NETWORKING LEARNING PROCESSES: A VIRTUAL CAMPUS TO SUPPORT HOUSING STUDIES

LEANDRO MADRAZO
Ramon Llull University

PAUL RIDDY
Ramon Llull University

MARTA MASDEU
Ramon Llull University

OIKODOMOS, a Virtual Campus intended to promote contemporary housing studies in Europe, has been developed with the support of the Lifelong Learning Programme (LLLP) in 2007-2009 and 2010-2011. Over the life of the project, learning activities have been implemented with the participation of the partner institutions, in order to help develop and test the pedagogical model and its supporting ICT environment. The activities have included four joint workshops in Ghent, Grenoble, Bratislava and Istanbul, with each one addressing a specific theme regarding contemporary housing: life-long dwelling, housing for diversity, effective housing and proximity. Urban and housing projects were carried out in local design studios and joint workshops, as well as in the learning environment provided by the digital platform. Alongside students, community representatives, local authorities and housing experts participated in these activities, thereby contributing to the identification of design projects, formulating program needs, and assessing project results. This blended-learning approach integrated and connected courses, academic levels and learners from different locations, working both at home and in the digital platform of the Virtual Campus.

OIKODOMOS VIRTUAL CAMPUS: AN INTEGRATED LEARNING SPACE

The goal of the oikodomos virtual campus is to create a learning space which fosters the collaboration of learners -- including students and teachers -- beyond the limits established by institutions, disciplines and academic programmes. Therefore, the virtual campus is not a surrogate of the "actual" university, or an organization of schools with a shared curriculum. It is a network of learners and activities; a space where learning activities are designed collaboratively and carried out in conjunction with other pedagogical activities which occur in the participating institutions.

Oikodomos is an inclusive learning space which integrates different schools (architecture, urban planning), subject matter (housing design, urban planning, energy efficiency and sustainability), courses (design studios, seminars), academic levels (bachelor, post-graduate) and learners (students, citizens). A novel learning space emerges from the interactions between schools and programmes, as well as between students and teachers from different institutions. It is an open-ended space which transcends the limits established by institutions, disciplines and academic programs.

THE DESIGN STUDIO: PARADIGM OF ARCHITECTURAL EDUCATION

In the learning of applied arts and sciences - such as architecture- the understanding of theoretical concepts is achieved only partially through books and lectures. Future architects acquire most of their knowledge in the design studio, where a continuous interaction between theory and practice takes place in a context of collaboration and knowledge exchange between novices and experts (Spigai, Stefanelli and Condotta 2006). As noted by Cuff (1992), the current teaching methods in architecture have their origins in the atelier system of the art academies, which was eventually adopted by the polytechnic schools. In today's architectural education, a design studio is meant to be a simplified model of a world in which the future architect will work, where some roles are adopted (architect, specialist) and real conditions -- the brief, site, budget, and construction techniques -- are simulated.

As Devetakovic (2007, p.326) asserted, "The term 'studio' has a physical component, determining a particular space in which the design activity occurs. At the same time, it indicates the activity of teaching architectural design." Therefore, a design studio is both a place where design professionals interact and a space (in a non-physical sense) where knowledge is created. It is simultaneously a learning and social space where knowledge is obtained collaboratively. Along with the process of creating a design product, such as an object, a building or a city, knowledge stemming from other disciplines, e.g., engineering and construction, or social sciences, finds its way into the design studio. A design studio is, therefore, a multidisciplinary and collaborative learning space driven by problem- and project-based learning. The output generated from open innovation and design ac-

tivities extends beyond artefacts (i.e., drawings, models in digital and analog formats) to encapsulate the distributed cognition of the collective (knowledge, artistic and technical skills and capacities, social and cultural values). This distributed cognition can be harvested by individuals within the design studio as well as outside it.

