The Journal of Teaching and Learning for Graduate Employability

ISSN: 1838-3815 (online) Journal Homepage: https://ojs.deakin.edu.au/index.php/jtlge/

Exploring the use of self-assessment to facilitate health students' generic skills development

Mahbub Sarkar[1], Simone Gibson[1], Nazmul Karim[1], Dakota Rhys-Jones[1] and Dragan Ilic[1]

Corresponding author: Mahbub Sarkar (mahbub.sarkar@monash.edu)
[1]Monash University, Australia

Abstract

Employability skills for health graduates, and many disciplines within higher education, are considered vital to maximising their capacity to cope with the rapidly changing, uncertain and highly competitive labour market. Despite the increasing importance of developing generic skills for employability, there is a dearth of knowledge about how to support health students to develop generic skills as part of their formal education. The main objective of this two-phase study was to engage health students in the process of self-assessment of their generic skills and explore the potential of this process to facilitate their generic skills development. The first phase of this study engaged students in completing a self- assessment questionnaire, incorporating a validated set of industry-demanded skills with associated behaviours. In the second phase a subsection of respondents participated in focus group interviews that explored their perception of the self-assessment process in generic skills development. Students viewed themselves as having some capabilities to perform the generic skills, as well as their university studies contributing to the development of these skills. The qualitative data found that the self-assessment process prompted students to reflect on their abilities and further engage with developing these skills. This study supports the evidence for contextualising and embedding a process of self-assessment of generic skills into the formal curricula to help better prepare health students for their future work.

Keywords: generic skills, self-assessment, employability, health education, work readiness

Introduction

The labour market has undergone substantial changes due to technological advancement and globalisation. Technological advancement has created new opportunities and redefined existing roles. This has challenged graduates to recognise and adapt to frequently changing career opportunities and distinguish themselves from other competitors in this globalised world (Evans-Greenwood, O'Leary, & Williams, 2015; Oliver, 2015). Aligning with this trend, employment sectors for health graduates have also gone through significant changes as a result of advances in medical science, healthcare and financial reforms, and globalisation (Biesma et al., 2008). Employability for health graduates, like other disciplines, has therefore been considered a vital agenda to maximise their capacity to cope with this rapidly changing, uncertain and highly competitive labour market (Biesma et al., 2008; Messum, Wilkes, Jackson, & Peters, 2016; Murdoch-Eaton & Whittle, 2011).

Drawing on Yorke's (2006) widely-accepted notion of employability, employability skills are those that graduates require in order to obtain employment, maintain it and progress successfully in their career. As Bridgstock (2009) outlined, employability skills comprise a combination of generic skills, discipline-specific skills and career management skills. Generic skills, also termed as 'transferable skills', 'core skills', 'soft skills', 'key competencies' (Mayer, 1992), are the key skills and capabilities transferable to a wide range of tasks and contexts beyond the education setting (Gilbert, Balatti, Turner, & Whitehouse, 2004; Hinchliffe, 2006). Such skills include communication, collaboration, problem-solving, critical thinking, initiative and enterprise. Given the global call for promoting graduate employability (Boden & Nedeva, 2010), generic skills have been an area of increasing focus for development and implementation within the higher education sector over the last two decades.

The importance of generic skills for graduate employability is generally well-reported in the literature—including perspectives of policymakers (Dodd, 2016), employers (Lowden, Hall, Elliot, & Lewin, 2011) and graduates (Sarkar, Overton, Thompson, & Rayner, 2016). Future labour markets, in the advances in Artificial Intelligence and automation will still require many generic skills that are difficult to automate, for example, creative and critical thinking, communication, leadership, professionalism, and abstract problem-solving (Acemoglu & Restrepo, 2018). In health education, the importance of generic skills has been explored in both professional health courses, such as medicine (Murdoch-Eaton et al., 2012; Rimmer, 2015) and dietetics (Matters, 2004), and non-professional health courses, such as health sciences (Biesma, Pavlova, van Merode, & Groot, 2007). The employability of graduates of health sciences and other science degrees is uncertain as there is no specific profession post-graduation (Choate et al., 2016; Palermo et al., 2019); instead, health science graduates may have to explore less structured career pathways for which generic skills are essential. For example, employers in Europe valued generic skills relatively higher than discipline-specific competencies while recruiting public health graduates (Biesma et al., 2008). Similarly in Australia, the increasing importance of generic skills was perceived by both employers and graduates in the health services management sector (Messum, Wilkes, & Jackson, 2015; Messum et al., 2016). From the learning perspective, promoting generic skills has been considered an essential factor for meeting the learning needs of diverse student cohorts who come from the globalised world and will work within an equally diverse, dynamic and globalised health care system (Frenk et al., 2010).

