Work In Progress: E-portfolios in Computer Science and Engineering Education

Madhumita Bhattacharya, Eva Heinrich and Ramesh Rayudu
Massey University, New Zealand, M.Bhattacharya@massey.ac.nz, E.Heinrich@massey.ac.nz, R.K.Rayudu@massey.ac.nz

Abstract – **Electronic portfolios (E-portfolios) provide an excellent vehicle for demonstrating what students have acquired in the way of attitudes, knowledge, skills and abilities during their progress through their selected program of learning. The contribution of this paper is to show how the portfolio process can be applied to a technical discipline? The purpose of the e-portfolios is to provide the opportunity for students to demonstrate their individual skills, guided by their personal goals and their acquired competencies required as per the graduate profile of their degree programmes. Students' participation in the project is on voluntary basis and development of the portfolios is not a part of assessment in the degree programme. Involving personnel from industry for their feedback on the (development) specification of (annotation criteria) life-long learning skills and students portfolios is one of the major aims of this project. Data will be collected from student participants to determine the effectiveness of e-portfolios as a tool for learning.**

Index Terms – E-portfolio, Computer Science, Engineering Education, and Industry.

PURPOSE AND OBJECTIVES

The purpose of this project is to expose computer science and engineering students to the importance of life-long learning skills, reflection and a holistic view of their degree programmes. E-portfolios seem to be ideal tools helping towards the achievement of these goals. e-portfolios have proven their values in the disciplines of education, arts and architecture [1, 2]. What needs to be analysed is how to best transfer portfolio processes into a technical area to successfully work with students that typically are less familiar self-analysis and presentation.' The following student learning outcomes are anticipated:

- Improvement of analytical skills based on reviewing the work they have done for their studies and selecting the most appropriate material as artifacts;
- Improvement of communication skills based on formulating the portfolio analysis;
- Increased awareness of the complete set of skills expected of a graduate of the respective disciplines by working with the annotation criteria provided.

One of the main objectives of this research is to develop annotation criteria to specify life-long learning skills that are in-line with industry employment skill sets. Hence industry representatives are sought to participate in the research as advisors. Help is sought in the following:

- Advice in creating a list of life-long learning skills
- Advice on content and representation of the portfolios
- Provide feedback on some developed portfolios;
- Advice on further development.

Creating an e-portfolio requires students to reflect on their programme of study and on their personal goals [1, 2]. Reflection helps students to gain a clearer understanding of the subject area and students' own aims and achievements. Besides preparing students for lifelong learning, creating one's own portfolio will allow one to communicate one's knowledge and skills effectively to prospective employers.

METHODOLOGY

The project started with the selection of an appropriate platform for e-portfolio development and we have selected "Open Source Portfolio" (OSP) [3]. This was followed by the development of a set of annotation criteria for a typical computer science degree course, a selected engineering degree course, and generic meta-level learning skills (Figure 1). On clicking the row and column descriptors one can see the explanations for each of these criteria.

Research staffs involved in the project have created an environment conducive to the students of computer science and engineering to understand the usefulness and application of e-portfolios. Student participants in the project can see sample portfolios for reference. They are also provided with regular, ongoing assistance to develop their own portfolios.

The e-portfolio features and students' portfolios will be evaluated by gathering feedback from industry personnel for future development. We also intend to conduct a qualitative analysis of student's portfolio and interview students to evaluate the learning outcomes through the development of e-portfolios

This is a pilot project. If successful we are hoping to expand it and transfer ownership to different colleges so that the approach is made available to all students.

