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# Places of Learning: A Discussion of Radcliffe's Framework for Learning Spaces in Light of Merleau-Ponty's Phenomenology

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## ABSTRACT

This paper presents a discussion of Radcliffe's pedagogy-space-technology (PST) framework for the development, implementation, and evaluation of learning spaces in light of Merleau-Ponty's *Phenomenology of Perception*. The following research questions have guided the theoretical discussion: In which ways can Merleau-Ponty's body-subject phenomenology enlighten Radcliffe's framework? How can Merleau-Ponty's body-subject paradigm be integrated into the development and implementation of hybrid learning environments? The reference to an exploratory case study within the frame of

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a larger research project will support the theoretical argumentation. In the study, the genesis of an innovative learning environment linked to a cross-institution master's program located at two Norwegian universities will serve as an example.

**Keywords:** *phenomenology, hybrid learning spaces, cross-campus teaching and learning*

## 1 Introduction

The past few years have taught us the importance of online and hybrid teaching and learning to guarantee continuity in education. A new awareness has arisen of the need to provide flexible and sustainable learning environments for learners throughout the educational system, not only in times of crisis (Adedoyin & Soykan, 2020; Petronzi & Petronzi, 2020). To ensure their survival in an increasingly digitalized world, higher education institutions (HEIs) must be able to provide *physical, hybrid (physical and virtual),* and *fully digital* learning environments, which can sustain learners' education, and promote the development of critical skills to meet future work-life challenges, and possible new crises (Bozkurt et al., 2020; Hodges et al., 2020; Williamson et al., 2020; Shearer et al., 2020).

This paper will present a discussion of Radcliffe's (2008) Pedagogy-Space-Technology (PST) Framework for the development, implementation, and evaluation of learning spaces in light of Merleau-Ponty's *Phenomenology of Perception*. The argumentation is articulated in six sections including this introduction and the conclusion. Section 2 presents an overview of the rationales for this paper. After an initial discussion of the understanding of space and human connections, with reference to various perspectives of classical learning theories, an introduction to the influence of Merleau-Ponty's phenomenology in the field of education and educational research will be presented followed, in section 3, by a brief shortcut to the meanders of architectural discourse, establishing a background for the subsequent theoretical discussion. In section 4, Radcliffe's PST framework will be introduced, along with a discussion of the need for a modification of the traditional framework. A phenomenological perspective informed by Merleau-Ponty's body-subject paradigm will be suggested and a ***pedagogy-first*** approach will then be proposed. An adapted version of the framework will be set forth for the design and implementation of hybrid (physical and virtual) learning spaces, where the learners are placed at the center of the experience and share a common responsibility to shape and support the learning environment they cohabit with their educators. To ease the theoretical argumentation, the genesis of an innovative learning environment will serve as an example. The learning environment in question has been designed and implemented within the frame of the SALTO research project at NTNU (2018–2022), an initiative focusing on cross-university collaboration and flexible learning opportunities for students enrolled in a master's degree program in music, communication and technology (MCT). The master's program is a collaboration between NTNU and the University of Oslo (UiO) and is therefore co-located at both campuses. An explanatory case study was conducted, and results were presented and thoroughly discussed in two previous publications (De Caro-Barek et al., 2023;

Nykvist et al., 2021). Nonetheless, part of the empirical results is referred to in this paper in section 5, to support the present theoretical discussion.

The MCT program managed and refined the development of **a laboratory for networked-based musical communication** called the **Portal,** which included physical workspaces based at each campus, and merged into an **extended and shared hybrid (physical and virtual) learning space for immersive learning mediated by technology**. A hybrid learning space is defined here as both a physical and virtual environment for learning, "where the focus is not merely on the notion of online and offline learning spaces, but also acknowledges the changing roles of teachers and students in these spaces and promotes student agency" (Nykvist et al. 2021; Hilli et al., 2019). The genesis of the Portal is informed by Radcliffe's Pedagogy-Space-Technology (PST) Framework (Radcliffe, 2008) for the design, implementation, and evaluation of learning spaces. Through the Portal, a 24/7 connection between the two universities supported and enabled synchronous and asynchronous cross-campus teaching and learning activities, communication, and collaboration. In this shared and technologically enhanced learning environment, students and educators together "explore, and evaluate pedagogical, spatial, and technical solutions, reflecting on this shared presence's theoretical and practical possibilities and limitations" (Støckert et al., 2019, 2020; Støckert & Stoica, 2017). The aim of the present theoretical discussion is to enrich principles within PST that can promote student-active learning and cater to better interaction and collaboration among students, and between students and educators, through authentic work-life tasks. The following research questions have led the theoretical inquiry:

- In which ways can Merleau-Ponty's body-subject phenomenology illustrate Radcliffe's framework?
- How can Merleau-Ponty's body-subject paradigm be integrated into the development and implementation of hybrid (physical and virtual) learning environments?

## 2 Rationales for this paper and terminology clarifications

To better understand the intentions of this paper, some clarifications are in order.

Space and place seem to reside in two different ontological frameworks (Goodyear, 2016): the abstraction of the physical, concrete space into a quantifiable, measurable unit; and the animated space inflated with life that becomes a place for humans to dwell in. The rationale for this paper is therefore twofold, it entails a theoretical level and a practical one. On a theoretical level, this paper tries to understand the intimate connection between space and humans that creates places of meaning, and specifically, places of learning out of physical and virtual spaces. On a practical level, this work is an attempt to conceptualize and provide directions for the creation of learning places to sustain educational needs in the 21st century. In doing this, it is this author's hope to overcome obsolete conceptions of what learning spaces in higher education should

be and focus on which teaching and learning practices actually transform rooms into learning places where knowledge is created and collectively negotiated rather than reproduced.

## 2.1 Understanding space and human connections

Since the very beginnings of our societies, humans have occupied and modified the environment around them. They turned their physical surroundings, the tacit space around them, into artifacts of meaning imbued with their lifeworlds (Norberg-Shulz,1976; Tuan, 1977). Natural spaces, for instance, became sacral places, meaningful to the human communities living nearby. Then man-made artifacts colonized these natural spaces and shaped them into the urban spaces that we know today. Within these spaces, we can recognize different functions and related values. It is in the process of attaching values, by imprinting a qualitative meaning to a physical phenomenon, that a space becomes a place (1977). What makes a house into a home? The personal intimate experience of space (1977), the qualitative meaning humans apply to the built space of brick and mortar of a house turns it into a home – a place of actualized agency and expectations, a place filled with life. Without the voluntary act of imprinting a value onto matter, a house would just be a pile of inanimate, purposeless bricks (1976).

In the same way, we can consider the spaces humans have used throughout the centuries to impart, preserve, and perpetuate knowledge, to be houses that can become homes and places of learning only when there are learners to attach values to them and dwell in them.

For a very long time, undisputed consensus has existed as to both how spaces for education should look, and which values make them places for learning. This consensus seems to be shared in the case when learning is objectified into an acquisition metaphor, as Anna Sfard called it (1998), as well as when it is negotiated as in a participation metaphor. The **acquisition metaphor** views learning as a process of acquiring knowledge. This metaphor is based on the assumption that knowledge is a kind of entity that can be transferred from one person to another or created by an individual. It suggests that learning is a process of accumulating knowledge, where the learner is seen as a container to be filled with knowledge. On the other hand, the **participation metaphor** views learning as the process of becoming part of a community. This metaphor emphasizes the social aspect of learning and sees knowledge as something that is constructed through participation in social practices. It suggests that learning is about becoming a member of a community and participating in its practices. Sfard (1998) critically evaluates the interpretations and applications of these metaphors and stresses the dangers of too great a devotion to one single metaphor. As the author phrases it, "When a theory is translated into an instructional prescription, exclusivity becomes the worst enemy of success. Educational practices have an overpowering propensity for extreme, one-for-all practical recipes" (p.10). The understanding of learning based on either of these two ontological perspectives will inevitably inform

