Supporting Sustainable Student Learning at USP Through the Use of ePortfolios

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***Abstract*— Universities have a responsibility to provide students with the means to support themselves in their learning processes in the contemporary workplace, particularly in light of the emphasis on "work-readiness". As a result, recent focus for universities has been to accommodate individual student learning and achieving graduate attributes to nurture professional growth and development of students. With grades less relied upon as a proof of learning: multiple stakeholders in education and the workplace want documentation that provides evidence of the entire process of learning and students' capability. To answer these calls, our faculty at University of the South Pacific (USP) has introduced the use of ePortfolios and mentoring in its four-year undergraduate degree programmes in Bachelor of Software Engineering and Net-Centric Computing. The purpose of this paper is to highlight this approach employed by the Faculty to support its accreditation processes and foster closer industry-academia linkage. Using ePortfolios, students are provided a context within which they can appreciate the knowledge and skills they are acquiring and contextualize understanding of the many roles within the profession, and are guided by their mentor on the additional capabilities they might require to achieve (over the medium term) their career goals.**

Keywords*— *ePortfolio; graduate attributes; industry linkage; professional development.

I. INTRODUCTION

Universities and industry have been collaborating for over a century, but the rise of a global knowledge economy has intensified the need for strategic partnerships that go beyond the traditional funding of discrete research projects. When companies and universities work in tandem to push the frontiers of knowledge, they become a powerful engine for innovation and economic growth. Silicon Valley is a dramatic example [1]. For developing economies, the desire to bring academia-industry into a closer relationship with each other is more being felt now than before. There is increasing demand from the industries especially in Pacific Island Countries (PIC) to have graduates who are competent and can easily be absorbed in the workforce [2].

For some time, university graduates have been able to provide evidence of their degree capabilities solely through their university qualifications. Now, contemporary professional, and workplace communities and other stakeholders exert greater pressure on universities for more accountability [3] as they increasingly demand graduates who can evidence their employability skills.

Universities must establish how best to respond to these demands, which are somewhat summative in nature, while at the same time, developing more personalized forms of learning which engage their learners and support their development as reflective professionals and confident and autonomous learners [4].

A. The University of the South Pacific

The University of the South Pacific (USP) was set up in the South Pacific region in 1968 by its 12 member countries - Cook Islands, Fiji Islands, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu. A total of 14 campuses are spread over an area of 30 million square kilometers of the Pacific Ocean. The University plays a pivotal role in the development of the Pacific region through the provision of higher education, relevant and useful research, and reliable and practical technical advice to its member countries. In order to be responsive to the region's needs, the university has undertaken a Strategic Total Academic Review (STAR) project in 2010 to develop a comprehensive suite of programmes to meet the region's human resource development needs.

In 2011, the Faculty of Science, Technology and Environment (FSTE) introduced two new professional undergraduate programmes in the field of Information & Communications Technology(ICT). These two four-year

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programmes, namely Bachelor of Software Engineering (BSE) and Bachelor of Net-centric Computing (BNC), intends to produce quality, world-class graduates in the rapidly evolving ICT discipline. BNC and BSE programmes have a fixed structure which gives a greater emphasis to the discipline specific courses. The degree has been specially designed in response to the industry demand in the region. To improve the readiness of the students for the workforce, all enrolled students will undergo six month industrial placement in their final year of studies.

The BSE and BNC programmes have sought provisional accreditation from Australian Computer Society (ACS) in 2012 and the faculty is working towards attaining full accreditation in the coming years.

This purpose of this paper is to highlight one of means employed by the Faculty to support its accreditation processes and foster closer industry-academia linkage. The next few sections discuss how ePortfolio has been effectively incorporated within these two new programmes as a learning and aggregation tool to support individualized learning. It further highlights the inclusion of mentoring scheme to instill essential elements of professionalism; notably, reflective learning and career planning skills much needed in our modern workplace. Finally, we conclude by discussing how the ePortfolio is expected to assist in the accreditation process of the programmes.

II. EPORTFOLIO

EPortfolios have been identified as a technology which has the potential to benefit 21st century models of learning, teaching and assessment [5]. An ePortfolio is a tool that provides a convenient way for students to store and record evidence of their educational progress, professional attitudes, achievements and skills. Portfolios can be used as a learning tool to allow students to take charge of their professional development, to monitor and ensure specific competencies are achieved for accreditation purposes and to enhance experiential learning through reflection.

