment. On the basis of students' spatial positioning, teachers may infer their enthusiasm for the course and their previous academic scores (Xi et al. 2017).

Spatial configurations of belonging and collaboration

Most students emphasised the importance of group work for successful learning, which circular seating around round tables enables. One student explained, *»I like that we can be in small groups because we see and hear each other better and talk more. We collaborate more effectively. I think it's exactly because we sit in a circle and face each other.«* This account, along with the following ones, indicates that this sense of security in peer relations helps them step out of their comfort zones. Goodwin (2000) confirmed that posture, gestures, and eye contact play vital roles in organising social interactions and coordinating joint work.

The central empty space in the classroom, described as *»egg-shaped«* by students, was perceived as important for movement⁶ and more intense collaboration. Students associated this space with experiences of working and interacting together, as illustrated by the statement: *»We all sat in the middle of the classroom and talked together [...] about deeper topics with students we never thought we could talk like that with [...]«* This sense of group belonging appeared to provide the security needed for openness towards both oneself and others. One student spent most of the tour in this space and described it as a *»productive space worth using«*. Students' accounts indicated that shared activities and embodied learning experiences in the central area strengthened collective identity and

6 Although embodied learning is a broader concept, the term *movement* is employed here to reflect students' own language, as they predominantly used this expression when discussing embodied learning activities and bodily engagement during the tour and focus group.

group homogeneity. This finding aligns with that of Danish et al. (2020), who understood embodied learning as being simultaneously individual and collective. In their meta-analysis, Liu et al. (2025) noted that collective embodied learning is more effective than individual learning, with significant differences between groups.

Classroom as shared identity

During the classroom tour, students especially highlighted the importance of the whiteboards displaying their work created in pedagogical courses. One of them said, »*I somehow feel happy to see that this is actually our work and our effort we put in,*« and another added: »*Actually, all of our works are shown to other students who come in after us.*« Displaying their work in the classroom seemed to evoke positive feelings among the students, as reflected in statements expressing feelings of pride. Moreover, it also supported the practice of *documentation as meaning-making* (Clark and Moss 2011), making learning visible through the production of *traces* that enable interpretation and dialogue.

By making their work publicly visible within the shared space, students could create opportunities for ongoing discussion, reflection, and reinterpretation of their learning. In this sense, the classroom becomes a dialogic environment in which meanings are negotiated collectively. This resonates with Zhang's (2022) findings that embodied activities can create critical and dialogic spaces in which students actively engage with, question, and reinterpret their understandings. Students want more frequent opportunities to display their works because, as noted during the tour:

»*It would be good if there were more of our displayed works and what we use in teaching, so that other students from other departments, when they come in, get an idea of what we actually do and not just think we are students who play around.*«

In conclusion, the spatial, emotional, and social perspectives of the classroom as a physical aspect of embodied learning form an intertwined context in which students can feel comfortable, safe, and engaged. These are associated with tidiness, functionality, furniture arrangement, and the sense of belonging and security provided by familiar places, shared activities in a communal space, and closeness with peers. This answers *the third research question* regarding how students perceive classroom space within embodied learning.

Embodiment and engagement in learning

The thematic analysis suggests that embodiment plays a key role in learning, with movement being interpreted as liberating students and fostering their cooperation, engagement, and presence in instructional interactions.

Movement as liberation and self-awareness

During the tour, students described activities involving movement as liberating and as a marked departure from traditional sedentary lessons. They explained how movement helped release stress and tension caused by prolonged sitting while also developing greater self-awareness of their own needs and learning process. One student reflected: *»It all actually starts from the head; first, we thought about it, and when our brain relaxed, we somehow pushed that stress aside, and then our body automatically freed itself, totally relaxed.«* This account was interpreted as reflecting a still-present dualistic perception of mind and body, in which cognitive relaxation is seen as a prerequisite for bodily release, rather than the mind and body being understood as mutually interconnected and equally involved in experience and action, as Merleau-Ponty (1945/2012) emphasised in his phenomenology of perception. These findings align with Liu et al. (2025), who note that embodied learning can make learning more enjoyable and active, thereby effectively reducing academic stress. Students specifically emphasised mindfulness and activities involving movement that raise body awareness and help even introverted students open up. Such experiences suggest that embodied engagement, including movement, reduces emotional tension and facilitates expressing personality, creativity, and playfulness, while a sense of fun increases intrinsic motivation. This aligns with the findings of Wang et al. (2022), Faella et al. (2025), and Zuo and Lin (2025), who identified gestures and embodied learning as contributors to improved intrinsic motivation and cognitive engagement. Building on students' accounts, shared movement-based activities were interpreted as fostering cooperation and trust by creating shared experiences among students, consistent with Geršak and Tancig (2018) and Anttila and Svendler Nielsen (2019). The focus group participants further emphasised the role of movement habits in overcoming fear of public speaking: *»We are not stuck to the podium; we like to walk around and show, and not just look at the slides.«* However, despite recognising the value of bodily engagement in learning, students noted resistance among peers accustomed mainly to sedentary lessons: *»They find it strange that we constantly use those kinds of activities [...]. They don't want to. What are we trying to do? Why that?«* These reflections highlight the need to further promote movement within embodied approaches to learning, recognising them as essential for quality learning.