educational practices. What has become increasingly evident is that siding with either one learning metaphor also influences the shaping of the spaces where learning is supposed to happen. Following epistemological currents in learning theory development from behaviourist approaches through cognitivism, constructivism, humanism, social learning, and experientialism (Pritchard, 2017), it is also possible to discern clear patterns affecting the building and management of learning spaces in educational institutions. Metaphors are a central aspect of architectural design (Boys, 2011), so the kind of learning metaphor preferred by educational institutions is concretized in the building of learning environments, reflecting the values inherent in the chosen metaphor. Often, universities have been described as "ivory towers", a figure of speech used critically to describe higher education institutions as enclosed spaces characterized by hierarchical structures meant to protect the elitist pursuit of knowledge, disconnected from the practical concerns of everyday life (Behrent & Steven, 2022; Shapin, 2012). In these spaces, educators are knowledge managers. They supervise the continuous transfer of knowledge to the students, whose learning outcomes are painstakingly measured against traditionally defined assessment criteria. The epitome of a learning space mirroring this concept of learning is the *auditorium*, a room built to enable the student audience to hear and watch the performance of the professor – the "sage on the stage" – lecturing (King, 1993). The antipode of the auditorium as a classical learning space, still very much in use today, are the modern open, flexible, and articulated learning spaces anchored in the participation metaphor for learning. These open spaces will, in this paper, be mentioned and characterized as *piazzas*, social spaces of movement and flow, enclosed and delimited in the perimeter as well as interconnected with adjacent spaces through arcades and corridors – places for gathering as well as for individual rest, where people can sit together or alone, to explore as well as reflect. Different learning theories are concretized within these learning environments or *piazzas*, the common denominator being a learner-centered perspective, where learners are agents and take responsibility for their own learning, learning from each other with each other, while the educator assumes a facilitator role, becoming a guide on the side (1993). Table 1 below is adapted and modified after Ashworth et al. (2004) and presents an overview of the best-known learning theories, the major contributors to their theoretical development, the view of the learning process, and the purpose of education accordingly. The modification mentioned above has been made by this author and includes the addition to the matrix of the experiential learning theory, and of three rows illustrating how different learning theories can influence the building and management of learning spaces and the related teaching and learning practices (cf. Typical learning environment, Educator's typical teaching style, and Learner's role in the table). This table is by no means exhaustive and represents undoubtedly an (over)simplification of complex theories, but it can be helpful in presenting a generic overview. Theorists do have similarities and tangent points, as well as differences, so the types of learning environments included in the table and the description of educators and learners' roles can overlap between two or more learning theories.

**Table 1:** Learning theories, learning spaces, and teaching and learning practices

| | BEHAVIOURIST | COGNITIVIST | HUMANIST | SOCIAL LEARNING | CONSTRUCTIVIST | EXPERIENTIALIST |
|---|---|---|---|---|---|---|
| ***Learning theorists*** | Guthrie, Hull, Pavlov, Skinner, Thorndike, Tolman, Watson | Ausubel, Bruner, Gagne, Koffka, Kohler, Lewin, (Piaget) | Maslow, Rogers | Bandura, Rotter, Engestrom, Eraut, Lave and Wenger, Salomon, (Vygotsky) (Piaget) (Boud) | Candy, Dewey, Piaget, Rogoff, von Glaserfeld, Vygotsky, Boud, Illeris | Kolb |
| ***View of learning progress*** | Change in behavior | Internal mental Processes (including insight, information processing, memory, perception) | A personal act to fulfil potential | Interaction with, and observation of, others in a social context. Situated learning, communities of practice, distributed cognition. | Construction of meaning from experience | Learning by doing. Learning styles. 4 stages: Concrete learning, Reflective observation, Abstract conceptualization, Active experimentation. |
| ***Locus of learning*** | Stimuli in external environment | Internal cognitive structuring | Affective and cognitive needs | Interaction of persons, behavior and environment | Internal construction of reality by individuals | Experiential learning cycle model: Internal construction from interaction and stimuli in the external environment |
| ***Purpose of education*** | Produce behavioral change in desired direction | Develop capacity and skills to learn better | Become self-actualized, autonomous | Model new roles and behavior | Construct knowledge | Apply knowledge, real world practice. |
| ***Typical Learning environment*** | Auditorium, formal learning spaces (classrooms, libraries, labs.) Individual spaces | Auditorium, formal but also informal learning spaces (both inside and outside educational institutions) | Formal and informal learning spaces that focus on the learner's personal needs | Piazzas, shared formal and informal learning spaces inside and outside educational institutions | Piazzas. Formal and informal learning spaces. Shared spaces as well as individual spaces | Piazzas, formal and informal learning spaces, shared and personal spaces according to one's learning style preferences |
| ***Educator's typical teaching style*** | Lecturing, one-way communication, drilling exercises | Less lecturing and more focus on mentoring | Facilitation, supporting | Scaffolding, model-role, mentoring, facilitation | Mentoring | Facilitation. Theory into practice |
| ***Learner's role*** | Passive receiver of knowledge. Reproducer of knowledge | Both passive and active learner. Reproducer of knowledge as well as co-constructor. | Active learner, co-constructor of knowledge, self-actualizer | Active learner. Reproducer as well as co-creator of shared knowledge | Active learner. Co-constructor of knowledge | Explorer. Co-creator of shared knowledge. |

## 2.2 Understanding learning environments in the 21st century: The digital turn

Complex as the theoretical landscape in educational theory might be, the last three decades have witnessed an increasing need to better understand how the technological digital turn has affected humans' relationship to technology. This factor does not seem to be properly addressed in epistemological discussions on learning conveyed by established learning paradigms (Siemens, 2005). The exponential development of the applied disciplines within computer science, and the consequential mainstream implementation of digital technologies in education caused George Siemens (2005) and Stephen Downes (2012) to publish well-known articles, in which they urged a rethinking of what it means to learn in the digital age. Much of their work has been connected to the development of massive open online courses (MOOC) in relation to networked learning (NLEC, 2021). Through connectivism, Siemens and Downes developed a learning theory that could better explain human-technology interaction, and its influence on learning. According to them, human-technology interactions challenge established notions of what learning is, and how and where it occurs. Traditional learning theories, such as behaviourism, cognitivism, and constructivism have approached learning from either an individual or intrapersonal view of learning. Because they were developed largely prior to the digital turn in society, they do not necessarily take into account learning that can occur *outside* human beings and fail to address learning located within technology and organization systems (De Caro-Barek, 2019). They prefer to focus on teaching and learning paradigms, and seem to ignore "the value of *what* is learned and of the process of decision-making needed to make good learning judgments in knowledge-rich environments" (2019). Table 2 below summarizes the differences between the three established learning theories of behaviorism, cognitivism, and constructivism, and connectivism.

**Table 2:** Behaviorism, Cognitivism, Constructivism, and Connectivism

| BEHAVIORISM | COGNITIVISM | CONSTRUCTIVISM | CONNECTIVISM |
|---|---|---|---|
| Human-centered | Human-centered | Human-centered | Network-centered |
| Understanding behavior is understanding learning | Understanding the mind is understanding learning | Understanding social interaction is understanding learning | Understanding networks of knowledge is understanding learning. |
| Learning is unknowable (black box theory) | Internal mental processes create meaningful knowledge | Social processes create knowledge | Interaction with network technology creates knowledge |
| Learning is a result of behavioral changes | Learning is an individual process and is based on the integration of new knowledge within existing mental schemas | Learning happens in a social context and builds on personal experiences shared with others | Learning happens as a network product in interaction with already existing knowledge channels, humans and non-humans (information systems, AI) |
| Technology is a medium and artifact for behavioral control | Technology is a medium and artifact supporting individual learning | Technology is a medium and artifact facilitating social connections | Technology is an agentic entity that connects, builds, and expands existing knowledge and can create new knowledge |

