Collaborative Learning Spaces from Research to Practice: The KAEBUP Platform

Nadia Charalambous[1]([✉]) [ID], Christos Mettouris[2] [ID], Ilaria Geddes[1] [ID],
Evangelia Vanezi[2] [ID], George Papadopoulos[2] [ID], Constantinos Xenofontos[2],
and Marios Kyprianou[2]

[1] Society and Urban Form Lab, Department of Architecture, University of Cyprus, Nicosia, Cyprus
Charalambous.nadia@ucy.ac.cy

[2] Department of Computer Science, University of Cyprus, Nicosia, Cyprus
{mettouris.g.christos,vanezi.evangelia,papadopoulos.george,
xenofontos.constantinos,kyprianou.a.marios}@ucy.ac.cy

Abstract. In this paper an innovative collaborative online platform, the Research to Practice platform (R2P), developed in the context of the EU funded project Knowledge Alliances for Evidence-Based Urban Practices (KAEBUP), is presented. The platform attempts to eliminate research and institutional barriers in educational urban studies cultures through the development and use of digital resources, structured under Collaborative Learning Activities, a novel concept proposed in a previous research project Emerging Perspectives on Urban Morphology (EPUM), and further developed in this project. The CLAs methodology implements a collaboration approach through the R2P platform, designed to meet the objectives of the higher education institutions (HEIs) in their mission to ensure that architectural and urban design students complete their studies with the skills to enter the professional world on the one hand, and to influence, innovate and support practice through their research work on the other. All participating organisations play an active role in the design of the CLAs and the platform, where learning involves co-construction and co-evolution of knowledge among partners. CLAs offer an innovative way for collaboration between academia, research, and practice/entrepreneurs, aiming at eventually creating and formulating an online community of practice, where the active membership of learners, teachers and practitioners will facilitate an educational social praxis.

Keywords: Collaborative learning activities · Blended learning · KAEBUP R2P platform · ICT tools · Urban form studies

1 Introduction

1.1 Addressing Urban Challenges in Academia and the Profession

There are major challenges faced by contemporary cities and the professionals involved in their design and management, including continued urbanization, increasing migration flows, complex mobility patterns and systems, climate change, ageing populations,

health, and social inequalities. This is why urban and planning professionals are now required to have broad knowledge of the variety of issues affecting cities and multidisciplinary skills to address them. It is also why evidence-based approaches to urban design and planning are ever more sought after, to ensure that the challenges are addressed effectively and sustainably, based on sound knowledge, and understanding of the impact of design and planning decisions.

A significant number of HEIs across Europe address the topic of evidence-based urban design and planning, but this still retains a secondary role in curricula compared to traditional methods of teaching design studio. Whilst a small number of successful enterprises in Europe have made research outputs a core element of their practice to address pressing urban challenges including sustainability, mobility, health and social cohesion, there is to date no formal research as to how these companies have formulated their business models and how they effectively integrate research into their work.

Despite the growing demand for evidence-based urban practices by designers and authorities to ensure successful and sustainable results in urban design and governance, there is little awareness in academia with regards to demand for research skills in the profession and the opportunities available for entrepreneurship in this field [1]. Furthermore, the links between businesses and HEIs in many countries remain minimal. There seems to be a 'rupture' at the point where academic research and teaching should 'flow' into the professional world. The purpose of this project is to mend this rupture and create a coherent, seamless, but powerful flow of skills and research into the professional world [2]. Strengthening the links between academia and businesses to mutually benefit from the tools that teaching, and research can provide to enterprises and from the experience of evidence-based practice is a pressing and timely need.

Acknowledging the above challenges, the KAEBUP project's activities focus on developing an entrepreneurial mind-set among students and staff in the fields of architecture and urban design, by training them into how research is used as the basis for professional practice. The purpose of the project arises from the need to innovate teaching practice with a view of understanding what businesses in the field of planning, architecture and urban design require from academia, both in terms of learners' basic and transversal skills, as well as tools, methods, and research findings to apply in the profession. The project addresses three specific needs identified through the needs analysis carried out as preparatory work for the project:

1) strengthening learners' experience of the professional world, and their transversal skills, by working on real-life urban projects;
2) developing students' and staff' understanding of business models for evidence-based urban practices; and
3) co-creating urban knowledge through exchange and involvement of academic and company staff in teaching, research, and practice.

