The e-Learning Café project of the University of Porto: innovative learning spaces, improving students' engagement in active and collaborative learning.

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This paper reports the ongoing research project headed by the University of Porto (U.Porto) and the research group Centre of Spatial Representation and Communication (CCRE), from de R&D Centre of its Faculty of Architecture (FAUP), which aims the design and study of hybrid spatial environments: e-Learning Centres.

The state of the art review discusses the significance of informal physical learning spaces for learning activities in academic education. The most important outcomes of research are mentioned, resuming the strategy applied for the e-Learning Café of Asprela. Outcomes from the daily activities and of studying critically its space configuration in relation to the users' social behaviour are addressed. Finally, the strategy for the design and upgrade of the new e-Learning Café for Porto's Botanical Garden is undertaken.

Our main objective is to present and discuss the contribution of the e-Learning Café project of the U.Porto and of the successful implementation of its program, focused on learning physical spaces able to combine social interaction with diverse pedagogical and cultural activities, all of which have proven to be an important relational dimension for all the people working or studying at U. Porto and an asset to foster the openness of the University to the society.

1. The importance of the physical space, spatial principles of design in learning activities: a short review

In recent years there has been a significant amount of debate regarding the importance of space and spatial design principles for learning. We can point out a few examples like: the "Designing Spaces for Effective Learning, guide for the 21st century" report by JISC exploring the relationship between space design and learning technologies; In the 2004 book by EDUCASE on the draft Learning Spaces; In 2005, EDUCASE Learning Initiative, focused on the informal design of learning spaces and studied design elements associated with the effectiveness of informal learning spaces, developing a guide for the design of diverse elements, assumptions and factors that contribute to the success when creating spaces for informal learning; the OECD-CELE project (Centre for Effective Learning Environments) began his studies in assessing the quality of learning spaces in 2005 and, recently "The research on Learning Space Design" from the Perry Chapman Prize (Painter et al, 2013)

Within this background, and focusing our attention to Portugal, we can say that there are an increasing number of activities related to the quality of teaching spaces in Portugal: a clear example of this is Park School with the Modernization Program for the Secondary Park School. Among various actions, we highlight the International Seminar «Doing School»,

which focused on the theme of Architecture Learning Spaces and In_Learning research project in IST/UTL.

In fact, it is important to mention that the University of Porto and its Faculty of Architecture are very interested in the study of spatial principles for designing spaces for learning activities with strong ICT integration and in their construction and architecture. This can be seen by the development of the research project that began in 2006 that aimed to design and study hybrid spatial environments: e-Learning Centres. The design, construction and evaluation of hybrid spatial environments - e-Learning Centres - in U.Porto constitutes a very important and strategic research program that aims to offer to the academic community a set of integrated environments, providing new spaces where social and learning activities are combined and where the whole academic community can meet, exchange knowledge, share experiences and work more effectively in groups, thus promoting interdisciplinary, innovation and entrepreneurship.

It can be said that in recent years, many things have changed within the learning world of universities and we have witnessed the emergence of learning spaces created to host diverse uses, where formal activities related to learning and studying are combined with the dynamics of socialization and where ICT has an important role. Within this context, the U. Porto and CCRE in FAUP are very interested in the study of spatial principles for designing spaces for learning activities with strong ICT integration.

In view of all this, we believe it is reasonable to admit that learning is an activity that will yield superior results if the environment where it takes place is a rich, dynamic and sustainable environment. In fact, as Whiteside (2009) states: "To create sustainable learning spaces, we must create community, take a holistic approach, use a common language, apply core pedagogical knowledge, and explore emerging technologies as a catalyst to engage faculty and students while we partner with others for pedagogy rich designs, assess learning in the new spaces, integrate ideas for Innovation, and revisit design methodologies."

Finally, it must be said that e-Learning Centres in U. Porto: Asprela and Botanical Garden - design, building and evaluation of hybrid spatial environments constitutes a very important and strategic research program providing new spaces where social and learning activities are combined and where the whole academic community can meet, exchange knowledge, share experiences and work more effectively in groups, thus promoting interdisciplinary and innovation.

2. e-Learning Café of Pólo da Asprela and the e-Learning Café of Botanical Garden

The U.Porto campus aims to offer various types of learning spaces covered by technology within its boundaries: e-Learning Centres. The e-Learning Café of Asprela and the e-Learning Café of Botanical Garden and their programs are important steps in that direction. The general objective is to offer new physical learning spaces that promote different types of communication among the users of university facilities, using ICT as the best means to structure and organize the university space. This project created a set of new dynamic learning spaces that integrate social and study activities constituting a strategic relational dimension for all the people implicated in some way with U. Porto.