The transition to the current 4th Industrial Revolution with the advent of artificial intelligence (AI), machine learning, robots, the internet of things (IoT), and increased automation processes has turned our attention to the impact these technologies have on the educational sector and society at large (Bonfield et al., 2020). Education 4.0 is perhaps a "nebulous term", but it has become known to describe the different approaches and trends taken by educational institutions to align their services and curricula to prepare future graduates for work within Industry 4.0 (2020). Different attitudes and agendas seem to characterize the approach to technology for educational purposes. On one hand, for instance, connectivism focuses on technology as a direct means to understand human learning, and as a disruptive factor bringing radical changes into established educational systems. It promotes self-regulated learning and professes a deep belief in the open network learning paradigm and, by extension, open education, open science and research, and a general democratization of the educational sector. On the other hand, technology-mediated learning theory (Boer, 2019) is another recent attempt to conceptualize the impact of online technologies in formal learning contexts, with the intention of optimizing technology implementation for better teaching and learning practices. With a greater focus on learning optimization and educator intervention, this theory considers technologies exclusively as artifacts employed in technology-mediated learning contexts where "the agentic intentions reside with humans, and not with technology" (2019, p.1037). The agenda here is more utilitarian and can serve as an example of the growing production and accreditation culture that has become so common in education. The rising field of learning analytics epitomizes this tendency, through its research focus on algorithm generation for the collection, analysis, and reporting of data about learners and contexts in which learning occurs, in order to correct and improve learners' performance and learning outcomes.

Both connectivism and technology-mediated learning theory have often been criticized for being undertheorized, and for not necessarily contributing to new epistemological paradigms, being themselves too practical in nature (Boer, 2019). It is not pertinent to this paper to further this discussion. However, it is possible to claim that both theories have a considerable impact on learning space research, particularly in the case of hybrid and fully digital learning environments. Digital technology makes it now possible to deliver education in asynchronous ways with no necessity for the learners to be in situ, sometimes even with no need for an educator. The very idea of education has been evolving towards more democratic and learner-centered practices where learners are increasingly seen as contributors to, not only as recipients of knowledge (De Caro-Barek, 2023). When learning is freed from the normative boundaries of brick-and-mortar educational buildings and physical presence, do future students still need learning spaces? In this case, what makes learning spaces into learning places in the 21st century? What are the consequences for universities and their campuses?

## 2.3 Understanding phenomenology and its meaning for educational theories and learning spaces in Education 4.0

The learning theories outlined in the paragraph above have informed teaching and learning practices with the hope of benefiting learners' development, but also with a clear intention of potentially influencing their learning outcomes. Research in teaching and learning has traditionally produced literature related to principles or techniques derived from the implications of research findings on effective learning. Often, pedagogical ideas are discussed based on examples from classroom settings, consequently "implications for evidenced-based methods for teaching are presented objectively, as if those methods represented universal truths" (Greenberg et. al., 2019, p. 2). This objectivism has its roots in a utilitarian focus on the acquisition of abstract knowledge and skills that dominates contemporary pedagogy, particularly in higher education (Greenberg, 2019; Thorburn & Stolz, 2020). Attention is rarely given to considering the dynamic processes involved in the lifeworld (*Lebenswelt*) of the "classroom" (2019, p 2). As a reaction, Greenberg et al. (2019) argue for a phenomenological approach to teaching and learning in higher education informed by the field of existential phenomenology as articulated by Merleau-Ponty (1945/1962). This existential-phenomenological perspective, the authors claim, provides a unique lens through which to examine the lived experiences of educators and students within the educational setting. The application of this phenomenological approach extends beyond the confines of the physical learning environment, offering a comprehensive framework for teaching and learning deeply rooted in Merleau-Ponty's philosophy, with several interconnected elements playing a pivotal role. These elements, namely *embodiment*, *sociocultural embeddedness*, *ambiguity*, and *intersubjectivity*, are believed to influence perception and intentionality significantly (Greenberg et al., 2019, p.12). They are constantly at play within the learning environment, shaping the experiences of both students and their educators.

> **Perception** is the subjective process through which we become aware of the world, influenced by what stands out to us in a given context. This process inherently limits our perspectives in ways we often do not realize. As Churchill (Churchill, 2006, p. 89) puts it, our perception is always a function of our perspective.
>
> **Intentionality** is the mental quality that directs us in a certain way. Bakewell (2016) describes it as the ongoing relationship between our minds and the world, where our thoughts are always about something. Searle (1999) further explains that intentionality involves subjective states like beliefs, desires, loves, hates, fears, intentions, perceptions, and hopes.
>
> **Lifeworld** refers to the lived experience of a human being in the world, where subjective meaning arises from the situated context. It is a social, historical, and cultural world that includes individual, social, perceptual, and practical experiences (Parson, 2016).

Perception, intentionality, and lifeworld are influenced by factors that are often overlooked. In their attempt to define an existential-phenomenological framework for teaching and learning practices in higher education anchored in Merleau-Ponty's body-subjectivity paradigm, Sohn et al. (2017) and Greenberg et al. (2019) summarize these overlooked factors as follows:

> **Embodiment** refers to the body as a lived, experiential structure and the context of cognitive mechanisms. Our lived experience always includes embodied aspects of development, cognition, physical sensations, and emotions.
>
> **Sociocultural embeddedness** is our existence within a specific sociocultural environment. Our personal, professional, familial, linguistic, and societal experiences shape our worldview, influencing what and how we perceive the world.
>
> **Intersubjectivity** is the connection between humans in some form of mutuality, which can foster a sense of community or alienation. In an egalitarian approach, an educator should join students as another learner exploring course content and personal experiences.
>
> **Ambiguity** is the fundamental indeterminacy of experience that can inspire awe, mystery, and creativity. If overlooked, it can lead to a utilitarian attitude that prioritizes specific practical applications of knowledge and skills without considering their phenomenological meaning.

Our understanding of the world comes primarily from our first-person experience of it, through our perceptions and the intentionality that connects our subjective states with the world. Merleau-Ponty (1945/1962) describes intentionality as part of an ever-flowing energy, a network of relations between a person and the world. However, perception and intentionality are subjective, and due to academia's rationalist, objectivist focus, we often overlook their influence (Greenberg, 2019). By acknowledging these influences, educators could instead delve deeper into their understanding of the factors that contribute to shaping teaching and learning practices. This exploration can uncover underlying assumptions and intuitive thoughts that may otherwise remain unexamined, potentially hindering the learning process (Greenberg, 20019, pp. 8–11).

Greenberg's and Sohn's attempts are commendable. Phenomenology is perhaps experiencing a resurgence in educational philosophy, but as an epistemology, particularly in educational research contexts, it has been criticized for its complex concepts that are difficult to apply methodologically to a broader framework for teaching and learning (Thorburn & Stolz, 2023). On the other hand, Merleau-Ponty's work offers clearer ontological insights into the structure of being, emphasizing the body as the subjective matrix of experience. This latter perspective has indeed been taken on board by researchers and practitioners in educational contexts, to better understand the lived-body experiences of learners. Phenomenological methods can generate shared

understanding by allowing individuals to reflect on their experiences. However, these methods can often be overly descriptive, privileging first-person accounts that prove difficult to challenge or dispute (Thorburn & Stolz, 2020).

