

CONCEPTUAL PROBLEMS WITH DISEMBODIED COGNITION IN LEARNING ENVIRONMENT(S) AND THE ALTERNATIVE OF EMBODIED CREATIVITY

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Abstract. The article is motivated by today's practical realities and theoretical transformations that have affected education on a major scale. The shift from in-person to online classrooms at the beginning of the pandemic brought forward a series of issues related to embodied conditioning for creative strategies in the learning process. After presenting the shortcomings of the disembodied approach to education, we emphasize the role of the embodied (somatic, motoric, affective) aspects of education and discuss the embodied skills of creativity in a variety of learning environments. While so called embodied creativity became a fast-developing field due to mostly quantitative experiments in teaching-learning environments, it still lacks some conceptual clarification, especially in relation to its genesis in the paradigm of embodied cognition. Hence the main goal of this conceptual article is to extend, through the method of theory adaptation, the existing body of research on embodied cognition in academic environments to show how the embodied teaching and learning paradigm presents embodied creativity methods as an alternative to the disembodied approach to education and how technological environments provide an opportunity for such purposes.

Keywords: education, embodied cognition, embodied creativity, learning environment, physical action, skills, technology.

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1. Introduction

Though transformations in learning practices and institutions have been highly visible after the COVID-19 pandemic, some clarifications on how technologies and practices entangle to generate creative and learning outcomes demand further connections between new approaches and long-standing conceptual apparatuses. In this paper we aim to generate several avenues of bridging embodied cognition with conditions of the COVID-19 post-pandemic learning environments. Previous literature dedicated to this topic emphasized the role of embodied (somatic, affective) aspects and opened the discussion about embodied skills in learning (O'Loughlin, 1995; Barsalou et al., 2003; Black, 2010; Briedis, 2020, 2022; Macrine & Fugate, 2021, 2022). However, this study serves to extend this conceptual foundation in light of the new circumstances of embodied creativity in learning environments. Hence our main goal is to expand the existing body of research on embodied cognition in academic environments to demonstrate how the embodied teaching and learning paradigm informs learning theory, presupposing the application of the embodied approach to educating the whole person in changing learning environments. Finally, this can help us to understand how we interact while learning and teaching in a creative manner.

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There is a rapidly growing body of studies showing how embodied action (which is inseparable from cognition here) positively impacts learning and creative processes (e.g. Amabile, 1996; Gallagher & Varela, 2003; Barsalou, 2010; Macrine, Fugate, 2021, 2022; Stanciu, 2015; Petsilas et al., 2019; Abrahamson & Lindgren, 2014; Abrahamson & Sánchez-García, 2016; Hutto & Sánchez-García, 2015; Lakoff & Nuñez, 2001; Nathan & Walkington, 2017; Weisberg & Newcombe, 2017; Núñez et al., 1999; Pouw et al., 2014; Radford, 2003, 2009). According to this approach, the creative use of the body in performing learning tasks helps students to improve their self-confidence and to facilitate collaborative problem-solving activities (Gauvain, 2018). However, how reflections on embodied creative coping with technologically mediated environments could be integrated into the learning-teaching process remains a pressing question that this paper aims to tackle. In this regard, the present article also engages with recent research on the embodied use of media technologies in the creative building of meaningful environments (Couldry & Hepp, 2017; Navarro & Briedis, 2023; Briedis & Navarro, 2024) that can highlight the social and embodied aspects of learning and creative exploration.

2. Methodology and theoretical framework

As a conceptual article, this contribution builds up on previously developed concepts and theories (Hirschheim, 2008), those of embodied cognition, that were also tested through empirical research. Apart from such empirical testing and applications (Corley & Gioia, 2011), the focus of the current text is established in the theoretical extension of the embodied paradigm to creative and learning activities in a technological and mediated environment. In order to achieve that goal a conceptual relation (Jaakkola, 2020) should be established between embodied cognition and previous conceptualizations of learning and creative processes (referred further as “disembodied approaches”), but with the intent of revising (MacInnis, 2011) and critiquing such previous conceptual frameworks through the identification of insufficiencies in their explanatory potential.

In the light of this, a dual theoretical adaptation and revision strategy will be followed, since among the diverse research designs for conceptual papers (Jaakkola, 2020) theory adaptation (MacInnis, 2011) provides the adequate framework for introducing alternative conceptualizations of practices and assumptions that remain uncontested in specific contexts. We aim to better articulate some of the current embodied explorations of learning and creative processes with previous fundamental research on embodied cognition.

It is important to the purposes of this text to clarify that the founding hypothesis of our article is that embodiment strategies and relevant extending, modifying, and amplifying technologies have a positive impact on the learning process, creativity, and learning outcomes. Within a conceptual contribution, this practice-oriented hypothesis highlights the continuity that can and should be established between data, theory, theoretical frameworks and conceptual frameworks (Varpio et al., 2020). As Varpio et al. (2020) write, we follow the subjectivist inductive approach to formulate theory through its refinement and adaptation.