The literature is generally positive about the benefits of ePortfolios [5],[6],[7] and [8]. Research has shown that ePortfolios can "enhance" learning outcomes for students [9], [10] and that ePortfolios are more likely to be successfully valued by students when they are used for assessment [10]. The result is that globally the use of ePortfolios is becoming integrated into student-centered learning within undergraduate programs. Precisely how successful it will be to our programme will only be known in the coming years. A recent paper by [11] argues strongly that successful implementation requires not only setting relevant assessments but also changing faculty assessment practices.

The Faculty has designed a subject that continues from the second to the fourth year in a students' degree programme. The university's graduate attributes and employability skills are central to the development of assessment criteria and the type of artifacts to be accumulated in the ePortfolio. The next section discusses the finer details of the ePortfolio subject.

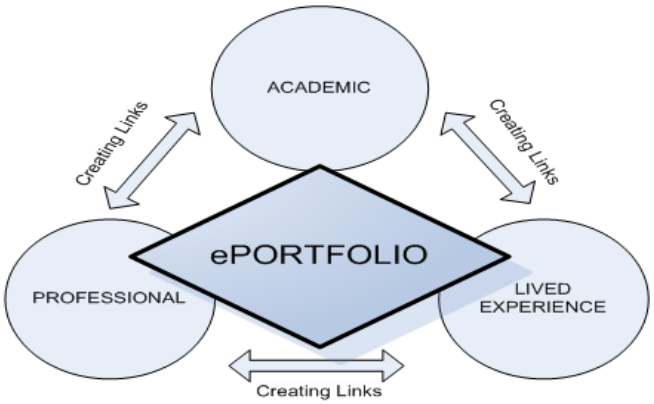

Figure 1. Using ePortfolio for holistic student development

III. DESCRIPTION OF THE SUBJECT

The Faculty recognized the need to prepare students in aspects of professionalism so that they can practice in an international ICT profession. Further, it needed to ensure that graduates have the professional capabilities specified in their program and subject outcome statements.

Thus, this subject, called *Foundations of Professional Practicee*, has been introduced in Semester 1, 2013, which aims to prepare students for transition from university to professional practice in industry and the public service. Each students portfolio is expected to be a unique expression of their academic, co-curricular, and any programme related work experience. Demonstrating the knowledge, skills and attributes gained within and beyond the classroom when incorporated with reflection element turns the collection into evidence of a deeper learning experience. It represents a new focus for the Faculty and its intentional nature is targeted towards the professions.

A. Educational Outcomes

On completion of the course, students are expected to be familiar with the essential elements of professionalism; notably, reflective learning and career planning.

It is expected that students will have a contextual understanding of the many roles within the ICT profession, their own particular capabilities profile, and the additional capabilities they might require to achieve (over the medium term) a desired professional role.

B. Methodology

The course is constructed using ICT skills taxonomy; the Skills Framework for the Information Age (SFIA); an ePortfolio technology (Mahara); mentoring; and assessment (by mentors).

The Skills Framework for the Information Age (SFIA) [12] is a common framework which allows an international understanding of what an ICT role actually involves and identifies the skills required. SFIA has been adopted by the ACS, as well as other professional societies and organisations

to provides a foundation for the membership grades, accreditation and programs of the ACS.

SFIA framework within our implemented course is used to provide a context within which students can appreciate the knowledge and skills they are acquiring and plan a career and further professional development. Most of the generic skills possess similarity with the university's graduate attributes while the more specific skills resemble the programmes learning outcomes. Using this guideline, the programmes Graduate Attributes (GA) was deduced (Table I).

TABLE I
EXPECTED SKILLS AND LEVELS AT GRADUATION

BSE Programme GA	BNC Programme GA
Professionalism (E)	
Communication (E)	
Critical thinking (E)	
Pacific citizenship (E)	
Professional Ethics (E)	
Teamwork (E)	
Creativity/Innovation (E)	
Programming skills (E)	Programming skills (E)
Knowledge of OS (M)	Knowledge of OS (M)
Project management skills (E)	Project management skills (M)
Knowledge of Computer organization and architecture (M)	Knowledge of Computer organization and architecture(M)
Data communication and computer networks (M)	Data communication and computer networks (E)
Knowledge of algorithm design and analysis (E)	Knowledge of algorithm design and analysis (E)
Adaptability to different job requirements (E)	Adaptability to different job requirements (E)
System analysis and design skills (E)	System analysis and design (M)
	Distributed systems skills (E)
	Computer and network security skills (E)

(E) – ACHIEVEMENT EXPECTED AT EXCELLENCE LEVEL
(M) – ACHIEVEMENT EXPECTED AT MILESTONE LEVEL

C. Assessment Criteria

To ensure that there is some consistency in the feedback given to the students, specific criteria have been written in order to provide both verbal and documented feedback to the students (and the faculty) on students' progression in terms of their abilities listed in Table I.