Nonetheless, it is this author's conviction that phenomenological considerations are indeed relevant in various educational contexts. They are particularly useful in addressing the current utilitarian culture of higher education, and the role of educators in relation to the increasing pressure exerted by technological development. The entry of technology within the educational domain has certainly revolutionized the way we contemplate education, but it has also brought increasing dehumanization to the sector, in favor of a hyperfocus on production and results, standardization, reporting, management, and control. Education has become "learnification" as Biesta suggests (2010), and its vital formative aspect is at risk of succumbing to an exponentially increasing need for measuring and specialization. Educators are encouraged to adopt trendy methods and techniques, and have become *instructors* and professional operators of teaching practices (Greenberg, 2019, p. 163). Moreover, the prevailing educational curricula in higher education highly regard knowledge that is somewhat detached from our bodily existence (O'Loughlin, 1997). This dichotomy seems to disrupt the fabric of lived human experience, and assumes that we exist sometimes as intellectual beings, equipped with the ability to acquire knowledge, and at other times as agents who act to achieve specific results, while these two aspects are never truly separate (O'Loughlin, 1997, p. 30). What is needed in today's education is a type of understanding that *directly* corresponds to how we live. Our experiences are layered with meanings that shape the world we inhabit. This world, as a social construct, engulfs us. The world is a network of ecological connections that bind people to their environment. Including Merleau-Ponty's body-subjectivity concept within pedagogical practice redirects the focus towards human understanding and human experience as a lived conjunction between mind and body, and not as a dualistic logical disjunction of Cartesian heritage, which nowadays seems obsolete. The *embodied experience* or body-subjectivity paradigm can serve to bridge the gap between the subjective and objective. Moreover, this aspect of Merleau-Ponty's phenomenology proves indispensable when considering concepts of space and place in educational contexts. Educational institutions should build learning environments that can foster students' understanding of ideas of body, space, and social interaction in relation to the physical environment in which they dwell, since these are all intertwined aspects of their lifeworlds. New convergent technologies and hybrid forms of communication and interaction should also be included in the equation, as these are now an unavoidable part of how humans live and express their lives. For the same reason, it is not possible to ignore the emergent contribution of AI to the plethora of educational technologies available, nor the fact that AI will forever reshape the concept of education and human learning. It is no longer a question of whether automation processes will revolutionize teaching and learning and the role of educators. Technologically, it is conceivable that individual students could benefit from a smart robot that is perfectly tailored to their interests and needs and has access to

up-to-date information across *all* fields of both human and *non-human* knowledge, that is knowledge that will emerge by itself from automation systems. Such a robot would not be subjected to personal and cultural bias and/or make factual errors, which a human educator might do. While this may seem like science fiction, the technology is already here. If the objective is *learning*, we must then reconsider what learning entails and what should be learned. Higher education institutions can no longer train students to compete with machines that are more intelligent. Instead, education should focus on the elements that are uniquely human, thereby ensuring that machines cannot outperform us. As one professor in religious and philosophy didactics wrote newly "... everything we do in education must differ from machine learning. If machines can perform a task better, we need to rethink our approach" (Hovde Bråten, 2023). It is, in other words, crucial to reevaluate our understanding of what it means to be human in the face of artificial intelligence and our pervasive digital reality. Human knowledge competence is undergoing a redefinition process in which the focus is moving away from the meaning of mere *possession* of knowledge to its *application*. This includes an increased emphasis on metacognition, or reflecting on one's learning process, understanding the nature of knowledge, and how it is formed. Furthermore, the application of knowledge extends to solving new and unfamiliar problems. A profound, thorough understanding of a subject enables the learner to apply this knowledge in various contexts. This convergence of human learning and AI processes underscores the need for a holistic approach to education that integrates digital advancements with inherently human capabilities and values. For the time being, the human experience, particularly in the context of education, still extends beyond the confines of digital reality (as long as body identities will not be attached to AI, we still might have a chance). It therefore necessitates the creation of spaces that foster community, dialogue, resistance, and social learning to fully express itself. Educational spaces must facilitate independent thinking and ethical discussion. These spaces need to be animated with the lifeworlds of their dwellers who can reclaim their very human essence to be indisputably rooted in the reality of the body-subject.

In the next section, this paper will explore the implications the inclusion of phenomenological approaches based on Merleau-Ponty's body-subjectivity can have in developing learning spaces for higher education in the 21st century. These approaches do not limit themselves to the domain of education and pedagogy, but rather connect knowledge from different academic fields and orchestrate and conduct their efforts towards the creation and development of places where human learning can unfold.

## 3 Towards a phenomenology of learning spaces

Phenomenological approaches in architectural design have been present in a continuum from the late 1950s until today, with a renewed focus on the impact of space, materials, and light on the human senses (Tamari, 2017; Sirowy, 2017). One of the first internationally acclaimed attempts to introduce phenomenological considerations in architecture is exemplified in Norwegian architect Norberg-Schulz's book *Genius*

*Loci: Towards a Phenomenology of Architecture* (1979), where he draws on Heidegger's hermeneutic ontology to show the interconnectedness of humans' lifeworlds (or the concept of *genius loci* borrowed from ancient Roman culture)[1] and the study of space in architectural designs (1979, pp. 7–10, 18–20). With Norberg-Schulz, architecture expanded the existential sense of the dwelling space.

Throughout the late 1980s and until today, the contribution of phenomenology as a theoretical/philosophical framework within architecture has been growing, including ideas from Heidegger, Bergson, Merleau-Ponty, and Gadamer (Otero-Pailos, 2010).

Phenomenology in architecture is even more relevant today since today's architecture, in particular public architectural design, is challenged by the necessity to include new emergent technologies in a complex and comprehensive spatial picture, where human beings interact with physical as well as virtual artifacts (Tamari, 2017). In *Attunement: Architectural Meaning after the Crisis of Modern Science* (2016), architectural historian Alberto Pérez-Gómez draws on the concept of *embodied cognition*[2] and argues phenomenologically for an architecture that enhances human values and capabilities, an "interconnected" architecture that respects its location and its inhabitants, while it functions as a communicative platform for society. Space and environment matter "... not only as a material ecology that must obviously be kept alive for the survival of our species, but also because it is nothing less than a constituent part of our consciousness" (Pérez-Gómez, 2016, p. 124). This idea of the interconnectedness of space, mind, and lived life becomes especially relevant when designing learning spaces, since the space must accommodate the lived lives of its dwellers, students and educators, with all their idiosyncrasies.

Research on teaching and learning spaces in higher education is a relatively new and still underrepresented field. However, the last two decades have witnessed an increased interest in and development of socio-material perspectives in human sciences (Ellis & Goodyear, 2016) and architecture (Boys, 2011). Researchers with diverse backgrounds in the social and human sciences seem to have merged their research interests and efforts with those of architecture for learning spaces in trying to better understand, theorize and define the relations that connect the material world (space, place, and tools) to human activity, thought and language, and learning (Boys, 2011). The design of learning spaces in higher education has evolved from the

1 In classical Roman religion, a genius loci (plural, genii locorum) was the protective spirit of a place. In modern usage, the term usually refers to a location's particular atmosphere. In the context of modern architectural theory, the concept of genius loci impacts the theorization of place-making.

2 Proponents of the theory, such as Varela et al. in *The Embodied Mind: Cognitive Science and Human Experience* (1992) emphasize the active and significant role of the biological body in the shaping of cognition and in the understanding of an agent's mind. Through a cross-fertilization of different fields of study anchored in a phenomenological perspective, the authors pioneered the connections between phenomenology and science, and between Buddhist practices and science – an unorthodox approach that has since become highly influential (MIT press Scholarship online: https://academic.oup.com/mit-press-scholarship-online/book/15075/chapter/169494945#260554941).

modernist institutionalized approach, where space can be designed as "a functional and metaphorical response to human behaviour" (Boys, 2011, pp. 69–70) to a more comprehensive approach, embracing the complexity of relationships and activities, where social and spatial practices intersect in it beyond the informal/formal learning divide (Boys, 2011, pp. 69–70).

