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THE ROLE OF PHYSICAL AND VIRTUAL SPACES IN THE LEARNING AND EMPLOYABILITY OF HIGHER EDUCATION GRADUATES

ABSTRACT

In this paper, we explore how the relationship between physical and virtual spaces in the higher education process affects the development of the knowledge and competencies that graduates need as they enter the labour market. A discussion of learning in higher education from the perspective of physical and virtual spaces is followed by a section on relevant views concerning successful learning and then on phenotypic forms of knowledge and competencies. We summarise the focus of each section in a final conceptual model. Five sets of questions for operationalising indicators for studying the interconnectedness of physical and virtual spaces in learning in higher education are derived from the model. The paper is based on an exploratory, integrative review of relevant sources.

KEY WORDS: virtual space, higher education, employability, competencies, academic profession

Vloga fizičnega in virtualnega prostora pri učenju in zaposljivosti visokošolskih diplomantov

IZVLEČEK

V članku proučujemo, kako odnos med fizičnim in virtualnim prostorom v procesu visokošolskega študija vpliva na razvoj znanja in kompetenc, ki so potrebne za prehod diplomantov na trg dela. Razpravi o visokošolskem učenju v fizičnem in v virtualnem prostoru sledita sekciji o relevantnih pogledih na uspešno učenje

ter o fenotipskih oblikah znanja in kompetencah. Vse glavne poudarke poglavij strnemo v sklepni konceptualni model. Na tej podlagi izpeljemo pet sklopov vprašanj, ki so namenjeni operacionalizaciji indikatorjev proučevanja prepletanja fizičnega in virtualnega prostora pri učenju v visokem šolstvu. Članek je zasnovan na eksploratornem integrativnem pregledu relevantnih virov.

KLJUČNE BESEDE: virtualni prostor, visokošolsko izobraževanje, zaposljivost, kompetence, akademska profesija

1 Introduction

The discussion in this paper begins with a simple question: why in these "modern" times is it still useful for students to attend lectures? This question has partly been answered in studies that examined the COVID-19 pandemic's impact on learning outcomes. These studies showed that school and faculty closures and the transition to digital technology had devastating effects on the cognitive, social and emotional components of students and teachers (e.g., Haelermans et al. 2021; OECD 2022). During the pandemic, we often wondered how the use of ICT (information and communication technology) would change daily learning and teaching practices in the long term. Despite the pandemic coming to an end, at the time of writing we have more questions than answers on this topic. Yet, a new challenge is emerging today in higher education that also stems from ICT: Artificial Intelligence.

In many ways ways, we cannot get rid of the feeling that higher education is undergoing a profound "digital" transformation. In this context, an interesting question is the role that ICT plays in the development of competencies. Does ICT add to or reduce the differences between students' learning outcomes relative to their prior knowledge? How is ICT, originally intended to support traditional education, changing the nature of learning and the social role of educational institutions? How does the physical–virtual space relationship in higher education affect the development of knowledge and skills needed to enter the labour market? The aim of the paper is to develop a conceptual model related to these areas.

The issue of "digitalisation" thus stands alongside other major "post-Bologna" issues: the professional relevance of higher education programmes, the accessibility of education, the quality of teaching, the diversification of educational programmes, questions regarding public funding and the evaluation of higher education institutions, or the academic profession's development. The "digitalisation" of higher education during the pandemic altered several processes temporarily, partly or permanently (Pavlin 2021):

(a) students' more passive following of lectures while using laptops and smartphones;
b) the "relocation" of a proportion of lectures to the Internet, although one may wonder whether this process has not led (too) many students to perceive all lectures as unnecessary formalism;
c) the logic of writing theses and completing various forms of knowledge assessment using artificial intelligence. As a result, a large number of students have reduced the central processes of competence development to short-term, superficial information-processing for the purpose of passing exams;
d) the dynamics of student mobility, which includes both the transition of graduates from education to the world of work and international mobility; and
e) the strong discrepancy between theory on one hand and the implementation of different types of student work practices on the other.

These processes of the "digitalisation" of higher education are closely linked to the emergence of the virtual space, usually referred as the online environment that allows participants to interact (e.g., IGI Global 2023). For more than decade virtual space or worlds have been described as digital environments in which "individuals, groups, and even organizations interact... they may be thought of as vast opportunity spaces that only become inviting when users can expect certain activities to be performed there consistently" (Saunders et al. 2011: 1079). The virtual space is becoming an ever more important factor in shaping individuals' personal and professional identities (Attrill-Smith 2018). In higher education and elsewhere, virtual space is associated with the rise of artificial intelligence, online communities, augmented reality, artificially designed systems of tutoring, mentoring etc. based on text and audiovisual technology. The question of whether virtual space competes with physical space in the higher education context is becoming ever more pressing.