Given the vital importance of generic skills for graduate employability and learning, higher education institutions have taken initiatives to identify ways of incorporating these skills in higher education curricula. These responses include embedding work-integrated learning (Jackson & Wilton, 2016; Rowe & Zegwaard, 2017) and developing independent study units and programs focusing on key generic skills (Jackson, 2014; Sarkar et al., 2017). Despite widespread initiatives in higher education, gaps between employer satisfaction and graduate performance in the workplace persist, with employers criticising the ability of graduates to contribute effectively to the workplace primarily for their limited capacity to demonstrate a range of generic skills (Lowden et al., 2011; Prinsley & Baranyai, 2015).

As employability comprises a process of learning for life, many graduates may lack a well-developed set of skills required by their potential employers (Sarkar, Overton, Thompson, & Rayner, 2020). To enhance generic skill development, students need to be aware of their strengths and limitations, and able to reflect with an attitude towards continue learning and progressing these skills (Hill, Overton, & Thompson, 2019; Hinchliffe, 2006). A self-assessment tool and mapping development against the skills is an approach to generate student self-awareness (Marais & Perkins, 2012). Self-assessment, also termed as 'self-rating', 'self-audit', 'self-report', and 'self-perception', refers to a method for the evaluation of personal attributes and abilities against perceived norms (Colthart et al., 2008). The process of self-assessment engages students in evaluating and monitoring their own capacity to perform the generic skills, enhancing their awareness of individual strengths and any developmental needs, providing stimulus to take appropriate action to address the needs (Jackson, 2014). Continual monitoring of, and reflecting on, their own performance of generic skills may help students to take responsibility for their own skill development as well as developing their ability to transfer these skills

in education and future careers (Murdoch-Eaton & Whittle, 2011). Self-assessment, therefore, engages students in a process of structured reflection which may contribute to improving their thinking and action capabilities (Moon, 2006). This notion aligns with the need for developing a propensity for lifelong learning (Hinchliffe, 2006), which is critically important in the rapidly changing world of work and therefore potentially impacts on student experience and outcomes (Murdoch-Eaton & Whittle, 2011).

Despite the increasing importance of developing generic skills in health education, there is a dearth of knowledge about how to support health students to develop generic skills as part of their formal education. The key objective of this study is to engage health students in the process of self-assessment of their generic skills using a self-assessment tool and explore the potential of this process to facilitate their generic skills development. This paper, specifically, discusses how health students:

a) self-assess their ability to perform targeted generic skills and view the development of these skills in their university study, and

b) perceive any value of the process of self-assessment to complement and enhance their generic skills development.

While reliability of self-assessment can be questioned (Eva & Regehr, 2007), aligning with previous research (e.g. Pop & Khampirat, 2019), this study uses self-assessment with an aim to generate student reflection upon their own competence that supports them in identifying both strengths and areas for further development. The study then focuses on evaluating the effectiveness of self-assessment from student perspectives.

Research design and methods

This study was underpinned by pragmatism (Leech & Onwuegbuzie, 2009), and a two-phase design was adopted to utilise the power of quantitative and qualitative methods for different research questions within a research study (Creswell & Plano Clark, 2018; Leech & Onwuegbuzie, 2009). Phase 1 addressed the first research question employing quantitative methods, while the second question was explored qualitatively in the second phase. In the first phase, students across a range of health-related degrees completed a self-assessment questionnaire focused on a set of generic skills. Participating students were provided with a copy of their responses and encouraged to retain the copy so that they could reflect on it at a later stage of their degree and discern any changes and developmental needs in these skills. This process was designed to prompt students to self-reflect on their capabilities and further engage with developing these skills. In the second phase, a subsection of respondents participated in focus group interviews that explored their perception of the self-assessment process in generic skills development.

This research was approved by the Human Research Ethics Committee of Monash University (number 17138).

Participants

Students studying undergraduate and postgraduate courses at different year levels in public health, health science, nutrition science, and dietetics courses at, Monash University in Australia, participated in this study. Students in these disciplines were invited using an announcement on the learning management system (Moodle) and during their lecture/tutorial to complete the self-assessment questionnaire online, via Qualtrics.

A total of 202 participants out of 221 who opened the Qualtrics link voluntarily completed the questionnaire (completion rate 91%). Participants' median age was 20 years (IQR 19–23). The majority of the participants were female (87.1%), local/domestic students (79.2%) studying undergraduate courses (77.7%), engaged in part-time paid employment (59.4%), and English as their first language (70.8%). Of the 202 participants, 68 (33.7%) represented the discipline of health science, whereas 54

(26.7%), 53 (26.2%) and 27 (13.4%) students came from the disciplines of nutrition science, public health and dietetics respectively.

