









**Literature review
of blended learning
techniques in the field
of architecture
and urban design**



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1. Introduction and objectives of the report

1.1 Introduction

This report (deliverable 9) summarises the results of the KAEBUP project's research activities (task 2.4) in relation to teaching and learning, blended-learning techniques in the field of architecture, urban design, and planning, informing the project pedagogic model (Figure 1). It presents the scope and course of action of the research, including its framework, relevant definitions and methods, as well as its outcomes and proposed recommendations.

The research work was part of "WP2 Preparation", aiming at supporting all other phases and activities of the project, situating KAEBUP's position in relation to evidence-based practices and producing the knowledge base to steer the course of action to strengthen the understanding of the relationship between research and practice. Furthermore, the findings presented here will provide the project consortium and interested stakeholders with information to develop links between academia and practice, as well as to embed entrepreneurial skill development within higher education curricula.

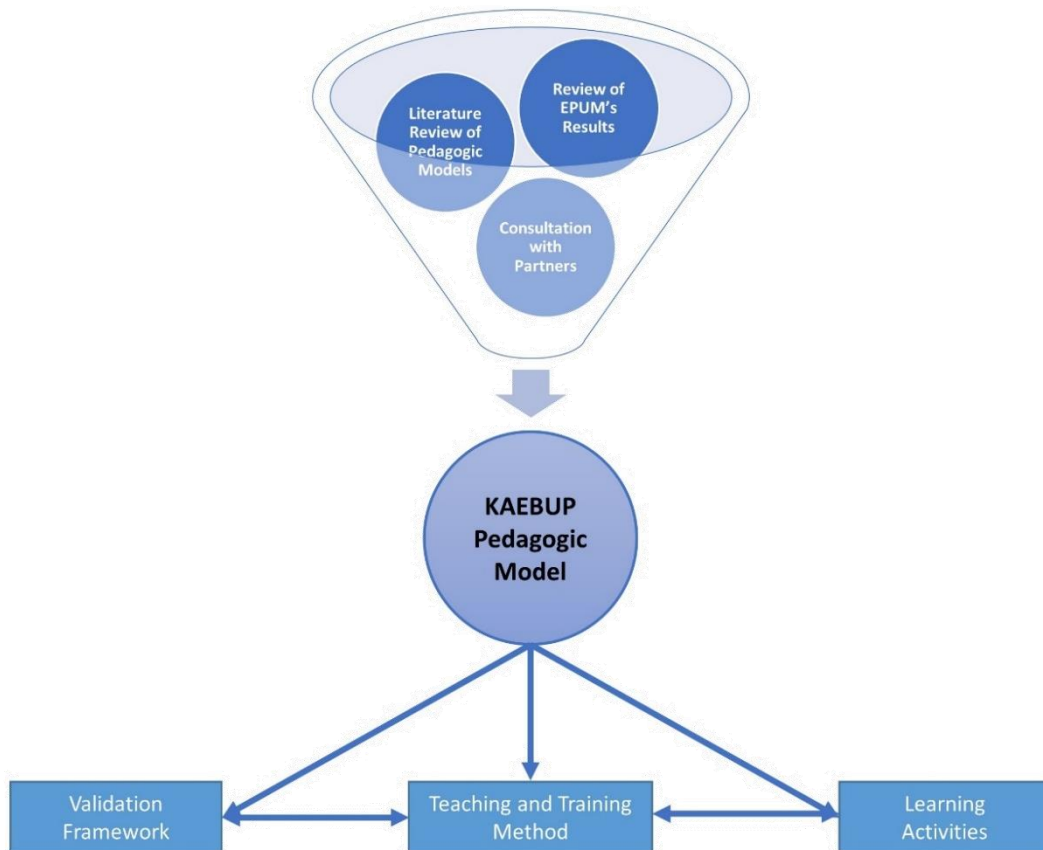


Figure 1. Developing of KAEBUP pedagogic model.

The research process included:

- Desk-based research on pedagogic models in higher education and their application in digital learning environments.
- Desk-based research on the extent of digital platforms and Open Educational Resources (OER) available for teaching and learning architecture and urban design.
- Review of the pedagogic results of the EPUM project (<http://epum.cs.ucy.ac.cy/>) in particular urban morphological education.
- Interviews with project partners on their views of the most appropriate pedagogic approach for the KAEBUP project, as well as their current use of blended-learning techniques, digital platforms and OER.
- Critical assessment of current state-of-the art on use of blended learning techniques for architecture and urban design.
- Needs analysis of existing resources, blended-learning activities, skills development practice and thematic subjects.

- Drafting of report presenting the literature review, research, gap analysis and recommendations for teaching and learning project activities and outputs.

1.2 Objectives of the report

This literature review discusses the main pedagogic models in higher education and, in particular, their application in e-learning. It also collates existing knowledge on the extent, reach, relevance and nature of blended-learning techniques used in architectural, urban design and planning curricula. It also appraises the extent to which such techniques are used in professional practice for formal or informal Continuing Professional Development (CPD), gaining additional qualification or filling in gap skills within an organization. Furthermore, it reviews the role of urban morphology in evidence-based design education.

Whilst the bulk of the review was carried out through desk-based research, it is informed and complemented by interviews with the project partners about their opinions on pedagogy aimed at forming future professionals in their field, their experience and knowledge of blended-learning techniques, digital learning platforms and Open Educational Resources (OER). Furthermore, the review identifies and evaluates the existing skills gap in the field of architecture, urban design, and planning.

The objectives of the review are:

- To discuss the potential benefits of different pedagogical approaches for the purposes of the project.
- To identify the most relevant OER and the most effective blended learning techniques available for teaching architecture, urban design, and planning.
- To critically assess the existing literature on the effectiveness of blended-learning and to highlight where gaps in resources and activities exist.

The aim of the review is to inform the creation of KAEBUP Pedagogic Model - an innovative teaching and training method using real-life urban projects to be deployed during the course of the project's teaching and learning activities. The focus will be to develop the knowledge base to support innovative teaching and learning not just during the course of the project, but also to inform or redefine curricula ad-hoc across European institutions in the long-term.



2. Literature Review

2.1. Pedagogic models in higher education

There are a variety of approaches to pedagogy, which relate to different aims that teachers and educators have for individuals and groups involved in learning. The three main approaches are:

1. Didactic pedagogy, which involves instructional routines, the consumption of knowledge and its recitation.
2. Authentic pedagogy, focusing on real-life experiences and how the content of teaching is relevant to the learners in terms of real life.
3. Reflexive and transformative pedagogy, which is based on problem solving and co-designing teaching, so that the learners are engaged in producing knowledge and understand the meaning of the content and how it makes a difference to them by reflecting on their own learning.

Beside approaches, pedagogy also has various dimensions and components. The dimensions are: architectonic (the space where learning takes place), discursive (what happens in the space), intersubjective (who is in control of the activities), socio-cultural (the make-up of participants and norms of interaction), proprietary (who is in control of the space), epistemological (what is considered valid knowledge), pedagogical (what instructional choices are made), and moral (the purpose of the learning).