The concept of sentient "bodily" materiality of our existence as expounded in Merleau-Ponty's *Phenomenology of Perception* (1945), and in the posthumous *The Visible and the Invisible* (1964), lies at the core of understanding how human beings perceive and build their own identity in the bodily space of the world (Merleau-Ponty, 1945). Space emerges through the ways the body inhabits the world. It is not an entity existing a priori outside of ourselves. Its existence depends on "the interweaving of all the relationships in the historical and idiosyncratic unfolding of lives" (Mazis, 2016, p. 29). The first sentence in Merleau-Ponty's *The Visible and the Invisible* is expressed in a condensed way, like a paradox: "We see the things themselves, the world is what we see" (1964, p. 17).[3] In this, Merleau-Ponty goes beyond Husserl and Heidegger and defines the body's typical mode of existence as being-toward-the-world. With *The Visible and the Invisible*, "perception" is no longer *an act* of a knowing mind overlooking its experience and transforming physiological processes into rational meanings. It is *the fact* of an essential agent body. The body is located in the middle of what it perceives, at the same time polarizing everything that happens to it from its own perceived non-objective "dimensions", from the constantly changing spatial perspective of sight (*la foi perceptive*) (Merleau-Ponty, 1964, pp. 21–24) to the very idea of space and time and truth:

> We have not a constituting consciousness of things, as idealism believes, or a pre-ordination of things to consciousness, as realism believes (they both affirm the adequation=equivalence of the thing and the spirit), we have with our body, our senses, our gaze, our power to understand speech and to speak, "measurers" for Being, dimensions where we can relate to it, but not a relation of equivalence or immanence. (1964, p. 140)[4]

This is where the paradox lies, perception and sensation reveal to us a world that cannot be simply subjective nor foreign to us, since it is none other than what we perceive. In the chapter, "The Intertwining: The Chiasm" (1964, p. 170),[5] the philosopher

3 "Nous voyons les choses mêmes, le monde est cela que nous voyons". Author's translation.

4 "Nous avons, non pas une conscience constituante des choses, comme le croit l'idéalisme, ou une pré-ordination des choses à la conscience, comme le croit le réalisme (ils affirment tous deux l'adéquation de la chose et de l'esprit), nous avons avec notre corps, nos sens, notre regard, notre pouvoir de comprendre la parole et de parler, des 'mesurants' pour l'Être, des dimensions où nous pouvons le rapporter, mais non pas un rapport d'adéquation ou d'immanence" (p. 140). Author's translation.

5 L'entrelacs – Le chiasme.

presents a thorough explanation of the ontology of the flesh (*chair du monde*). Merleau-Ponty brings in the notion of *chiasm* each time he tries to think not of identity, not of difference, but of identity within difference, unity by opposition, terms which are usually held to be separate, such as seer and seen, interior and exterior, visible and invisible, each being itself only by being the other. The iconic concept of *la chair du monde*, the flesh of the world, visualizes the world as an extension of the phenomenal body. The structure of the world cannot be thought of except in relation to the structure of the human body. The body, as a coherent unity of senses and meaning, is a structure that itself structures the world. Merleau-Ponty's concept of *corporéité*, or corporeity, as the only way for living creatures to be-in-the-world (*être-au-monde*) and to know the world, leads to new ways of enacting architectural interactions. The mode of being-in-the-world is not that of substantial reality, but of "becoming". It does not exist in a static way, as a being, but in a dynamic way as a "movement". It is kinesthetic awareness, it projects the animated into the inanimate, transforming it and bringing it to life (Toadvine, 2019). As Rachel McCann suggests (2016), in the environment, it is impossible to separate the world from the human body, the body sentient from the body sensed, as they integrate within the phenomenal unfolding of the flesh (Locke &McCann, 2016, p. 193). Phenomenology in architecture implies the simultaneous exchange of meaning between the human body inhabiting the space and the spatial entity itself. A phenomenological approach to architecture builds spaces, which put the human at the center of the spatial experience, as the material experience of the space changes and transforms itself because of the human "gaze".

Parallel to this development within architecture, awareness of the need for **a phenomenology of learning environments** has also emerged since the beginning of the 2000s (De Caro-Barek et al., 2023). In this context, recent contributions to learning space research seek to theorize practice to inform the design, management, and evaluation of learning spaces, which are research-based and take into consideration the agency of the users involved, students, educators, administrators, and designers (Germany, 2014; Goodyear, 2020; Støckert & Stoica, 2017). Often, the metaphor of inhabiting *a liminal space* is suggested (Boys, 2011, pp. 78–79; Locke & McCann, 2016, p. 135). The liminal space is a space of transition and transformation, and as such can be compared to the learner's educational journey. In educational theory, liminality has often been linked to threshold concepts (Land et al., 2014), to address the state of a learner's troublesome transition from an earlier, somewhat incomplete, understanding (or practice) to a higher one (2014, p. 200). In this paper, however, the concept of liminality is embraced for its transformative potential, as a space that transforms and at the same time is transformed by its users and their encounters, as they wander through it and evolve (Land et al., 2014). In this sense, liminality is seen through the phenomenological lens of Merleau-Ponty's indirect ontology, as "… a *space of envelopment* in which perceiver and perceived fold back within each other as they unfold and intertwine, undercutting traditional dualism of subject/object, self/other, mind/matter and passivity/activity" (Mazis, 2016, p. 23). The following section will try to

address the need for a phenomenology of 21st century learning environments inspired by Merleau-Ponty's considerations of the body-subject paradigm, by discussing Radcliffe's globally employed Pedagogy-Space-Technology Framework.

## 4 Pedagogy, space, and technology: The old and the new

Much of the published literature on learning environments has mirrored a paradigmatic development in pedagogical currents, from behavioristic approaches to more progressive and socio-constructivist approaches to teaching and learning (Baars et al., 2021). The direct link connecting this transition to the dramatic increase in the availability of digital technologies is now a well-established side of social sciences' discourse (2021). While we watch society projecting itself through the 4th Industrial Revolution and towards a future 5th Revolution of Digital Humanism (Thurston & Hayes, 2021), the traditional role educational institutions have had for centuries, as exclusive knowledge providers, has now been challenged by the competition of new players in the open and private education business community (De Caro-Barek et al., 2023). The broad availability of online educational platforms and online courses offers learners throughout the educational sector a previously unimaginable level of flexibility and accessibility (Pates & Sumner, 2016). The next generation's places of learning (Radcliffe, 2015; 2008) are no longer delimited by the physical perimeter of educational institutions' buildings. There is thus a growing international consensus that it is crucial to develop and offer hybrid learning environments that are **flexible in form and time**, with a general understanding that learning takes place also informally and in "cross-border" collaboration (Leijon & Tieva, 2021, p. 33). The turn of events caused by the pandemic has forced educational institutions to rethink and redesign their physical learning spaces, and adapt more to the needs of 21st century learners. However, a somewhat myopic focus on learning space design and technology seems to overshadow the need for a more in-depth conversation on pedagogy (Pates & Sumner, 2016). In higher education in particular, despite the broader consensus on social constructivist teaching approaches as most effective in terms of enabling student learning (Stover & Ziswiler, 2017), the journey from frontal teaching in auditoria to student-centered active learning is by no means the norm (De Caro-Barek et al., 2023).

Radcliffe's intention when conceptualizing the Pedagogy-Space-Technology Framework (2008) was to offer a reference tool to ease the convergence of pedagogical practices, design of physical learning spaces, and implementation of technology to create new models of campus interaction, where optimal learning space design can support student learning (Manciaracina, 2019). The figure below pictures the interrelated constituents of the Pedagogy-Space-Technology Framework (PST). Each of the three elements (pedagogy, space, and technology) exerts mutual influence on the others creating a circular course of actions embodying the life cycle of the learning space (Radcliffe, 2008, p. 14).

