1-1-2008

ACS Accreditation: What‟s in the name?

Grace Tan
Victoria University

Tan, G., Victoria University, Australia

ACS Accreditation: What's in the name?

Grace Tan

School of Computer Science & Mathematics
Victoria University, Australia
E-mail: Grace.Tan@vu.edu.au

ABSTRACT

In Australia, all higher education Information and Communications Technology (ICT) programs seek accreditation at the professional level with the Australian Computer Society (ACS). It acts as the basis for national and international benchmarking of ICT professional education. Additionally, meeting the requirements of an independent professional body is vital for onshore and offshore course marketing purposes, hence contributing towards the University's performance portfolio.

The overriding task of the ACS accreditation is to examine all aspects in the provision of a quality ICT education program designed to produce competent graduates. To this end, the ACS seeks evidence that comprehensively covers the three main aspects of accreditation assessment: the structure and content of curricula; the resources of the teaching and learning environments; and the quality assurance processes in place at the applying University.

This paper describes the recent ACS accreditation of Victoria University computing courses: the accreditation process, the preparation for the accreditation, the visit of the accreditation panel and their feedback. The paper reports on the local response and the process of addressing the panel recommendations which posed a number of local challenges. An insight into issues of importance in the execution of the recommendations is discussed as the ACS accreditation informs the framework for future course reviews.

INTRODUCTION

Acquiring a recognized professional body accreditation is pivotal for all quality, technically-based, academic programs. In particular, such endorsement is vital as a quality assurance measure for courses which have a major component of Information and Communications Technology (ICT) content. It acts as the basis of national and international benchmarking of ICT professional education and it shapes the curricula (Harman & Meek, 2000, p. 3; Collings et al., 2005). Internationally, these professional organizations include the Association for Computing Machinery (ACM), the Accreditation Board for Engineering and Technology (ABET), the Institute for Certification of Computing Professionals (ICCP) and the Institute of Electrical and Electronics Engineers (IEEE) (ACM, 2007; ABET, 2007; ICCP, 2007; IEEE, 2007).

In Australia, higher education is an important export industry, with large cohorts of offshore and onshore international students (Harman & Meek, 2000, p. 33). The endorsement of a professional accreditation ensures international credibility and it enhances the marketability of academic programs (ACS, 2003; Jones & Price, 2002; Tan & Venables, 2007; Ramakrishnan, 2007). The Australian Computer Society (ACS) is the professional body responsible for the assessment of all higher education ICT courses accreditation ensuring that their programs are of an 'industrial strength'.

Founded in 1966, the ACS provides the public voice of Australian ICT businesses and professionals. The association attracts membership from all sectors of business, industry, government and academia. Its objectives are 'to further the study, science and application of Information Technology; promote, develop and monitor competence in the practice of ICT by people and organisations; maintain and

promote a code of ethics for members of the Society; define and promote standards of knowledge of ICT for members, promote the formulation of effective policies on ICT and related matters; extend the knowledge and understanding of ICT in the community; promote the benefits of membership of the Society and promote the benefits of employing members of the Society' (ACS, 2007).

Through the key service of program accreditation for higher education courses, the ACS assesses the suitability of potential graduates as ICT professionals through the dissection of course content and structure, based on the criteria of outcome-based learning, along with examination of staff and educational resources. It also assesses the quality assurance processes of the applying institutions. The set of accreditation criteria is similar to that used by the Computing Accreditation Commission of the ABET for the accreditation of undergraduate computing programs in the United States (Crouch & Schwartzman, 2003).

ACS ACCREDITATION PROCESS

The standard lifespan of an ACS accreditation is five years and it may be granted by the society for one of two different grades of accreditation: the professional level for courses with a major IT focus, and the associate level for other IT related programs. A submission for ACS accreditation is initiated at the invitation of the applying university with the entire process expected to take at least six months. The key steps include completion of a suite of ACS documentation templates by the University, the assembling of an assessment panel by the ACS, followed by the panel's site visit and the eventual final report of the ACS recommendations and assessment.