The questionnaire respondents who voluntarily provided their contact were invited via email to participate in the focus group interviews. Given the similarities between disciplines and convenience to conduct interviews, we formed groups considering two categories. One category comprises students from public health and health science courses, whereas the other one includes nutrition science and dietetics courses. Four group interviews were conducted—two from each of the categories—with a total of 22 participants (>10% of the questionnaire respondents).

Phase 1: Self-assessment questionnaire

The self-assessment questionnaire incorporated a validated framework of an industry-demanded skills set comprising ten skills and 40 associated behaviours (Jackson & Chapman, 2011). Table 1 presents the target skills set and the number of behavioural items associated with each of the skill.

Table 1: The Target Skills Set and Number of Behavioural Items for each Skill

Skill	Number of behavioural items
Working effectively with others	6
Communicating effectively	5
Self-awareness	3
Thinking critically	2
Analysing data and using technology	3
Problem-solving	3
Developing initiative and enterprise	4
Self-management	4
Social responsibility and accountability	4
Professionalism	6

Figure 1 shows an example of the set of behaviours associated with the skill 'working effectively with others', as provided in the questionnaire.

- Complete group tasks through collaborative communication, problem-solving, discussion and planning
- Operate within, and contribute to, a respectful, supportive and cooperative group climate
- Acknowledge the complex emotions and viewpoints of others and respond sensitively and appropriately
- Work productively with people from diverse cultures, races, ages, gender, religions and lifestyles
- Defend and assert your rights, interests and needs and convince others of the validity of your point of view
- Address and resolve contentious issues with key stakeholders

Figure 1: Behaviours Associated with the Skill 'Working Effectively with Others'

Given that students often struggle to articulate generic skills (Hill et al., 2018), a description of behaviours constituted to a particular skill may help students to build an awareness of what behaviours are expected from them to demonstrate their capability to perform the skill.

While the framework of the industry-demanded skills set used in our study was used previously in the context of business education, the skills are generic in nature and are expected from any graduates irrespective of their discipline. Denise Jackson, a developer of this framework, affirmed the potential applicability of this framework in the context of health education due to its generic nature (personal

communication, May 14, 2018). Also, the skills targeted in this framework are aligned with the health graduate capabilities at Monash University, characterising health graduates as collaborative team-workers, effective communicators, committed to lifelong learning, able to generate evidence-based practice and being professional. Cronbach's alpha values for the target skills set ranged between .832 and .901, confirming the internal consistency of the items (DeVellis, 2012).

To answer the first research question, students were asked to assess (a) their current capabilities in performing each of the behaviours and (b) how well these behaviours are developed in their university study. A scale, ranging from zero to 10, was used in self-assessment because of its benefits of increased sensitivity and closer to interval level of scaling and normality (Leung, 2011). For the capability question, a rating of zero equated to students considered themselves unable to perform the behaviour and 10 was defined as being an expert and able to teach others. For the development question, a rating of zero was defined as no development at all and 10 identified as developed very well.

Analysis of self-assessment (quantitative) data

SPSS (version 25) was used for statistical analysis of the data. After screening and cleaning of the data, descriptive statistics were generated to report participants' demographic characteristics (e.g. age, gender, year of study, degree type and discipline). Based on students' responses to the skill-associated behaviours, two mean scores were calculated for each of the skills—one score demonstrates their overall capacity to perform the skill, and the other reflects their development of this skill in the study. For each skill, the minimum and maximum mean ratings were zero and 10, respectively, for both capability and development. Mean scores for each of the skills were compared across study disciplines using ANOVA. The relationship between students' perceived development of their targeted skills in the university study and perceived capability to perform those skills was first analysed using Pearson correlation coefficient, and then examined using multivariable linear regression adjusting for gender, degree level and discipline of study.

Phase 2: Focus group interview

Focus group interviews were conducted to stimulate discussion and elicit students' views on the value of the process of self-assessment for generic skills development (Stalmeijer, McNaughton, & Van Mook, 2014). A semi-structured interview protocol was used with necessary probes and prompts allowing the interviewer to explore participants' answers to gain deeper insights and seek clarification to ensure the research question was addressed (Newing et al., 2011). The interviews lasted between 41 and 57 minutes (mean 48 minutes), and were digitally recorded and transcribed for analysis.

Analysis of focus group (qualitative) data

A thematic analysis procedure was used in analysing the group interview data (Miles, Huberman, & Saldana, 2014). Commonly recurring themes were identified using an inductive approach. Based on the recurring themes and any connection between them, a thematic framework was constructed that was grounded in the data. Interpretation of this thematic framework in the lights of existing self-assessment and generic skills development literature was made in consultation of the research team. The lead author of this paper first did the coding and identified themes in the qualitative data. The second author independently coded a subset of the data. Codes and themes were cross-checked and discussed with the research team for further refinement and resolving any ambiguity in coding and theme identification. This approach helped to maximise the rigour of the analysis. NVivo™ was used to support the analysis.