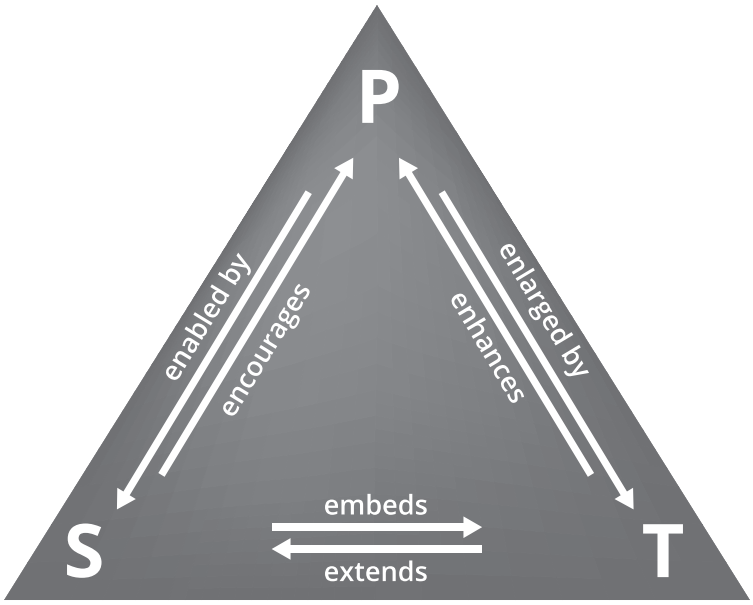


**Figure. 1:** Adapted from Radcliffe's PST framework (2008).

To ensure PST's maximum flexibility for its stakeholders and their agendas, whether they are administrators, faculty, architects, students, educators, and/or equipment and technology providers, the framework *does not* mean to suggest a hierarchy that values one element more than the other (Radcliffe, 2008, p. 14). Radcliffe's PST framework has since been theoretically referred to and practically implemented in different educational scenarios, from online mooting court activities for law students in Australia (Ng, 2015) to active learning classrooms with a focus on social learning in American universities (Zhu & Basdogan, 2021). The trend we are now witnessing is that PST has slowly moved from being a framework most suited to physical learning spaces on campus (Casiraghi et al., 2020; Lee et al., 2018; Manciaracina, 2019; Zhan et al., 2020) to becoming a reference for *hybrid* and *fully online* learning spaces as well (Pan et al., 2020; Xiao et al., 2019, 2020).

However, as it has been discussed in a previous publication (De Caro-Barek et al,. 2023), upon closer examination, even in PST the pedagogical element seems to play a more passive role. When reading the framework, pedagogy is "enabled by space" and "enlarged by technology". Space "encourages" pedagogy, and technology "enhances" it. There is no actual agency related to pedagogical thought and action. In its present form, PST can be (mis)interpreted as a framework that rather places a heavier focus on physical and technological form than pedagogical substance. Therefore, in the next section, a *pedagogy-first* approach is preferred when conceptualizing a framework for student-centered physical, hybrid and virtual learning environments.

## 4.1 Pedagogy first and the human factor

Cleveland and Fisher (2014) have critically analyzed methodologies and methods used to evaluate learning environments in higher education in view of contemporary

approaches to teaching and learning. One of the interesting references is to Radcliffe's PST framework as a useful guide not only to design, but also to evaluate learning environments with a direct link to students' learning outcomes (Cleveland & Fisher, 2014, p. 10). However, Powell (2008) suggests that this type of evaluation can be very difficult, since learning outcomes depend on a significant and uncontrolled number of variables and contributing factors beyond space and technology, which relate more to the kind of teaching and learning activities carried out in the learning space than the space itself (Cleveland & Fisher, 2014, p. 11; Powell, 2008, p. 29). With a background in the phenomenology of architecture outlined earlier, it becomes clear that those "significant and uncontrolled variables and contributing factors" influencing teaching and learning activities in the learning environment must refer to the unpredictable ways of human agency. This refers to how the interaction between the users, students and educators is mediated in the learning space with and through technology. On this note, a more recent critique of the PST framework by Manciaracina (2022) highlights the incompleteness of the framework, since the presence of users seems to be missing (p. 94). Manciaracina (2022) argues that in a learning space that follows human-centered design approaches, focusing on the type of interaction and the user is what should guide the design. The PST framework reconsiders the creation of learning environments to facilitate participatory learning-centered experiences. However, it does not account for the users and their interactions as "both actors and directors, enablers and resisters, learners, and instructors" (Manciaracina, 2022, p. 94). These multifaceted aspects of human agency and interaction are what, in this paper, have been defined as ***the human factor***, the X-variable that is notably absent in the equation of the PST framework, as the framework itself does not emphasize pedagogy and the users.

Nevertheless, pedagogy is de facto the only constituent of the framework that can express and actualize any agency, since it manifests itself in the interaction between educators and students. Following Merleau-Ponty's body-subject paradigm, learning environments do not exist a priori, they only exist *where* and *when* students and educators are presently occupying the environment. Along with the same logical thought, technology is of no use if not employed by someone in the environment. However, nowadays, the notion of environment has expanded, and blurred out the "boundaries" of the space-time continuum as the physical becomes more and more entangled with the immateriality of the internet of things and artificial intelligence. In the increasingly changing and fragmenting complexity of the world, Merleau-Ponty's flesh is the only constant, the carnal grip of the body on its own and on the mind's existence. The human factor should therefore be the encompassing element at the very core of any framework trying to define, design, and implement learning environments, as it is the only element that can account for any pedagogical agency. The human factor is the variable enabling the encounters of educators, students, and other participants in their learning environments, whether physical, hybrid, or fully online. It, therefore, can be used to identify and recognize users' behaviors at different levels of interaction.

The human factor accounts for their presence, their being-in-the-world: how educators interact with students; how students interact with their peers; and how educators interact within their fellow academic community. It shows how all perform their roles, how those roles might be subjected to changes and evolve because of that interaction, and how all can contribute to creating an intellectual community of users, who are interested in transforming and innovating their shared learning environments.

When drawing a parallel to the research field of computer science, distance education, and e-learning, it is possible to find meaningful cross-fertilization points with the development of networked learning theory (NL) (Dawley, 2009; Hodgson et al., 2012). Although being a relatively recent research field, NL has been a productive practical and theoretical trend in educational practice, in both higher education and the corporate sector since the late 1990s (Goodyear et al., 2006). Networked learning is defined as learning "in which information and communication technology (ICT) is used to promote connections and interactions" (Goodyear et al., 2006, p. 2). Interactions in networked learning environments take place in many forms, "through text, voice, video, graphics, and shared working spaces" (p. 3), physically, hybrid or fully online. Human interaction is the very core of the ontology and epistemology of networked learning because "knowledge emerges or is constructed in relational dialogue or collaborative interaction – knowledge is not a property but a social construction/way of knowing from our experience of the world" (Hodgson, 2012, p. 293). This aspect seems to resonate with Merleau-Ponty's idea of a world that is common to all yet subjective, an "umbilical link" that not only connects, but rather allows the subjective relation to Being to happen *only* through the intersubjective relation to others (Merleau-Ponty, 1964, p. 85). In Merleau-Ponty's words, "... the synchronism of consciousnesses is given by their common belonging to a Being (the flesh of the world) of which none has the cipher (the code) and whose law they all observe"[6] (p. 91). The certainty of accessing the same world that others perceive, a world that, paradoxically, is common to all in its subjectivity, constitutes the foundation of a kind of truth where knowledge can exist. So, in this sense knowledge is both subjective, intersubjective, and collective. It is shared just as the space-time continuum of human interactions where it unfolds is shared. Networked learning environments are indeed characterized by "a learning culture in which the members value supporting each other: no one individual is responsible for knowing everything" (Hodgson, 2012, p. 295). In such environments, students and educators interact and can become peers sharing not only a space, where existing knowledge is negotiated and new knowledge is created, but also a place of belonging.

A framework for the design of networked learning environments, such as the one Radcliffe visualizes in his PST model, should include human interaction, or the human factor as it is referred to in this paper. However, strangely, when considering Radcliffe's

6 "[...] le synchronisme des consciences est donné par leur commune appartenance à un Être (la chair du monde) dont aucune n'a le chiffre et dont elles observent toutes la loi". Author's translation.

PST, the missing link in the framework is indeed the human factor. This is the only element that can account for the interaction between students and educators, students and students, educators and educators, and for how that interaction becomes concrete in collaborative teaching and learning practices and the creation of knowledge. This is the reason why it seems pertinent and necessary to modify and update Radcliffe's initial PST in a way that can strengthen and highlight the position of pedagogy and the human factor, encompassing the framework by including the educators' and the students' points of view. It is in fact pivotal to hear directly from the users how they perceive teaching and learning in such a collaboration-based learning environment.

Figure two below pictures the modified version of the PST framework. In this modified version of PST, the users and their encounters are positioned at the very center of the framework, while the human factor encases the framework itself by directing a deliberate focus on pedagogy as the element expressing the agency of human interactions in learning spaces.