The paper draws on an exploratory, integrative review of recent sources with the aim of operationalising key indicators that may serve as a starting point for further research. The paper first continues the discussion of learning in higher education in the setting of physical and virtual space. This is followed by a section on relevant views on successful learning and then on the phenotypic forms of knowledge and skills that graduates need as they seek to enter the labour market. In the final conceptual model, we summarise the main findings from the sections. Questions resulting from this model aim at developing indicators for understanding the duality between physical and virtual space.

2 Physical and virtual space in higher education

When concentrating on physical and virtual space in higher education, we are first interested in how the two spaces are linked to deep understanding of the subject matter and changes in students' cognitive and behavioural characteristics. Is it possible to say that learning processes in virtual space can mainly be explained from an information-processing perspective, whereas learning in physical space is situational? While this is of course a gross oversimplification, the contextualisation of learning, the development of confidence, and the role of prior experience in relation to the subject matter, for example, are different in a physical environment than in a virtual one. Regardless of the differences, both spaces (physical and virtual) are reflected in students' mental images. These images are both a personal and a cultural construct. Naturally, the logic of interaction between the body and the environment is completely different in each space.

2.1 Perspectives of higher education concerning physical space

Faculty, university or academic spaces include lecture halls, spaces for hands-on learning and research, laboratories, libraries, residence halls, along with various ancillary facilities such as green spaces, athletic facilities, dining halls, and social spaces etc. Each of these spaces, with their functional, motivational and symbolic meanings, influences students' socialisation[1], professional identity, and learning success in various ways:

> *College hallways, cafes, cafeterias, student clubs, green spaces, residence halls, and other spaces where students and professors meet are integral parts of the higher education process: what happens after the lecture is sometimes even more important than the lecture itself* (Pavlin 2020: 269).

Embodiment theory stresses that all forms of learning and all educational objects (including mathematics) are fundamentally based on bodily perceptions or ideas (Abrahamson and Lindgren 2022). The theory highlights how spatial and abstract thinking, representation, visualisation, social relationships, and identification are all shaped by the body. Participation, experience, and mastery of physical space accordingly have a significant impact on knowledge transfer. This makes it surprising that discussions about the design of learning spaces for active learning, as the opposite to teacher dominated learning and active engagement

1. The author notes that the generation of students that did not have an opportunity to socialise in the physical environment of the college after graduating from high school due to COVID behaves significantly differently than the generation before them. These differences relate to assertiveness, anxiety, ability to think abstractly, making contacts, communicating with the professor, and so on.

of students (Børte et al. 2023: 597–598), and competencies development have received relatively little attention in sciences related to learning. More emphasis should be placed on the following issues associated with this area:

What are the socio-spatial characteristics that make the development of certain competencies conditional on the field of study? For example, Capdevila (2019) queried which forms of team learning exist and how they can be most effectively developed in higher education depending on the field of study. The author described how social innovation is strengthened by participation in the local environment, how open innovation systems that involve the development of services and products for commercial use are linked to collaboration between users, providers and universities, how technological tools such as 3D printers or laser cutters affect teamwork etc. Similarly, it is worth considering the importance of physical space for developing other key competencies related to a particular field of study. For example, Huhtelin and Nenonen (2019) addressed a similar issue by examining the work environment's impact on improving the concentration of researchers (and also experts) in various professional fields.

A different perspective on the role played by physical space in developing employment skills is offered by the concept *of university–business cooperation.* Authors in this field (e.g., Davey et al. 2018) describe disciplinary and entrepreneurial features in several forms of collaboration, such as research and development, lifelong learning, commercialisation of shared research results, design and implementation of joint curricula, student mobility in the form of internships, student entrepreneurship, collaboration in the use of shared spaces, and so on. The comprehensive international study produced by these authors indirectly and directly shows via the example of 50 best practices of collaboration that the results of collaboration between universities and companies are very much rooted in the physical space or local environment.

Finally, the extension and enrichment of competence development in a given course of study by other, (still) less common and obligatory learning environments and areas should be highlighted. One example of such a "complementary" spatial context is learning in museums where different technologies can ensure the authenticity of the learning experience (Pierroux et al. 2022). Halverson and Sheridan (2022) note that learning in very remote environments can strongly influence the development of generic competencies, which are then particularly useful in undergraduate education. As an example, they state that different areas of the arts (e.g., music, visual arts, theatre) significantly influence the development of language, imagination and creativity, which are important in very different settings.

The discussion in this part already extends to the areas of virtual space that are described below.