Typically, in a design studio the learning processes occur when students develop a project in its stages: identification of the problem; sketching; developing a solution; analysing results; discussing the results with tutors and peers; intermediate reflections; and, finally, the presentation of a project for critical assessment by a panel. Collaboration among students, and among students and tutors, is a significant feature of the design-studio model. Along with this process of collaboration, existing knowledge from previous individual experiences and from other disciplines flows through the studio while new knowledge is collectively created in the search for solutions to the problem in hand. As Schön (1983, p.78) argued, design in the studio context can be considered "a conversation with the materials of a situation," in which the expert guides the apprentice in the process of actively reflecting "on the construction of the problem, the strategies of the action, or the model of the phenomena, which have been implicit in his moves" (Schön 1983, p.79). This is constructivist, problem-based learning in action: theoretical concepts are initially explored and understood by placing them in a practical context, which steadily builds on and expands the learners' reference framework, insights and skills.

FROM THE DESIGN STUDIO TO THE VIRTUAL DESIGN STUDIO

The traditional design studio, with the support of ICT, overcame its physical constraints, expanding the numbers and types of participants as well as the disciplines and cultures involved, to became a "virtual design studio" (Wojtowicz 1995). According to Maher, Simoff and Cicognani (1999, p. v), "Establishing a way of transferring documents by file transfer was enough to establish a virtual design studio." Thus, the VDS was "an environment that facilitates sharing design information and supporting interaction regardless of place and time," being "dynamically created by the confluence of technology for communication and people involved in a specific design project" (Maher, Simoff and Cicognani 1999, pp.3-4). Indeed, the VDS enabled geographically distant institutions to interact -exchanging files, communicating- but it begged the question of the transformations that were necessary to achieve a successful integration of different learning processes involved in a collaborative design studio context (Bradford 1994). Today, communication through digital networks is no longer seen as the essence of a VDS. Instead, emphasis is placed on the design and implementation of learning environments which support the design and implementation of collaborative learning processes, in which learners placed in different settings can participate.

Today, design studios, in their face-to-face and virtual forms, are well established as learning models in the schools of architecture. Moreover, physically located studios and VDS are being combined so "the efficiency and flexibility of computer-assisted forms of learning are combined with the social aspects of face-to-face communication" (Achten, Koszewski and Martens 2012, p.28). Nevertheless, we still lack a replicable pedagogical methodology to support VDS; one which would facilitate the effective design and planning of the studio activities, proper dissemination of the results produced, and the reuse of knowledge acquired (Shao et al. 2009; Çagdas et al. 2000). The successful management of a VDS demands new organisational strategies which encourage interaction between the various stakeholders (students, teachers from different subject areas, specialists and laypersons, practitioners); procedures to construct, to represent and to elicit the collective knowledge generated during the design process (definition of the design problem, evolution of a design idea, comparative analysis with similar projects); communication protocols to present the products of design to different audiences in an effective way using digital media, thus enabling interactions between actors from different stakeholder groups; and effective access to digital repositories with quality content (analysis of building performances, building information models and building components).

Accordingly, in OIKODOMOS we have applied the constructivist philosophy to our learning design. Learning activities are the result of a reflective dialogue among the teachers who participate in this design. The design and implementation of sequences of learning activities requires a shared vocabulary that encompasses and somehow reduces the differences amongst the teaching practices at different schools in different countries.

OIKODOMOS DIGITAL PLATFORM

The OIKODOMOS digital platform provides a medium which validates the application of the collaborative pedagogical model. It consists of three environments: Workspaces, Case Repository, and OIKOpedia. These environments can be used separately or in combination during the learning activities.

OIKODOMOS Workspaces1 supports project-based learning activities, such as the development of an architectural and/or urban planning project, doing so in a collaborative manner (Figure 1). Moreover, it facilitates collaboration among distant learners who carry out joint learning activities in physical and/or virtual settings, including design studios, seminars, and courses.