All HEIs involved in this project already run teaching modules which refer to the relationship between research and practice. These may be on how sustainable urban design is developed through research outputs, research-based design studios, methodologies and tools for evaluation and impact assessments. Advancing a co-development of knowledge by involving professional practices, through collaborative, blended-learning approaches, in this teaching will strengthen the HEIs' effectiveness in offering innovative

courses addressing contemporary needs through real-life professional projects. It will enable them to test how their research performs when applied to real-life case studies characterized by industry, political and marketing demands. Therefore, it will provide them with the opportunity to explain, clarify and argue how and why their research findings are relevant to design practice and potentially input into ongoing projects. Participating enterprises and NGOs, will enhance their objectives to inform design practice through structured understanding of architecture and urban form, independently assess designs applying research tools for planning evaluations and to adapt design proposals based on changing demands of clients, briefs, and contextual situations, as well as to advance research and practice in the built environment.

The co-development of a critical mass of knowledge about what tools and research findings are needed by contemporary urban practices are proposed to be channeled and elaborated through the online 'research-to-practice' (R2P) platform. The R2P exploits and expands capacities already developed through EPUM's online platform by enhancing its collaborative features and adding a critical mass of knowledge through the input of enterprises and real-life case studies. Student's experience of work-based learning and taking part in transnational collaborative learning activities supports the development of their transversal skills, including digital skills, critical and innovative thinking, inter- and intra-personal skills, global citizenship and media and information literacy. It is important to note here that the R2P platform, although developed in the context of the research findings of contemporary urban practices, it has the capacity, capability and potential to be applied in any research domain that advanced collaborative work practices need to be applied.

The mode of learning which proves to be suitable for such collaborative learning environments is one that facilitates both face-to-face activities, so as to allow institutions and professional practices to work independently, with on-line activities which enable the synchronous or asynchronous collaboration and learning across institutional/professional barriers, in other words, a blended learning approach. The project's learning and training activities thus build upon blended-learning techniques and Open Educational Resources (OER) already developed through the EPUM project by applying the same principles of a mixture of transnational face-to-face and online small teaching activities along with intensive workshops.

1.2   Collaborative Blended Learning Approaches in Urban Form Studies

Blended learning, which refers to a learning environment which combines face-to-face instruction with computer-mediated instruction, has gained much popularity in higher education in the past years. It is a term which is endowed with multiple meanings, and it has become apparent through several studies that different models of blending can exist at various levels. The value of blended-learning, however, is not merely about the application of ICT for teaching and learning, "recombining concepts that were previously considered contradictory, such as collaborative-reflection and asynchronous community" [3].

Learners, learning styles, academic programs, subject-matters, disciplines, and institutional frameworks can also become blended. The 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 pedagogical methodologies which take advantage of their collaborative potential and point to the creation of alternative learning environments. Punie [4] highlighted the potential of such learning environments to transcend existing limits, physical, conceptual, and institutional and to place students at the center of the learning, enabling the personalization of learning as well as social interaction at different scales, while being flexible enough to integrate various learning styles, teachers' skills, and curriculums, gradually becoming informal platforms to share expertise and knowledge across organizations. In the OIKONET [5] as well as in the EPUM project, the term Learning Space to address learning outcomes which are in line with those described by Punie has been initiated in the field of housing and urban form studies respectively [6].

The KAEBUP project, further acknowledges the lack of such collaborative, blended learning environments in the field of urban form studies and practices, to explore the potential to link academia, research, and practice, aiming at fostering the co-development of knowledge cutting across institutional and geographical boundaries.

Addressing the pedagogical objectives outlined in the previous section, the project's participants developed, implemented, tested, and are evaluating a blended learning approach which aims at fulfilling a double purpose: to enable participating institutions and professional practices to keep their own program and to facilitate the design and implementation of learning activities in collaboration. Activities carried out in the proposed shared digital platform are integrated with face-to-face activities carried out at the participant institutions through open learning processes (synchronously or asynchronously) as well as in joint hands-on, intensive training workshops, business model workshops, internships, and professional development sessions.

The blended learning approach adopted is supported by the development of the collaborative web-based learning environment, (R2P), structured under specific activities in various thematic areas proposed collaboratively by professors, students as well as practitioners, aiming at breaking down institutional barriers in educational cultures through the development and use of digital learning spaces and resources. These activities are referred to as Collaborative Learning Activities (CLAs) offering an innovative way for collaboration in the education system, by making available resources which are accessible to anyone wanting to access training regardless of their geographical location, educational culture, or ability to travel.