Movement as engagement

Students often linked embodied engagement, such as movement, gestures, and manipulating objects, with increased interest, a better understanding of lessons, and higher involvement, contributing to better knowledge retention. These results align with previous research on embodied learning across educational levels. For example, Kilbourne et al. (2017) concluded that 96% of elementary students showed greater involvement and desire to participate

when movement was incorporated into lessons. Similarly, Benes et al. (2016) interviewed 17 teachers and concluded that incorporating movement in teaching enhances student engagement, concentration, learning, and memory.

During the tour, students easily recalled embodied learning activities they participated in, stating: *»I think it was really interesting [...] a nice change. Otherwise, we are so static, always just sitting down.«* They were aware that such activities often push them out of their comfort zones but recognised all their benefits, as emphasised during the focus group: *»Initially, stepping out of the comfort zone feels quite uncomfortable. However, in the end, we can see only the benefits. We are very active and excited when it comes to this kind of learning.«* Students were also aware that movement increases attention, concentration, and presence during lessons; as one student stated, *»As soon as movement is involved, I think more about what I'm doing, and it helps me focus on what we are doing.«* According to student experiences, this contributes to a deeper understanding and memory of lesson content. This is supported by previous studies: Benes et al. (2016) and Nuraeni (2019) indicated movement's role in memory and recall, whereas Hegna and Ørbæk (2021), Jusslin et al. (2022), and Zuo and Lin (2025) demonstrated embodied learning's contribution to deeper understanding and greater involvement in instruction.

By contrast, traditional sedentary teaching students have often been associated with low motivation and disinterest. One student mentioned during the focus group: *»Some professors want to hear our opinion. They want us to participate, but when frontal teaching dominates, we are not interested and so they don't get feedback from us.«* Teachers' bodily engagement also plays a major role in student interest, motivation, and class participation, which Sullivan (2018) highlighted as key to improving educational practice. Green and Hopwood (2015) called for reconsidering the role of teachers' bodies in their initial training. One student described a lecturer's style as follows: *»She flies around the room while teaching, it's like watching tennis, she's here and then she's there. It's stuck in my memory so much that I can't and don't want to forget it.«* This instructional approach effectively engages students' attention and supports their regular attendance: *»And also how they use their body and movements in their speech [...]. It kind of draws us in to keep listening. Most students do come to their lectures.«* This suggests that students saw movement as integrated into the entire teaching and learning process. Movement acts as a catalyst, transforming them from passive participants to more open and engaged learners. Body engagement fundamentally changes students' approach to learning, allowing them to experience it as a space of freedom and authenticity.

Together, these results answer the first and second research questions. Students conceptualised embodied learning as a process integrating body and mind in teaching, and their experiences with embodied learning included feelings of release from tension and stress through body awareness and movement, which, from their perspective, significantly enhanced concentration, quality collaboration with peers, and, ultimately, their engagement.