Even once a general approach to pedagogy has been selected, there needs to be alignment between the different components in order to implement the approach and to achieve desired learning outcomes. Such an alignment requires examining and making decisions about underlying assumptions about learning and how this takes place. Specifically, different learning theories and perspectives should be reviewed to enable the mapping of any selected approach to learning activities. Mayes and de Freitas (2004) reviewed and mapped different learning theories in relation to pedagogical approaches to provide the basis for instructional designers

to make informed decisions about the pedagogical design frameworks they wish to adopt. The main learning theories are:

1. The *associationist/empiricist* perspective (**learning as activity**). In this approach, knowledge is a structured accumulation of associations and skill components, where learning requires a sequence of tasks based on their relative complexity, with the completion of simpler ones as a pre-requisite of more complex ones. Learning takes place through forming, strengthening, and adjusting associations by reinforcing particular connections through feedback. The sequence of instruction is designed to follow small and logically-ordered steps. This perspective is often associated with teacher-centered pedagogy and currently often dismissed as an educational theory. However, such criticism neglects to acknowledge the theory's emphasis on active learning-by-doing with immediate feedback and careful analysis of learning outcomes, where the methods used to assess these are aligned with the learning objectives and teaching methods (in a similar way to the "constructivist" approach).
2. The *cognitive* perspective (**learning as achieving understanding**). In this psychological view, learning is seen as the output of an individual's attention, memory and concept formation process. It places emphasis on the processes of interpreting and constructing meaning, where learning is viewed as an outcome of the interaction between existing structures for understanding and new experiences. Cognitive approaches sustain that understanding is gained through intellectual activity (creating hypotheses and building new forms of understanding), rather than the absorption of information. In this perspective, as performance develops, lower-level tasks no longer require conscious attention and cognitive resources are shifted to higher, more strategic levels of processing. Accordingly, concepts must be used as tools and practiced rather than delivered through instruction.

3. The *situative* perspective (**learning as social practice**). This approach acknowledges the influence of the socio-cultural setting, where learning takes place, on the learning outcomes. Knowledge is seen as situated in the practices of communities and, therefore, it focuses on successful practice (as the ability of individuals to participate in those practices). It shares with constructivism the idea that learning has to be meaningful to the individual. There are two strands to this perspective: one emphasises that learning activities should be authentic to the social context where the skills/knowledge are embedded, the other focuses on the relationship of the individual with a group of people, by which the role of the learning becomes more participatory and central as they learn the practices of the community.

A strand of pedagogy refers to *activity theory* (Jonassen 2000), focusing on the *activity system*: a group pursuing a specific goal in a purposeful way. In such a system, there is a connection between individual participants and the system's purpose – a relationship which is mediated by tools. These tools make the activity possible and can be physical or cognitive and may enable or limit an activity through their affordances. The different perspectives all together bring varied elements to curriculum design. Most current implementations of learning activities are unlikely to comprise only on-to-one mapping between a single theoretical perspective and the learning activities but would blend elements from different levels of learning: the overt activities and their outcomes, structures and processes, and participation. The pedagogical design implications of the three theoretical strands can be summarised as:

- The *associative view* emphasises routines of organised activity, clear goals and feedback, individualised pathways and routines.
- The *cognitive view* emphasises interactive environments, learning activities encouraging experimentation, support for reflection.
- The *situative view* emphasises participation in social practices of enquiry and learning, support for the development of learners' identities, facilitation of learning relationships.

Bloom's taxonomy (1956) was developed to classify the complexity of assessment questions but has since been used more generally to classify learning outcomes through basic cognitive competences to be developed by the learners, which include: *knowledge, comprehension, application, analysis, synthesis* and *evaluation*. Whilst these may provide useful tools to define desired outcomes, they do not address fundamental pedagogic issues and are often used inappropriately to justify teaching decisions that have already been taken. Different kinds of learning relating to higher education comprise:

- Academic understanding: learners' performance grows through increased academic skills and learning outcomes display more structural complexity, both quantitatively and qualitatively.
- Generic competence: learning outcomes include transferrable analytical and flexible capabilities which may be harder to define in a curriculum: confidence, self-discipline, communication skills, ability to collaborate, etc.
- Reflection: this has been identified as a crucial learning outcome as well as a necessary pedagogical method, which is indispensable for the learning cycle to proceed.
- Skill: as a learning outcome, this embodies the practical side of "functional" or "working" knowledge, which is of particular relevance for professional training and applies to the competence of applying and practicing concepts.

Many studies demonstrated that student's ability to understand something new depends on previous knowledge, therefore new knowledge can only be built on the existing one through problem-solving and feedback. The *constructivist view* emphasises the active construction of knowledge, self-regulation, goal-orientation and the cumulative nature of learning.

The concept of constructive alignment is based on a student-centred model of teaching (Biggs and Tang, 2011), which requires clarity on:

1. The content of teaching and the intended learning outcomes

2. How to ensure that students understand the content as set in the learning outcomes
3. What teaching and learning activities are required to achieve the above

In practice, the constructivist approach translates into outcomes-based teaching and learning, where the students clearly understand the learning outcomes that they are meant to achieve. The moral dimension of this pedagogical approach is about achieving *conceptual change* rather than the acquisition of information: effective learning changes the participants' perspective of the world. In order to achieve learning outcomes and conceptual change, a variety of cognitive levels need to be activated. These can be translated into verbs, which cover the full range of learning activities and vary from shallower didactic tasks to deeper transformative tasks (Figure 2).