2.2 Views on higher education from the perspective of virtual space

The term "virtual space" is used for many purposes, including social interaction, learning and studying, entertainment, video games, business activities, and more. In the context of higher education virtual space can be understood through virtual or learning communities, that emerge when students participated in a virtual classrooms, online collaborative learning groups, and peer networks (Clemmons et al. 2014).

When considering the (co-)existence of students and their studies in virtual space, we soon encounter many unsettled questions and warnings. One of these was pointed out by the well-known Israeli historian Harari (2014) a decade ago with the thesis that the individual turns from subject to object while using ICT. This thesis has become more relevant upon the advent of artificial intelligence (e.g., GPT-4). The question of the risk of a decline in critical thinking among students and their ability to internalise concepts has risen to the fore. Moreover, the advent of "smart" phones has been accompanied by warnings of impaired attention, the deterioration of long-term memory formation, and degradation of various cognitive skills. One of the side effects of the constant "multitasking" caused by smart phones is addiction and compulsive behaviour, which is quite comparable to gambling addiction (Price 2018). Mobile phones paradoxically cause loneliness and depression despite numerous social networks. Smartphone use reduces the authenticity of social and learning experiences and reduces sleep, further reinforcing the cycle of self-alienation. According to OECD studies, the introduction of ICT into education systems over the past 20 years has generally not been reflected in improved student competencies because education systems have not adequately addressed the evidence about how people learn (Sawyer 2022b: 658–659). As ICT makes its way into schools, workplaces and society, it seems as if the companies developing the technology are always a few steps ahead of users' actual needs.

We agree with Stahl and others (2022) who state that students' needs should be the focus of learning activities and ICT should be a supporting activity, not the other way around. It is hoped that the evolution of ICT's supporting role in learning will shift from using computers in classrooms and promoting isolated learning[2] to "cooperative" learning in groups where learning elements are shared and the result is then synthesised and, finally, to "collaborative" learning in the sense of creating new meanings together (Stahl et al. 2022: 408). It is only in this way,

2. In terms of the naïve notion that it is possible to digitise learning from the classroom and disseminate it to large numbers of students, thereby reducing costs.

the authors conclude, that the creation of shared concepts and theories, the connection of ideas, the development of a shared meaning for the chosen topic, and dialogue will create successful competencies for young graduates. These require emotion, gesture, and silent elements of knowledge. This calls for engagement in physical space, supplemented (not replaced!) by virtual space as needed.

We conclude this section by noting that the development of higher education programmes has long ceased to be about the choice between virtual and physical spaces, but about the quality of their complementarity. Sawyer (2022a: 17) describes how ICT holds great capacity to concretise abstract knowledge, which includes both textual and audiovisual articulation, effective manipulation and correction of knowledge in the process of creation, and the ability to transmit information in different ways. This raises the question: why are we so surprisingly slow in learning how to use "smart" ICT to develop key competencies without causing major collateral damage?

3 Relevant views on successful learning

Numerous academic disciplines address the issue of successful learning in higher education. In this paper, we limit ourselves to the views and approaches considered to be most relevant to our discussion of the connection between higher education and the two different spaces. In so doing, we suggest that approaches to learning should not simply be polarised into less modern information-processing (primarily traditional lectures) and more "modern" approaches that are supposedly more situational and practical and thereby better prepare students for their careers. Instead, it is important to be aware of the differences between learning approaches in terms of their impact on students' career relevance, which may be seen as one of the central issues concerning learning quality. One of the authors who describes these principles is Sawyer (2022a). The author stresses the importance of traditional learning being based on linking new knowledge to previous experiences and a deep understanding of concepts, integrating new knowledge into a coherent system, knowledge of patterns and operating principles, and sufficient repetition to internalise the new knowledge (ibid.: 5). This is related to the issues of the transition from novice to expert and the use of learning principles and methods that do not passivate or demotivate students. Moreover, in the context of traditional discussion about competence development it is important to consider transition from passive to active learning within physical space, integration of active learning methods with digital technologies in classrooms and the adoption of active learning methods using digital tools in online education/virtual spaces (Allen and van der Velden 2011; Stahl et al.

2022). These principles are most frequently observed in the context of the following basic learning settings.

Well-designed traditional lectures are at the heart of higher education because this is how students internalise concepts, seek causal relationships, structure knowledge etc. Like some situational forms of learning, good traditional lectures involve, among others, discussion, reasoning and reasoned argument, personal awareness or metacognition of learning, and the principles of teaching, with the instructor attempting to create a situation in which students arrive at solutions and insights on their own. Such lectures rely on students learning from each other (not just from the instructor), on the integration of different processes of tacit and explicit knowledge creation, i.e., on the socialisation and articulation of knowledge processes and different ways of dealing with information and data. Some professors use interactive teaching methods with ICT, questions, quizzes, audiovisual presentations, simulations, role-playing and group teaching. The learning processes are based on the creation of shared values and norms and complement other learning processes that we list below.