The overriding task of the ACS accreditation is to examine all aspects in the provision of a quality ICT education program designed to produce competent graduates. To this end, evidence based documentation is required that comprehensively covers the three main aspects of accreditation assessment: the structure and content of curricula; the resources of the teaching and learning environments; and the quality assurance processes in place at the University. A site visit is also scheduled to support the validity of the furnished documentation.

The course structure and content for any program is examined against the Society's defined core body of knowledge (CBOK). It is important to note that the ACS view is 'The CBOK does not in itself constitute a curriculum it is more a scoping exercise of the disciplines involved in information and communications technology that should be considered in the establishment of a curriculum.' (ACS, 2003, p. 9). Broadly speaking the CBOK is based upon recommendations made by its American counterpart, the ACM. The CBOK comprises both generic and ICT specific skill sets, as detailed in Table 1.

Group 1- Generic	Group 2 – ICT Specific
Interpersonal Communications	Data Structures and Algorithms
	Program Design and Implementation
	Software Engineering and Methodologies
Ethics/Social Implications/Professional Practice	Information Security
	Conceptual Modelling
	Systems Analysis and Design
	Database Management
Project Management and Quality Principles	Computer Organization and Architecture
	Systems Software
	Data Communications and Networks
	Discrete Mathematics

Table 1: ACS Core Body of Knowledge (CBOK)

Examination of the teaching and learning environment focuses on the human and physical resources supporting the delivery of an ICT program. Details are needed for all academic and technical support

staff and they include staff qualifications, their experience and levels of expertise. Physical facilities such as laboratories, instructional resources and the provision of library resources also come under inspection.

Checks of quality assurance processes include examination of various University policies regarding student entry into the program, the teaching and learning strategies, student assessment and mandated core graduate attributes against the evidence of successful student outcomes and graduate profiles. Inspection is made of the mechanism of staff selection, staff performance development plan and the code of conduct. Of particular interest to the Society are any advisory mechanisms used to provide professional and industry input to the program design and its delivery.

THE PREPARATION

At Victoria University in Melbourne, Australia, the last ACS accreditation was undertaken in 2001 whereby 5 separate undergraduate and 5 postgraduate programs were evaluated and received their respective ACS level. Since that time, our offerings have been expanded to 15 different programs, 8 undergraduate and 7 postgraduate as listed in Table 2. All new and existing courses came due for accreditation in late 2006 and so an invitation was sent to the ACS initiating accreditation.

Title of Course	Level of Accreditation Sought
Undergraduate Programs	
Bachelor of Science in Computer Science	Professional
Bachelor of Science in Computer and Mathematical Sciences	Professional
Bachelor of Science in Internet Technologies and Applications	Professional
Bachelor of Science in Information Technology	Professional
Bachelor of Science in Computational Financial Mathematics	Associate
Bachelor of Science in Computer Science and Aviation	Associate
Honours Programs	
Bachelor of Science (Honours) in Computer Science	Professional
Bachelor of Science (Honours) in Computer and Mathematical Sciences	Associate
Postgraduate Programs	
Graduate Diploma in Multimedia Information Networking	Professional
Graduate Diploma in Software Engineering	Professional
Graduate Diploma in Computer Science	Professional
Graduate Diploma in Computer and Mathematical Sciences	Associate
Master of Science in Software Engineering	Professional
Master of Science in Computer Science	Professional
Master of Science in Computer and Mathematical Sciences	Associate

Table 2: A list of programs submitted for accreditation in 2006

Locally, the process commenced with a meeting of the key stakeholders inclusive of the head of school, course co-ordinator, year level co-ordinators, off shore program managers and the school advisory committee members to discuss the application requirements as outlined in the Guidelines (ACS, 2003). Initially, the head of school delegated the collection of various documents to describe the program under the broad headings of: descriptions of the course structure including contents of individual units of study offerings; staffing details, qualifications and experience; the provision of

support infrastructure such as technical facilities and library resources; and the quality assurance mechanisms in place.