1.3 Related Work on Collaborative ICT Platforms

In the context of Computer Supported Collaborative Learning (CSCL), learning takes place through social interaction by using computers. CSCL software systems are collaborative learning environments that utilize technology to facilitate user (teacher to learner and learner to learner) interaction and communication, as well as learning coordination [7, 8]. An effective collaborative learning environment is one that effectively and efficiently supports knowledge sharing in a formed learning group [7]. A number of literature works have contributed towards the development of such learning environments.

In [7] the authors propose using semantic web technologies to build a software tool for knowledge sharing through the usage and management of multimedia annotations in

CSCL. Four annotation categories are supported: definitions (descriptions and explanations), comments, questions, and associations (e.g., links to other resources). Users can annotate web content and link documents and other resources to their annotations. The experimental evaluation showed that students doing collaborative group reading using this system achieved on average much higher scores than students doing group reading using other methods. In addition, the study showed that students in the first group have used collaborative multimedia annotations that contributed to enhanced knowledge sharing.

In case of multidisciplinary learning groups, the authors in [9] proposed an algorithm for composing optimal learning groups in situations where people have different domain backgrounds. The algorithm is integrated in an ontology-based e-learning system that creates self-built educating communities: trainees that participate in the education process gain points through achievements and ultimately become trainers. User profile information is explicitly acquired by having users fill forms. Based on this profile, users are assigned to (or are recommended) learning groups by maximizing the diversity within a group and minimizing the diversity between groups.

In the subject of exchanging data between learner groups, the authors in [10] propose an XML-based procedure using web-services for CSCL data exchange. The data to be transferred from one learner group to another include Moodle forum discussions, online chats, and votes. This allows learner groups to not have to start their discussions from scratch, without any reference of other groups' discussion. The positives of having other learner groups' data available is that the preceding discussions could effectively be used as scaffolding information to participate in the discussions [10]. In addition, the preceding discussions and the information shared provide adequate cognitive workload for the learner to be able to participate in the discussion [10]. A negative point is that the process of actively collecting information and discussion itself is a collaborative learning process in which the user does not participate.

2   The Research to Practice Platform (R2P)

The learning platform proposed, titled Research-to-Practice or R2P platform, comprising OER, to support blended-learning activities and co-creation of a critical mass of knowledge, aims to enable and support the project's teaching and learning activities, and to channel and organize research outputs in relation to evidence-based practice and entrepreneurship. As mentioned in the introduction, the platform aims to support effective and efficient higher education systems, to facilitate the exchange, flow, and co-creation of knowledge, to tackle future skills mismatches and to promote excellence in skills development. It aims to address the rupture in the flow of research and skills into the professional world, the lack of concerted effort from the quadruple helix to co-creating urban knowledge and the identified need to strengthen learners' transversal skills.

To this end, following the needs analysis specific to the fields of architecture and urban design, the KAEBUP project developed a Validation Framework for all learning and training activities. ESCO Transversal Skills and Competences relevant to the profession were identified in relation to the learning outcomes specified for all activities. Each skill

is then matched to a task and activity that will take place during the project or can be embedded in existing curricula, linking each skill to the task which learners can carry out at a specific time during the project, during the timeline of their modules or in their own time (see following paragraphs). Each participant's profile is associated with a log reporting the completion of each task, which can be reviewed by any participant to enable feedback from across institutions and from peers. The completion of all tasks by a user will 'issue' a transversal skills certificate (a report, see following paragraphs) for architecture and urban design. The outcome is the implementation of an online 'transversal skills module', which can be taken as an elective by students or composed formally in curricula by institutions across Europe either as part of existing courses or, potentially, to be given certification and ECTS credits automatically applied when the module is taken as an elective.

2.1   R2P Platform Architecture

To fully support the concept of Collaborative Learning Spaces, allowing the co-construction and co-evolution of knowledge and the active membership of learners and teachers it was decided to exploit the Moodle LMS as the basis for the R2P platform. The selection was based (1) on the wide range of functionalities offered by Moodle, in which all the functionalities needed were included; (2) its popularity among users [11]; (3) it's accessibility as Moodle received WCAG 2.1 Level AA accreditation while accessibility features [12] have been added to the authoring tools so that the content that is produced is as accessible as possible; and (4) it's privacy features [13] that are provided assisting Moodle sites meeting GDPR compliance needs.

The platform, among other functionalities, enables teachers to add Learning Activities in the form of courses in various categories, as depicted in Fig. 1. Each Learning Activity may include many tasks, each of which is assigned with one or more skills, named competencies. To enable the assignment of competencies to tasks, the MOODLE competency framework was used where the "Transversal skills competencies" competency framework was created including 14 skills, as shown in Fig. 2.