Situational forms of learning can be broadly divided into those that rely on the acquisition of relevant work experience and those that largely dispense with it. Situational forms of learning include student internships, apprenticeships, various forms of simulations in laboratories and other hands-on learning spaces, and different entrepreneurial activities. It is important to stress that these forms of learning are all considered as active learning methods also incorporating principles of problem based learning. Well-designed forms of hands-on learning can be compared with many elements of traditional master–apprentice learning, the processes of which are described by coaching and mentoring, among others (Collins and Manu Kapur, 2022). Achieving good outcomes in situational learning depends on theories being well presented in the classroom.

Project-based learning is (hopefully) a form of problem-based learning that can be described from both an information-processing and a situated learning perspective. It is an approach aimed at deep understanding and is often a simulated or semi-simulated form of learning in higher education institutions, while it is increasingly becoming a form of work organisation in work establishments. As Krajcik and Shin (2022: 76) note, the typical phases of project-based learning relate to: i) asking a key question; ii) learning (or working) objectives; iii) work processes or learning phases; iv) supporting learning technologies and methods; and v) achieving tangible end results or products. These phases may focus on virtual space to varying degrees.

The described forms of learning are reflected in the spiral of different types of knowledge, as discussed below.

4 Different types of knowledge and "know-WHERE"

Genotypic definitions of knowledge tend to be very broad and difficult to use for operationalising measurement tools. For example, the OECD's (2019) definition states that knowledge includes "established facts, concepts, ideas and theories about certain aspects of the world. Knowledge usually includes theoretical concepts and ideas as well as practical understanding based on the experience of having performed certain tasks". This definition implicitly raises two questions. First, whether knowledge is divided into different forms of phenomena and, second, what are the relationships and connections between them.

Both questions open the way to discussions of phenotypic forms of knowledge. Aristotle began the discourse on this topic by designating phronesis as general practical knowledge or wisdom, epistèmè as scientific knowledge, and technè as craft knowledge in his descriptions of the various cognitive processes (Cohoe 2022a; Cohoe 2022b). Much later, Polanyi (1966) pointed out the importance of tacit knowledge, and Nonaka and Takeuchi (1995) focused on numerous connections and outcomes that can result from the transformation between tacit and explicit knowledge. In the context of organisational knowledge management, Hislop et al. (2018: 15–45) aptly summarised the differences and similarities between an objectivist and a practical approach to understanding knowledge. The first approach views knowledge mainly as a theory, an object, the property of an individual or organisation, an ultimate objective truth, an outcome of an intellectual process, and the superiority of objective knowledge over subjective knowledge. In contrast, the practice-based approach states that knowledge is both a practice and an object, arises in a social process, is a social construct, objective knowledge is not superior to subjective knowledge, and knowledge is a dynamic process between tacit and explicit knowledge.

Among many other authors, de Jong and Fergson-Hessler (1996) provided a more systematic and in-depth phenotypic discussion of the observation of knowledge. They first describe the distinctions between generic and domain-specific, concrete and abstract, formal and informal, declarative and procedural, and condensed and distributed knowledge. In particular, they emphasise the difference between deep and surface knowledge, automatic and non-automatic knowledge (basically a concept similar to tacit and expressed knowledge), isolated and structured knowledge, and verbal and graphical knowledge[3]. Another approach to considering knowledge refers to the concept of positive

3 Among other things, this raises the question of which differences exist in knowledge depending on whether it originates from a physical or a virtual environment.

psychological capital, summarised by Penger and Dimovski (2006: 434). The authors highlight the difference between traditional economic capital and the question "What – do you have" (finances, material resources), human capital and the question "What – do you know" (experience, education, skills, ideas), social capital and the question "Who – do you know" (relationships, contact network), and positive psychological capital and the question "Who – are you" (self-confidence, hope, optimism). This approach provides a useful broader contextual framework in the typology of different forms of knowledge presented by Lundvall and Johnson (1994). They described "Know-WHAT" as knowledge about facts captured in the form of information, "Know-HOW" as the ability to do something, and "Know-WHY", which we can understand as knowledge about causes and effects. They also described the form of knowledge "Know-WHO", which we can understand more broadly than simply knowledge about communication and connecting people. This form of knowledge is related to the concept of social capital, i.e., the ability to build a network of contacts and to form and maintain strategic alliances; namely, it is the ability to select and make those contacts that are critical for achieving short- and long-term goals. Know-WHO is associated with many general competencies such as communication, analytical thinking, and authority, and thus goes beyond the definitional starting point of competencies, which states that competencies are knowledge about the application of knowledge (Svetlik and Pavlin 2004: 203). These four forms of knowledge were also described by Savage (1996: 256) with some semantic nuances. He added two more forms of knowledge: "Know-WHEN" as a sense of planning time, rhythm, and the reality of expectations, and "Know-WHERE" which the author described as a sense of where things happen or should happen.