As we will show in the results, a lot of mentalistic and disembodied paradigms of learning and creativity still inform learning practices. We seek to adapt insights from embodied cognition paradigm to vitalize the reflections on learning and creativity, and in doing so

some of the shortcomings of dualistic mind-body chasms will be highlighted. Thus, the conceptual resources on which this argument is built drawn on the embodied understanding of human cognition. Today, embodied cognition incorporates aspects of an organism's adaptive behavior in the environment according to the 4E approach. Thus, cognition is understood primarily as "embodied", but also as "embedded" within a context of affordances (Gibson, 2014), "extended" beyond the introspective approach to the individual through socio-cultural horizons, and "enacted" when the body as a sensorimotor schema dynamically participates in meaning-making (see Rowlands, 2013; Glenberg et al., 2005; Shapiro, 2014). In turn, most educational guidelines follow theories that are mentalistic, *i.e.*, they establish a Cartesian divide between the mind and the body. Traditionally, the process of education presupposes a rather static engagement with the learning environment – students sit, watch, listen, write, *etc.* But with the rise of embodied cognition, mentalism has been greatly questioned. Theories of embodied cognition state that the mind is not an abstract and isolated entity; it is not in the brain, but is integrated into the body's sensorimotor systems and distributed across the physical-social space. As was already mentioned, one of the goals of this research is to present embodied and creative learning as a viable alternative to this mentalistic approach.

3. Results: the disembodied and embodied cognition controversy in learning

Classical views in philosophy of language, mind, and cognitive science present the mind as an information processor, akin to a sophisticated computer, which significantly reduces the potential embodied creative strategies in certain (learning, skillful, professional, *etc.*) environments. On the contrary, empirical studies show (Malinin, 2016; Kimmel et al., 2018; Frith et al., 2020; Briedis, 2020, 2022; Linkola et al., 2022) that embodied systems underlie information processing, and this implies, *contra* the inference-based approach, that embodiment contributes significantly to various mental phenomena related to creativity. Thus, by challenging classic (and still in a way mainstream) approaches to mind and cognition, the embodiment paradigm offers new ways of conceptualizing knowledge and presents a novel take on creative variation as opposed to body-to-mind reductionism.

Embodied cognition and creativity (Malinin, 2019; Macrine & Fugate, 2021) also thematizes the first-person experience, which presents problems of learning in a radically new light. For example, there are certain questions that an embodied approach is in a better position to address. For instance, what is meant by information, which is not, opposed to meaning, value directed. To study the constitutional conditioning of meaning and especially the genesis of new meanings via creative strategies, then, is to rely on the embodied cognition and embodied creativity perspective. This paradigm is based on the idea of an organic link between body, mind, and environment (we must also include intersubjectively given others), as has been shown in a number of empirical and even experimental studies exploring the shortcomings of the theory and practice in education (Dingli et al., 2018; Frith et al., 2020; Linkola et al., 2022; Macrine & Fugate, 2022), in order to evaluate the correlation of embodied strategies and creativity outcomes.

Despite this growing body of research, there is still little conceptual clarification regarding an educational framework that can successfully apply a number of already developed embodied learning strategies. At the same time, the increased importance of technological prosthetics for expanding learning has opened up new dimensions in the research area of learning tools and emerging technologies (Dingli et al., 2018). Hence, in contemporary discourse on learning perspectives, renewed interest in embodied cognition and embodied creativity exists in conjunction with the exploitation of technologies, presupposing new teaching approaches and interactions.

In short, current educational strategies (*i.e.*, teacher education, teaching pedagogy, curriculum and environmental design, and educational psychology) and approaches can be traced back to “disembodied” views of human thinking (Macrine & Fugate, 2022), while perceptual, sensory, and motor systems were presumed to be irrelevant in understanding brain processes (Wilson, 2002; Woodward et al., 2009). Hence, thought operations were considered to be “limited” by the bodily senses and had to be “freed from the corporeal trappings of the physical world” (Young & Whitty, 2010). Simultaneously, computer analogies of cognition were extrapolated into sophisticated computational models, missing the personalistic essence of the learning process. Alternatively, an “embodied creative learning” paradigm suggested that behavior should not be modeled primarily on the input-output schema of an isolated brain as a “black box”. The embodied approach to learning theory promoted the idea that cognitive creative performances are essentially linked with the learner’s interactions with the affectively and enactively structured environment.