The assessments are broken down on a semester basis and are released incrementally with explicit focus on specific aspects of professional development at different levels within the programme. Over the three (3) year course, through this over-arching course, students will have the opportunity to use the ePortfolio to accumulate evidences and reflect on the following:

- What am I good at? What are my strengths?
- What professional capabilities do I need and what professional capabilities do I have?
- What is my plan for the future?

The entire process will be completed under the guidance of Mentors from academia and/or industry. Table II briefly outline the expectations and student workload for each semester.

With students already enrolled in normal courses each semester, this subject is streamlined to ensure that students' workload is not drastically increased.

TABLE II
LEARNING TASKS FOR THE SEMESTER

Expectations	Student Workload
<u>Year 2 Semester 1&2: ePortfolio</u> 1. Understand and appreciate the benefits of knowing their individual learning styles, personality types and belief systems. 2. Interpret the results of such tests for personal and professional development.	5 to10 hours per semester
<u>Year 3 Semester 1&2: ePortfolio</u> 1. Understand and appreciate the benefits of knowing individual learning styles, personality types and belief systems. 2. Interpret the results of such tests for personal and professional development. 3. Self-assess and analyse technical and professional capabilities and evaluate alternative paths to achieving personal professional objectives.	7.5 to 15 hours per semester
<u>Year 4 Semester 1: ePortfolio</u> 1. Understand and appreciate the benefits of knowing individual learning styles, personality types and belief systems. 2. Interpret the results of such tests for personal and professional development. 3. Self-assess and analyse technical and professional capabilities and evaluate alternative paths to achieving personal professional objectives. 4. Create a realistic, achievable and professionally-rewarding career plan for the years immediately following graduation.	10-20 hours per semester

D. Role of Mentors

Mentors or Industry supervisors are key to the process as they support individuals to identify and address learning and development needs. In the early years of the programme, mentors will encourage students to reflect on their (pre) professional situation (ie. self-assessment of their capabilities) and to consider in detail their career options. Mentors will, twice per semester (more frequently during the final project), assess student ePortfolio postings which, in essence, will be

reflective self-assessments with supporting evidence (assignments, extra-curricular activities etc).

In cases where evidence provided by students does not meet the specified outcomes, the mentor's role is to advise students on methods of acquiring the evidence and assisting students in those methods. The Mentors are also encouraged to liaise with other mentors and module administrators so that all necessary resources are available to students.

At the completion of mentoring a student (whether or not the student has successfully achieved the specified outcomes), as appropriate to produce a student status report which:

- assesses the student against the subject's outcomes,
- identifies any and all problems encountered by the student in the module, and
- in the event of an unsatisfactory outcome, contains recommendations for the student's progress.

In terms of workload, each mentor is expected to work with up to 5 students at any point in time, where each student might be in their 2nd, 3rd or 4th year of study. Contact hours per student are expected as follows:

- 30 to 60 minutes per semester per 2nd year student.
- 45 to 90 minutes per semester per 3rd year student.
- 1 to 2 hours per semester per 4th year student.
- Up to 2 to 4 hours of collaboration with other mentors and module administrators

E. Student Feedback

The grading system used is a simple binary (satisfactory/unsatisfactory). The assessments are based on published program outcomes (Table I) and will trigger constructive feedback and supportive counseling from mentors to students. Mentors will provide written feedback for the students and the faculty on students' progression in terms of the abilities on a semester basis. The ePortfolio is also expected to provide a grounding from which students can select their final year projects and industry placements.

IV. Implementation Results

The piloting of the subject, *Foundations of Professional Practice*, eventuated smoothly in Semester 1, 2013. A total of 39 students are enrolled in the BNC and BSE programmes. They were connected to 12 mentors from the industry. Mentors were selected from the existing relationship networks and believed to have the following characteristics:

- Local practicing ICT professional - SFIA level 5 (or above) in core skill areas.
- USP ICT programme alumnus (strongly preferred)
- Technical concentration matching the student group
- Membership of a Professional Society
- Strong, vibrant communicator
- Willing to donate time.

The students were briefed on their expectation in Week 3 and were assigned to their mentors. The assessment was conducted in Week 12 and 13 whereby the students met their mentors either face-to-face or via Skype sessions to share their progress and were evaluated on their progress. The mentors' recommendation was exchanged with the students with improvements expected in the coming semester.