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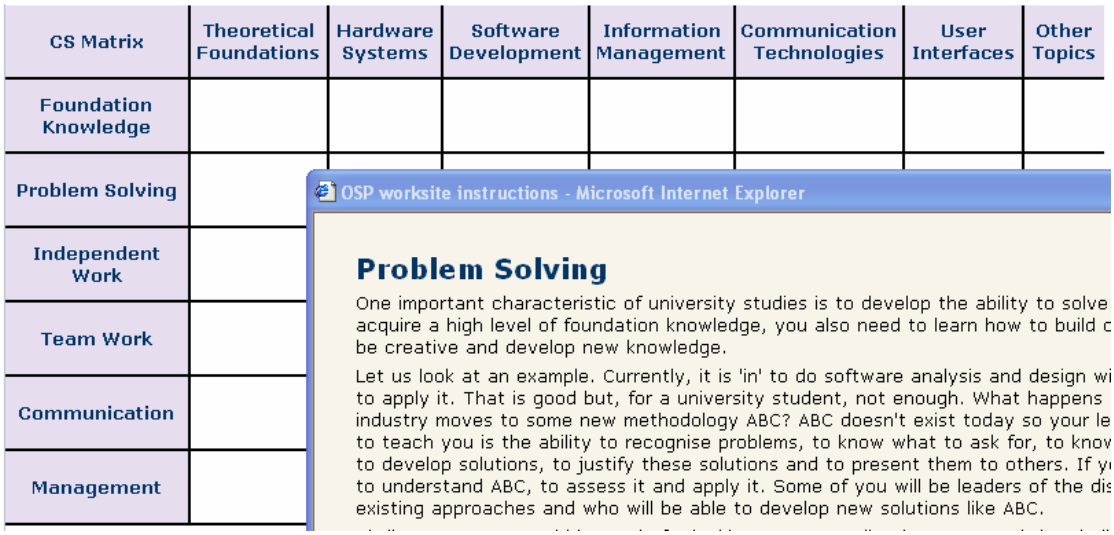

FIGURE 1: MATRIX SHOWING GENERAL SKILLS ANNOTATION CRITERIA IN CONTEXT OF COMPUTER SCIENCE SUBJECT GROUPINGS AND EXAMPLE ROW DESCRIPTOR

PROCEDURE FOR CREATING E-PORTFOLIO

To create Portfolio with OSP the students start by referring to the graduate profile for the course of study. The graduate profile lists all the skills and knowledge students should obtain during their studies. Guided by the graduate profile and students own aspirations students formulate their personal goals. Students then identify the exemplars (the artifacts) that demonstrate the work the students have done in acquiring specific skills and knowledge in a particular subject area. Students then critically reflect on what they have learnt in creating the artifact and discuss how that has helped him/her to achieve the goals set. Finally the students will create a presentation of their individual e-portfolio, containing personal goals, artifacts and reflections. It is possible for the students to nominate people to share or review the portfolio for feedback. Ideally the students should continue working on their portfolios during and after his/her studies.

EXPECTED OUTPUTS

The project will produce a framework for applying the portfolio technique to science and technology based disciplines and beyond. This will include knowledge of suitable life-long learning skills but as well insights into the process of exposing science and technology students to different educational techniques.

RESULTS

A set of annotation criteria has been developed as shown in Figure 1. Student participants can create the repository of artifacts by uploading files under appropriate annotation criteria (lifelong learning skills). The skills identified are problem solving (decision making, critical and analytical thinking), independent work, team work (collaborative and co-constructive skills), communication (written, verbal, presentation and organization skills) and Management (self, resource and information). We have used these annotation criteria to develop two sample portfolios, available at http://eportfolios.massey.ac.nz/portal (login guest/guest). So far we have conducted five interviews with industry representatives who are involved with graduate recruitment in companies ranging from small to large. We have discussed the life-long learning skills with them; they have confirmed the absolute importance of these skills and given us examples of how experiences of the students during their studies relate the requirements in the workplace. They have confirmed the value of portfolios for a number of reasons – they display the awareness of the students on these important issues and allow prospective employer to learn more about a student before conducting an interview. They have stated the value of having evidence in the portfolios as it allows them to get a good idea of the capability of the students.

The feedback on the annotation criteria provided by industry personnel have been taken into consideration for the next phase of development of the portfolio matrix.

ACKNOWLEDGMENT

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REFERENCES

[1] Bhattacharya, M, "Introducing Integrated E-portfolio Across Courses in a Postgraduate Programme in Distance and Online Education". In R.C. Sharma & S. Mishra (Eds), *Cases on Global E-Learning Practices: Successes and Pitfalls*. IDEA Group, Hershey, USA.

[2] Barrett, HC, "Researching the Process and Outcomes of Electronic Portfolio Development in a Teacher Education Program ". *Conference Proceedings of the Society for Technology and Teacher Education (SITE), Nashville, March, 2002*.

[3] Open Source Portfoilo *Available online:* http://www.osportfolio.org/ , accessed 29 May 2006.