The first e-Learning Café designed in U. Porto - e-Learning Café of Asprela – has been in use since 2008 and its new architecture took advantage of the open space configuration of the atrium, first floor room and double height ceiling areas of an already existing University building. Its program consists of four main
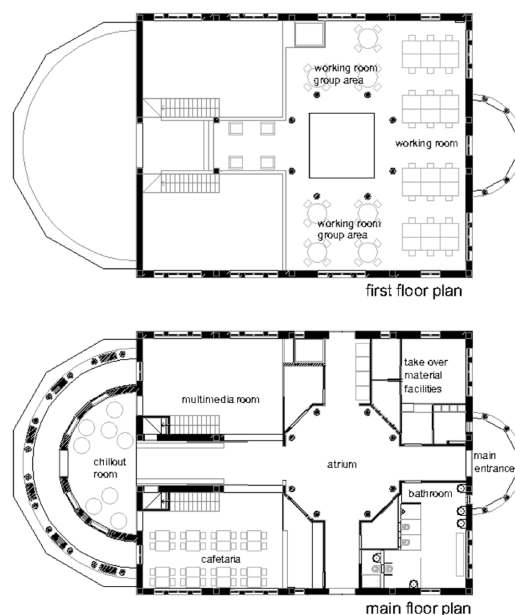

Figure 1: e-Learning Café of Asprela: main floor and first floor

interrelated spaces: Cafeteria / Bar, Multimedia room, Chill-out room and Work / Study room. The aim was to create a strong, coherent and flexible spatial design, linked to the new e-Learning Café program. A new set of interrelated spaces, having each one of those places, an individual ambience and design reinforcing its particular purpose or use, and the adoption of solutions that assured easiness for users or programmers to change some characteristics or ambiences of those spaces. The different ambiences that are created for each area are mostly the result of considering the new furniture and its layout as an important spatial design element for characterizing the space and by controlling the natural light and applying different types of artificial lighting to each individual area.

2.1. Extending the Potential of Digital Multi-User Interactive Systems for the Outer Space of an e-Learning Centre: Architectural Design for the Arrangement and Design of Outer Space Garden of e-Learning Café of Asprela of U. Porto

The increased number of students using e-Learning Café of Asprela encouraged us to design a new program for the outer space of the building. The new proposal, U-thinking, aims to provide a solution of a coverage area, located on the back patio of the building making possible to use the garden for studying, working and for cultural activities regarding the arrangement of all the outdoor space surrounding the building.

The space is divided into two main areas protected with an innovative and distinctive coverage. Thus, at floor level we have two zones: a "more conventional" working/ studding area with chairs and tables next to a more informal comfortable zone where a granite bench defines the space that can shelter some cushions and "bean bags" for more a informal study and socialising area.

Partially covering the studding area, we designed an inflatable cloud that helps shelter and to define the space. The interior light can be emitted in a system of LED, allowing this space to be used at night.