Over the following months, several meetings were convened to examine the ongoing data collection and its veracity, to identify shortfalls in the collected information, to assign new collection tasks and to organise overall collation. The completion of the supporting documentation was an arduous task that relied upon a concerted team effort amongst academic staff and a process which has been widely reported to contribute undue anxiety (Crouch & Schwartzman, 2003; Yue, 2007). Collation involved the use of mandatory ACS templates to organise and format the collected information into two volumes totalling approximately 400 pages. Finally, the completed volumes were submitted to the ACS for examination prior to a mutually scheduled accreditation visit.

Prior to the accreditation visit, the ACS oversaw the appointment of panel members with the provision that the participating university may nominate one panel member. In our instance, five panel members were chosen, being the manager of the ACS, three interstate senior computing academics and one industry representative as nominated by our university. The applying university was responsible for all travel arrangements and accommodation for visiting panel members.

The ACS sent an itinerary of proposed meetings of the panel, alone, and together with members of the deanery and chancellery, senior school staff, teaching staff, students and graduates, as well as scheduled inspections of computing facilities, teaching spaces and library resources. Additionally, the University was expected to ensure a full coverage and representation of the various key groups at these meetings. The three main foci of assessment were each given approximately the same amount of time in the scheduled meetings for the day.

THE VISIT

In preparation, the panel convened on the evening before the site visit for a briefing session of several hours. A preview of the completed documentation was made which looked for evidence of coherency in three components of assessment against the documentation provided. They identified areas that were evidently satisfactory which did not require further action as well as issues of concern that would need additional information during the site visit.

The onsite visit went ahead as planned with each meeting lasting approximately one hour. The panel queried each attending group regarding their perspective of the course structure, program delivery and the local educational culture. Of interest was the alignment of units of study and course objectives and associated outcomes and coverage of the CBOK. As well, they asked about the provision of resources and the suitability of the support mechanisms within University along with the impact of University policies within the program.

The panel sampled an array of differing examination scripts across all year levels in an effort to assess the depth and the breadth of program offerings. A careful scrutiny of the capstone tasks of the final year industry projects were made, with staff and students being interviewed extensively about their quality and impact. A particular focus of the panel was on the system processes ensuring quality at all levels throughout the University. It encompassed internal course development and approvals, particularly those involving external advisory boards.

The Feedback

Feedback from the ACS panel came in two stages. An initial preliminary oral report was made to the Dean and senior staff of the School at the completion of the site visit. Some months later a draft comprehensive report was sent to the School. It encompassed all aspects of the assessment together with the final outcomes for each of the individual course accreditation applications. Then the School had the opportunity to comment or correct on matters of fact. The draft was returned to the convenor

for the final report preparation. The formal report was then approved by the ACS Board before it was forwarded to the University's Vice Chancellor.

Positive feedback was obtained from the ACS accreditation panel. This mentioned the quality of the final year capstone projects and their impact on student learning outcomes; in particular, ACS complimented the strengthening of alliances that had been made with industry partners. The ACS documented that students and graduates were very supportive of the capstone project subject and of the course as a whole. Particularly, students and graduates recognized the enthusiasm of the academic staff, their availability in assisting them as well as the quality of computing facilities and resources. The panel also commended the School's plans to embed contextual learning by aiming to provide 25% learning in the workplace within the program content. However, they cautioned the School that these plans should not weaken the intellectual rigor appropriate to a computing course. The ACS advised that the assessment practices would need to be aligned with the learning and teaching activities and the overall course objectives. The Panel were generally satisfied with the resources available on staffing and infrastructure in the delivery of the programs.

PANEL'S RECOMMENDATIONS

Further to the overall feedback, several specific recommendations from the Panel were made and are detailed below under the following headings: - Course Matters, Student Matters, Quality Assurance and Advisory Mechanisms.

Course Matters

The Panel deemed that while our undergraduate courses covered the breadth of the CBOK, more intellectual thoroughness was still needed, particularly in the second and third year of the undergraduate courses that were seeking accreditation at the professional level. This, however, was not a problem for the courses seeking accreditation at Associate level. Hence, the Panel recommended a benchmarking study to be undertaken with other universities ensuring that standards of our courses remain equivalent to those of other Australian universities.