As such, embodied cognition supplements traditional cognitive science, which presents the mind as a computer, when symbolic inputs produce symbolically encoded outputs (Shapiro, 2010), and where the meanings exist independent of perceptions and/or actions with the cognition that depends on the sensorimotor capacities of the human body and these sensorimotor capacities are “embedded in a more encompassing biological, psychological, and cultural context” (Varela et al., 1992). Therefore, sensory, motor, learning, and creative processes are inseparable in cognition and are dependent on organism-environment relations. These relations in turn restructure the organism’s teleological and necessary actions based on what sensory information is accessible (*via* affordances) to them at the time of action and the goal ahead.

Though the criticism of disembodied paradigms of creativity and human learning in this article is seen through the lens of embodied cognition, it is worth noting that the traditional theorizations of learning and creativity are also currently being contested through a variety of de-westernization strategies and practices (Alacovska & Gill, 2019). The scholarly production and the dominant paradigms in creativity and learning still show an unbalanced westernized point of view, even if new approaches are progressively gaining relevance and inspiring new practices. For the conceptual objectives of this article, it is important to highlight that one of the most distinctive traits of traditional Western-originated paradigms of human mind is the dualistic conception of body and mind. Consequently, it is often forgotten that cultural, creative, and educational spheres less assimilated to western paradigms often make use of the body as one of the most valuable resources for creative action and interaction (Navarro & Briedis, 2022). In this regard, these conceptualizations have a de-westernizing potential for creativity and learning studies that can be explored in future elaborations.

Criticizing the computational theory of mind, the embodied cognition paradigm challenges a number of previous assumptions that are relevant to creativity in education. First of all is the body–mind dualism. Insofar as cognitive learning processes are seen as computational, they can be investigated without regard to the “hardware” (embodiment) in which they are situated. Bodily enacted knowledge, in turn, involves processes of perceptual experience that deeply affect conceptual and/or creative thinking. Barsalou et al. (2003) have firmly established that there is a compatibility effect and a correlative complementarity between the physical and mental states. This means that the wide use of embodied metaphors presuppose how those can result in a more efficient skillful performance. For example, the experiments show that those participants who were asked to pull the lever closer to the body when they like someone or something performed the task faster than those who indicated the affection by pushing it further away from the body. The task of those working with embodied creativity is to establish the clear constitutive relation between affective, intersubjective dimensions of cognition here and to envision the application of these schemata for learning environments.

Much learning via formal learning environments results in students forgetting what they have learned and not having the knowledge “at hand”, which means that the knowledge is not applied when relevant circumstances arise outside of the static learning setting in space-time and conceptual context. Recent research in embodied and/or action-grounded cognition provides fresh possibilities for what it means to learn in order to become more a pragmatic part of how students understand and take on worldly tasks. It should also provide guidelines for the design of learning environments that synthesize learning with experiences that makes it meaningful and useable (Dewey, 1997).

4. Prospects of embodied cognition in learning environment(s) and discussion

The methods used in today’s classrooms vary greatly between human-centered and technology-centered approaches, which is crucial to the paradigm of embodied creativity (Macrine & Fugate, 2022). There is evidence that both have benefits in this regard; however, student outcomes in relation to these different methods differ qualitatively. Human-centered learning features increase creative engagement and quality of learning as well as situated possession of information (Craig & Amernic, 2006); it connects increased performance in learning environments to dynamic embodied learning, better attention, increased communicative features, and decreased cognitive noise (Craig & Amernic, 2006). This brings to the fore the issues of skills and creativity.

In his groundbreaking work, Dreyfus (2016) identifies three different understandings regarding embodiment, which helps to illuminate the construction of our argument here. The first of those understandings of embodiment is the physical; the second is the equipment in terms of bodily skills and situational reactions that we human beings have developed; and the third is the culturally grounded abilities and understandings that humans responsively gain as affordances from the cultural horizon in which they are embedded. In a creative learning environment, this structure of human embeddedness can be coupled with technologies to amplify the dialectics between students’ acquired skills and new creative ways to solve relevant tasks

or problems. For example, by using multi-perspectival videotaping and thematizing gestures, teachers could identify students who have not fully grasped the concept or task at hand. On the other hand, these mismatches can be reduced, particularly when encouraging students to produce some environmental gestures and thus convey information via their bodies that could not be communicated otherwise.

There are other pertinent perspectives on embodied cognition and creative engagement with the environment (e.g., Varela et al., 1992; Damasio, 2005; Semin & Smith, 2008), as well as linguistic approaches that focus on the basing semantics in embodied metaphors (e.g., Lakoff & Johnson, 1999; Johnson, 1990; Gibbs Jr., 2005) and more psychological ones that attend to modal sensory representations and the simulation of mental operations (e.g., Barsalou et al., 2003; Dingli et al., 2018; Pecher & Zwaan, 2005).