One of our formal references for the cloud structure came from cartoons, since they typically represent someone's thoughts in the form of a cloud. Thus, we adopted the form of a cloud for our structure, which symbolizes the materialization of everyone's thoughts.
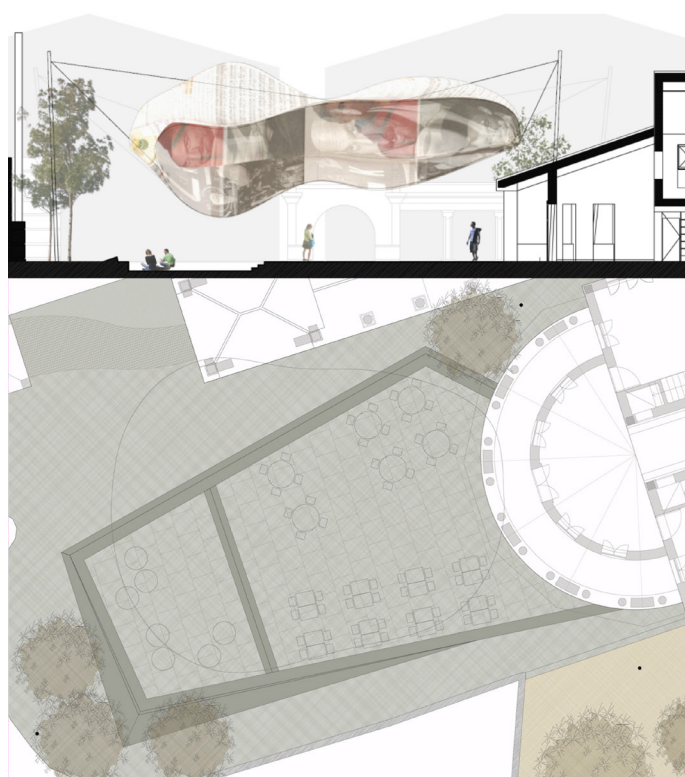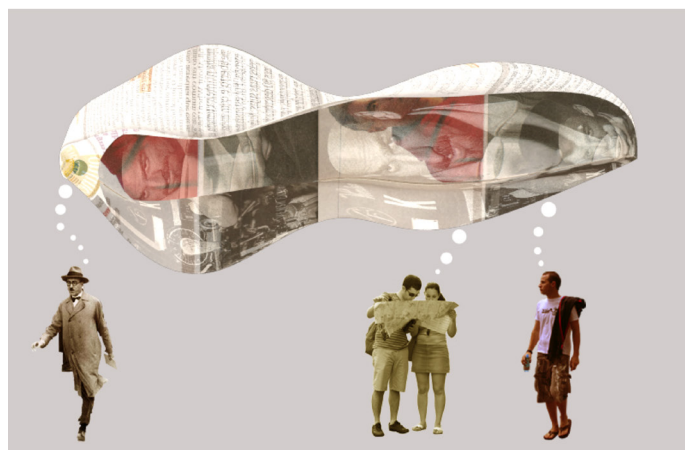

Figure 2: Section and plan of design project proposal for the outer space of e-Learning Café of Asprela

The interior of this structure can be illuminated whenever necessary showing on its surface dispersed phrases, thoughts or famous formulas considered to have been a mark of knowledge in the past. The iconography of the cloud shape representing the thoughts in the cartoons is, in fact, an allusion to the great thinkers and urges students to idealize. The technology embedded in the coverage structure will also allow projections of artistic interventions as well the implementation of interactive digital artifacts for reproducing, for example, the concentration
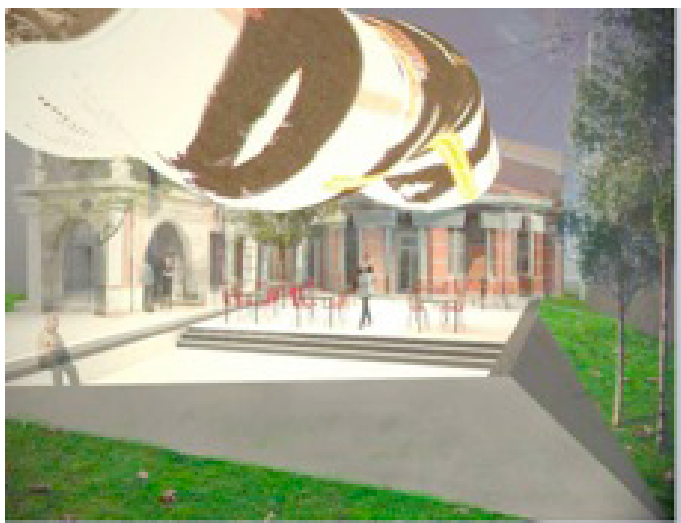
Figure 3: Simulation of the design project proposal for the outer space of e-Learning Café

of students in the space, the weather conditions or the state of user's emotions.

3.2. e-Learning Centre for the Botanical Garden of the City of Porto: The Program and its Design

The design of the e-Learning Café for the Botanical Garden of the city of Porto was another important output coming from the e-Learning Centers in U. Porto research project and is the result of the upgrading and transformation of Salabert House located inside the Botanical Garden, which constitutes an important public space of identity of Porto. Within this context, the architectural design proposal is paying special attention to the genius loci of this place proposing the reconstruction of Salabert house to its original volume and typology and a new extension building.

The proposed design for this new e-Learning Café will contemplate, in addition to the diverse learning and socializing spaces, other spaces for integrated activities that are known to balance the learning process and ensure regular healthy routines (informal learning spaces, multifunctional spaces, flexible spaces capable of adapting to different needs, spaces for music and sport activities related to students posture and relaxation).