The Case Repository2 contains housing examples which are documented and analyzed by students, individually and in collaboration, working under the guidance of their tutors (Figure 2). It is used to support learning based on the analysis of precedents. In this regard, the case repository is not only a digital archive but also a learning space of its own, where knowledge is constructed in collaboration. Currently, it contains approximately 350 documented cases, with analysis and comments by students and teachers from different institutions.

Finally, OIKOpedia3 is a knowledge base containing the topics studied in the OIKODOMOS Virtual Campus in the field of housing studies. It is structured into concepts which are described in a con-

cise manner, featuring case studies associated with the concepts and references. This collection of concepts provides a valuable learning resource to assist teachers in the design of the learning activities as well as the students in their learning process. As in Wikipedia, OIKOpedia enables registered teachers to continuously enhance the content and add new concepts. Content is provided in English as well as in other languages.

CREATING A JOINT LEARNING STRUCTURE

The schools participating in OIKODOMOS have different curriculums, timetables, and educational cultures. Regardless of the efforts and the progress made with the Bologna reforms, there are still many differences between higher education institutions across Europe, ranging from organisational matters to approaches to tutoring and the teaching of design. Bringing together this diversity into a common pedagogical framework first requires teachers to have a common approach to the design of Learning Activities and, secondly, to agree on a common framework within which to integrate the multiple courses and seminars planned at their own institutions. This is a complex issue, and it is a major challenge.

The initial step was to establish a common understanding of the educational processes and the language used to describe them. To do this, we turned to the method of aligning learning and teaching proposed by Biggs and Tang (2007), as illustrated in (Figure 3). In an ideal situation, the first design iteration would start with goals and learning outcomes, followed by the alignment of the other elements around the ellipse. In practice, however, a designer of learning processes might start at another point on the ellipse and ensure alignment by cross-checking and a subsequent iteration around the cycle.

The teachers involved in the joint learning activities agreed on how to define the constituent elements of the educational process. Learning Activities which encompassed a core set of Learning Tasks were developed, and a list of associated learning outcomes was created. Along with alignment, the process of identifying and describing the learning outcomes and competencies evolved into a common pedagogical framework, which provided the necessary flexibility for each teacher and school to adapt it to the specific conditions of their programs (subject-matter, timetables). Thus the participants use the OIKODOMOS Virtual Campus to blend learning activities across institutions as well as between face-to-face and virtual environments.

BLENDED LEARNING: AN INTEGRATIVE APPROACH

The term "blended learning" refers, in the basic sense, to any combination of face-to-face instruction and computer-mediated instruction. Heinze and Procter (2004) described blended learning as the "learning that is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and founded on transparent communication amongst all parties involved with a course."

In the context of the OIKODOMOS learning model, blended-learning means integrating virtual and face-to-face spaces, course formats (seminars and design studios), the subject matter (housing design and urban planning), and learners (bachelor and post-graduate students). This integration work requires innovative approaches which question the existing pedagogical procedures and structures. In fact, as Garrison and Kanuka (2004, p.97) contended, blended learning conveys "a fundamental reconceptualisation and reorganization of the teaching and learning dynamic, starting with various specific contextual needs and contingencies (e.g., discipline, developmental level, and resources)" and therefore leads to "rethinking and redesigning the teaching and learning relationship" (Kanuka 2004, p.99).

A key to the blending of learning is to intertwine the activities which are carried out at each school with the collaborative tasks carried out in the Virtual Campus by the various institutions. This represents a great challenge from the point of view or learning design, since it requires continuous communication, mutual understanding, and commitment towards pedagogical innovation from the participating teachers.

Unlike many e-learning projects, OIKODOMOS was not constrained to the online teaching of basic concepts while leaving the practical work for the face-to-face activities. Instead, it ventured into the development of distributed blended design activities to be carried out both online and on-site. This mix of asynchronous, Internet-based technologies with face-to-face learning has been considered by Garrison and Kanunka (2004, p.96) as "an effective and low-risk strategy which positions universities for the onslaught of technological developments that will be forthcoming in the next few years".

