

Integrating Generic Skills into Disciplinary Curricula

Sitalakshmi Venkatraman, Fiona Wahr, Anthony de Souza-Daw, Samuel Kaspi

Abstract—There is a growing emphasis on generic skills in higher education to match the changing skill-set requirements of the labour market. However, researchers and policy makers have not arrived at a consensus on the generic skills that actually contribute towards workplace employability and performance that complement and/or underpin discipline-specific graduate attributes. In order to strengthen the qualifications framework, a range of ‘generic’ learning outcomes have been considered for students undergoing higher education programs and among them it is necessary to have the fundamental generic skills such as literacy and numeracy at a level appropriate to the qualification type. This warrants for curriculum design approaches to contextualise the form and scope of these fundamental generic skills for supporting both students’ learning engagement in the course, as well as the graduate attributes required for employability and to progress within their chosen profession. Little research is reported in integrating such generic skills into discipline-specific learning outcomes. This paper explores the literature of the generic skills required for graduates from the discipline of Information Technology (IT) in relation to an Australian higher education institution. The paper presents the rationale of a proposed Bachelor of IT curriculum designed to contextualize the learning of these generic skills within the students’ discipline studies.

Keywords—Curriculum, employability, generic skills, graduate attributes, higher education, information technology.

I. INTRODUCTION

THE higher education sector is expanding worldwide, and there has been a growing emphasis on generic skills that could benefit the employability for graduates [1]-[4]. The graduate competencies are generally divided into discipline-specific skills and generic skills [5]. Generic skills are considered to enable graduates to apply discipline-specific skills in different situations in an adaptive and innovative manner [6], [7]. In Australia, a range of generic learning outcomes that are not specific to a particular qualification type or program have been developed to strengthen the Australian Qualifications Framework (AQF) [8], [9]. The main objective of giving emphasis to such ‘generic’ skills is to equip graduates with the key transferable skills that may have application in their study, work and life contexts. The strengthened AQF has given consideration to a range of ‘generic’ learning outcomes that are not specific to a particular qualification type or education program. The AQF recognizes four broad categories of generic learning outcomes:

- Fundamental skills, such as literacy and numeracy

S. Venkatraman is with Melbourne Polytechnic, 77 St Georges Rd, Preston VIC 3072, Australia (phone: +61 3 9269 1171; fax: +61 3 9269 1484, e-mail: SitaVenkat@melbournepolytechnic.edu.au).

F. Wahr, A. de Souza-Daw, and S. Kaspi are with Melbourne Polytechnic, 77 St Georges Rd, Preston VIC 3072, Australia (e-mail: FionaWahr@melbournepolytechnic.edu.au, TonydeSouza-Daw@melbournepolytechnic.edu.au, SamKaspi@melbournepolytechnic.edu.au).

appropriate to the level and qualification type.

- People skills, such as working with others and communication skills.
- Thinking skills, such as learning to learn, decision making and problem solving.
- Personal skills, such as self direction and acting with integrity [9].

Complementing the academic and employability arguments, there is evident demand from business and employer organizations for graduates to possess generic skills that are required to demonstrate lifelong learning attributes in order to cope with the dynamic labour market [10], [5], and [11]. However, there is much debate on which skills actually foster employability [12], [4]. In general, the curriculum is designed with substantive field-based studies to achieve discipline-specific attributes within that particular profession [9]. The ALTC report provides the following general meaning associated with graduate outcomes:

“Graduate outcomes include knowledge outcomes and generic outcomes (generally referred to as graduate attributes). Often, these knowledge and generic outcomes are inseparable because generic outcomes are entwined with discipline knowledge and associated professional practice” [13].

After providing a comprehensive literature review both from Australian and international higher education contexts, the ALTC report concludes that the challenge is to have transparency in the curriculum for assuring the graduate attributes [13]. In Australia, the two curriculum-focused frameworks that address graduate capabilities are:

- The AQF, which covers all qualifications from the Senior Certificate to PhD; and,
- The General Capabilities adopted by ACARA.

The capabilities approach also provides useful guidance on how to approach the question of generic and discipline-specific skills by deploying them in context to have meaning:

“In the capabilities approach, the focus is on the development of the individual and on work, and consequently students need access to the knowledge, skills and capabilities they need to work in their vocational stream” [14].