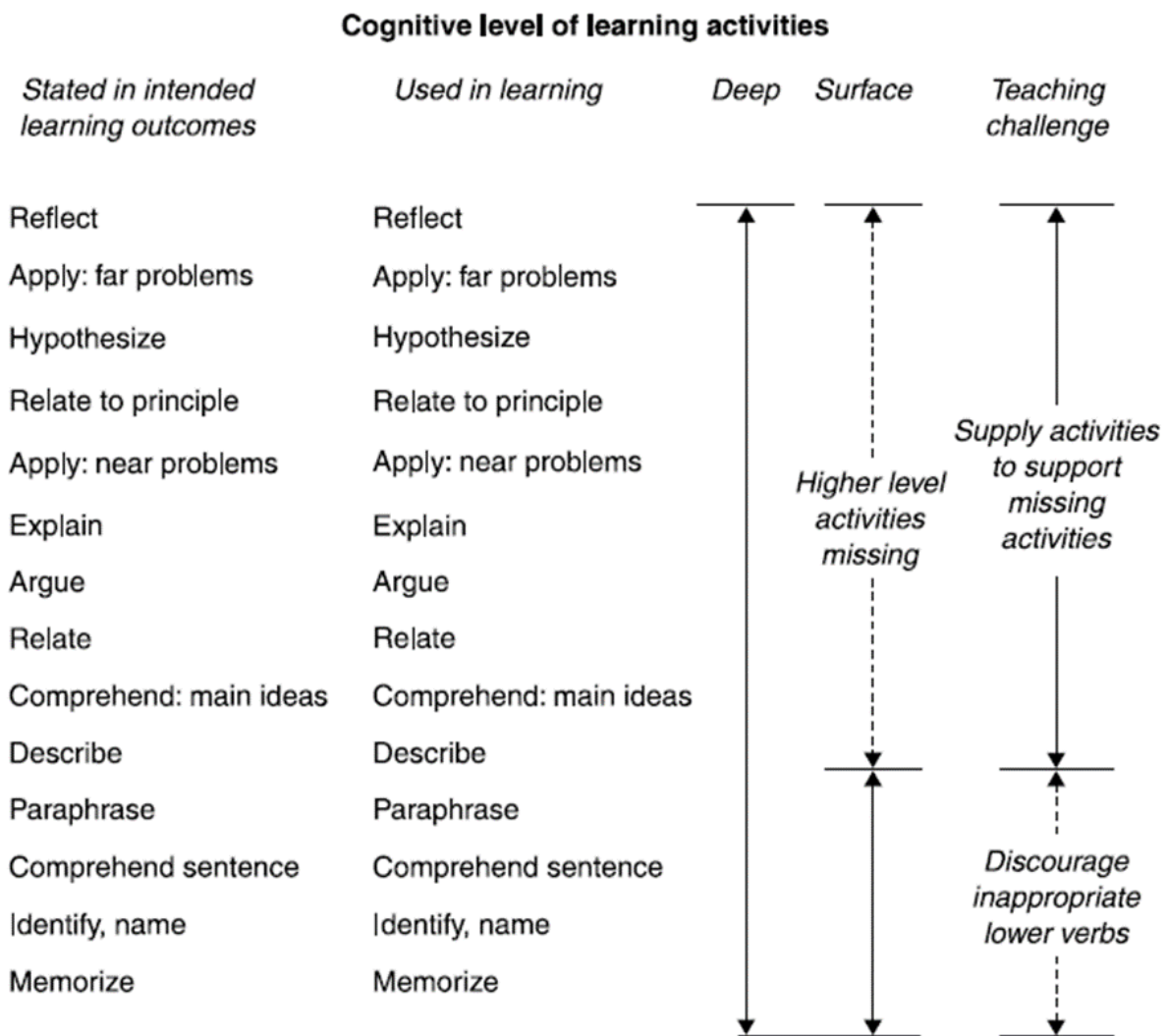


Figure 2. Desired and actual level of engagement, approaches to learning and enhancing teaching. Source: Biggs and Tang, 2011, p. 29.

Within constructive alignment, teaching and learning activities need to be aligned to the verbs used in the intended learning outcomes. Beyond this, there are general characteristics that define an effective teaching and learning context. Based on the literature, Biggs and Tang (2011) summarise these as:

1. metacognitive control, reflective learning
2. relevant learner activity
3. formative feedback
4. appropriate motivation
5. a base of interconnected knowledge

6. social learning
7. teaching quality

Constructive alignment has proven particularly successful when using portfolios as an assessment method, both during its original application (Biggs, 1996) and later ones (Cain and Babar, 2016). In the first case, constructivism is used as a framework to guide decision-making in instructional design in order to align course objectives with performance assessment. “Performances of understanding” were used to systematically align the teaching methods and the assessment. A portfolio was used for the students to assess the achievement of the course objectives. This led to a reflection on the part of the students to devise ways to achieve the learning and on the part of the teacher to design and provide appropriate activities to support them. The key issue was to operationalise high levels of understanding and performances through teaching and learning activities, which can be assessed. In the second case, an evaluation was made of two case studies using formative feedback and delayed summative assessment as a means of embedding constructivist learning theories in the application of constructive alignment. Both approaches encouraged students to incorporate feedback. The portfolio-based approach directly provided the assessment output; the open-book examination approach indirectly used the portfolios. Removing marks from individual tasks and delaying assessment to the end enabled students to focus on the feedback. The approaches provided a means for staff to help guide student learning.

As Biggs (1996) points out, there is a tension between administrative and academic requirements in terms of grading, especially in relation to class size and resource commitment: qualitative methods required by constructive alignment are more time consuming, while quantitative methods provide easy quality control for institutions. A working version of constructivism should include: the curriculum objectives are clearly stated (understanding and performances); the teaching methods should place students in contexts that elicit required performances; and the assessment tasks address those performances. As the application of constructive alignment has become more common over the past 20 years, these tensions have risen further (Loughlin et al, 2021): the tensions tend to originate from the conflation of academic

and institutional practices with educational theory. Loughlin et al. (2021) support that constructive alignment constitutes good teaching practice and when used holistically, it is valuable for academics. It is not an appropriate tool for quality assurance, as it cannot guarantee its consistency in practice and encourages resistance and rejection by academics; it should therefore not be used for this purpose or for micro-management of activities in the classroom.

2.2. Pedagogic models in e-learning

Specific to online learning are three main pedagogical perspectives: instructional systems design, constructivist and communities of practice. These are not exhaustive, but a starting point for pedagogical design when using ICT. In order to choose a pedagogical approach, the following questions should be asked:

1. Is the pedagogic model characterised by an analysis of the learning outcomes into subject-matter units? (leads to associationist/ISD)
2. Is the model characterised by active ownership of the learning and teaching activities by the learners, producing task outcomes for feedback from tutors and peers? (leads to cognitive/constructivist)
3. Is the model characterised by active discussion across groups of learners? (leads to socio-cognitive)
4. Is the model characterised by a focus on the development of real-world practice? (leads to communities of practice)

Conole (2010) reviewed pedagogic models and frameworks, which are most relevant to e-learning. The author covered the associative, cognitive and situative learning theories, discussing “mediating artefacts” used in learning and teaching, including: narratives and case studies, tables and matrices, visualisations, vocabularies, models and frameworks. 20 models and frameworks are described and categorised according to the principle learning theory they are associated with; those which do not fit within a specific learning theory are categorised as either generic (including

Biggs' constructive alignment) or assessment practice. The common mediating artefacts to guide decision-making are:

- Narratives and case studies: these describe the contextual details of a particular pedagogical intervention. While they are valuable because they provide rich information on the location, they may be difficult to generalise or adapt.
- Tables and matrices: these are commonly used to map the components of a course. They are a useful means of formalizing learning activities and providing a framework to teachers to design and structure activities. They can be particularly useful to plan blended learning because they can be used to reflect on different educational approaches.
- Visualizations: these tend to be used to represent a teaching practice, including providing an overview of a course, depicting learning outcomes, activities, assessments or key features of teaching and learning. They are useful to emphasise relationships between different aspects of a teaching and learning process.
- Vocabularies: these can range from lists to structured taxonomies and are often used to define learning outcomes for assessment (as in constructive alignment) but can also be helpful to define different components of teaching and learning, as well as for developing support work, mechanisms for activities and scaffolds for project work.
- Models and frameworks: as abstract representations, these are helpful to understand something which is not necessarily evidence or that we can identify directly. They are often aligned to a particular pedagogical approach and tend to describe the stages and processes involved in learning.

Additionally, to the review by Mayes and de Freitas (2004), this report provides further details on different approaches which fall within specific learning theories:

“The *associative* perspective focuses on behaviour modification via stimulator-response pairs, trial and error learning, learning through association and

reinforcement, and observable outcomes, and gives rise to *behaviourist* theories.” (Conole 2010, p.11). Approaches falling within this perspective include:

- Merrill’s five first principles: 1) demonstration – learning is promoted when learners observe a demonstration; 2) application – learning is promoted when learners apply the new knowledge; 3) task-centred – learning is promoted when learners engage in a task-centred instructional strategy; 4) activation – learning is promoted when learners activate relevant prior knowledge or experience; 5) integration – learning is promoted when learners integrate their new knowledge into their everyday world.
- A transaction model of direct instruction (Huitt et al., 2009), comprising four phases: presentation, practice, assessment and evaluation, monitoring and feedback.

“The *cognitive* perspective views learning as transformations in internal cognitive structures. Pedagogically, it is characterised by processing and transmitting information through communication, explanation, recombination, contrast, inference, and problem solving.” (Conole 2010, p.12). Approaches falling within this perspective include:

- Kolb’s learning cycle: using an action-based or “learning by doing” approach through a four-stage cycle (experience, reflection, abstraction and experimentation).
- Conversational framework, which describes the stages involved in the dialogic interaction between teacher and student, demonstrating the way in which concepts are internalised and adapted in the process.
- Community of Inquiry (COI) framework, which models problem-based learning and facilitates collaborative learning.
- Constructivist Learning Environments, which argues that learning takes place when students are actively engaged in making meaning.
- n-Quire framework, which supports inquiry-based learning across formal and informal learning contexts.