The program for the ground floor areas in the Salabert House contains the more public spaces: cafeteria / bar and break out spaces, and in the upstairs floor the space is distributed among working group room and individual working room areas. The

new building will have a reception area where there will be dynamic data on for communicating interactively information related to the continuous monitoring, real-time occupation and programming of the e-Learning Café. Then, next to this "open space" area, we find the "chill out" room that will allow the implementation of collaborative projects and a significant interaction with technological artefacts, this area will also have specific technology with a design focused on body position, correct working postures and allowing high levels of performance and comfort.

We are also thinking of using the electronic communication system similar to the one utilized at the University of Strathclyde. In this new e-Learning Centre the interactive technologies will be present in many of its spaces, and may be temporarily used to change the perception of users / participants in relation to these spaces. Such initiatives, which interpret the individual's behaviour, provide a better awareness of the person itself and her place in the group and space environment. For this reason, they can improve the communication and interaction among the users of those spaces.

3. Program

The e-Learning Café of Asprela has a non-traditional schedule, it is open all year, 365 days, and throughout the year the opening hours are adapted to the needs of the users.

The e-Learning Café is mainly a place to stay, meet others and feel comfortable, were the design of the furniture and the arrangements of tables are cosy and relaxing. Nevertheless this space is also a place to communicate and socialize. To enhance these soft skills, several activities are proposed throughout the year, being all free of charge and open to all the academic community.

To respond to the need of preparing students to achieve increasing levels of communication and collaboration skills and to be able to foster the acquisition of knowledge and encourage attaining excellent and significant outputs, the e-Learning Café of U.Porto brought up the "Show yourself" initiative, which is captivating students, researchers and professors.

The main goal of the "Show yourself" initiative is to bring to the e-Learning Café work developed in different research units of the University, namely the work coming from the Young Researchers Project of U.Porto. Furthermore, these events aim

to contribute to a better understanding of the research work done by different groups of students who also use this space to learn and socialize. The idea, besides other things, is to create a positive and strong dynamic around the "e-Learning cafe", where it assumes a role of "showcase" of these activities and of the University.

Many significant examples of this event could be described as, for example, the session with Around Knowledge, a start-up's company created by three former U.Porto students, all with different backgrounds and this fact was one of the strong points of the session, as they explained the importance of working in multidisciplinary teams and how this impacted on their company. The final product of the session was the launching of an application for smartphones specifically developed for the e-Learning Café. The goal for this session was achieved as the public, mainly students from different curriculum areas - arts, engineer, and science among others -, perceived the importance of multidisciplinary teams to develop successful products and services for the market.

Another example was the session with the research group of the project "Sem+nem- moving houses". This session was particularly interesting, as the team concentrated on very important aspects of sustainability and on a vision of the future development of construction. This project takes place on the vanguard of Architecture and Engineering, pursuing the concept of "house as a living element", adapting and offering the best quality of the inhabitant's life. A dwelling that interacts with the environment and solar luminosity variations, recreates at each moment a new interior and exterior space, adapting itself to the daily routine, changes its appearance during the day, follows the sun's course, and feeds from it. The impact of the session was mainly the understanding of the key steps to make an idea work.

We also invited the OSTV channel to the e-Learning Café. The OSTV is a global and unique way to make TV, where most of the contents arrive through an international network of collaborations. It's a channel open to all creators and artists. During the session, the first Creative Camp was launched. Two weeks of intensive creative workshops and art work, in a village at the northern of Portugal where students of all areas of knowledge experiment and learn in a different way. Several of the students that attended the session at the e-Learning Café were interested and attended the Creative Camp.

4. Conclusions and Further Work

Accordingly, U. Porto as a higher institution concerned with the quality of their learning facilities took the redesign of this e-Learning Centre as a priority, especially after 5 years of its outstanding results (Neto et al 2010) (Vieira et al 2009) (Neto et al 2008), (Neto et al 2007). It can be said that the e-Learning Café is now a place of reference for all the academic community. The interaction and the personal enrichment are the base of all the activities developed and as will be seen next, with the new proposed design for its exterior gardens, this program will be even more consolidated and enriched.

It seems reasonable, taking into account all that has been synthesised in this paper, to say that the present studies and results suggest the need for a new form of learning and social environment characterized by different activity settings, small-group activities and strong ICT integration. Moreover, when speaking about efficiently embedding technology in architectural spaces for learning and social activities, interactive digital artefacts can play a key role for strengthening the interaction of students, teachers and university staff with those spaces and foster new ways for them to communicate, study and work within these learning environments.