There are concerns expressed about the variety of definitions employed and how the application of generic skills may differ among vocational streams [15]-[18]. Hence, in this paper, we address the growing recognition of context-dependency of generic skills in designing a revised curriculum for a Bachelors program.

II. LITERATURE REVIEW

There is evidence worldwide that more scrutiny is taking place on academic standards, in particular within the higher education sector [19]-[21]. Many academics believe there is a decline in academic standards and poor English language skills among international students [22]-[24]. Since higher education is predominantly decentralised, there is a need to assess the trends in academic standards and how they compare across various institutions. In 2008, the Australian Government launched a major review to reshape Australia's higher education system in order to be internationally competitive [25]. The Bradley Review of Higher Education argued that:

“Australia must enhance its capacity to demonstrate outcomes and standards in higher education if it is to remain internationally competitive and implement a demand-driven funding model” [25].

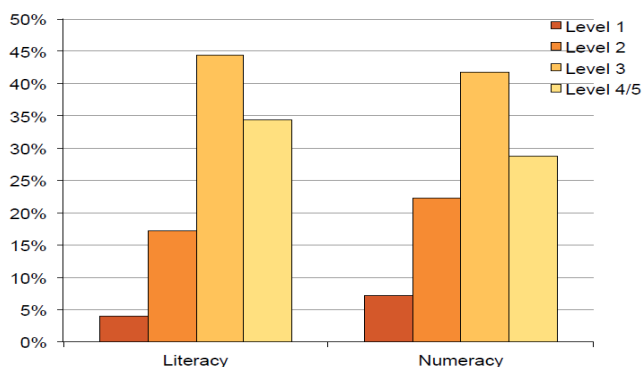


Fig. 1 Australian graduate literacy and numeracy levels [20]

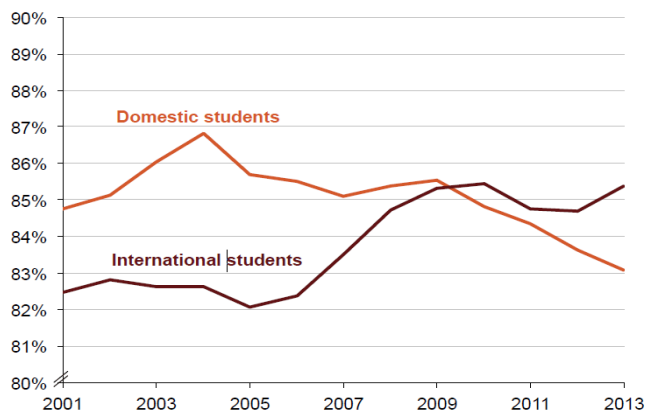


Fig. 2 Pass rates for domestic and international students [27]

The Organisation for Economic Co-operation and Development (OECD) conducted a project on Assessment of Higher Education Learning Outcomes (AHELO) to provide comparable international test results of generic skills along with some specific tests for engineering and economics students [26]. The study involved graduates from various countries including Australia and the scores were summarized on a scale of 5, with 1 being the lowest. Among the generic

skills, literacy and numeracy skills achieved by graduates in Australian were compared. Fig. 1 shows that most graduates achieved level 3 or above in literacy and numeracy skills, with substantial minorities of graduates scoring lower levels. The discipline pass rates of domestic and international students were compared. As shown in Fig. 2, the trend in the past decade indicate that the international students have improved more recently, gaining a higher subject pass rate than domestic students. This could possibly be due to recent enforcement of higher English language requirements for incoming international students. However, it was concluded that not all higher education institutions ensure graduates to have these generic skills. When there is more intake of students, institutions reduce the entry requirements, leaving it to the respective discipline to ensure the standards of these generic skills are achieved by the weaker students. Hence, the development of generic skills as a component of the curricular activity is necessary.

The current literature indicates that there is a strong link between generic attributes and employability, as well as employee performance [11], [27]. The results of a recent survey show that graduates were unable to commence their chosen career due to a deficit in generic skills rather than discipline-specific skills [18]. Hence, in this competitive employment landscape, higher education institutions are redesigning their curricula to assist students to maximize the generic attributes.