These conceptual apparatuses, despite their differences, contribute to a growing body of research regarding concrete aspects of embodied cognition and creativity in learning environments (Macrine & Fugate, 2022), for example, intersubjectively established gestures and their impact on the processes of communication, learning memory, adaptive information processing, mental simulation, and self-reflection (Goldin-Meadow, 2009). Moreover, some embodied cognition and creativity research suggests that the physical actions students perform and the actions being performed around them (by peers and teachers) in a playful, creative environment shape their mental experience into the long-term working memory. For example, when students imaginatively imitate the gestures of a teacher, this activity recalls the embodied experiences one had in a classroom, and this leads to more skillful performances in a mediated learning environment, thus establishing the student's memory as the embodied creative "I can".

Other methods of research and analysis regarding creativity in learning environments concerns visual perception, which is also a skillful embodied action. Embodied movement and the feedback it generates (how well or poorly the task is executed) are more deeply integrated into visual experience than the traditional cognitivist models of vision acknowledge. In this regard, the visual processing is not disconnected from other embodied operations. What the student perceives visually is thus determined by what she does in order to arrive at the physically displayed and socially significant task. For example, the movement of the perceiver amounts to understanding that part of the intersubjective environment can be revealed and explored through appropriate movements of the eyes, head, and limbs, which can also be creatively modified, in order to attain the situated knowledge in a novel way.

Recent technological developments provide affordances that make the application of these embodied learning environments highly efficient: e.g., touch-gesture interfaces like the *iPhone* and *iPad*, for example, in observing direct manipulation sessions. Direct manipulation, as described by Shneiderman (1983), is the ability to manipulate virtual objects on a screen without the use of command-line inputs (i.e., "dragging" a file to a trash bin rather than typing "del"). Direct manipulation of virtual objects in creative software environments has been consistently changing over the past few decades moving closer to the paradigm of embodied learning and creativity. Gadgets like touchscreens and other interactive interfaces do not presuppose external control devices (i.e., a mouse or a joystick) to experience and/or execute the control over objects on the screen. Instead, here the user's body as a sensorimotor schema

enables the experiences to make the manipulation of virtual objects more efficient, changing the level of direct manipulation and opening the way for creative strategies. Encouraging students to directly and creatively manipulate the virtual objects amplifies the learning experience, and adding the experience of a feedback (*i.e.* how well the creative manipulation goes) increases the student's performance and intersubjective synchronization with peers and teachers. Hence, the more sedimented and action-based the perceptual experience, the better the mental simulation achieved, and the more efficient usage of affordances for learning and understanding accomplished (Chan & Black, 2006).

This in turn generates a potential to contribute to the development of the following issues that are relevant to the learning processes and/or environments: 1) meaning and value constitution in the field of education; 2) organization of learning environment and process; 3) review of internal and external communication during the learning process; 4) genesis of students' learning skills and habits and personalization of the learning process; 5) introduction of innovations in the teaching process; 6) analysis of the origin and regularity of learning errors; 7) ego-level structures (higher order), emotional affectivity and its relationship with the learning process, issues of long-term motivation, communication with peers, teachers, mentors, and administration.

Though only a relatively small number of implications for an embodied practice of learning and creative thinking have been presented, the notion that both the mind and the body are the source of one's experiences and cognitive processes provides a new understanding of how learning and creativity can be sparked in the deeply technologically mediated environment we inhabit without neglecting the centrality of the human body.

5. Conclusions

Traditional education programs today still rely on theories that are mentalistic, *i.e.*, they do not take into account the grounding provided by the body for cognition, thus greatly reducing the possibilities for embodied creativity generated by the conceptual apparatus of embodied cognition and new technologies. However, with the advent of embodied cognition and creativity, mentalism has been challenged. Recent research in embodied cognition and creativity provides an alternative to this approach. Theories of embodied cognition suggest that the mind is not an abstract and isolated entity but is rather deeply embedded in the body's sensorimotor systems, which opens up new possibilities for the creative appropriation of learning environments and their technological mediation, as well as the motility of the human body and its prosthetic amplification by technology. Hence, embodied creativity includes creative strategies that emphasize or are generated by the sensori-motoric, affectional body schema in a technologically mediated and intersubjectively distributed environment.

Embodied creativity research has opened up the way and suggested methodologies to reflect on and expand the impact of embodied activities on creative thinking, stimulating the development of new techniques dedicated to amplifying creative output in return. As such, embodiment offers a valuable paradigm for a more effective learning and for sharing the results of a learning process, as well as a diagnostic tool for measuring conceptual understanding and improvement of learning environment(s). This embodied approach has the

potential to increase personal engagement and motivation both inside and outside of the learning environment. Finally, these conceptual and methodological changes bring us closer to explaining how something new emerges within traditionally established (educational) environments.

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