A survey was also conducted on how the students perceived the ePortfolio as a tool to appreciate the knowledge and skills they were acquiring and contextualize understanding of the importance of reflective learning. All students in the two programmes attempted the survey. The questions were asked on a 5-point Likert scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree). The result is summarized in Table III.

TABLE III
STUDENTS PERCEPTIONS TOWARDS USE OF EPORTFOLIO

	Questions	Likert Scale Ranks				
		SA	A	N	D	SD
1	EPortfolio helps me develop my technical skills	28%	55%	9%	3%	5%
2	I would use an ePortfolio to help me better understand the linkage of courses	21%	50%	18%	7%	4%
3	I would use an ePortfolio to guide my skills progression	28%	54%	9%	4%	4%
4	I use my ePortfolio to learn my weaknesses	23%	52%	16%	5	4%
5	I use the Mentor comments about my e-portfolio as constructive criticism	20%	52%	18%	6	4%
6	I would use an ePortfolio to validate and guide my knowledge development	21%	50%	18%	7%	4%
7	I plan to continue to enhance my ePortfolio for lifelong learning after graduation	28%	45%	19%	5%	5%
8	I think viewing my peers' ePortfolio would be a valuable learning experience	26%	54%	9%	6%	5%

SA = STRONGLY AGREE A = AGREE N=NEUTRAL
D = DISAGREE SD = STRONGLY DISAGREE

The results show that students have positively embraced ePortfolio as a tool for professional development and self-evaluation. They generally seem to be able to appreciate the importance of their specific courses and how it will eventually fit in the programme (more than 70% of the students). This understanding is fundamental for their self-reflection and

career planning. The feedback from the Mentors is also positively taken on-board by the students. Interestingly, close to 80% of the students suggested that it would be valuable to view their peer's portfolio, something which has been the underlying reason for using ePortfolios for this exercise.

V. CONCLUSION

The implementation of ePortfolio to document the learning process of students in the two new programmes at USP was described in this manuscript. The success of the framework, however, is yet to be seen in the years to come. However, the faculty is positive that the success will depend on the three key stakeholders (students, academics and employers) realising the value of the proposed approach. Using SFIA is anticipated to provide a sound platform for evaluating the programmes and their relevance to industry. Through external mentoring, it is provides a means to foster the academic-industry partnership and validating the relevance of the programmes. The ePortfolio is also expected to provide a grounding from which students can select their final year projects and industry placements.

Finally, the aggregation of the student artifacts and assessment feedbacks is hoped to supplement the full accreditation requirement of the two new programmes.

REFERENCES

[1] *Making Industry-university partnerships work: Lessons from successful Collaborations*, Science Business Innovation Board, 2012.

[2] Improving employment opportunities in Pacific Island developing Countries, Small Island Developing States Series, no. 1, 2007.

[3] J.E. Clark. and B. Eynon, "E- portfolios at 2.0 —Surveying the Field", Peer Review, vol.11, (1), 2009, pp.18-23.

[4] J. Chau and G. Cheng, "Towards understanding the potential of portfolios for independent learning: A qualitative study", Australasian Journal of Educational Technology, vol. 26 , pp 932-950, 2010.

[5] JISC, "Effective practice with e-portfolios: Supporting 21st century learning" [online], 2008, http://www.jisc.ac.uk/publications/publications/effectivepracticeeportfolios.aspx (acessed : 28 August, 2013)

[6] B. Cambridge, *Electronic portfolios: emerging practices in student, faculty, and Institutional learning*,Sterling, Virginia: Stylus, 2001.

[7] G. Lorenzo and J. Ittelson, "An overview of E-Portfolios". Educause Quarterly, 2005, pp.1-19.

[8] G. Hallam, W. Harper, C. McCowan, K. Hauvile, L. McAllister and T. Creagh, "*Australian ePortfolio project: Final report*",QUT publications, 2008.

[9] A. Jafari and C. Kaufman, *Handbook of Research on ePortfolios*. Hershey: Idea Group , 2006.

[10] L. Stefani, R. Mason and C. Peglar, *The educational potential of e-portfolios,* London: Routledge, 2007.

[11] S. Housego and N. Parker, "*Positioning ePortfolios in an integrated curriculum*", Education and Training, vol. 51, 2009, pp408-421.

[12] "Introducing SFIA" [online] 2013, http://www.sfia-online.org/ (Accessed: 20 August 2013).

[13] K. Zeichner and S. Wray, "The teaching portfolio in US teacher education programs: What we know and what we need to know", Teaching and Teacher Education, vol. 17, 2011, pp. 613-621.