A better known discussion on a related topic was developed by the father of organisational knowledge theory, Ikujiro Nonaka. He uses the term "Ba", originally introduced by the Japanese philosopher Kitaro Nishida, to describe "the space in which relationships are formed". This space can be physical (e.g., an office), virtual (e.g., email, teleconferences), mental (e.g., experiences, ideas) or combined (Nonaka and Konno 1998: 40). The authors stress that "Ba" is not limited to a single dimension, but that learning and knowledge acquisition occur precisely at the intersection of these different spaces. They describe four contexts *in which knowledge is created:* i) socialisation as the transmission from tacit to tacit knowledge, which is existential and takes place in face-to-face communication and is described as *Original Ba;* ii) externalisation as the transmission from tacit to explicit knowledge, which is reflective and occurs in face-to-face communication between individuals and is described as *Interactive Ba;* iii) a combination as the transmission from explicit to explicit knowledge, which is systemic and occurs from group to group and is

described as *Cyber Ba;* and iv) internalisation as the transmission from explicit to tacit knowledge, which occurs in situ and is described as *Synthetic Ba*. One of the many questions that emerges as a reader goes through this typology is what happens when we try to achieve certain learning outcomes in the wrong place. Consider, for example, trying to teach tacit knowledge and socialisation outcomes via the Zoom program. Know-WHERE is thus intertwined with other forms of knowledge. Physical space always reflects the symbolic problem, virtual space much less often and in other ways. Physical space often shows the depth of social connection and positioning between social actors, while this is not evident in virtual space. Physical space "embodies" the (de)formalisation of the relationship, which is extremely important for the authenticity of the learning experience and identity formation, as discussed in theories of situated learning (e.g., Wenger 2002).

The knowledge category "Know-WHERE" is addressed much less frequently in organisation and learning theory than other forms of knowledge, even though it is very important. It refers indirectly and directly to where a deep understanding and internalisation of learning take place, where ideas for decisions and understanding of concepts are gained, in which spaces the individual can rest, where the individual can break bad habits and retain new ones, where the individual obtains a boost for a fresh start, where the individual meets new people, where the individual can realistically assess their social, study and work situation, where the individual can successfully set new goals, where the individual is capable of creative thinking, and so on.. Accordingly, we wish to stress that "Know-WHERE" should not only be understood as geographical knowledge about where certain things and events are, will be, or have been, but as metacognition (knowledge about knowledge) about the symbolic and functional meaning of space in relation to motivational and identification processes. Alternatively, in the context of our discussion of how and where physical and virtual space complement or exclude each other in the learning process.

5 Employability and competencies for the labour market

Graduate employability has been a central concept in discussions of the "modernisation" of higher education for over two decades. It often encompasses three main areas (Healy et al. 2022: 801): i) society, education systems and policies; ii) institutional strategies; and iii) the individual level of the student or professor. In addition, there are different sub-areas of collaboration between university and business that all contribute to employability. Healy and others (ibid.) also link the employability context to the area of career development. This includes issues of career decision-making, the specifics of careers at different stages of life, match-

ing personality types to environments, professional identity, and so forth. In the context of the discussion on changes in learning and teaching from the employability aspect, we are especially interested in questions of the match between education and work and the competencies acquired and expected: in particular, which competencies are needed for young graduates' integration into the labour market, and where they should be developed. This is related to issues of public funding of higher education programmes, the integration of applied knowledge into higher education programmes, the design of student internships, and more.