“The *situative* perspective views learning as social participation, and emphasises interpersonal relationships involving imitation, modelling and the joint construction of knowledge. It views the ultimate objective of learning as to enable us to experience the world as meaningful.” (Conole 2010, p. 17). Approaches falling within this perspective include:

- Activity theory, which is based on the premise that the context where activities occur must be taken into account if we are to understand the situation and appropriately interpret results.
- Communities of Practice, which sees learning as social participation through the understanding of how communities of practice are formed and developed.
- Five stage e-moderating model, which describes the stages of increasing competence in participating in a community and emphasizing dialogic aspects.
- Connectivism, which emphasises the connected and networked nature within which modern learning occurs considering the elements involved in the learning process facilitated in a networked ecology.
- Framework for online communities, which focuses on the dimensions of sociability and usability with associated design criteria and determinants of success.

Furthermore, there are a number of generic frameworks, which do not align with the three theoretical perspectives:

- The Support Open Learning (SOL) Model by the Open University enables distance learning in the students’ own time with the support of tutors and centralised student services.
- The Learning Design Initiative and Course Business Models by the Open University complements the above framework by providing “views” to be used in the design of courses at micro-, meso- and macro-level.
- 3D pedagogy framework argues that effective learning makes explicit which components are foregrounded in learning activities by considering learning

scenarios against three dimensions of information–experience, non–reflection–reflection and individual–socially–based learning.

- Constructive Alignment has as a central tenet that the learning activities and assessment within a course is aligned with the intended learning outcomes.
- The Hybrid Learning Model is a multidimensional model to describe various learning situations: creating, exploring, practicing, imitating, receiving, debating, experimenting, meta–learning.
- Affinity Model uses “spaces” as a basis for modelling online education – these spaces are: organised around a passion, involve production, use smart tools, are not age graded, combine beginners and experts, use mentoring, distribute and disperse knowledge, foster proactive aided learning, set learning as life–long.
- Reflection, assessment, and feedback models. There are many models focusing on reflection and feedback from assessment, often closely linked to Kolb’s learning cycle.

Terms regarding pedagogical frameworks and models are not always clear and distinct, and the ways in which frameworks are used may vary. Sometimes they just provide a pedagogical position statement, sometimes they guide the learning activities design process. Therefore, they can be used as guiding principles, to direct the design of learning activities, guide the development of a learning environment or support the students’ learning process. One limitation of frameworks is that, because they are abstractions, practitioners may misunderstand how to apply them effectively. Therefore, simplified models must be used with care and supported by good design.

2.3. Urban morphology education

Professional architectural, urban design and planning practice is facing many complex challenges including “wicked” problems concerning sustainability, socio-economic and environmental issues, as well as increasing consumers’ power and expectations, and the changing nature of the market.

The educational process must be adjusted towards a mind-set, which enables flexibility in the future role of the architect and accounts for professional opportunities beyond the strict architectural field (Charalambous and Christou, 2016). In many ways, architectural education, because of its focus on learning-by-doing and experimentation can provide the opportunity to create effective pedagogical models based on practice-based learning (Cunningham, 2005). The availability of ICT can support and expand the scope of pedagogical models for students to establish their conceptual framework through practice-based education, encouraging innovation through feedback, exchange and participation. Pedagogical models may be improved to enable design students to understand market opportunities, identify or even create and exploit professional opportunities – reshaping architectural, planning and urban education to embed an entrepreneurial perspective cultivated through the learning process. In this process, communication and collaborative skills should be viewed as vital learning outcomes to enable future design and planning professionals to perform within a widening make-up of consultant and interdisciplinary teams (Charalambous and Christou, 2016).

Over the last decades, there has been an increasing acknowledgement of the importance of urban form to the many dimensions of our lives in cities. Consequently, urban morphology, as the science of urban form with more than one century of disciplinary history, has acquired a key role in the debate on the past, present and future of cities. But what is indeed urban morphology? Why teaching it? What contents should be taught in an urban morphology course? And how should we effectively teach it?

Barke (2018) argues that urban morphology makes sense of the world around us. Furthermore, he states that, culturally, understanding it leads to awareness of urban aesthetics and the layers of meaning attached to townscapes – through such appreciation, its study contributes to the quality of urban life. Practically, urban morphology has a vital educational function – through the detailed study of urban form, we learn both what not to do and how to do things better. And, finally, urban morphology provides an appreciation and unique training for integrating closely

related fields of practical application such as planning, urban design, and architecture (the main topic of KAEBUP).

After acknowledging the relevance of urban morphology, one fundamental issue is the selection of contents for a morphological-based course: what is the body of knowledge of urban morphology? As we must be selective, what is included and what is excluded? What influences this selection (disciplinary background, morphological approach, geographical)? Conzen (2018), Strappa (2018) and Yamu and van Nes (2021) are three excellent examples of content selection in different morphological approaches. It is also important to understand where urban morphology is positioned in the various degree courses (architecture, geography, and town planning), the levels of instruction (and how it is related to other courses), its position within the relation between research and practice, the syllabuses (and the teaching methods, the specific tasks, resources and hours of teaching, the contents of each lesson) and the feedback of students (Oliveira, 2018).

How is urban morphology being taught? In the early 2010s two national reviews on the teaching of urban morphology in Spain and Portugal were published. Ruiz-Apilániz *et al.* (2015) examine the 33 schools of architecture in Spain. They found that urban morphology is present in most compulsory urban studies modules, but these modules are rarely seen as relevant to architectural programmes and only a few are fully dedicated to the study of urban form. Similarly, in a review of the Portuguese context, Oliveira (2012) argued that urban morphological theories, concepts, and methods can be found in some degrees offered by different institutions of higher education; nevertheless, these have a marginal role in the educational strategies promoted by each faculty or department. In some cases, urban morphology is a discipline within a particular course (sometimes, the words “urban morphology” or “urban form” are part of the discipline title, sometimes they not). In other cases, different urban morphological contents are taught in various disciplines along the course. Sometimes, the introduction of this discipline (or of these contents) in the course is framed by a systematic view, but other times this takes place at some time in the course and it does not follow a sound continuous line through the whole curriculum.

However, recent publications show how some researchers have been systematically teaching urban morphology, exploring its major strengths and overcoming its weaknesses. Oxford Brookes University has been a key reference of education in urban morphology over the last decades (Hayward and Samuels, 2018; Kropf, 2017, 2018). Hayward and Samuels (2018) describe how they use the concept of urban tissue to analyse and explore design solutions for extensive housing projects. Framed by a simplification of urban morphology, they describe the technique of applying urban tissues, which represent developments known to the designers followed by an interrogation of the result to ascertain the degree to which that tissue is appropriate. Kropf (2018) describes a module, structured in four parts (introduction, analysis, design guidance and critique, and design proposal), on how new development can be accommodated in historic environments and the issues relating to the conservation of areas within settlements as opposed to individual buildings or artefacts. He states that design can be used to teach urban morphology, particularly on how the former can make the latter a subject more accessible to students.