III. PROPOSED CURRICULUM

As part of the new Australian Quality Framework, in order to be successful in the workplace, it is envisaged that graduates acquire generic skills that enable them to fully utilise their discipline-specific knowledge and technical capabilities. According to the Business Council of Australia:

“Generic skills including communication, teamwork, problem solving, critical thinking, technology and organisational skills have become increasingly important in all workplaces.” [28]

In addition, based on the recent survey conducted, one of the main concerns related to the need to develop generic skills alongside disciplinary knowledge [18]. With these findings from background literature as input, a revised Bachelor of Information Technology (BIT) curriculum has been proposed in Melbourne Polytechnic. We ensured that BIT offered subjects that covered the breadth and depth areas included in the Australian Government's Protection's Skilled Occupation List and the recent trends in big data and analytics to underpin the digital economy [29]. Similarly, the 2014 Graduate Outlook refers to employment demand for people qualified in areas that are covered by the course [30]. Further, the Victorian Government has reported a current skills gap in Victorian industries in computing and information technology skills and the Australian Computer Society has analysed the digital skills, jobs and education in the country.

“Higher education institutions promoting the strength and diversity of ICT-related study and career paths to students, with the aim of increasing the future pipeline of

ICT graduates, as well as developing more interdisciplinary opportunities between ICT and other subject area” [31].

In order to cater to all the above generic skills gap, four subjects have been introduced as common core subjects to instil generic skills in the first year of the proposed curriculum. These subjects are designed to equip students with generic skills across different disciplines, such as IT, Business, Accounting and Hospitality within each of their respective Bachelors programs. The common core subjects will assist students to develop the academic and learning skills which will support them throughout the course and for their future career. These common subjects are:

1. Effective Business Enquiry and Communication (EBEC),
2. Essential Business Mathematics and Statistics (EBMS),
3. Foundations of Information Technology (FIT), and
4. Foundations of Business (FB).

Through the first subject (Effective Business Enquiry and Communication), the students would gain sufficient academic literacy skills as required in the enhanced AQF. This subject provides an introduction to the principles of academic and business enquiry relevant to the discipline area (e.g., Information Technology, Business, etc.). This subject includes the development of academic and literacy skills needed to undertake higher education studies with an emphasis on investigations, literacy and presenting information. Students also learn people-related skills such as team work, and personal skills such as academic integrity that are context-dependant relating to the students' chosen field of study, namely Information Technology. For e.g., learning and assessment activities for IT students would include reviewing IT industry white papers and journal articles, using IT code of ethics and integrity, as well as oral and written presentations that are necessary for the IT industry.

The second subject (Essential Business Mathematics and Statistics) covers fundamental mathematical and statistical techniques to adequately address business issues and decisions. The mathematics covered in the subject is closely applied to business settings and issues, and provides the foundational numeracy skills needed for the course. Students will be able to apply these basic and fundamental numeracy skills for problem solving as required in other subjects of their chosen discipline program (for example, using statistics for data analytics in other subjects of the BIT degree program).

The third subject (Foundations of Information Technology) serves the purpose of meeting the industry demands for all disciplines to include computing and IT skills in the rising digital economy. This subject introduces the field of information and communication technology (ICT) and its role within a business context, how information technology (IT) supports business productivity with database systems and software applications, as well as the common terms and concepts related to the ICT community and the business world. This subject also introduces global IT work solutions and considers the implications of these in reshaping various organisations.

Finally, the fourth subject (Foundations of Business) exposes the students to the business world through case studies and role play. This subject provides an introduction to the key management concepts and core business practices. It covers the major functional areas of business, including management, marketing, accounting, finance, economics, and information technology of today's competitive business world. In addition, it introduces other important concepts such as ethics and social responsibility, forms of ownership, small business and entrepreneurship, and international business, as well as, latest trends in economy, social networking, competition in the global marketplace, and the green movement. In addition, responding to the continued calls from industry that graduates of the course will be 'work ready', the renewed course includes improvement to final year capstone subjects that are industry-based projects. This consists of one capstone subject in each semester of third year. The proposed capstone experience will provide students with the opportunity to:

- Integrate their discipline-based knowledge;
- consolidate key skills required for professional activity;
- apply knowledge in an authentic project-based or simulated activity;
- reflect on their actions and experiences;
- develop a professional identity; and,
- plan for future further learning or work opportunities

Active learning principles, which are important for developing a knowledgeable and practical IT professional, are used in the delivery of these subjects. A range of learning approaches is used in conjunction with the overall curriculum design to develop the desired attributes in students. These include:

- Self-directed learning programs that model work in practices covering different disciplines based on the student's field of study.
- Role play for students to practice and refine skills.
- Debate to explore controversial issues and research, develop argumentation skills and identify assumptions.
- Case studies which provide structured exploration of important concepts and their application.
- Simulations in which students are able to develop skills and apply knowledge to realistic but controlled situations in their own field of study.
- Problem-based learning where students apply their knowledge and skills to address a defined problem.
- Work-based learning approaches where students observe and apply what they are learning in their course into their workplace.
- Project-based learning where students combine knowledge and skills to complete an assigned task.
- Applied research skill development and scholarly practice.

IV. BENCHMARKING

An important aspect of the quality and benchmarking of a degree program is the graduate employment, which forms a

main objective of completing a higher education qualification. Despite understanding the employer perceptions of the readiness of graduates to enter the workplace and the existence of graduate attribute statements, studies have indicated that many graduates are not optimally work ready [32]. Hence, much research and data collection have emphasised on employability skills that relate to graduate attributes. However, there is little consensus on which graduate skills actually fosters employability. Some employers perceive that graduates are poorly prepared for teamwork, while some report other gaps in graduate skills for employability [33], [34]. The Department of Education (DoE) and the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCS RTE) commissioned a national survey of employer satisfaction with graduate attributes [11]. There has been a growing recognition of context-dependency and that employability skills cannot be demonstrated without understanding the context in which the skills are being used [12], [23]. The Core Skills for Work (CSfW) framework detailed a set of non-technical skills in tandem with language, literacy and numeracy skills, as well as technical or discipline specific skills that contribute towards work performance, as shown in Fig 3.

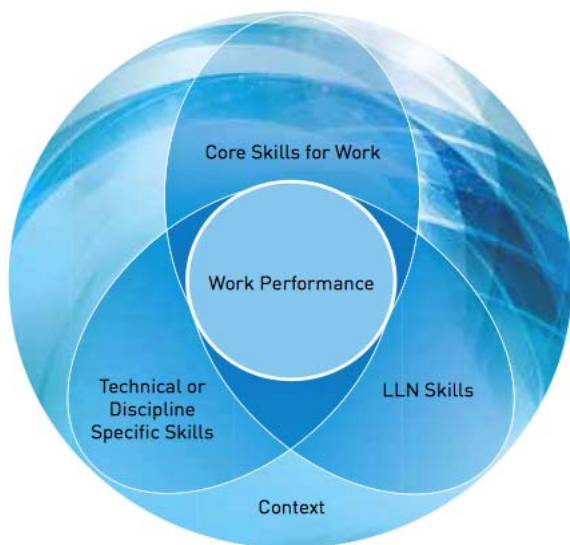


Fig. 3 Employability skills under CSfW framework [11]

The Employability Skills Framework [17] has listed eight employability skills as follows:

- Communication skills
- Teamwork skills
- Problem-solving skills
- Self-management skills
- Planning and organising skills
- Technology skills
- Lifelong learning skills
- Initiative and enterprise skills

This shows that the employability skills have many commonalities with the university-defined graduate attributes [21].

A comprehensive literature review [13] reported the findings of Australian and international research regarding graduate attributes as follows:

- *knowledge learning outcomes* include graduate course learning outcomes in accordance with course accreditation and in some instances, external accreditation requirements;
- *threshold standards* defined as “the minimum learning outcomes a graduate must achieve including discipline-specific knowledge, discipline-specific skills including generic skills as applied in the discipline and discipline-specific capabilities”; and,
- *generic graduate attributes* have increasingly been explored and articulated, in addition to discipline-specific knowledge.