Employability has been often described with the concept of competencies (e.g. Römgens et al. 2020). Competencies are considered from the viewpoint of various forms of knowledge, capital, personal identity construction, personal adaptability, career opportunities, professional knowledge, individual adaptability, and success. While these considerations remain largely on the conceptual level, in international research reference models of competencies in the education–labour market relationship are often presented by researchers under the umbrella of the OECD. One of the best known reference models was presented by the OECD with "Definition and Selection of Competencies: Theoretical and Conceptual Foundations" (DeSeCo) project, which was conducted between 1997 and 2003 and includes three basic categories of competencies (OECD 2019: 11): interactive use of tools (e.g. ability to use language, symbols and text, information, and technology), acting in heterogeneous groups (ability to communicate well with others, ability to cooperate, and ability to manage and resolve conflicts), and acting independently (ability to act within the "bigger picture", ability to design and carry out life plans and personal projects, ability to assert rights, interests, limits and needs). Building on this, several elements related to the above categories have been identified as important for graduates' successful lives (OECD 2019: 13–14): foundational (basic skills, knowledge and values, and attitudes that are prerequisites for further learning), transformative competencies (creating new values, balancing tensions and dilemmas, taking responsibility), student "co-agency" (the belief that students have the will and ability to positively impact their lives and the world around them), knowledge (disciplinary, interdisciplinary, epistemic, procedural), skills (ability to carry out processes and use their own ideas), attitudes and values (principles and beliefs that influence our decisions, judgments, behaviours and actions ....), and the anticipation-action-reflection cycle (learners continuously improve their thinking and act consciously and responsibly). All of the above elements work differently when the learner "uses" them in a physical or a virtual environment.

In international research, for applied purposes reference is more often made to a set of competencies developed by the international consortium of projects

REFLEX and HEGESCO (Allen et al. 2011). The sets of competencies identified there are as follows: "[P]rofessional expertise (expertise in one's field, analytical thinking and ability to establish one's authority), functional flexibility (knowledge in other fields, ability to quickly acquire new knowledge and ability to negotiate effectively), innovation and knowledge management (ability to use computers and the internet, ability to develop new ideas and solutions, openness to new opportunities) and human resource activation (ability to work under pressure, effective time management, ability to work productively with others, ability to motivate others, clear expression, and ability to coordinate activities)" (Allen and van der Velden 2011: 17). This model has been largely adopted by one of the best-known projects in the field of graduate employability: EUROGRADUATE (Mühleck et al. 2020). Based on the research mentioned above and our own knowledge in this area, we can summarise the description of the following competencies that are important for graduates' transition to the labour market:

Ability to use professional knowledge refers to the academic discipline and practical knowledge in the relevant fields. The ability to use this type of knowledge is based on linking theories (from which a graduate can establish a critical distance) with the solution to a particular professional problem, taking appropriate ethical and professional standards into account. This competency is closely linked to other competencies such as analytical thinking and communication.

The ability to work under pressure means the ability to achieve results within set deadlines while graduates are exposed to (un)predictable "disruptions". Stress management holds extraordinary importance for well-being and various aspects of individual and organisational career success. In this context, skills like time management, adaptation and acceptance of new (unpleasant) circumstances, selected aspects of emotional intelligence, learning from mistakes and situations, a focus on problem-solving, ability to switch between tasks (multitasking), and personal commitment to achieve the goal despite difficulties are associated with this competency.

Effective use of time is primarily related to the ability to establish habits (at what times of the day to do something), prioritisation, other aspects of personal management and management between short- and long-term goals, personal discipline and work–life balance, and the ability to establish one's authority over others, which especially in an organisational sense means delegating and sharing tasks with others.

The ability to work productively with others, or teamwork, means the ability to adapt, integrate and actively participate in groups, admitting mistakes, sharing ideas and resources, communication skills – notably articulating ideas clearly – resolving or managing constructive conflict, reliability and accountability in the

sense of being aware that one person's mistake can jeopardise the functioning of the entire team, and the list goes on.

ICT skills no longer include just basic computer skills about operating computers, digital communication (email, Zoom, web forums...), data sorting (one of the best-known programs is MS Excel) and data preparation (MS PowerPoint), but refer to the advanced use of software tools and web portals in a specific field of work. It frequently also includes the ability to search for data in databases and archives, which in advanced stages is not merely a technical process but also involves soft knowledge and intuition and depends largely on professional competencies. For most professions, this competence does not mean being able to write code in a programming language.

It is important to note that credentials for competencies are not universal. They must be adapted to a given academic field, institution, organisation, micro team, or profession. This raises the question of how to better understand the ways competencies are developed, a complex topic pursued internationally by a variety of disciplines. A greater research challenge than identifying professional competencies, describing them, and ranking them by level of difficulty from novice to expert is the study of how competencies are developed and, in particular, how they are interconnected.

In the area of graduate competence development in the transition to the labour market, we can mention the following findings to illustrate the above. First, individual modes of learning and teaching do not develop the different generic competencies in the same way. Group tasks, for example, chiefly strengthen teamwork and the ability to work under pressure, and research projects have a significant impact on the effective use of time in addition to developing subject competencies. Second, the complexity of the programme of study and the amount of effort students put into it have a considerable impact on expertise in their field as well as on several other aspects of career success, but less so on certain other generic competencies. Third, relevant work experiences during the period of study influence the development of career-relevant competencies; no particular influence is found for non-relevant ones. Fourth, the development of competencies does not end with the completion of studies. Initial work experiences are an important catalyst for "academic" competencies.