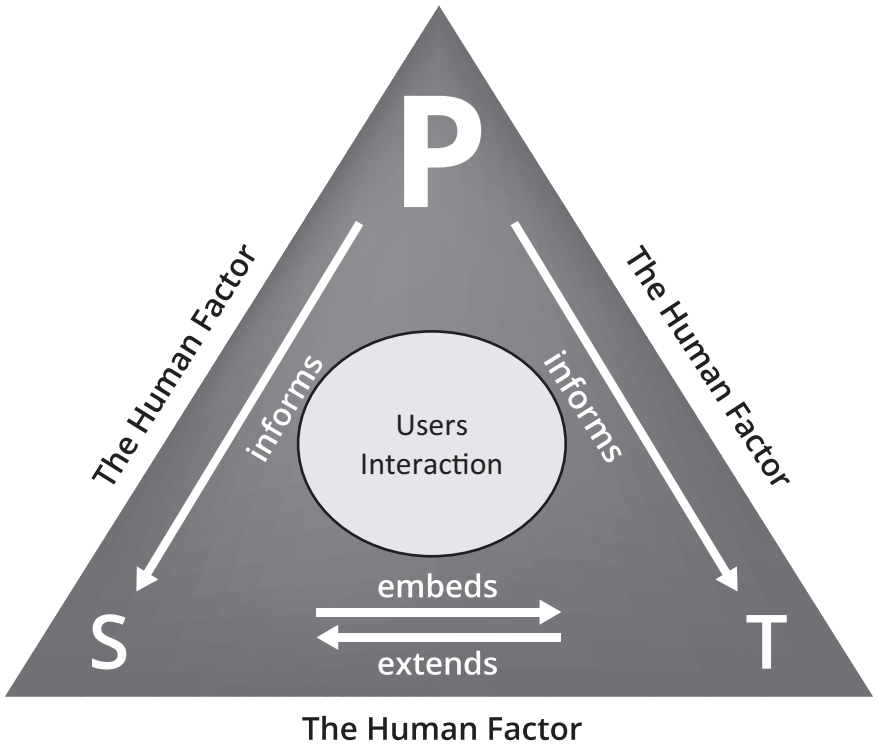


**Figure 2:** A modified version of the PST framework. Pedagogy first and *the human factor.*

In this modified framework, the human factor expresses two parallel levels of human agency, a general level, and an individual space-time specific level. The two levels coexist in the liminal space of the learning environment. By encasing the framework, the human factor represents, on a general level, the fundamentals of human agency that should lead any decision-making regarding learning environments. If the framework is to be read through Merleau-Ponty's lens, nothing exists outside the

boundaries of human existence. In this respect, the liminal border of the human factor resembles "la chair du monde", Merleau-Ponty's ontological flesh of the world, described by Pascal Dupond (2001) as the fundamental expression of the unity of being as "seer-visible" (p. 5), and by Granade (2007) as "the original environment in which we live and where we are in contact with things" (p. 4). By locating the actual users' interactions at the very core of the framework, the human factor then is embodied by materializing contingently in time and space through the individual existence of the users and their encounters. These encounters constitute the basis for the development of pedagogical practices to sustain collaborative learning and student-centered learning activities. The P for pedagogy is therefore pictured as more predominant in the framework, since it is the element representing the manifestation of human agency. As pedagogical practices emerge from the evolving interactions of the users in the learning environment, they should reflect this dynamism and adapt to users' needs. It is pedagogy that should *inform* both the design of the space and the choice of technology accordingly. While space embeds technology, and technology expands space, they are both subordinated to pedagogical agency, and how educators and students choose to collaborate and work in their learning spaces/arenas: physical, hybrid, and/or fully digital. The framework appears therefore to be both fixed and flexible. While the human factor is the fixed element that defines the framework in general, the individual users' interactions inside the framework will be subjected to change and development, as individual lives are. At the same time, and similarly, while pedagogy remains the crucial red thread of any learning environment, the environment itself, represented by space and technology, will necessarily change and develop according to the changing needs of its users. The continual evolution of the learning environment will then again affect pedagogical practices in a mutually recursive process. In this duality of character of the framework, both fixed and flexible, reversible, and inevitably subjected to change, it is possible to discern the echo of Merleau-Ponty's concept of *intertwining* or *chiasm* (1964): a dynamic structure of mediation that combines unity-in-difference (Toadvine, 2019); the complete interdependence of sensed and sensible within the flesh (McCann, 2015); a space of movement and becoming (2015, pp. 193–195) as human encounters unfold "in the corporeal depths of our embodied existence" (p. 198). Then, what are the implications of these ideas, and how can this framework be used as a guide in the concrete design and implementation of learning spaces? In the following section, an explanation of how the modified PST framework can be employed in developing networked learning environments in higher education is presented, together with some examples from the exploratory case study conducted within the SALTO project.

## 5 Music, communication, and technology (MCT) and the SALTO project

As mentioned earlier, a previous publication (De Caro-Barek et al., 2023) has presented a thorough account of the SALTO research program and the related master's program

in music, communication and technology. The MCT master's program constitutes "the living lab and testbed" for the research program SALTO (2018–2022). The SALTO project represents the concretization of a pedagogical vision that values collaboration, knowledge sharing, and knowledge creation among students and educators, and goes beyond educational institutions' classical physical barriers. SALTO is based on a study situation where students, while located at two different Norwegian universities, are enrolled in the same joint master's program (MCT). The scope of the research in SALTO encompasses the development, investigation, and evaluation of cross-campus/cross-university hybrid learning spaces, and teaching and learning solutions. The project manages and refines a two-campus hybrid learning space for physical-virtual interaction across the web called the **Portal**, where students and teachers explore educational, methodological, and technological solutions *together* (Støckert et al., 2019, 2020).

The aim has been to develop effective pedagogy with synchronous and asynchronous student-centered learning activities at both campuses, with particular emphasis on interaction, resource sharing, and communication. Established strategies for student-active learning have been adapted to a "cross-campus" context, while being anchored within Radcliffe's PST framework (Radcliffe, 2008) for the sustainable design of physical *and* virtual learning spaces. Key pedagogical approaches and relevant activities at the core of the MCT master's program have been:

- Collaborative and peer learning (Boud & Cohen, 2014): Project work, problem-based learning, and development projects in groups across campus.
- Flipped classroom (Bergman & Sand, 2014): Cross-campus development of digital learning materials and common methods for in-depth study, and discussions.

The choice of a master's program in music, communication, and technology is grounded in the assumption that if pedagogical and technological innovation can overcome spatial challenges and facilitate communication and collaboration through flexible solutions, resulting in productive crossings between musical performance and technological innovation, then the same innovative approaches can successfully be employed in other subject areas.

## 5.1 The Portal

Students enrolled in the MCT master's program were asked to contribute to the building and running of their learning spaces in collaboration with their educators. Being a cross-campus and cross-institution master's program in music technology, the very core of the initial activities focused on setting up a learning environment where state-of-the-art technology could support student learning across spatial distances. The newly designed learning environment was called the Portal and constituted both a physical and virtual space. The Portal consisted of several dedicated

physical rooms at UiO and NTNU that were interconnected through Uninett[7] (Norway's research and education network). The best way to describe the Portal is as "[… a black-box theatre stage with props to create scenography for several learning scenarios" (Støckert et al., 2020). The physical rooms use mirrored, symmetrical set-ups of AV equipment for student-centered learning activities. These mirrored set-ups created the illusion of an extended and shared space. Focus on visual contact through several screens and advanced 360° cameras, sound connection with the lowest possible latency, and shared workspaces from each side of the Portal enhanced the sense of social presence (De Caro-Barek & Støckert, 2021; Støckert et al., 2020). At the same time, a new perception and notion of presence also arose, related to human-computer interactions and social interactions in a heavily technology-based networked learning environment (Støckert et al., 2020). Students were free to discover and try out technologies (software, collaboration platforms, process management platforms) that best suited their communication needs, synchronous or asynchronous. They were actively involved in the set-up and running of their rooms, from infrastructure maintenance to furniture choices to organizing social corridors for digital interaction across campuses. As Støckert et al. (2020; 2019) remark, student-conducted activities in the Portal represented a new type of learning strategy: one that "prepares students for the fourth industrial revolution: a future where the borders between the online/offline, physical, digital and biological worlds are blurring, resulting in a fusion of advances within artificial intelligence, machine learning, physical computing, the Internet of Things and other technologies (Støckert et al., 2020, p. 79).