LEARNING AS A PROCESS: DESIGNING AND IMPLEMENTING LEARNING SEQUENCES

To achieve the integration inherent in the blended-learning model, learning activities are structured as sequences comprised of discrete tasks. This design of learning places careful attention upon the selection and ordering of learning resources, the choice of learning and teaching processes, and the interaction between learners as well as between learners and content. Thus, the use of multiple tools in different environments to carry out the learning activities is also fostered.

Paralleling the above discussion, the Learning Activities carried out in the OIKODOMOS Virtual Campus are based on a simple conceptual structure (Figure 4). A "Learning Workspace" is the environment created by a group of teachers who decide to develop joint "Learning Activities" around a particular theme over a specific period of time. The learning activities are, in turn, made up of "Tasks" which can be either single or grouped in sequences. Sequenced tasks can be constrained to a single "Learning Activity", or they may cut across different ones. This learning structure is sufficiently flexible and neutral to support different kinds of activities -- from the collaborative development of a project to course assignments - which can be carried out by students working individually or in

groups, as well as by schools working independently or in collaboration with others.

Learning tasks can be performed at each school, by different schools in the digital platform, or by both. The network of tasks represents a flow of inputs and outputs. In the OIKODOMOS Virtual Campus, learning is mediated as a process through which some inputs -- study themes, assignments, references and readings -- give rise to associated outputs (i.e., student works, comments on others' works, peer and teacher evaluations). Thus the results produced in a task (e.g., an analysis of precedents) can become an input for another task (e.g., a design studio) taking place at another institution. Hence the timing of the learning activities is not determined exclusively by the courses or academic programs of each university but by the sequencing of the on-site and online activities.

The learning activities have an existence of their own: they become more or less active as more tasks are defined and works are submitted. They move from the virtual to the physical, depending on the sequence of courses and workshops which are set up; and finally, they come to an end as learners complete their inputs to the process (Figure 5). Thus, the temporal structure of the Virtual Campus might have meeting points with that of an academic program but might not have to coincide with it (e.g., semester, quarter). The management of the learning activities in the context of this active network represents a major challenge for teachers. Learning is an open-ended process which can start somewhere and then expand throughout time and space in an unforeseeable manner. In this context, rather than learning plans, the teachers are expected to set up learning strategies and respond to network activity in a timely manner.

IMPLEMENTATION OF THE VIRTUAL CAMPUS ACTIVITIES

The process of creating the network of learning activities in the OIKODOMOS Virtual Campus starts with a group of teachers agreeing on a common theme (the name given to the Learning Workspace), which they will develop for a given period of time, typically a semester or an academic year. The teachers then determine the ways in which they will address the common theme within the course (seminar or design studio) being taught at their institution. So far, the following Learning Workspaces have been carried out in the OIKODOMOS Virtual Campus, dedicated to "Lifelong dwelling", "Dwelling for all", "Effective housing", "Housing and Proximity", and "Housing Reagents". Once the theme has been agreed upon, different forms of collaboration might be established in order to create a network of shared activities, from punctual collaborations (an evaluation of the work done at other schools, providing the output of a course as input for another course) to joint activities (carrying out the same project in the design studio).

The activities integrated in a Learning Workspace might embrace not only the individual courses at each participating school but also the joint workshops. So far, five international joint workshops have been organized, each with its own Learning Workspace. In these face-to-face workshops, students and teachers, who collaborate in the designated Learning Workspace, come together for a period of time, typically a week. The workshop is part of the sequence of activities which are performed before, during and after, in a variety of ways. For example, before coming together in the workshop, students had the chance to carry out preparatory activities in the Virtual Campus. In this way the joint workshop becomes a step in the learning process, enabling learners to continue working in collaboration but in a different setting. Then, the joint workshop is the physical and conceptual place for the convergence of activities that previously originated in the different places, in the physical and conceptual senses. After the workshop, the collaboration can continue on a distant basis in the digital platform as well as in the courses and seminars at each institution.