The employability skills and graduate attributes are a significant subset of the broad set of generic skills [35]-[37]. In order to ensure that the proposed curriculum prepares the students to be internationally competitive, we followed the list of generic skills identified by National Centre for Vocational Education Research (NCVER) across several countries with common ‘elements’ as follows:

- Basic fundamental skills, e.g. literacy etc.
- People-related skills, e.g. teamwork etc.
- Conceptual thinking skills e.g. problem-solving etc.
- Personal skills e.g., acts with integrity etc.
- Skills related to the business world, e.g. enterprising etc.
- Skills related to the community, e.g. citizenship etc.

We can easily map these six sets of generic skills onto four broad-category conceptualisation of generic skills specified under AQF policy and with our common subjects based on the curriculum's learning activities as follows:

- basic fundamental skills (EBEC, EBMC, FIT)
- people skills (EBEC, FB)
- thinking skills (EBEC, EBMC, FIT, FB)
- personal world view skills (EBEC, FIT, FB)

Overall, it is evident that the BIT course has been redesigned to cater to the fast evolving technologies in the field of IT and the needs of the business world. The course curriculum renewal process has engaged with industry and academic discipline experts, through the Advisory Reference Group (ARG), in order to elicit and incorporate current and future directions in the industry. The proposed course changes have also been made in response to the accreditation requirements of the industry's key professional body, namely, the Australian Computer Society (ACS).

V. CONCLUSION

The recent focus on generic skills as a contributory factor to employability and work performance has motivated higher education institutions to make reforms in the curriculum design. This paper explored the current literature and reported that there is little consensus on a single set of skills for employability, since both generic as well as discipline-specific skills play important roles. However, based on the industry demand and the discipline context and qualification standards

reported in Australian higher education, a common set of generic skills have evolved to meet the industry needs of the current digital and fast changing economy. The discussion presented in this paper demonstrates how to integrate these generic skills in a discipline-specific curriculum design by introducing common subjects across several disciplines offered by a higher education institution in Australia. Future work is to evaluate the effectiveness of the curriculum change with respect to generic skill achievement using appropriate measures and student and academic feedback mechanisms.

ACKNOWLEDGMENT

The authors wish to thank the VET Development Centre for providing the research fellowship grant to conduct this ongoing project. The project team comprises of Dr. Fiona Wahr, Ms. Christine Tully, Dr. Samuel Kaspi and Dr. Sitalakshmi Venkatraman. Other active contributors to this project are Dr. Anthony de Souza-Daw, Ms. Georgina Bourke, Ms. Koula Lykourinos and Ms. Maggie Iovannella.

