Research Statement
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17/01/2014

Background

Being an education track faculty I am on the one hand particularly interested in making my research very closely linked with the community of practice, and at the same time put my research efforts into the service of the School and the SIS students. Thus, my current research is built around two specific topics:

- Innovative and effective teaching methodologies for technology-centered courses in a higher education environment
- Managing program-level Learning Outcomes and course-specific Competencies a university setting

Research Areas

Teaching methodology for technology-centered courses in higher education environment

This interest in teaching methodology and teaching approaches for technology-centered courses in university settings was driven through my initial work on a set of technical case studies which I initially intended to adapt for the use in IT/IS undergraduate curricula. While there is certainly a need for comprehensive and in-depth technical case studies which could be used in undergraduate IS studies, I have realised that technology-centered courses frequently require “stories” or “examples” which are capable of clearly illustrating a specific technical aspect, issue or problem in a very concise manner. Such “stories” or “examples” could be effectively used as a basis for in-class exercises, labs or short practical tasks – and they are essentially different from full-featured “MBA” style case studies used in seminar-style classes. The challenge here, however, is that such “examples” or “stories” need to be clearly concept-oriented rather than technology-oriented (i.e., contrary to a professional development course a university course is not teaching a technology or tool but a concept or principle, thus, platform- or technology-independency is essential).

Additional difficulties stem from the use of complex enterprise-level software packages in those courses. I have been researching on innovative ways to overcome these difficulties – from the challenges involved in deploying and making such software packages available to students to the assessment and grading of hands-on components completed in these kinds of courses. In the course of my research work I try to explore how the students’ ability to understand complex technical issues and to map those issues to the underlying concepts is influenced through practical hands-on work. In addition, I am intensively exploring different ways of creating and designing hands-on practical exercises and labs for such courses (involving different visual aids such as videos etc.).

Learning Outcomes and Competencies management

My work in this area was initially triggered by the belief that a further improvement of the pedagogy and the learning effectiveness in the SIS undergraduate programme, particularly in the courses involving extensive hands-one work in the fields of software programming, business IT systems design, development and deployment or web engineering, strongly depends on what efforts we make to further sharpen the skill attainment requirements related to IT architecture, design and
development and what efforts we undertake to align these requirements within the particular course as well as across all courses in SIS.

Using the Enterprise Web Solutions (EWS) course as a pilot study, I extracted and defined a set of skills a student has to possess when entering the course (“prerequisite competencies”), a set of skills and abilities which every student has to attain in order to successfully complete the course (“core competencies”) and a set of skills only advanced students will be possessing when completing the course (“advanced competencies”). Using the derived sets of competencies I have designed a Competencies Matrix for this course. The derived Competencies Matrix for the EWS course was subsequently used to revise the complete teaching content in order to understand where and how the teaching and assessment material (lectures, labs, quizzes, projects, assignments) can be improved/aligned to improve the pedagogy and learning effectiveness in this particular course.

At a later stage, the competencies were integrated with the existing Learning Outcomes framework of the undergraduate program. This integration process made necessary several changes to the existing Learning Outcomes Management System.

In the process of the extension of the initial Learning Outcomes Management system, a new and distinct set of functionalities emerged which were – at a later stage – isolated from the LOMS system and integrated into a completely new application (PCMS – Program and Curriculum Management System). This system has become the principle IT system used by the faculty members to manage the course and manage the course learning outcomes and competencies.

The next step was the design of a new system (CDDR – Course Design Document Repository) which enables an easy exposure of course-related information to the public. The PCMS system was enhanced through several new modules which enable management of course-design related material, and the new CDDR system is serving as a front-end portal to view this information. The CDDR system has been integrated into the School of Information Systems web site and is used now as a single point of access for all course-related information. Thus, manually generated and managed course design material have become unnecessary, the relevant information is easier to integrate into the main School web site and it is easier accessible, sharable and usable for students and other interested parties.

Currently, I am principally focusing on further development of the Learning Outcomes framework. One of the main issues is the integration of ABET Student Outcomes into our Learning Outcomes framework and formulation of the new Performance Indicators for the Student Outcomes. Moreover, I am also concerned with designing a new module to the PCMS system which would allow clear mapping of course-level competencies to performance indicators and student outcomes through the course assessment components.

Selected output

Conference Papers (Refereed)

"Actively linking learning outcomes and competencies to course design and delivery: experiences from an undergraduate Information Systems program in Singapore", by Ilse BAUMGARTNER and Venkataramanan (Venky) SHANKARARAMAN, 03/2013, IEEE Global Engineering Education Conference (EDUCON 2013), Berlin, Germany

"Using enterprise level software for a large scale compulsory course in an Information Systems undergraduate program – an example from Singapore", by Ilse BAUMGARTNER, 03/2013, Learning and Teaching in Computing and Engineering (LaTiCE), Macau

"Using non-graded formative online exercises to increase the students’ motivation and performance in classroom. A longitudinal study from an undergraduate Information Systems program in Singapore", by Ilse BAUMGARTNER, 05/2013, International Conference on Computer Supported Education (CSEDU 2013), Aachen, Germany
"Case study methodology in technology-focused Information Systems courses: examining the students’ perspective", by Ilse BAUMGARTNER, 07/2013, IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE2013), Denpasar, Bali

"Using case studies to design and deliver technology-centered computing education courses: an innovative approach from an undergraduate Information Systems program in Singapore", by Ilse BAUMGARTNER, 07/2013, 18th Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE 2013), Canterbury, UK

Conference Papers (forthcoming)
"Structure of face-to-face teaching sessions for an undergraduate technology-centered computing course: establishing a set of best practices", by Ilse BAUMGARTNER and Venkataramanan SHANKARARAMAN, 04/2014, IEEE Global Engineering Education Conference (EDUCON 2014), Istanbul, Turkey (status: accepted as a full paper)