#### *5.1.1 Space*

A crucial part of the master's program curriculum entailed the physical setup of the infrastructure in the Portal. The very coming into existence of this learning environment became both a major part of students' learning activities and a physical and virtual space they could design, modify, and adapt to their own needs. Despite initial hiccups and technical challenges that tested students' patience, working in the Portal seems to have enabled a sense of co-presence (Bulu, 2012; Kim et al., 2016) as communication could happen freely in the physical and the virtual space. The Portal made it easy to communicate and collaborate at a distance on a high level of interaction, as it could be used for formal learning activities, as well as informal meetings, and even cross-campus jam sessions. It became, however, quite clear after a short time that both formal and informal social interaction within and through the Portal worked

7 Uninett AS was a Norwegian, state-owned company that developed and operated the Norwegian research network by connecting Norwegian educational and research institutions to international research networks. Uninett had its head office in *Teknobyen* in Trondheim. In 2021, the Solberg government announced a major reorganization, and Uninett became part of the new administrative body Sikt – the knowledge sector's service provider (Wikipedia, 2023).

better in smaller groups, whilst one-to-one communication and multi-discussions were difficult in plenary settings, particularly with reference to audio quality. Learning activities were then modified accordingly.

In this technology-extended space, students established their own additional arenas for asynchronous and/or synchronous communication and interaction, and formal and informal collaboration. One student from the study reports as follows:

> Then we have other studios where we can have different group meetings at the same time and this is really important for teamwork, for projects to work in groups of four and not all the class at the same time. We also have a Discord server, we use it a lot, we have a lot of different channels. We don't have only channels for the courses, we also have channels for sharing music, sharing inspiration, and gear and software, and yeah, we use it a lot.

Because of the acquired technological experiences, when Covid-19 struck, students working in the Portal felt they had an advantage, since the Portal had contributed to improving their collaborative capability to work in fully online learning environments. However, students still report that relationships are indeed easier to establish onsite than in a distributed setting between two campus locations, and that physical (face-to-face) presence between students and educators is still easier. Having professors onsite, facilitating the hands-on problem-solving locally during the program was, for example, not just helpful, but also contributed to the perception of equality and belonging between the two campuses. While lockdowns have shown us that it is both possible, practical, and convenient to meet, collaborate, study, and work fully online, it seems that our very brain architecture, how we are wired, has behavioral preferences of its own, and face-to-face contact is still irreplaceable (Harviainen, 2016; Lieberman, 2014; Mercer, 2013; Nowak & Biocca, 2001). Even when informal social arenas can be established in hybrid and virtual settings, like the Portal, it still seems important to meet in person first. Meeting in person positively affects social relations and thereby lays a foundation for establishing a context for later cross-campus collaboration online. That is one of the reasons the program organized an exchange trip between campuses at the very beginning of the first year of study. The students who were able to get to know their fellow students on the other campus collectively report this as a positive and decisive experience. Space is after all "our habitat", and "our body is the central reference point for perception" (Hornecker, 2005). Some scholars link this bodily experience of being present to social presence, and define the latter either as "the degree to which a person is perceived as a 'real person' in mediated communication" (Gunawardena, 1995, p. 151), "a student's sense of belonging in a course and the ability to interact with other students and the instructor" (Picciano, 2002, p. 22), or "the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people through the medium of communication being used" (Garrison et al., p.94). However, as highlighted by Whiteside et al. (2017), different learners will perceive different levels of social presence even in the

same environment and will correspondingly behave differently. It is therefore possible to argue that the sense of presence depends entirely on the persons engaging in the physical, hybrid or virtual environment (Whiteside et al., 2017). Nonetheless, creating digital "corridors" for social encounters in hybrid and/or fully digital spaces, like the ones that would have occurred naturally in physical spaces, and downsizing student cohorts into units of 4–5 individuals seem to allow a more natural communication flow, interaction, and collaboration dynamic (De Caro-Barek & Støckert, 2021). In MCT, this approach has actively contributed to developing a higher sense of social presence and perception of learning among the students (Støckert et al., 2020).

### *5.1.2 Technology*

Paradoxically, the technological aspect, even in the case of the complex high-end technological infrastructure that students had to deal with in the Portal, was never a critical issue. In general, technology allowed easier and more useful access to competent persons for lectures and workshops off and between campuses, contributing to the perception of equal distribution of pedagogical resources. It also enabled collaboration and social learning both within and outside the regular frames of the program. We can say that technology extended the physical and virtual space of the Portal, and adapted to students' evolving needs. Students were allowed to explore freely and seek functional/appropriate technology to support their extra needs for communication and project process management in a cross-campus setting. One student remembers:

> We found out that it was also okay to use other technologies such as Discord: a very popular tool – at least for those who do gaming. So that's where it "comes" from. And then Slack to communicate. And then Google Docs, for example – where we could write together. So, we eventually found out that we had to use all these tools then, to communicate and work together. And since most or most subjects were of the type, yes, digital, where we programmed things and stuff, we also used – to a minimal degree then, but – software to share code then for example. Well, we have GitHub for example, but we also have that kind of live sharing of code with Visual Studio Code, then.[8]

With digitalization being a potentially disruptive force for many professions, the conceptual and practical abilities MCT students gathered during their studies regarding technology added an extra value for work-life post-studies, as they were trained to solve complex problems through their complementary competencies (Bennet et al., 2020).

Building and maintaining the technological infrastructure of the Portal demanded great skill and commitment from MCT students. While all students seemed to understand the necessity of optimizing learning arenas for technical (AV) and practical

8 Discord, Slack, GitHub, and Visual Studio Code are all digital platforms for collaborating, co-writing, and sharing resources online and offline.

purposes, not all students agreed on the level of technical completion to be achieved. Many students referred to the difference between *sufficiency versus optimization* of solutions for communication purposes. In other words, sometimes good enough can indeed be enough. There seems to be a difference in the way students perceived technology as a learning object versus technology as a medium to support teaching and learning. Technology for teaching and learning should play a supportive role and adapt to students' needs by enabling better communication flow and consequently more natural human interaction dynamics.

## 6 Final remarks

The uniqueness of the teaching and learning environment of the MCT program lay in its ability to evolve accordingly to the users' needs. This would not have been possible without rethinking not only teaching and learning practices, but also, fundamentally, the kind of relationship that links the individual to the space they occupy and share with others, and how this relationship translates into the building of learning environments.

Studies in educational architecture tend mostly to focus on the material space itself (Boys, 2011), and on how the design of educational buildings embeds a representation of the mission and values of the commissioning institution (2011, p. 169). Architects try to convey an abstract ideal of education by concretizing it into a built space (Ellis & Goodyear, 2016, pp. 157–158).

Building learning environments tend also mostly to focus on the material elements, such as the layout of the space, furniture, colors, and infrastructure solutions, and on how these factors reflect the abstract ideal of what learning is supposed to be according to, once again, the values and mission of said educational institution. However, it is the authors' belief that learning environments rather should reflect the dynamics of real human interactions, and how they change and unfold in time and space, whether this space is a physical entity or the cyberspace of the internet of things. The modified PST framework introduced in this article, with the definition of the human factor in terms of Merleau-Ponty's phenomenology, is an attempt to offer a guideline for the design and implementation of learning environments, physical or networked (hybrid and fully digital). In these spaces, the experiential meaning of the users' lives is a sine qua non condition for the existence of the learning environment itself. As Ellis and Goodyear remark (2016, p.157), spaces for learning, from institutionalized abstract entities, should become places of learning, real to people.

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