In the last decade, Mareto has been coordinating a number of “Workshops in Architecture and Urban Morphology” (WAM) in different cities in diverse countries. Framed by a process typological approach and particularly by concepts such as polarities, routes and fabrics, he explores the relationship between urban form and sustainability and proposes a set of methodological tools, including the “morphological map” and the “nodality survey” (Mareto, 2018). Finally, Oliveira (2016, 2018) proposes a comprehensive course in urban morphology organised in seven parts: the elements of urban form, the agents and processes of urban transformation, cities in history, contemporary cities, different approaches in the study of urban form, the relation between scientific research and professional practice and, finally, the relations between urban morphology and other fields of knowledge of a social, economic, and environmental nature. Similarly to WAM, the course has been taught in different universities in four different countries.

2.4. Blended learning and Open Educational Resources in urban studies

Design and planning professionals are now required to address global issues in local contexts. Blended learning approaches combine face-to-face and virtual interactions, enabling the combination of physical and digital activities covering local realities through global interactions (Charalambous and Christou, 2016). Previous experiences of blended learning in related fields have identified that the network of distributed spaces, times and contents in blended learning environments can open new pedagogic pathways addressing the global-to-local symbiotic relationship (Madrazo *et al.*, 2016).

In every learning environment, across all disciplines, collaboration is crucial to an effective learning performance. Following Laal and Laal (2012) collaborative learning could be defined as an educational approach to teaching and learning that involves groups of learners working together cooperatively to accomplish shared learning goals. The authors cite Brown and Lara (2011) and Johnson and Johnson (2009) to state that when compared with competitive effort (working against each other to achieve a goal that only one, or a few, can attain) and individualistic effort (working alone to accomplish goals unrelated to the goals of others), collaborative efforts typically lead to: i) higher achievements and productivity; ii) more caring, supportive and committed relationships; and iii) greater psychological health, social competence, and self-esteem. If collaborative learning is crucial to effective learning performance, it is important to pay attention to the fact that the key to the efficacy of collaborative learning is social interaction. Indeed, the lack of social interaction leads to reduced effectiveness of collaborative learning (Kreijns *et al.*, 2003).

The Covid 19 Pandemic has brought important changes in education all over the world and across disciplines and have expanded the discussion on the challenges of maintaining this collaborative environment in a growing and intensified online and blended learning. In this context, Open Educational Resources (OER) and blended learning technics have come to the centre of debate in teaching and learning. Online learning can be a tool to promote accessibility, flexibility, connectivity and

interactivity between teachers and students, students and students, and students and technology (Singh and Thurman, 2019).

A common definition of OER is presented by the William and Flora Hewlett Foundation, a pioneer of OER initiatives, describing it as “teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge” (Atkins *et al.*, 2007, p.4).

According to Graham (2006), blended learning could be defined as learning systems that “combine face-to-face instruction with computer-mediated instruction”, bringing together two separate learning environments. Although this broad definition of blended learning is based only on physical attributes, Graham (2021) claims that “future blended models need to focus on the pedagogical layer in addition to the physical/structural layer”.

Cronje (2020) calls our attention to the problem that the current definitions of blended learning are concentrated on the “blend” and ignore the “learning”. Therefore, it seems essential to understand blended learning in its relationship with the three dimensions of any form of instruction: media, method, and modality. Modality is the general physical environment (online or face-to-face), and media is the set of physical tools or technology used to deliver or mediate instruction. The teaching strategies and practices used in instruction are influenced and limited by both modality and media (Graham, 2021).

Blended learning generally refers to a learning environment which combines face-to-face instruction with computer-mediated instruction. Whilst they have gained popularity in recent years, studies suggest that blended learning implementations are most often used for the purposes of efficiency and supplementation, rather than fully exploiting its potential to enhance the learning experience and collaboration (Driscoll, 2002; Hofmann, 2006).

As Randy and Vaughan (2008) point out, the value of blended-learning transcends the mere application of ICT for teaching and learning, “recombining concepts that were previously considered contradictory, such as collaborative-reflection and asynchronous community”. According to Graham (2006) blended learning is usually defined as the combination of instructional modalities, instructional methods as well as the combination of online and face-to-face learning instructions. Therefore, it is becoming apparent that different models of blending can exist at various levels. For example, blended learning can occur by blending levels of activities, course-levels, program-levels or even institutional-levels (Graham, 2006). Other components which might become blended also include learners, learning styles, academic programs, subject-matters, disciplines, and institutional frameworks (Madrazo *et al*, 2016).

This possibility to combine learning activities which can be carried out at different times and in different places (on-line, in the classroom) combined in interaction with other learning resources, requires specific pedagogic methodologies which take advantage of their collaborative potential and point to the creation of alternative learning environments. Such a learning environment was suggested by Punie (2007) to describe ICT-enabled educational spaces which transcend existing limits, physical, conceptual and institutional. Punie highlighted the potential of such environments to place students at the centre of the learning, enabling the personalization of learning as well as social interaction at different scales (from learning individuals and communities to learning cities and regions), while being flexible enough to integrate various learning styles, teachers’ skills, and curriculums, gradually becoming informal platforms to share expertise and knowledge across organizations.

Driscoll (2002) has observed that the term blended learning refers to four different concepts, pointing that these four different definitions illustrate the untapped potential of blended learning to enhance the learning experience:

1. To combine or mix modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal.

2. To combine various pedagogical approaches (e.g., constructivism, behaviorism, cognitivism) to produce an optimal learning outcome with or without instructional technology.
3. To combine any form of instructional technology (e.g., videotape, CD-ROM, web-based training, film) with face-to-face instructor-led training.
4. To mix or combine instructional technology with actual job tasks to create a harmonious effect of learning and working.

The purposes for blended learning adoption reported in literature are generally three: i) pedagogical improvement, by increasing learning effectiveness, satisfaction, and efficiency; ii) increased access and flexibility (temporal and geographic); and iii) cost effectiveness and resource use (Graham *et al.*, 2005). Blended learning effectiveness may be dependent on many factors and among them student characteristics, design features and learning outcomes (Kintu *et al.*, 2017). Learning outcomes have an important role to play in the design of an effective blended learning environment, but having learning outcomes is not enough, alignment must be in place to ensure their achievement (Bralić and Divjak, 2018).

The blended learning model in built environment studies has been used in previous research project, such as OIKODOMOS, OIKONET and EPUM. OIKONET, focusing on housing studies, exploited the possibility of combining learning activities which can be carried out at different times and in different places (on-line, in the classroom) combined in interaction with other learning resources, requiring specific pedagogic methodologies which take advantage of their collaborative potential and point to the creation of alternative learning environments. This was in line with the goals described by Punie (2007) to take advantage of blended learning spaces to place students at the centre of the learning. The EPUM project (Emerging Perspectives on Urban Morphology) has identified the lack of a collaborative, blended learning environment in urban form studies (Charalambous, 2020; Mettouris *et al.*, 2021). To fill this gap, EPUM proposed an open learning curriculum in urban morphology, engaging Higher Education Institutions' teachers and students in multidisciplinary BL activities to address the variety of issues faced by contemporary cities. For this purpose, EPUM

developed some OER resources (Oliveira *et al.*, 2020) and an innovative collaborative online platform (Mettouris *et al.*, 2021). Some of the resources are collated from existing sources while others were developed in the project. In the case of EPUM, which developed an open learning curriculum (OLC) for urban form studies, it was found that the blended learning approach enabled the development of an open learning and teaching space that cut across institutional and research boundaries and fulfilled a double purpose: 1) it enabled participating institutions to keep their own academic program, and 2) it facilitated the design and implementation of blended learning activities in collaboration. The blended learning approach adopted and supported by the EPUM digital platform, proved extremely important for the implementation of the OLC resulting in the creation of several Collaborative Learning Activities among partners throughout Europe, facilitating a community of inquiry, which was constituted above and beyond institutional and physical barriers (Oliveira *et al.*, 2020). All EPUM's outputs were created as open access resources and are free of copyrights. KAEKUP is built on this EPUM's experience of pedagogic techniques, blended-learning techniques and OER.