Student Matters

In the meeting with students and graduates, the Panel observed that both students and graduates were articulate and supportive of the courses. However, they noted an absence of a total 'student experience' in that there was very little opportunity for students to meet besides in the classrooms. The Panel identified the lack of a student common room as a problem. There were limited opportunities for students to meet and interact which was further exacerbated by the fact that most students support themselves through work, and therefore have little spare time for extracurricular activities. The Panel recommended that the School take steps to provide the necessary facilities for fostering social networking of students and to also provide access to alumni for the current student cohort.

Quality Assurance

The Panel lauded the current framework of quality assurance policies that had been established in the University. In particular, the generic skills described in the Core Graduate Attributes (CGA) Policy at the University overlapped significantly with the desired ACS CBOK. The current CGA policy of Victoria University mandates that each exiting student can

- effectively problem solve in a range of settings, including professional practice;
- locate, evaluate, manage and use information effectively;
- communicates effectively as a professional and as a citizen;

- work both autonomously and collaboratively as a professional;
- work effectively in settings of social and cultural diversity (Miliszweska & Tan, 2004).

Paramount to the implementation of the local CGA policy is the understanding that assessment tasks should relate and develop these generic attributes. While commending the CGA policy, the ACS Panel noted that the subject descriptions should relate to the CGAs and that the students should be formally informed of the desirable graduate outcomes each time they undertake an assessment task.

Unlike the CGA policy, the ACS noted that not all policies had reached full development. For example, there was a formal process of student evaluation of teaching and units of study; the shortcoming being that there seemed to be no proper process to measure how these individual evaluations meet the course objectives as a whole. A similar lack of measurable performance indicators has been reported as problematic for like programs by Crouch and Schwartzman (2003). In our case, the panel strongly recommended that a strategic course management program be further developed and implemented. It should start with course objectives and technical knowledge requirements and examine how these will be achieved through the course curriculum. Identification of the measuring instruments for the evaluation of how the course objectives are met is part of this process.

Advisory Mechanisms

The Panel recognized the existence of an internal School Advisory Board (SAB) whose task was to provide internal academic advice and direction for both local and offshore courses. Additionally, the work of the SAB should be informed by input from an external Course Advisory Board which had only been recently formed. The Panel recommended that a meeting of the Course Advisory Board be scheduled as soon as possible to establish the quality and currency of the courses through professional and formal links with industry.

THE RESPONSE

Although the accreditation is not in itself a full review or audit of courses, it did help identify key areas that needed immediate attention and some forward planning. Responses to the ACS recommendations, needed to take into account the needs of different stakeholders, including the University, staff of the School, industry partners and students. Some issues for consideration in formulating our responses included:

- How does compliance with the ACS recommendations impact upon existing University policies and expectations? Are there any conflicts?
- When is a timely response to the ACS recommendations given they are not synchronized with standard University processes?
- What is the best way to benchmark our courses to ensure depth, breadth and the currency of programs?
- How would our responses maintain or enhance the educational outcomes of the course?
- What resources and infrastructures are available to develop appropriate responses?
- What will the overall impacts be upon the student cohort at all year levels? And how will our solutions enhance the ‘student experience’?
- How do we strengthen our alliances with industry partners?
- How do we strengthen our ties with alumni?
- How is it possible to measure course objectives and their outcomes?
- Is it possible to make use of existing mechanisms to measure course objectives and their outcomes?

With these questions in mind, the responses to the ACS recommendations are aligned under the same headings given in the panel's recommendations.

Course Matters

Since the University routinely conducts academic review of all course programs on a four year cycle, the feedback from the Panel would be useful in informing our impending course review. With the ACS recommendations in mind, we have been benchmarking the program with similar programs at other Australian institutions. In particular, we have taken on board the ACS suggestion that our programs be checked for depth of coverage of their CBOK. A detailed cross examination of all related units has been undertaken to identify shortfalls and possible topics for extension that need to be included. This is quite an onerous task where great attention to detail is needed to ensure seamless delivery of related units of study. Yue (2007) advocates a similar course-based assessment model as the course committee is responsible for all facets of learning assessment including evaluation of assessment tools.