Challenges in embodied learning

Insecurity and Discomfort in Movement

During both the tour and focus group, students frequently emphasised difficulties and discomfort associated with movement in teaching, thereby answering the fourth research question about challenges of embodied learning. Students reported feeling shy, insecure, and afraid of making mistakes, especially during more complex activities requiring full-body involvement. One student noted during the tour: *»Our hands are here, and that is not so unusual [...] but everything bigger and more expansive feels a bit scary.«* Students further explained in the focus group: *»I think many people are afraid or don't allow themselves to use their bodies.«* On the basis of students' experiences, the reasons for these feelings are multiple, including negative previous experiences with teachers who perceived movement in class as unprofessional: *»One professor said it looks unprofessional when students move around while presenting [...] that the movement might distract attention from the lecture.«* Nguyen and Larson (2015) highlighted resistance among university teachers towards embodied learning, characterising it as an uncomfortable, alternative, and nonintellectual approach. Such resistance may stem from insufficient understanding of embodied approaches among teachers, further underlining the need to develop their competences. Allen et al. (2025) stressed the crucial role of teachers in how physical aspects of learning are introduced and used in teaching. In the researchers' interpretation, students' self-confidence related to physical appearance influenced their willingness to participate in lessons, as illustrated by one student's explanation during the focus group: *»[...] when I feel ugly, it's automatically harder for me to participate in some activities, especially to be the centre of attention, than on days when I feel good about myself.«*

Furthermore, students described how discomfort also arises when they are placed in spaces they do not consider their own, particularly the front of the classroom, which is predominantly used by the teacher. Therefore, during the tour, they spent the least time in this area, preferring to move to *safer zones*. At the beginning of the tour, one student even asked for permission to move around in the classroom, and during the focus group, it was noted that movement *»is still quite unusual in higher education because we're not used to it«,* which other students confirmed. This indicates that embodied learning remains insufficiently integrated into the teaching process, an experience reaching back to primary and secondary education. Consistently, studies have shown that educational systems, especially at higher levels, continue to neglect the bodily dimensions of learning (Clughen 2023; Hegna and Ørbæk 2021; Macedonia 2019; Macrine and Fugate 2022; Mathewson Mitchell and Reid 2017; Re 2025). During the focus group, one student remarked: *»During elementary and high school [...] there was never any teaching done like this [...] we are all just used to sitting down quietly [...]. The teacher asks something and then we answer.«* This suggests that the habit of using the body and movement from an early age, in line with personal interests and preferences, has critical implications for such activities in

teaching, as illustrated in this statement: *»I have been dancing since I was very young. [...] I am used to moving and to movements that are not necessarily natural for the body, so this is not a problem for me personally.«* All students, future pedagogues and teachers, agreed that a supportive environment is crucial for applying embodied learning in their future practice:

»If the environment and peers are (more) traditional, I think it's really hard to implement; you'll always be seen as the black sheep [...] but if they like modern and innovative approaches, I think that would be a facilitating factor.«

Faella et al. (2025) also emphasised creating a supportive environment where students feel safe to express themselves with their bodies, without fear of judgement. Accordingly, Re (2025) pointed out that training teachers in embodied learning requires designing environments that move away from passive learning and encourage students to actively explore content by integrating body and environment. Notably, higher education teachers should be supported in applying embodied learning when working with future pedagogues and teachers. Allen et al. (2025) and Chang et al. (2024) noted that teachers' reluctance to incorporate embodied approaches into their practice stems from a lack of systematic institutional, mentoring, and practical support. Additionally, Puoti et al. (2025) indicated that changes in teacher professional development programmes towards embodied learning are necessary, emphasising experiential application. These challenges illustrate current difficulties in implementing embodied learning and the need for changes in pedagogical practice at all levels of the education system, especially in the initial education of future teachers and pedagogues.

Conclusion

The findings of this research align with studies highlighting the value of embodied learning while also pointing to its limited implementation in practice, particularly in higher education. This pattern was further reflected in the analysis of the participants' study programmes. Students conceptualise embodied learning as a process that integrates the body and mind in learning and teaching, and they express openness to such activities. Although their experiences with embodied learning in higher education were limited, they revealed a strong connection between bodily engagement and classroom spatial design, emotional safety, sense of belonging and collaboration, and overall educational quality in terms of student engagement. In other words, the student-led tour and focus group demonstrated that students perceive the classroom as a physically, emotionally, and socially meaningful space in the context of embodied learning, where spatial layout, functionality, and organisation could contribute to their concentration, engagement, and sense of belonging. Despite recognising the benefits of embodied learning, students also identified certain challenges, including feeling shy, bodily self-conscious, and afraid of making mistakes

during embodied activities, particularly in unfamiliar spaces and when prior experiences had not supported such pedagogical approaches.

