2011

Enhancing Project-Based Learning in Sustainable Building by Incorporating Learning Technology

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Project Reference Number:	175
Title:	Enhancing Project-Based Learning in Sustainable Building by Incorporating Learning Technology
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Description:	**Aims of project** This project aimed to enhance the learning experience of undergraduates in sustainable building by incorporating learning technology. Four objectives guided the research: ○ Identify the most appropriate areas for improvement in student project-based learning (PBL) in sustainable building through the use of learning technologies; ○ Determine the most suitable learning technologies to address the previously identified areas for improvement and how such technologies can add value and how these can be most effectively incorporated into the PBL in sustainable building; ○ Develop a sub-site of the University's SharePoint, incorporating the use of the identified learning technologies, for enhancing student PBL; ○ Evaluate the effectiveness of incorporating learning technology in sustainable building PBL **Background to project (or context)** Project-based learning (PBL) has been increasingly utilised in Higher Education (HE), which helps students develop a range of skills, including problem-solving, group working, critical analysis, and communication. PBL has also been gradually supported by technology to foster student-directed scientific inquiry of problems in a real-world setting. Sustainable building has been regarded as strategically important for the future of the UK construction industry. As a consequence of that strategic importance, there have been fast-evolving, increasingly stringent regulations and standards on sustainability and world-wide good practice of sustainable building. Therefore, PBL in sustainable building will only be effective when the state-of-the-art, fast-evolving knowledge and practice of sustainable building are fully reflected and engaged in the project learning context. Despite the previous research into integrating technology to enhance student PBL, it remains a concern to engage students effectively in

authentic practice, particularly in the comparatively new, fast-evolving discipline of sustainable building.

Methods used

This project was carried out as action research with the sustainable building discipline at the University, within the context of an innovative student building design project. The design project was cross three learning modules and multi-interdisciplinary involving 70 second-year undergraduate students from five building and construction courses.

- First, the most appropriate areas for improvement in student PBL in sustainable building through the use of learning technology were identified. This was achieved by: 1) a desk study; 2) semi-structured interviews with students and lecturers; and 3) discussions with senior construction industry practitioners who were involved in the student project.
- Secondly, the most suitable learning technologies to address the identified areas for improvement were determined and how such technologies could be effectively incorporated into the PBL was explored. This was achieved by: 1) an extensive literature review; 2) interviews with students and lecturers, and discussions with industry practitioners; 3) a number of meetings between the research team and the Learning Technologist and two technicians in the University IT support department.
- Thirdly, a sub-site of the University's SharePoint system was developed, which incorporated the use of the identified learning technologies for enhancing student PBL. This was mainly carried out by the research team, with support from the Learning Technologist and the University IT personnel.
- Finally, the effectiveness of the sub-site and incorporated learning technologies was evaluated. This was achieved by: 1) group interviews with all the student groups; 2) questionnaire surveys; 3) interviews with assessors of student project work; and 4) the researchers' observation and moderation of the use of the sub-site.

The qualitative data collected was analysed using the 'content analysis' method, i.e. following the logic of identifying the codes, themes and patterns, while the quantitative data was analysed using descriptive techniques.

Results

Within the SharePoint environment of the University (TuLiP), a project sub-site has been established, which makes use of a number of learning technologies including wikis, discussion boards, intranet and folders. This sub-site provides a platform for students to communicate within their groups and with their lecturers, and to engage with their

	allocated industry mentors. Furthermore, students can access best practice case studies and categorised information sources. Sharing documents via the sub-site was perceived useful and efficient, albeit exposed to copyright risks. The discussion boards and wikis were used to some extent but were perceived not as convenient as conventional ways of communication such as email, phone calls or text messages. The communication between students and lecturers and mentors was found not to have dramatically benefited from the use of the sub-site, mainly due to slow responses to questions and messages posted on the discussion boards, and perceived difficulty with its use. In this sense, the use of learning technologies should not replace, but complement, the use of existing methods of communication, e.g. by lectures, face-to-face meetings, email, text messages, and phone calls. The use of the sub-site demanded a steep learning curve, for all the stakeholders. Training is important to ensure effectiveness of the use of learning technology.
Funding:	TFAS 2010
Type of Research:	Action Research
Web Site:	A Sub-site of the University intranet (TuLiP) has been established: https://tulip.plymouth.ac.uk/Module/ENBS243/DandBProject/SitePages/Home.aspx
Collaborators:	Helen Garmston (Research Assistant)
Keywords:	project-based learning; sustainable building; learning technology;
Publications:	Published: Pan, W. and Garmston, H. (2011) Enhancing Project-Based Learning in Sustainable Building By Incorporating Learning Technology. Poster presented at the 9th VC's Teaching and Learning Conference, University of Plymouth, Plymouth, UK, 7 July 2011. Submitted under review: Pan, W. and Garmston, H. (2012) Enhancing Project-Based Learning in Sustainable Building by Incorporating Learning Technology. The 48th Associated Schools of Construction (ASC) International Conference, Birmingham, 11-14 April 2012. pp.1-8. Under writing; to be submitted: Pan, W. and Garmston, H. (201?) Evaluating the Use of Learning Technology for Project-Based Learning. Targeted at a Journal, e.g. Innovations in Education and Teaching and British Journal of Educational Technology.