Conflict with the University policy of 25% of learning in the workplace for any program structure had been flagged by the ACS as possibly being problematic. Their concerns regarding the depth of content within such a framework caution us to be extremely careful in how such a policy is implemented in our IT programs. As yet, the implementation of the policy can only take place during the impending course review.

Of course, any benchmarking study with other universities will require extensive resources and support. For example, the recent construction within the School of an Access Grid Room (AGR) has made it is possible to interact remotely, yet interactively, with other institutions against whom we wish to benchmark (ICE-EM, 2007). The facility has been funded by the Australian Government and it can be used for discussion, seminars, lectures and collaborative research. The AGR allows us the opportunity to offer our students a range of specialty units of study at other institutions, live and online, and vice versa. In particular, it can be used to share the teaching of the Honours programs students. It is expected to inspire students by demonstrating the diverse range of opportunities available to them.

Student Matters

Prior to the visit by the ACS Panel, important steps to improve the 'student experience' were already in the pipeline. Over time, we had identified the first semester experience as crucial to students' overall success in the computing course. A number of transition related problems seem to impact negatively on commencing students; this is especially true for female students as they are more likely to seek a social framework amongst their contemporaries (Miliszewska et al., 2006). The need for a peer mentoring program in the first semester programming unit prompted some faculty members to apply for a University Teaching and Learning Grant to support such a scheme.

Since the ACS Panel visit, the peer mentoring program has come to fruition. In the following semester, in addition to timetabled lectures, tutorials and laboratory classes, mentoring classes were offered in a designated laboratory, three days a week, at the same hour every day. As it was important that commencing students could identify with their mentors, the student mentors were carefully chosen from amongst the successful second year and third year students who had good interpersonal skills and were from differing backgrounds. The tasks for mentors were to provide 'friendly' professional feedback and support to new programming students.

At the time of the Panel visit, there already existed a dedicated room for final year computing students. This room was used as a special laboratory for students completing their capstone projects and, as such, it encouraged social interaction amongst this group. Staff had already identified the need for a

similar facility for both the first and second year students and rooms had already drafted for these in an upcoming facilities upgrade.

It has become a practice to invite recent past alumni to speak about their working experiences with students undertaking final year industry projects at several occasions throughout the academic year. At the end of the year, funded by a government grant, recent graduates conduct all useability testing of third year projects. This is a networking opportunity where alumni offer their professional critiques of students' work and students can gain valuable insights into current industry practice.

It is hoped that the above measures will foster a community spirit amongst the students by allowing them the resources, space and opportunities for social interaction with their classmates and recent alumni.

Quality Assurance

From the University, through to the Faculty of Health, Engineering and Science and down to the School of Computer Science and Mathematics, there exists a quality assurance framework that ensures annual, biennial and quadrennial reviews of academic programs. The ACS recommendations have focused our attention on finding a suitable measure for individual course outcomes at the School level. To this end, discussions have been undertaken to see if existing voluntary measures such as the current student evaluation of individual subjects and student evaluation of teaching can be made mandatory for all units of study. This way, analysis across units, programs and years can be made to identify trends and any shortcomings.

Advisory Mechanisms

Subsequent to the ACS Panel visit, the external Course Advisory Board has met to discuss the current position of our programs and possible future directions. Members of the Board included industry representatives, professorial academic staff from other institutions and our senior academics. All participated in lively exchange of information and advice and saw the meeting as being the first of series of ongoing communications amongst the group. The key role of the Board will be to advise upon the challenges faced by the School and guide future directions undertaken by the School.

CONCLUSIONS

ICT course content is under continual review and change due to the evolution of the discipline, the introduction of new technologies, the financial constraints resulting from see-sawing student numbers and the demands of industry accreditation boards (Gruba et al., 2004, Tan & Venables, 2007). Meanwhile, students expect their ICT programs to be professionally accredited with the ACS, so that upon graduation they are automatically eligible for membership with the body thereby enhancing their employability.