Although there is not much in the literature on blended learning specific to urban studies, we can identify relevant OER and effective blended learning techniques available for teaching architecture, urban design, and planning. MITOpenCourseWare, from Massachusetts Institute of Technology, is a well-known example of OER, with plus 5200 results when searching for urban studies and 2000 results on urban form.

Gil (2019) explores if a blended learning approach can be used in urban design and planning studies, for acquiring essential GIS skills. The author developed an OER focusing on the pedagogical principles behind the choices of format and content. 'Introduction to GIS for Urban Studies' offers a set of tutorials and guides on essential GIS's topics and skills to support urban studies courses (Gil 2019).

In the realm of architecture, where creative design and collaboration need to work concurrently, several aspects which can benefit from blended learning. In terms of autonomy, online platforms can provide material for students to explore in the time

they determine to be best suited for them. Furthermore, a greater time flexibility can also allow for them to expand their architectural references on their own (Ioannou, 2018; Lane *et al.*, 2015).

Similarly, it is necessary to encourage a sense of self-criticism, enabling students to constantly review their own design ideas. Here, providing opportunities for students to present their work, both online through student blogs, or face-to-face through jury settings, allows the students to practice their critical thinking (Mohammed, 2017).

Collaboration can also be facilitated by these technologies. Student blogs can encourage them to share their designs and experiences online. The non-synchronous nature of the online platform can allow for a higher number of students to participate in group discussions, even the shyest, who might not share in a face-to-face class setting (Ioannou, 2018; Mohammed, 2017).

Yet, collaboration through online means does not need to be restricted to textual interactions. Current platforms allow for design proposals to be shared, commented and drawn upon. Thus, web 2.0 technologies do not need to be a barrier to creative and comprehensive inputs (Mohammed, 2017).

It is necessary to note that these same methods could have mixed results. Some students may become uncomfortable with the idea of sharing their design ideas with others, as it could risk losing its originality. Yet, blended learning has the capacity, not only to teach students, but also to involve them in creating innovative solutions, boosting their creativity by creating a learning environment conducive to creating and sharing designs (Ioannou, 2018).

Following the impacts of the Covid-19 pandemic on architecture education, Megahed and Hassan (2021) discuss the interaction and integration of technology-based models. The authors present a holistic blended learning strategy and propose a new theoretical and instructional model to design a suitable and balanced blended learning environment in architecture education.

3. Definition Cards

3.1. Urban morphology (UM)

Urban morphology is the study of urban forms, and of the agents and processes responsible for their transformation over time. Urban form refers to the main physical elements that structure and shape the city – streets and squares (the public space), street blocks, plots, and buildings (special and common), to name the most important. Although morphology was initially proposed as a branch of biology, its general and abstract nature enabled the application in many different fields, and in the end of the nineteenth century, in Central Europe, it started to be used in the study of cities. Urban morphology had a golden age in the first three decades of the twentieth century. In the second half of the twentieth century there were again innovative contributions to the study of urban form, stimulated by the activities of geographers and architects. Some of these individual contributions led to the development of schools of thought, feed by an increasing number of researchers in different parts of the world. Nowadays, we can identify four dominant schools of thought in urban morphology, with their own theories, concepts, and methods to address the physical form of cities and, as such, to impact on the social, economic, and environmental aspects of life in cities.

Key words: Urban morphology, urban form, physical form, agents of transformation

3.2. Blended learning (BL)

Blended learning combines face-to-face and virtual interactions in synchronous and asynchronous activities, as well as instructional modalities and methods. Therefore, it combines separate learning environments and resources, aiming to increase efficiency and supplement local contexts by enhancing the learning experience and collaboration across institutions, colleagues, and peers. Different models of blending can exist at various levels (activities, course-levels, programme-levels and institutional-levels); other components of the learning experience may also become blended, such learners, learning styles, academic programmes, subject-matters, disciplines and institutional frameworks. Blended learning environments are meant to enable personalization of learning as well as social interaction at different scales

(from individuals and communities to cities and regions), while being flexible enough to integrate various learning styles, teachers' skills and curricula, often becoming informal platforms of knowledge exchange across organizations.

Key words: blended learning, instructional methods, learning experience, collaboration

3.3. Communities of practice (CoP)

Communities of practice are groups of people who share a common interest and "join forces" to address problems in their shared topic of interest and/or achieve an individual or group goal. Such communities do not necessarily require co-presence, but they imply participation in a system of activities about which participants share understanding. Communities of practice often tend to address or advance a domain of professional practice by sharing and creating new knowledge, relying on both face-to-face meetings and online environments to communicate and carry out activities. Communities of practice are defined by the three characteristics of *domain* (a shared interest and competence), *community* (engagement in joint activities) and *practice* (shared resources – experience, methods, tools, approaches, etc.). CoPs enable learners and practitioners to take collective responsibility for managing and creating knowledge; they also link learning with performing in professional environments and are not limited by formal structures, organizational or geographic boundaries.

Key words: communities of practice, collaboration, professionalism, knowledge creation

3.4. Constructive alignment (CA)

Constructive alignment is an outcomes-based teaching and learning approach, by which the students clearly understand the learning outcomes that they are meant to achieve and become active owners of the learning and teaching activities. It aims at enabling *conceptual change* rather than the acquisition of information, by activating a variety of cognitive levels and supports the idea that effective learning changes students' perspective of the world. The activation of cognitive levels is "translated" into verbs reflecting a range of learning activities and levels of cognitive engagement (from shallower didactic tasks to deeper transformative tasks). Within this approach, teaching and learning activities must be aligned to the verbs used in the intended learning outcomes. The objective of constructive alignment is to achieve *functioning knowledge*: knowledge that informs actions by the learners, aiming them at preparing them for the professions. Constructive alignment is used as a framework to guide decision-making in instructional design in order to align course objectives with performance assessment and to operationalise high levels of understanding and performance through teaching and learning activities.

Key words: constructive alignment, conceptual change, cognitive levels, instructional design



4. Analysis of interviews with KAEBUP partners

All KAEBUP partners were asked to provide answers to a set of four questions in the form of a narrative ranging between 300 and 500 words per answer. This short “open-ended” questionnaire was meant as a form of written interview, enabling the respondents more time to reflect on the questions and familiarise themselves with the content. The questions were also formulated in an extensive and narrative way, including relevant definitions of concepts and terms used, as well as prompting questions. Only one response per partner was required, meaning that partners were able to choose whether the response would be provided by a single individual on behalf of the organization or whether internal discussion and collaboration would be applied to answer the questions. The four questions related to the following: 1) the alignment of KAEBUP with the main learning theories (empiricist, cognitive, situative); 2) the use of constructive alignment in the project – the skills and competences supporting the development of functioning knowledge; 3) the (potential) use of blended learning activities within partner organizations; 4) the (potential) use of OER within partner organizations.