When a teacher creates a Learning Activity, they also create the Learning Activity's tasks and then assign each task with skills. During the learning, while the student goes through an activity and performs the requested tasks, a checkbox is provided by the platform's UI (User Interface) that allows the student to declare that the corresponding task is completed (white circle in Activity box in Fig. 1). Upon completion of the task, the student is assigned the corresponding skill(s) of that task. When the student completes all the tasks of the Learning Activity, a report is generated by the customized plugin in the platform upon request (see Fig. 1) that outlines the completed tasks by the student and the gained skills. The report also includes the student's name, the Learning Activity's title and the activity's description. The plugin was developed by the authors as an external plugin and utilizes the R2P database, the Transversal skills competencies" framework and the student's responds through the UI to generate the report.
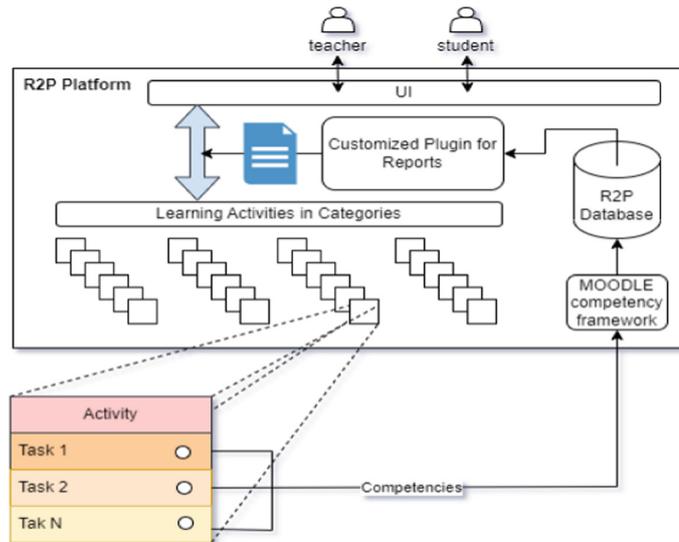
**Fig. 1.** The architecture of the R2P platform

Fig. 2. The transversal skills competencies of the R2P platform

The customized plugin for the reports is offered to the teacher as a MOODLE Activity or Resource in the corresponding MOODLE interface for adding Activities or Resources in a Learning Activity (course), as shown by the red rectangle in Fig. 3.

2.2 Platform Testing and Evaluation

The first phase of the project focused on the development of the R2P platform's structure and design. Using Moodle Learning Management System (LMS) as the basis for development, the R2P platform was designed, while its functionalities were developed as plugins on top of Moodle LMS. Once a first prototype version was released that included several but not all functionalities of the platform, a hands-on, Business Model Workshop was conducted in the context of the project in Parma, Italy. During the workshop a number of participants used the platform to conduct activities and then evaluated the platform using a questionnaire. The aim was to evaluate the R2P platform in terms of usability and ease of use for the participants of the Parma workshop. The results were overall positive. 75% of Participants stated that they were able to fully understand
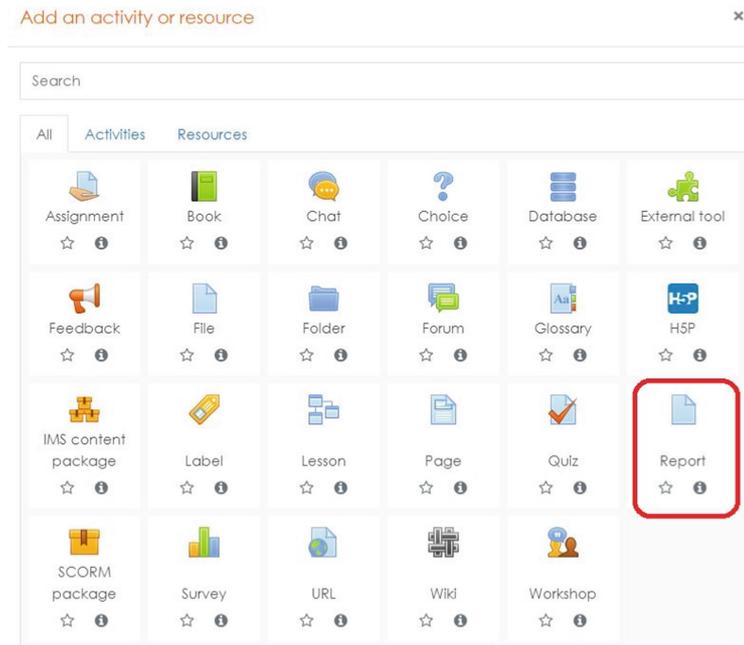
Fig.3. MOODLE interface for adding activities or resources (tasks) in a learning activity.

the tasks given to them, while the remaining 25% stated that they understood the tasks given to them. Participants were able to complete the tasks successfully using the R2P platform. Half of the participants stated strongly that the tasks were not difficult at all for them to accomplish using the platform, while the rest stated, "not difficult", with 14% of participants reporting minor difficulties.