EXPANDING THE NETWORK TO OTHER SCHOOLS

During the 2010-2011 academic year, we have tried new ways to expand the network of activities in order to involve more schools in the activities of the Virtual Campus. In one particular case, the goal was to integrate the Case Repository in the academic program of the School of Architecture at the TU Cottbus in Germany, while in another the goal was to have teachers from the School of Architecture in Valencia, Spain, act as external evaluators of the student works produced in the Learning Workspace titled "Housing and Proximity".

In the case of Cottbus, the goal was to facilitate their use of the learning resources contained in the Case Repository and, by doing so, introduce its inherent pedagogical methodology into their existing course structure.4 To achieve this integration, it was necessary to work in two directions: from the OIKODOMOS Virtual Campus towards the faculty in Cottbus, and from them towards OIKODOMOS. First, the responsible teachers in Cottbus were introduced to the methodology underlying the Case Repository, and tutorials were distributed to teachers and students in order for them to learn the functioning of the repository. On their side, the teachers from Cottbus analysed which course module would be most suitable for interaction with the Case Repository activities, and then modified the planned exercises so as to accommodate them. The experience proved to be successful, and it demonstrated that the OIKODOMOS pedagogical methodology can be exported to other learning environments.

To further expand the network teachers from schools not involved in the activities of a Learning Workspace were invited to evaluate the work done by students. This was done by a group of teachers from the School of Architecture of Valencia, Spain, who evaluated the work done by students of Sint-Lucas in Belgium working on the theme of "Housing and Proximity". To carry out the evaluation, the teachers from Valencia developed their own protocol5. To obtain an overall picture of the work to be evaluated, they first conducted a transversal view through different exercises on a similar task and, secondly, a longitudinal view towards identifying the objectives of the tasks and their sequences. This protocol was applied by the different teachers involved in the evaluation. The grading was per-

formed in the OIKODOMOS Workspaces digital platform, using the list of learning outcomes defined by the teachers who had set up the Learning Workspace. Teachers also provided comments to students and their respective teachers through the digital platform.

FACILITATING ACCESS TO RESOURCES

As of this writing, we are completing the development of an ontology-based model of the three environments which would facilitate new users' access to the information generated during four years of the Learning Activities. Through this environment, a user will be able to search for a concept (e.g., flexibility) and retrieve, for example, learning activities and student's works within a Workspace, projects which have been labelled with this category in the Case Repository, and the descriptions of the terms contained in OIKOpedia. These responses will be obtained without having to access each environment separately, and without requiring prior knowledge of their content and structure.

SUSTAINABILITY OF THE VIRTUAL CAMPUS

The OIKODOMOS Virtual Campus has, after more than three years of development and implementation, reached a level in which both the digital platform and the underlying methodology can be of further use by other schools and teachers. Access to the digital platform is facilitated upon permission from the Virtual Campus administrators, and online tutorials are included in the OIKODOMOS Workspaces and Case Repository environments. Guidelines and examples of best practices are available in the web portal, to facilitate the learning design task for teachers.

CONCLUSIONS

We have created a novel learning structure which integrates constructivist pedagogy with a learning platform specially created to support it. It is a flexible, modular structure which enables multiple forms of collaboration across schools and programs, giving teachers access to the collaborative design of learning activities. With the support of this structure, learning becomes an open-ended process driven by the inputs of learners, both students and teachers. A methodology has been devised and tested, and the experience documented whereby it can be carried forward by other schools.