4.1. Learning theories

None of the three theories proposed as a potential basis for KAEBUP’s pedagogic approach was dismissed as unsuitable to the project, as all were highlighted as appropriate for urban practice for various reasons by different partners. There was, however, a slight preference towards the situative and cognitive perspectives with no specific trend by type of organization responding (academic, practice or NGO).

The empiricist perspective was associated with the process of research: the process of acquiring data and information through experience (learning-by-doing) and through others' knowledge in order to reach new conclusions and lead to change. From this perspective, knowledge was seen to be rooted in action within a specific context and therefore, the empiricist approach would prove meaningful in real life and daily practice (the professional context). It was also mentioned that this approach would be most appropriate specifically for design courses and even in cases where other approaches were preferred, that it should play a part in pedagogy to achieve all-round understanding and know-how. Particularly, its "learning-by-doing" aspect would be well suited to KAEBUP if applied in combination with the situative perspective. Furthermore, repetition of action, guided experience and continuous feedback loops were also highlighted as vital pedagogical components in the field of the built environment aiming towards professional practice.

The cognitive perspective was considered relevant because of its aim to construct meaning and its approach of applying generic concepts in practice, something which was seen as necessary in a field addressing global and pressing issues such as sustainability and inclusivity within its scope. This approach also encourages reflection to promote experimentation and achieve innovation, something which is also necessary within the field in order to address the challenges faced by contemporary cities. The cognitive perspective also stimulates the process of forming concepts and transforming performance, something which is akin to the design process as well as urban development, thus making it relevant to fine-tune pedagogy to the characteristics of its specific subject. Finally, the understanding and application of theory was seen as critical in the field of architecture, but also limited at the point of practice, thus making this approach more relevant when leading to or in combination with a situative approach.

The situative perspective was most frequently identified as the most relevant to KAEBUP because of the project's strong focus on practice and its educational objective of exposing the students to professional environments, encouraging collaboration among researchers, students and practitioners. A particularly relevant aspect of this perspective is that learning is seen in terms of increasingly effective performance within specific (professional) contexts. The situative perspective was seen as the one which might most effectively contribute to KAEBUP's aim to relating education and research with professional practice in architecture, urban design and planning by supporting both academics and students better understand the practices of their community and, therefore, shape their research and educational approaches towards the needs of successful practices. By facilitating relationships and participation in the practices of the profession, the situative perspective can enhance learning and help the translation of scientific contents into practice-oriented outputs. Furthermore, connecting commercially-conditioned practice with theoretical perspectives of academia may be a suitable adaptation of the situative perspective to the KAEBUP project, which can also fit the need to contextualise research and practice within the different urban contexts of the project partners and case studies.

4.2 Constructive alignment

Moral and ideological frameworks developed through education and the formational processes were mentioned as providing the basis for actions taken in professional life. Constructing such a framework and subsequently making practical professional decisions in terms of design and planning requires the ability to hypothesise, in particular to be able to envisage cause and effects of professional actions, thus predicting the impacts of designs and plans. Such a skill was deemed as a most important one to develop functioning knowledge, but it was highlighted that its development requires comprehension and understanding of the subject matter through observation, reflection, critical thinking and the ability to relate different elements and phenomena, as well as to related to other people (colleagues, stakeholders and clients). The ability to describe, explain and argue is considered a particularly important skill within practice in order to achieve successful results in

communication, negotiate the development and implementation of a concept or idea. Cumulatively, the skills mentioned are often referred to as cognitive abilities or flexibility, also including creativity, problem-solving, flexibility and willingness to explore or experiment.

4.3 Blended learning

The great majority of partners use blended learning to a certain extent in their activities, but there was no complete agreement as to whether blended learning is beneficial even in cases when complete face-to-face instruction is possible (aside of environmental benefits). Some partners believe that international peer-to-peer interaction provided through blended learning makes it beneficial to students even when educators could be present, others thought that, when it comes to developing technical and practical skills, especially in the field of design, in-presence instruction remains the best option, even though some partners reported some excellent experiences of interactive and practical activities being performed remotely. There was general agreement that blended learning per se does not necessarily improve the quality of education and that this primarily relies on the proficiency of educators, the design of the activities and the relevance of the content. Again, there was general agreement that BL activities are most effective when integrated within existing courses in terms of delivery and added value, because in this way they serve a well-defined purpose, and they can be better exploited to enrich learning on a specific topic.

The greatest benefits of blended learning were identified as: 1) asynchronicity – the ability to undertake teaching and/or learning within one's own time, especially for professionals; 2) access to international expertise and knowledge exchange – making content more globally relevant, instruction more interesting for students and contribution by professionals into education more viable; 3) peer interaction among students from different background – fostering students' skills in collaboration with different cultural, educational, demographic and interest backgrounds; 4) networking – the overcoming of physical barriers to create networks based on common interest and excellence.

4.4 Open Educational Resources

Most partners make use of OER in their activities on a regular basis. The OER most used by the partners are either context-specific (national platforms for accessing data and legislative matters) or field-specific, relating to methodologies taught within the academic partners' courses. OER are also used ad-hoc to learn or enhance a technical skill or to collate material for a determined piece of research or case study; the most frequent use was generic open access resources, such as web sites, for improving self-knowledge about a topic or a site. All partners agreed that while carrying out their work without the mentioned OER would still be possible, quality, time and cost-effectiveness would be greatly impacted upon if these did not exist. Some partners felt that the supply of OER was adequate to their work, while others expressed an interest in greater availability of open access data-based resources, in particular, national and local data and statistics, but also more generic information and indicators, as well as cartographic material, for cities and sites globally. The importance of open access generally was stressed by some partners, specifically in relation to the KAEBUP project, both in terms of its outputs for future use, but also background resources, in particular relating to publications on urban morphology.



5. The KAEBUP pedagogic model

KAEBUP wants to take a reflexive and transformative pedagogic approach. The aim of the project is to support the development of students into professionals who have the skills to address and propose solutions faced by contemporary cities. Such an approach is also aligned with KAEBUP's objective of co-producing knowledge and using reflexive practice as part of the learning and evaluation process (in particular, through the students' diaries of internship experience). Nevertheless, authentic pedagogy remains relevant in the context of the project, as the programme's case studies consist of real-life projects, which have been recently completed by KAEBUP's partner enterprises. The selection of "real-life" case studies was intentional and an integral part of the project since its inception, to make the learning process relevant to the students in terms of real-life demands that will be raised in their future professional life.

Different learning theories may all be relevant to KAEBUP. Learning-by-doing and the practical application of concepts, typical of the empiricist perspective, is a long-standing feature of architectural and design education. Learning through knowledge-creation as intellectual activity, typical of the cognitive perspective, is a defining feature of research in all fields, including architecture, urban design and planning. The value of participation when it comes to developing professional skills and one's role within their community of practice, typical of the situative perspective, is a feature specific to educational fields which aim at achieving a professional qualification: architecture, urban design, and planning, as well as other applied sciences.

The key question here is what is the most appropriate pedagogic model for KAEBUP, based on its aims and objectives and its pathways to evidence-based urban practices?