An ACS accreditation is a symbiosis between the organisation and the applying University; graduate membership adds new blood to the ACS and the acquisition of accreditation for any university enhances the overall reputation of their ICT programs. As such, the process is a scoping exercise, conducted in a cooperative manner; it can be considered as essentially a quality assurance framework for ICT courses and a major driver for program improvement.

From the University perspective, a commitment to providing quality IT education necessitates the acquisition of an ACS endorsement. However, satisfying the needs and expectation for all stakeholders is challenging, particularly when the appropriate responses are likely to impact upon course design and may need substantial funding. This has been the case at Victoria University where responses to ACS recommendations have refined the process for setting course objectives and

assessment methods; necessitated considerable academic review; called for further attention to policy implementations and financial support sought from the University and from government grants.

REFERENCES

ABET – The Accreditation Board for Engineering and Technology. (2007). Retrieved December 2007, from http://www.abet.org/

ACM – Association for Computing Machinery. (2007). Retrieved August 2007, from http://www.acm.org/

ACS – The Australian Computer Society. (2003). Accreditation of Courses at the Professional Level – Guidelines for Applicants. ISBN 0909925 64 X.

ACS – The Australian Computer Society. (2007). Retrieved September 2007, from http://www.acs.org.au/index.cfm?action=show&conID=aboutacs

Collings, P., Sharma, D., and Walker, D. (2005). IT education and the knowledge society: an Australian perspective. In Proceedings of Enabling Technologies for the New Knowledge Society: ITI 3rd International Conference , pp. 57-73. Retrieved from http://ieeexplore.ieee.org/iel5/10703/33793/01609615.pdf?tp=&isnumber=&arnumber=1609615

Crouch, D. and Schwartzman, L. (2003). Computer Science Accreditation: The Advantages of Being Different. In Proceedings of the 34th SIGSCE technical symposium on Computer Science education, pp. 36 -40.

Gruba, P., Moffat, A., Sondergaard, H., and Zobel, J. (2004) What Drives Curriculum Change? In Proceedings of Sixth Australasian Computing Education Conference (ACE2004), Dunedin, New Zealand. Conferences in Research and Practice in Information Technology, Vol. 30.

Harman, G. and Meek,V. (2000). Repositioning Quality Assurance and Accreditation in Australian Higher Education. Evaluations and Investigations Programme Higher Education Division, Department of Education, Training and Youth Affairs (DETYA).

ICCP – Institute for the Certification of Computing Professionals. (2007). Retrieved September 2007, from http://www.iccp.org/

ICE-EM Access Grid Rooms – International Centre of Excellence for Education in Mathematics. (2007). Retrieved September 2007, from http://www.ice-em.com.au/AGR/index.html

IEEE – Institute of Electrical and Electronic Engineers. (2007). Retrieved September 2007, from http://www.ieee.org/portal/site

Jones, L. G. and Price, A. L. (2002). Changes in Computer Science Accreditation. Communications of the ACM, 45(8), pp. 99-103.

Miliszewska, I. and Tan, G. (2004). "Realising Core Graduate Attributes in Computer Science through a CPR (Collaboration-Participation-Relevance) Approach to Teaching", in Proceedings of the HERDSA Conference, Miri, Malaysia.

Miliszewska, I., Venables, A., and Tan, G. (2006). Addressing Female Attrition in Computer Science Courses through Improved Personalisation of the Learning Environment. In Proceedings of the AusWIT Conference, 4-6 December 2006, Adelaide.

Ramakrishnan, S. (2007). Accreditation of Monash University Software Engineering (MUSE) Program, International Journal of Issues in Informing Science and Information Technology, Vol. 4, pp. 73-89.

Tan, G. and Venables, A. (2007). The impact of Australian legislation upon an IT degree: Considerations and response. In Proceedings of the 2007 Information Resources Management Association International Conference (IRMA). May 19-23, 2007. Vancouver, Canada, pp. 70-73.

Yue, K.B. (2007). Effective Course-Based Learning Outcome Assessment for ABET Accreditation of Computing Programs. Journal of Computing Sciences in Colleges, 22(4), pp. 252-259.