The evaluation of the R2P platform provided the development team with valuable feedback as to where improvements need to be made, not only regarding the User Interface (UI) of the platform, but also regarding its functionality. In this context, the development team has undergone improvements for the platform and significantly enhanced its functionality, improving aspects such as communication/collaboration of its users via the platform, uploading of new material where interested users are automatically informed, posting announcements with enhanced and smart notification features (notifying only interested or enrolled to an activity users), automatic report creation and dissemination, and other.

2.3 Other Platform Functionalities/Features

The platform offers several functionalities for enabling and supporting teaching and learning activities:

- When someone registers, a corresponding notification goes to the coordinator via email.
- When a teacher uploads material to a Learning Activity, notifications go to all students enrolled in the relevant activity.
- When a user posts in the announcements, notifications to go all users enrolled in the relevant activity (forums).

The platform is accessible to participants upon registration, whereas specific functionalities of the platform remain publicly accessible for long-term exploitation by European institutions. The platform through its functionality communicates and promotes research findings for project dissemination mainly towards the end and following completion of the project.

The platform builds upon the experience developed through the EPUM project and its key features are: 1) ease of accessibility and structured navigation of Open Educational Resources (OER) to enable and support self-learning; 2) transnational interactivity for the purposes of teaching and learning activities (live online lectures, peer-to-peer feedback facilities, electronic submission system for remove assessment, distant-tutoring); 3) intra-personal interactivity enabling learners to access, store and keep track of tasks completed, self-issue template portfolios and skills certificates. Furthermore, the platform has a dedicated space for enterprises to access resources, tools and findings for scoping and testing their potential application in practice. This section of the platform also has an interactive character, by which professionals can request support, information, and feedback from academics to apply the tool, as well as to suggest research tasks to be carried out on their projects and indicating what innovations may be needed to support their work.

3   Conclusions - Learning, Co-construction, and Co-evolution of Knowledge through CLAs

The blended learning approach adopted and supported by the digital platform R2P, proves extremely important for the implementation of the KAEBUP project, resulting in the creation of Collaborative Learning Activities among partners throughout Europe, facilitating a community of inquiry which is constituted above and beyond institutional and physical barriers. The CLAs methodology implements a collaboration approach through the R2P platform, designed to meet the objectives of the HEIs in their mission to ensure that architectural and urban design students complete their studies with the skills to enter the professional world on the one hand, and to influence, innovate and support practice through their research work on the other.

The R2P platform strongly supports the methodology proposed, aiming at developing strong links and understanding between academia and practice to design a teaching and training method comprising blended learning techniques and work-based learning through various activities and learning mobilities aimed at:

a) facilitating the involvement of different stakeholders in the design of training courses across EU universities and the development and redefinition of bachelor and master-level programmes;
b) establishing connections between different academic programmes and varied business practices around knowledge co-creation, shared learning, skills development in higher education and long-life learning, competence in defined curricula, and entrepreneurial opportunities;
c) fostering mobility and exchange across institutions to support transversal skills and multi-stakeholder consultation on new curricular topics, and to enhance global citizenship;

d) evaluating and disseminating the project's outcomes to ensure that results are transferable and scalable and the widest possible range of potential users of the project's outputs is reached;

e) setting-up research activities and joint international workshops to address entrepreneurship in the specific fields of architecture, urban design, and planning.

The platform enables the development of OER through the input of different HEIs and professional practices with varied expertise and the implementation of blended-learning techniques, which include international collaborative learning activities, online lectures, remote feedback from peers and teaching staff from international institutions and real-life case studies located in a variety of EU countries. The fundamental benefits of this are the creation of a critical mass of knowledge, informed by organisations and stakeholders in the field of urban practices, with different capabilities and competences, and an effective system to support students' transversal skills development, enabling learners to experience how education, research and practice are linked together and how each can benefit the other.

The digital platform and resources will be interactive not just during the duration of the project when teachers and learners will be able to share data, content, outputs, and feedback, but also in the long term by enabling interested parties to participate through various activities, where learning involves co-construction and co-evolution of knowledge.

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