This research contributes to understanding embodied learning in higher education, where similar studies are scarce, especially from the perspective of pedagogues, who are responsible for ensuring educational quality, improving teaching practices, and supporting teacher professional development. The study also has value in the methodology, particularly in the use of the student-led classroom tour as a method that is itself embodied and participant-led. Data triangulation ensured the credibility and validity of the findings. It is important to note that this is a qualitative study; as such, the situated nature and context-dependence of the research must be acknowledged. Nonetheless, the findings may indicate tendencies regarding conceptualisations and experiences of embodied learning.

Future research and practice could adopt a vertical perspective on education, emphasising collaboration across early childhood education and care, schools, and universities. Particular attention should be directed towards preparing pedagogues and teachers by providing them with direct, sustained experience of embodied learning during initial education, as such experiences may provide a necessary foundation for meaningful changes in practice. Furthermore, embodied approaches could be more systematically integrated into higher education teaching, not as isolated interventions but as pedagogical practices embedded across courses, with careful attention to bodily engagement, emotional safety, and learning space use. Such integration requires clear pedagogical framing and gradual introduction to address potential student discomfort. At the same time, meaningful and lasting changes require continued professional development on this topic, especially for pedagogues as key facilitators of continuous professional learning. It also requires considering the sociocultural context, bodily self-perception, and the interaction between the body and the physical, emotional, and social dimensions of space. Integrating embodied learning within initial pedagogue and teacher education, continuing professional development, and conducting (participant-led) embodied research may help strengthen its recognition as a valuable approach to teaching and learning.

Statement on access to research data

The data are available with restrictions (legal/ethical restrictions)

The research data used in this article are not publicly available due to restrictions related to personal data protection and/or copyright (in accordance with ZVOP-2 and/or ZASP). Access to anonymized or restricted versions of the data is possible upon justified request to the authors of the article.

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Senka ŽIŽANOVIĆ (Univerza v Osijeku, Filozofska fakulteta, Hrvaška)

Katarina BOGATIĆ (Univerza v Osijeku, Filozofska fakulteta, Hrvaška)

Sanja SIMEL PRANJIĆ (Univerza v Osijeku, Filozofska fakulteta, Hrvaška)

RAZUMEVANJE UTELEŠENEGA UČENJA: KVALITATIVNA RAZISKAVA MED ŠTUDENTI PEDAGOGIKE NA HRVAŠKEM

Povzetek: Dialektični odnos med telesom in umom pri učenju zahteva ponovni premislek o pedagoških praksah in širših ciljnih izobraževanja. Raziskave dosledno potrjujejo prednosti utelešenih pristopov za globlje in trajnejše učenje, ki pa so v vzgojno-izobraževalno prakso še vedno vključeni nezaodstno. Zaradi te vrzeli je potreben razmislek, kako med začetnim izobraževanjem podpreti bodoče strokovne delavce pri razvijanju tovrstnih pristopov. Namen raziskave je bil pridobiti vpogled v to, kako dvopredmetni študenti pedagogike razumejo utelešeno učenje v okviru začetnega izobraževanja učiteljev in pedagogov na Hrvaškem. Uporabljene so bile tri metode: analiza študijskih programov, študentsko voden ogled učilnice in fokusna skupina z osmimi dodiplomskimi dvopredmetnimi študenti. Podatke smo pridobili s posnetki, zapiski in fotografijami z ogleda ter s prepisi razprave fokusne skupine, analizirali pa smo jih s tematsko analizo. Ugotovitve kažejo, da študenti utelešeno učenje prepoznavajo kot dragoceno, vendar učni prostor še vedno dojemajo kot pretežno sedeč. Raziskava je razkrila tudi izzive, povezane s telesnim samodoživljanjem študentov v povezavi z učenjem in gibanjem, kar predstavlja pomemben dejavnik pri udejanjanju utelešenega učenja v praksi. Prispevek se zaključuje s poudarkom, da je treba posebno pozornost nameniti opremljanju bodočih pedagogov in učiteljev z izkušnjami, umeščenimi v njihov sociokulturni kontekst, saj to predstavlja nujno osnovo za smiselne spremembe v praksi.

Gljučne besede: dialektika telesa in uma, učne izkušnje, perspektiva dodiplomskih študentov, študentsko voden ogled

Elektronski naslov: sgazibara@ffos.hr