ACKNOWLEDGMENTS

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ENDNOTES

1 www.oikodomos.org/workspaces
2 www.oikodomos.org/caserepository
3 www.oikodomos.org/oikopedia
4 See Norbert Kling's report "Integrating the OIKODOMOS Case Repository in the curriculum" in www.oikodomos.org, menu Resources
5 See Mónica García's report "External Evaluation of Learning Activities in OIKODOMOS Workspaces" in www.oikodomos.org, menu Resources
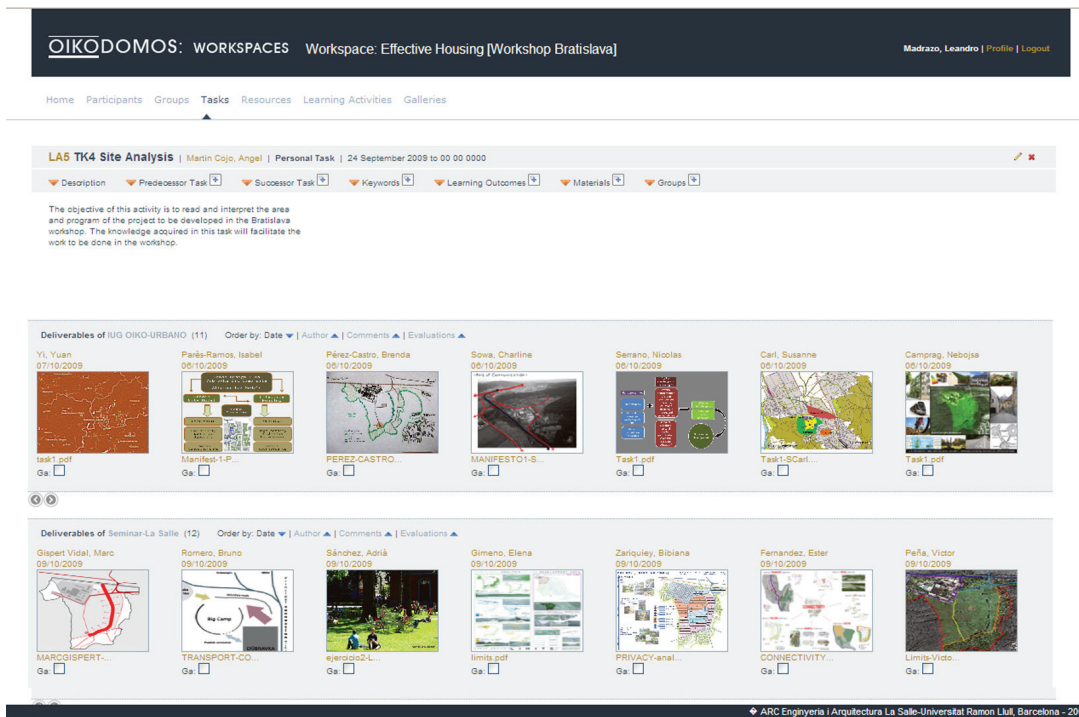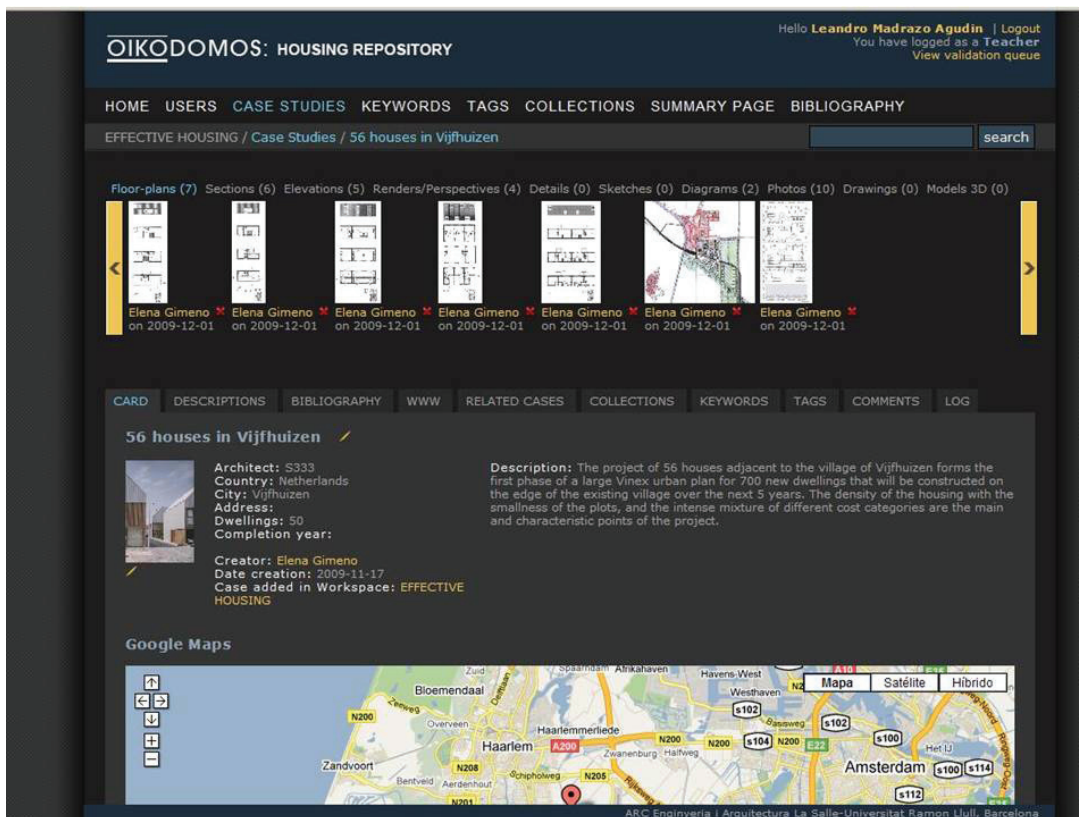
Figure 1. OIKODOMOS Workspaces.
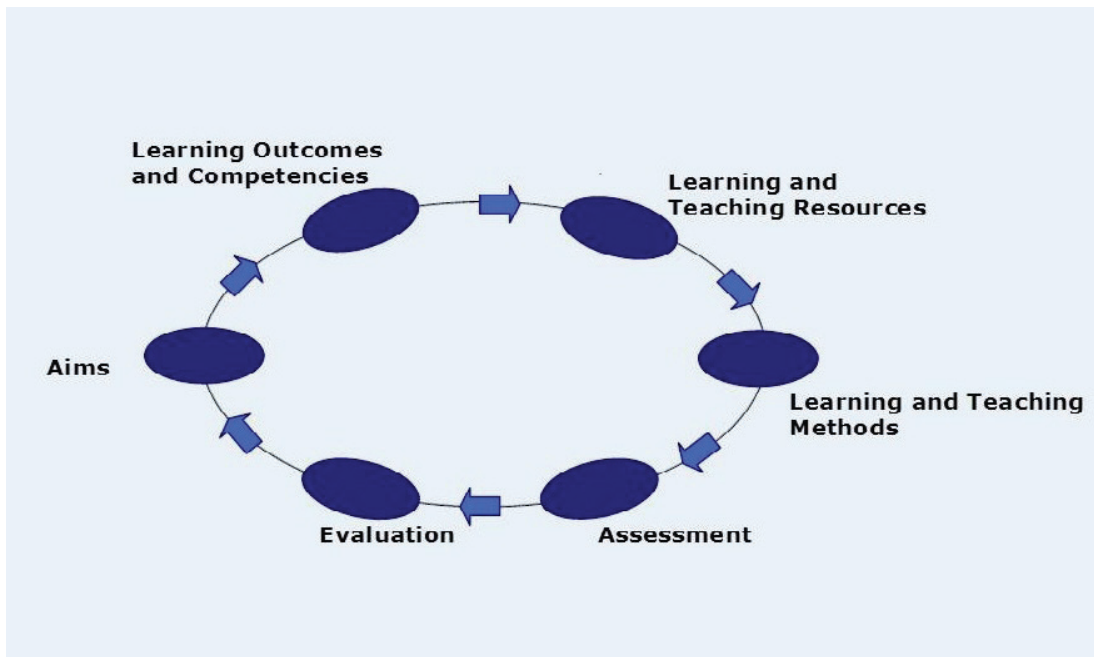

Figure 2. OIKODOMOS Case Repository.