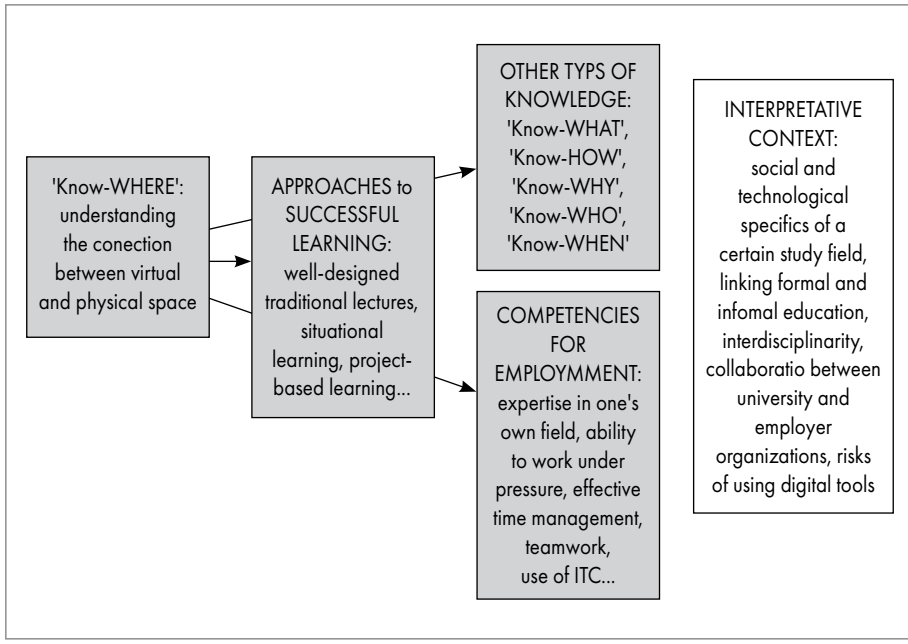
To our knowledge, research on the development of competencies in terms of the dialectic between physical and virtual space cannot be found easily in higher education research. The model that could serve as a starting point for this purpose is presented below.

6 Indicator questions and areas

As stated earlier in this paper, learning in a physical space is usually a much greater catalyst and motivator for professional development and professional identity than learning in a virtual space. Being "present" in physical space compared to virtual space generally means better motivation, a sense of responsibility for learning and work outcomes, and sensitivity to cultural diversity, among other things. The academic environment with classrooms and corridors, social spaces, cafés and green areas combines learning activities with the possibility of creating social contacts.

What about virtual space? In the previous discussion, we underscored that virtual space can be an important complement to physical space, but not a substitute (Stahl et al. 2022). The technology underlying virtual space is capable of analysing, articulating and concretising information to which it provides access at almost anytime and anywhere. At the same time, however, it is unable to provide what physical space can facilitate, especially in terms of social interaction. The connection of the dialectic between physical and virtual space raises many questions that we derive from the conceptual model shown in Figure 1. The model consists of five elements. The first element is interpretive and based on the phenotypic form of knowledge "Know-WHERE", which we describe with reference to the Japanese philosopher Kitaro Nishida's aformentioned concept of "Ba" as a space in which relationships are created and which, according to Nonaka and Konno's (1998: 40) conceptualisation, can be physical (e.g., an office), virtual (e.g., email, teleconferencing), mental (e.g., experiences, ideas...) or combined. "Know-WHERE" determines and contextualises relevant approaches to successful learning in the presented model (the second element). Learning approaches play a relative (albeit not exclusive!) role in shaping different (other) forms of knowledge (the third element) and competencies for employment (the fourth element). Finally, an interpretive (fifth) element is added to the model, inviting the reader to place the described relationships in the context of a certain industry or occupational field, a particular form of collaboration between the college and the employer organisation, or some other aspect of the study. The derivation of questions for operationalising research indicators based on the model appears below the figure.

Figure 1: Conceptual model of adding the virtual to the physical space.



Source: Author.

What are the implications of the perception and understanding of the importance of physical and virtual spaces for higher education ("Know-WHERE")?

How do students and professors assess the value of each space in terms of its actual functional role in the learning process? What is the original intention of participating in the virtual space and what is the actual intention? Are the physical and virtual spaces in competition with each other? Does ICT attempt to merge or alienate these two worlds? Which ethical and health issues arise when operating between these two spaces, and how aware are aware the participants are of these issues?

How does "Know-WHERE" impact the success and design of the learning process?