Nevertheless, for all the above to happen, it seems to us that universities have to be willing to change their facility planning process, their buildings programs, design and both integrate critically and use actively technology in their learning environments. We believe that this has been the case of U.Porto with the e-Learning Café of Asprela program, the new design proposals of U-thinking, e-Learning Design of Outer Space Garden and the new e-Learning Café for Botanical Garden, plus the research conducted until now focused on these issues, which all constitute important steps in that direction.

The results on the evaluation of this e-Learning Centre obtained until now are very significant and confirm the important principles that have been encountered in literature review and the important characteristics that have been pointed out for the architecture of rich learning and socializing spaces. In fact, with the experience and the results obtained until now with this e-Learning Centre of Asprela, we can say, in general terms, that articulated and flexible spaces able to manage different uses are of paramount importance for encouraging strong interchange of ideas and diverse social interaction within a learning environment. (Vieira et al,2009) (Neto et al, 2009) (Neto et al, 2007).

In fact, having seen how social areas in the university environment are important to enhance the learning and studying process and to create an overall atmosphere with which students can identify and feel a sense of ownership of the environment where they study and socially interact (Joss, 2011), we created a set of rich and diverse interactive social places in our Learning Centres that are also able to integrate some level of customisation by students It is worth pointing out that the research and design of learning and socializing spaces with strong ICT integration developed by the CCRE group until now shows that, in contrast to the visual art media, the interactive environments takes the body of the visitor and ensures their action/motion in space. This could be clearly seen through the several workshops with interactive media held with students in the multimedia room of e-Learning Café of Asprela, and can also, in some way, be concluded after reading several writings of diverse authors (Bullivent, 2005; Castle, 2007; Hertzberger, 2005) and several case studies already pointed out in this paper.

Finally, we give some evidence that backs up what many authors assert for, and this is that architecture in general, and in these type of learning environment programs in specific, should integrate a spatial evaluation system in their design process (Sanoff,2001; Brown,2005; Schaller and Huley,2004) explaining also how we have conducted our evaluation of the e-Learning Café of Asprela. In our opinion, this should be the most secure and reliable base for proposing physical improvements to university buildings since evaluation is a method of identifying needs and making possible the correction and the upgrade of these spaces in accordance to their functions. As a matter of fact, it could be seen until now that articulated and flexible spaces, which incorporate digital interactive artefacts that are able to manage different uses, are of paramount importance for encouraging strong interchange of ideas and diverse social interaction within a learning environment. Also, very significant, are the results obtained for the performance of the learning environment of e-Learning Café of Asprela and its diverse places for Socialization, Individual Study, Group Study and Cultural Activities, which corroborate the importance given to them in literature review and case studies presented in this paper. It seems, therefore, that they should be considered of ultimate significance for building a rich learning and study ambience supporting a community of inquiry.

Thus we believe that it is by integrating technologies and architectural digital artefacts actively in the design process that these can (1) foster communication and interaction between people; (2) allow for different levels of privacy and types of activities within a university facility or program; (3) open these university places and programs to the city and abroad.

References

Altman, I. (1975), The Environment and Social Behaviour Books / Cole Monterrey.

Boys, J. (2011), Towards Creative Learning Spaces: Re-thinking the Architecture of Post-Compulsory Education. Routledge.

Brown, M. (2003), Inversions, EDUCAUSE Review, vol. 44, no. 2, pp. 16–25, 2009. Brown, MB & Lippincott, JK, "Learning Spaces: More than Meets the Eye", EDUCAUSE quarterly, vol. 26, no. 1, p. 3.

Brown, M. (2005), Learning Spaces, chapter 12 of Educating the Net Generation, ed. Diana G. Oblinger and James L. Oblinger (Boulder, Colo.: EDUCAUSE, 2005), e-book, available at http://www.educause.edu/LearningSpaces/6072.

Bullivant, L. (2005), 4dspace: Interactive Architecture. London: AD/John Wiley & Sons, 2005. ISBN 0-470-09092-8.

Bullivant, L. (2006), Responsive Environments: architecture, art and design, V&A Contemporary. London: Victoria and Albert Museum. ISBN 1-85177-481-5, 2006.

[8] **Bullivant, L. (2007)**, 4dsocial: Interactive Design Environments. London: AD/John Wiley & Sons, ISBN 978-0470 319116, 2007.