KAEBUP focuses on functioning knowledge – knowledge that informs action by the learner, aiming at preparing them for the profession and, thus, enabling the performance of their professional role underpinned by understanding: using "theory to inform their decisions on what to do in their professional context, be it solving

problems, **designing buildings**, planning teaching or performing surgery” (Biggs and Tang, 2011, p.82). The pedagogic model is characterised by a focus on the development of real-world practice, which indicates that it should mainly follow the situative perspective, implementing activities based on communities of practice. Another indication that KAEBUP should follow this approach was given by the interviews with the partners, revealing a moderate preference and support for the situative perspective over the others, specifically its feature of participating in the practices of the community of interest. Nevertheless, all partners also deemed important to retain aspects of other pedagogic approaches, in particular, the learning-by-doing aspect of the empiricist perspective, including the feedback system, and the reflective practice supported by the cognitive perspective. Regarding the development of functioning knowledge, the project will apply constructive alignment to set learning outcomes for its different activities, but focusing on the cognitive abilities, which were deemed most important within the field: comprehending, relating, describing, arguing, explaining, reflecting and hypothesizing. At the same time, the project will aim to support the development of other transversal skills enabling the development of cognitive abilities and providing an all-rounded approach to learning: observation, critical thinking, creativity, flexibility, team work, problem-solving, curiosity.

Mayas and de Freitas (2004) found no e-learning models fully emphasizing a pedagogy based on the communities of practice. Whilst KAEBUP is not an e-learning programme, it includes strong online components and its objective of innovating learning may benefit from experimenting with such an approach in online environments. By retaining the constructive alignment model to set learning outcomes, KAEBUP will follow an approach specifying what the students should be able to do after a topic has been taught and the level of understanding that the students are to achieve. Teaching and learning activities will be designed to specifically achieve the stated outcomes. Such a model is placed in the framework of constructivism because this enables the design of learning activities to encourage students to construct knowledge (leading to desired outcomes), but it will be fitted within a collaborative – communities of practice – approach, since as one key

objective of the project is the co-creation of knowledge through the collaboration of teachers, students and professionals in the learning, teaching and research activities.

Blended learning is also particularly important for the implementation of KAEBUP because it can facilitate a community of inquiry which is constituted above and beyond institutional and physical barriers and at the same time it allows multiple levels and types of instruction to be adopted. In that sense, it provides the adequate conditions for the implementation of a “free and open dialogue, critical debate, negotiation and agreement” (Filius, 2019) between different organisations and participants. Such context, therefore, will offer an open educational practice which will help partners to share freely and openly ideas, knowledge, tools, approaches and materials used in the built environment. At the same time, it enables participating institutions to keep their won academic program, structure and curriculum, whilst offering students the ability to interact with researchers and professionals face-to-face in determined time-limited activities, and remotely in the long-term through the project’s Research-to-Practice (R2P) platform and the building of a long-term network of interest.

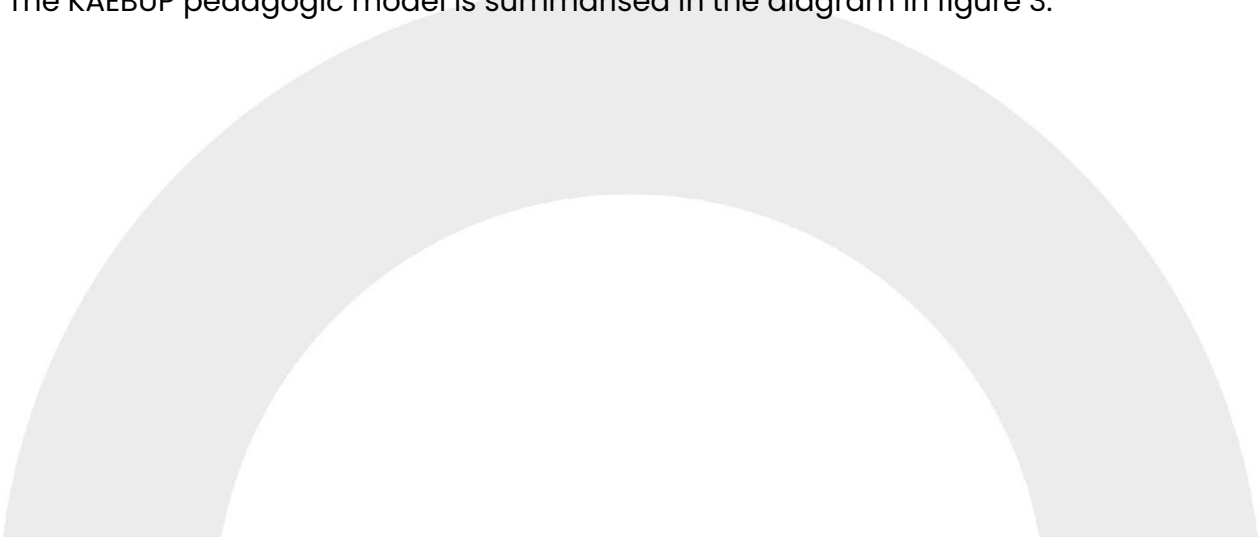


6. Conclusions

The KAEBUP project will broadly follow a situative approach to learning, establishing and enabling a community of practice of students, researchers, educators and professionals sharing the common interest of the built environment, carrying out joint activity and sharing resources (experiences, methods, tools, approaches). This community will share a common goal of improving architectural, urban design and planning education aiming to support the development of future professionals better able to address the pressing issues faced by contemporary cities.

The different components of the project's pedagogic approach, such as achieving the cognitive abilities required to develop functioning knowledge, and the learning tasks encouraging reflection and providing feedback, will be detailed in the project's validation framework (deliverable 9), teaching and training method (deliverable 14) and toolkit for developing transversal skills (deliverable 17). Learning outcomes and skills to be developed will be detailed in the validation matrix of each project activity. A competences framework for the transversal skills will be included in the Research-to-Practice (R2P) Platform and each task in different online activities will be linked to the relevant competences.

The KAEBUP pedagogic model is summarised in the diagram in figure 3.



constructive alignment: comprehending – relating – describing – explaining – arguing – reflecting – hypothesising

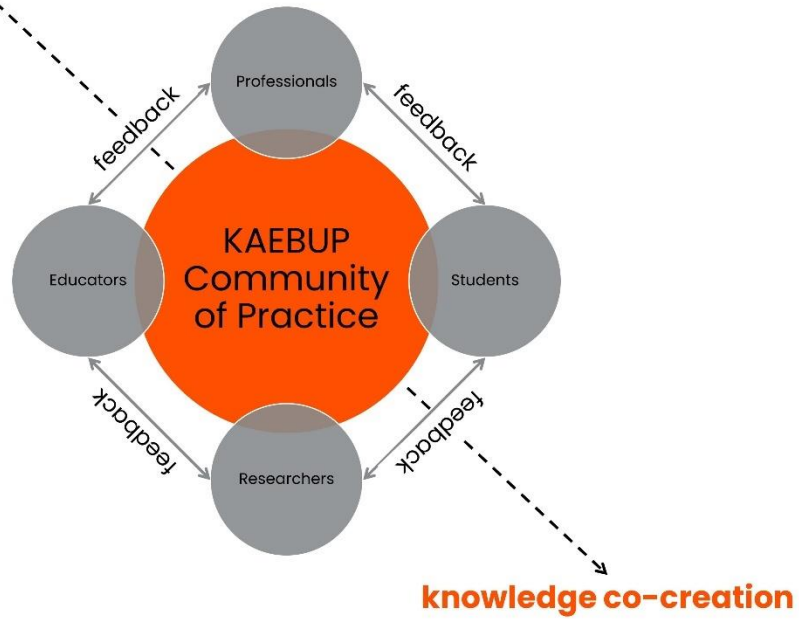


Figure 3. The KAEBUP pedagogic model



7. Appendix

7.1. Supporting data

The Interviews are available for consultation upon request.

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