In which ways do the differences between learning in physical and virtual spaces affect focus and academic success? How can ICT more effectively support the quality of traditional lectures and various forms of situational and project-based learning? How does the intertwining of the two spaces affect the individual process of knowledge creation and transmission? How is socialisation reflected in emotions, love, trust, engagement, externalisation in products and services, the combination in databases, networks, documentation, and internalisation in new mental representations and habits? How do both spaces influence the creation

of shared meaning in the learning process? Is there a risk that technology will distract the learning process from its original goals?

How does "Know-WHERE" influence the formation of different types of knowledge in students in the study process context?

In which ways do students and professors think about different kinds of knowledge and how do they evaluate them? Do they consider learning outcomes mainly through the concept of competencies? How do different types of knowledge ("Know-WHAT", "Know-HOW", "Know-WHY", "Know-WHO"...) complement and exclude each other? How do they understand the relationship between important learning processes and different types of knowledge? For example, are students aware of how limited virtual space is in reality for socialising and meeting social needs necessary for building trust and sharing knowledge? How important is each form of knowledge in terms of the professional relevance of the course and how much does each learning process contribute?

How does "Know-WHERE" influence the development of students' professional competencies through learning processes?

In which ways does the "more" virtual space affect the relationship between the specific and generic competencies acquired? Is it possible that the development of professional competencies takes space away from the generic competencies, which means a worse integration of graduates into the labour market (if we think, for example, of teamwork or work under stress)? How suitable is virtual space for developing generic competences? Or is the situation more complicated and can certain competencies actually be transferred from one space to another? If that is the case, should students strengthen a particular generic competency for the physical space in the traditional learning process and learn to apply that competency separately in virtual space? For instance, does the development of teamwork in physical space also impact the development of the "virtual twin" of that competency? To what extent can technology strengthen competencies without a connection to physical space? Or do certain competencies competencies only arise in the virtual world?

What is the interpretive framework of the questions posed?

What are the social and technological characteristics of learning and competence development from the aspect of the complementarity of physical and virtual space that dictates a given field of study (think of the differences between the natural and the social sciences)? What do the questions posed above mean for the development of the various collaborative processes between higher education institutions and employer organisations? What does the distinction between physical and virtual space in the learning process mean for the formalisation of education? What are the risks of using digital tools for both learning outcomes

and students' mental and physical health? What do technologies mean for the polarisation between the purpose of education for the needs of the labour market and the humanistic view of developing personal interests?

The questions aimed at developing indicators for understanding the duality between physical and virtual space extend to both the field of "higher education studies" and the "early transition of graduates to the labour market". We anticipate that this relationship will strongly shape the implementation and strategic aspects of higher education in the future, as well as the social and economic function of these systems. The design of the link between the two spaces already today significantly determines the quality of learning and its outcome: knowledge and competencies.

7 Conclusion

In this paper, we addressed in various ways the introductory question of why it is good for students in these "modern" times to continue to attend lectures on campus and also to participate in other situational forms of study. We emphasised that the development of different forms of knowledge and competencies is strongly intertwined, which explains why virtual space should complement physical space in learning processes, not vice versa. Professional competencies cannot be developed and used in isolation from general competencies. Moreover, confidence and professional identity, which are some of the most important motivational bases for successful knowledge transfer and longer-term career development, are fundamentally located in the physical world, something we were very aware of during the pandemic but quickly forget when it is convenient. Recall the opening observation that the "pandemic learning experiment" of moving the educational process almost entirely into virtual space did not have a positive impact on the development of competencies, certainly not generic ones. It has had the opposite effect. Compared to virtual space, physical space provides an authentic experience and a basis for the emotional processing of information and the development of long-term memory.

We summarised the "problem" of the digitalisation of higher education, which is associated with fundamental changes in learning in higher education during the pandemic period and afterwards, in a conceptual model. This model initially asks how understanding and evaluating the role of physical and virtual space in learning and teaching affects learning practices (from the perspective of either students or professors) and the acquisition of different types of knowledge and skills for the labour market. The model, which requires further research (both through surveys and interviews), leads to the proposition that the virtual–physical space relationship is a fundamental developmental issue in higher education

today. This includes, but also goes beyond, the discourse on the quality of study and the development of expertise.

Let us conclude the discussion by asking what all of the above means for the development of the academic profession. Who can teach at the university in these modern times? Will we retain the Humboldtian doctrine that only those engaged in research may teach, or will this process be replaced by the need for a high level of competence in manipulating data on the Internet? Or the ability to coordinate learning in two parallel spaces and for two different purposes? Is it possible that this area will become so demanding that the traditional academic will often no longer be the leading authority in their field?

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