Fisher, K. (2005), Research into identifying effective learning environments', Evaluating quality in educational facilities, pp. 159-167.

Fisher, K. (2006), 'The New Learning Environment: Hybrid Designs for Hybrid Learning', in R Donladson (ed.) Education futures Public #2, Woods Bagot, Melbourne, VIC.

Hertzberger, H. (2009), Space and Learning. International Conference.

Hertzberger H. (2005), Lessons for students in architecture. Rotterdam: 010 Publishers.

Hunley, S., Schaller, M. (2009), Assessment: The Key to Creating Space That Promote Learning. Educause Review; v44 n2, p26-28,30,32-34 ; Mar-Apr 2009. http://net.educause.edu/ir/library/pdf/ERM0923.pdf.

Joint Information Systems Committee. Designing spaces for effective learning: A guide to 21st century learning space design, 2006, Bristol, UK: JISC, http://www.jisc.ac.uk/uploaded_documents/JISClearningspaces.pdf.

Malcolm B. (2005), Learning Spaces, in Educating the Net Generation, Diana G. Oblinger and James L. Oblinger, eds. (Boulder, Colo.: EDUCAUSE, 2005), http://www.educause.edu/LearningSpaces/6072.

Neto, P., Vieira, A.; Vale, C. (2007), Ribeiro, L., e-Learning Cafe at the University of Porto: ICT influence on design of social learning spaces, European University Information Systems Organization 13th congress, 2007. http://www.eunis.org/events/congresses/eunis2007/CD/pdf/papers/p131.pdf.

Neto, P., Vieira A., Ferreira, C., Machado, I., Ribeiro, L. (2010), The Role of Digital Media and the Web for helping to transform an Old Place into a Rich Socializing and Learning Space: The e-Learning Café of U. Porto. International Conference Skilled Art | Engenho & Arte. Abril 2010. http://www.skilledart.eu/index.cfm?opt=3.

Neto, P.; Vieira, A.; Machado, I.; Ferreira, C.; Ribeiro L. (2010), e-Learning Café. Re-shaping Learning, Conference and Design Summer School, Brighton, UK .Jul 2010 http://arts.brighton.ac.uk/research/ cetld/reshaping-learning-conference, 2010.

Oblinger, D. (2006), ed. Learning Spaces, An EDUCAUSE e-Book, August 2006, http://www.educause.edu/ books/learningspaces/10569.

Oblinger, D. (2005), Leading the Transition from Classrooms to Learning Spaces. EDUCAUSE Quarterly, 28, no. 1 (2005), 14–18, http://www.educause.edu/apps/eq/eqm05/eqm0512.asp.

Oblinger, D. (2005), Educating the Net Generation. Boulder, Colo.: EDUCAUSE, 2005 http://www.educause. edu/educatingthenetgen.

Ornstein, S. (1995), Ambiente construído & comportamento: a avaliação pós-ocupação e a qualidade ambiental. São Paulo: Studio Nobel: FAUUSP: FUPAM.

Sawyer H., Schaller M. (2009), Assessment: The Key to Creating Spaces That Promote Learning, EDUCAUSE Review, vol. 44, no. 2 (March/April 2009): 26–35.

Sanoff, H. (2001), School Building Assessment Methods. Washington: National Clearinghouse for Educational Facilities.

Schön, D. (1987), Educating the Reflective Practitioner. San Francisco: Jossey-Bass.

Scott-Webber, L. (2004), In Sync: Environment Behavior Research and the Design of Learning Spaces, Ann Arbor, MI: Society for College and University Planning.

Taylor, S. (2009), Effects of Studio Space on Teaching and Learning: Preliminary Findings from Two Case Studies. Innovative Higher Education; v33 n4 , p217-228.

Taylor, A., Linking Architecture and Education: Sustainable Design of Learning Environments, Albuquerque University of New Mexico Press.

Vieira, A., Neto, P., Ribeiro, L., Sousa, M. (2009), Requalifying Old Place For New Uses – The e-Learning Café U. Porto. Requalifying Old Places for New Uses – International Symposium . IAPS-CSBE 'CULTURE&SPACE IN THE BUILT ENVIRONMENT NETWORK' and IAPS – HOUSING NETWORK REVITALISING BUILT ENVIRONMENTS, Istanbul, Turkey. http://www.culturespace2009. org/#cnt=sem_genInfo.html.