REFERENCES

- [1] H. Schomburg and U. Teichler, "Employability and Mobility of Bachelor Graduates in Europe". Key Results of the Bologna Process. Sense Publishers, Rotterdam / Boston / Taipei. 2011.
- [2] M.S. Velasco, "More than just good grades: candidates' perceptions about the skills and attributes employers seek in new graduates", *Journal of Business Economics and Management*, vol. 13, pp. 499–517, 2012.
- [3] Australian Graduate Survey (AGS), "Graduate Careers Australia", 2013.
- [4] F. Suleman, "Employability skills of higher education graduates: Little consensus on a much-discussed subject", *2nd International Conference on Higher Education Advances*, HEAd'16, 21-23 June 2016, València, Spain, *Procedia - Social and Behavioral Sciences*, vol. 228, pp. 169 – 174, 2016.
- [5] N. Detsimas, V. Coffey, Z. Sadiqi and L. Mei, "Workplace training and generic and technical skill development in the Australian construction industry". *Journal of Management Development*, vol. 35, no. 4, pp. 486-504. 2016.
- [6] S. Barrie, C. Hughes, G. Crisp and A. Bennison, "Assessing and assuring Australian graduate learning outcomes: principles and practices within and across disciplines". 2012.
- [7] S. Arkoudis, "Integrating English Language communication Skills into Disciplinary Curricula: Options and Strategies". Sydney: Office of Learning and Teaching, Department of Education. 2014.
- [8] ACARA, "General Capabilities in the Australian Curriculum", 2013.
- [9] AQF Council, "Australian Qualifications Framework Second Edition January", 2013.
- [10] M. Humburg and R. van der Velden, "Skills and the graduate recruitment process: Evidence from two discrete choice experiments". *Economics of Education Review*, vol. 49, pp. 24–41, 2015.
- [11] DIICCSRTE and DEEWR, "Core Skills for Work Developmental Framework: The Framework". 2013.
- [12] A. Tymon, "The student perspective on employability". *Studies in Higher Education*, vol. 38, pp. 841–856. 2013.
- [13] Australian Learning and Teaching Council, "Learning and Teaching Academic Standards Progress Report". 2010. Sydney: ALTC.
- [14] L. Wheelahan, G. Moodie and J. Buchanan, "Revitalising the 'vocational' in flows of learning and labour", Adelaide: National Centre for Vocational Education, 2012.
- [15] DIISRTE, "Assessment of Generic Skills", Discussion Paper. Canberra: DIISRTE. 2011.
- [16] K.L. Krause, S. Barrie, and G. Scott, "Mapping Learning and Teaching Standards in Australian Higher Education: An Issues and Options Paper". 2012.
- [17] K. Bowman, "Background paper for the AQF Council on generic skills", Reviews of the AQF, Australian Qualifications Framework Resources, Australia. 2010.
- [18] D. Bennett, S. Richardson and P. MacKinnon, "Enacting strategies for graduate employability: How universities can best support students to develop generic skill", Part A Report. Canberra, ACT: Australian Government, Office for Learning and Teaching, Department of Education and Training, 2016.
- [19] D. Kemp, and A. Norton, "Review of the demand driven system: final report", Department of Education, 2014.
- [20] ABS, "Programme for the International Assessment of Adult Competences", Australia, 2011-12, Cat. 4228.0, Australian Bureau of Statistics, 2013.
- [21] Precision Consulting, "Graduate employability skills: An examination of the development, teaching, assessment and reporting of graduate employability skills in the higher education sector", Canberra, DEST, 2007.
- [22] A. J. Harris and J. Ashton, "Embedding and integrating language and academic skills: An innovative approach". *Journal of Academic Language and Learning*, vol. 5, No. 2, pp. 73-87, 2011.
- [23] F. Zhang, B. Lidbury, J. Schulte, A. Bridgeman, B. Yates and J. Rodger, "A cross disciplinary approach to language support for first year students in the science disciplines". Final Report, Sydney: Office for Learning and Teaching, 2011.
- [24] G. Anderson and S. Timbs, "Assessing and developing English Language Proficiency: A pilot project at Curtin University Sydney". *Proceedings of the 25th Annual Teaching Learning Forum*, 28-29 January 2016. Perth: Curtin University.
- [25] DEEWR, "Assessment of Generic Skills". Canberra: DEEWR, 2011.
- [26] K. Tremblay, D. Lalancette and D. Roseveare, "Assessment of higher education learning outcomes: Feasibility study report, volume 1 design and implementation", OECD, 2012.
- [27] Department of Education, "Students: Selected higher education statistics 2013", Department of Education, 2014.
- [28] Business Council of Australia (BCA), "Lifting the Quality of Teaching and Learning in Higher Education". Melbourne: Business Council of Australia, 2011
- [29] ACS, "Skilled Occupations List Submission", Australian Computer Society, 2015.
- [30] GCA, "2013 Graduate Outlook Survey", Graduate Careers Australia, 2014.
- [31] ACS, "Australia's Digital Pulse", Australian Computer Society, Deloitte Access Economics, 2015.
- [32] M. Fullan and G. Scott, "Education plus, new pedagogies for deep learning". Washington: Collaborative Impact SPC. 2014.
- [33] Ithaca Group, "Employability Skills Framework Stage 1 Final Report", Department of Education, Employment and Workplace Relations. 2012.
- [34] H. Coates and D. Edwards, "The 2008 Graduate Pathways Survey: Graduate education and employment outcomes five years after completion of a bachelor degree at an Australian university", Australian Council for Educational Research, 2009.
- [35] E. Bexley, R. James and S. Arkoudis, "The Australian academic profession in transition", Centre for the Study of Higher Education, The University of Melbourne, 2011.
- [36] A. Radloff, H. Coates, R. Taylor, R. James and K.L. Krause, "University Experience Survey", National Report. Canberra: DIISRTE, 2012.
- [37] DEEWR, "Review of Australian Higher Education Final Report", The Bradley Review Report, Canberra: DEEWR, 2008.