Figure 3. Schematic of the aligned learning and teaching model based on Biggs' work (J. Biggs & C. Tang, Teaching for Quality Learning at University, Buckingham: Open University Press/McGraw Hill, 2007).
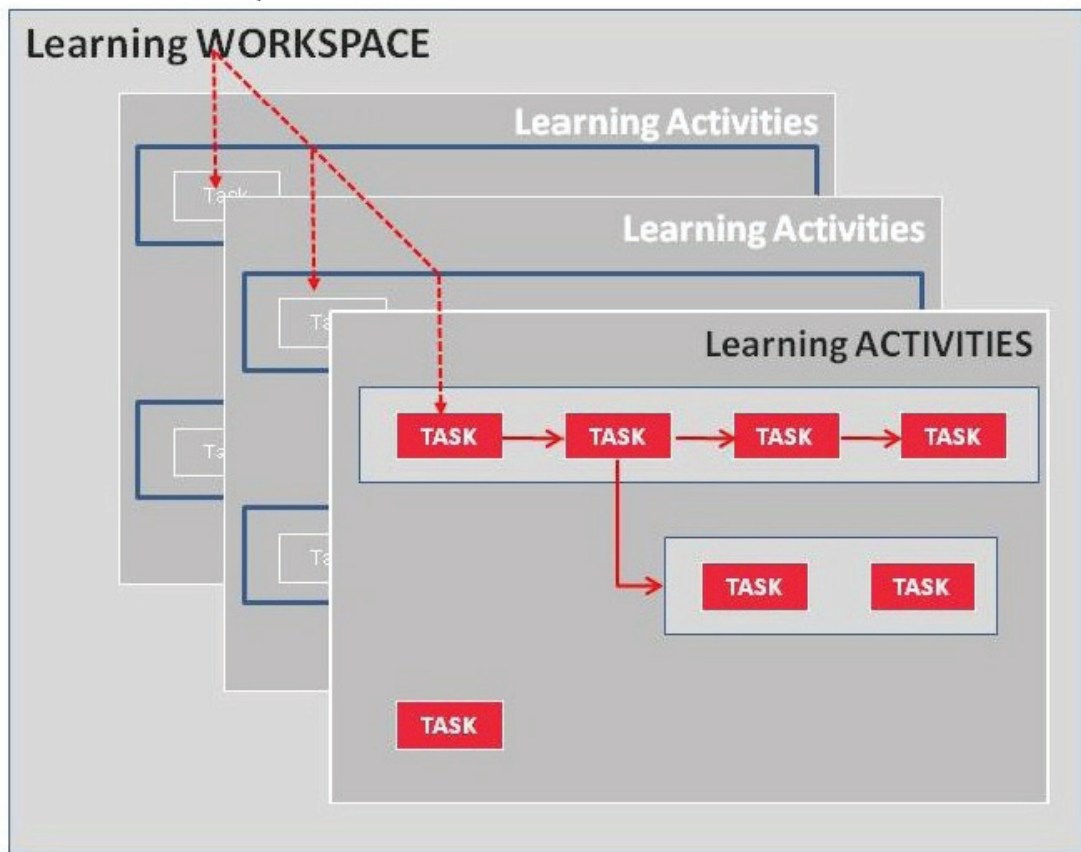

Figure 4. Structure of OIKODOMOS learning activities and learning spaces.

Figure 5. OIKODOMOS Workspaces: network of learning activities.