Results

Phase 1 data: Perceived capability to perform the skills and skill development

Figure 2 illustrates students' perceived capability to perform the skills sets and their perceived development in the university study. Overall, students viewed having some capabilities to perform the skills, as well as developing skills to a certain extent within their studies. However, when comparing the extent of their capability and development, students perceived the development of these skills in their university study as lower than their perceived capability to perform across all ten skills. For students' perceived capability, nine of the ten skills received a mean score higher than seven. The only skill which received a mean score below seven was 'analysing data and using technology', whereas 'social responsibility and accountability' received the highest mean score. Conversely, with respect to students' perceived development of the skills, the only skill to receive a mean score higher than seven was 'professionalism', whereas 'self-management' received the lowest score indicating the least development of this skill.

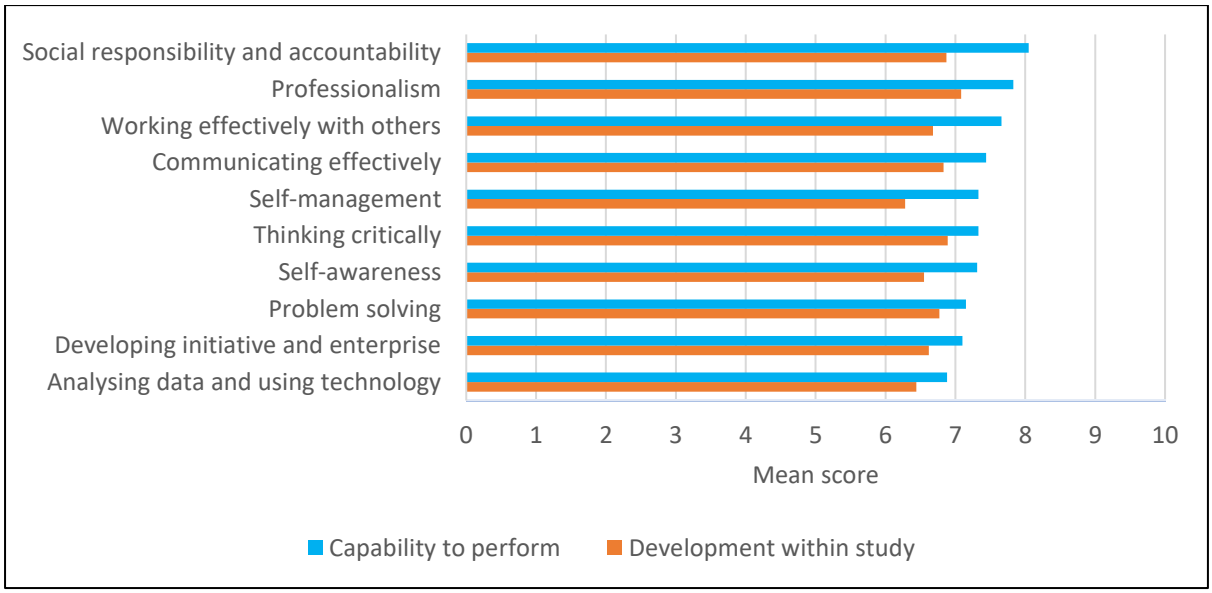

Figure 2: A Comparison between Students' Perceived Capability to Perform the Skills and Their Development within the Study

Table 2 presents a comparison between the perceived capability to perform and development across disciplines. Concerning the capability data, statistically significant differences across disciplines were found for four skills — 'working effectively with others', 'communicating effectively', 'social responsibility and accountability', and 'professionalism'. Of these four skills, on average, the capability to 'working effectively with others' was seen highest in Health Science students, whereas capabilities to 'communicating effectively', 'social responsibility and accountability' and 'professionalism' were found highest in Public health students. Regarding the development data, no statistically significant difference was found for any of the skills across disciplines.

As Figure 3(a) shows, students' perceived capability to perform most of the skills remains similar across study levels. The second-year undergraduate students viewed higher development for most of the skills within their study. In contrast, the first-year postgraduate students saw poor development in most of the skills [Figure 3(b)].

Table 2: Capability to Perform the Skills and Their Development across Disciplines

	Health Science (*n*=68) Mean ± SD	Nutrition science (*n*=54) Mean ± SD	Public Health (*n*=53) Mean ± SD	Dietetics (*n*=27) Mean ± SD	*p*-value*
Capability to perform					
Working effectively with others	8.0 ± 1.1	7.5 ± 1.0	7.7 ± 1.1	7.2 ± 1.4	0.017
Communicating effectively	7.7 ± 1.3	7.0 ± 1.5	7.8 ± 1.1	7.0 ± 1.6	0.002
Self-awareness	7.4 ± 1.6	7.4 ± 1.6	7.5 ± 1.1	6.7 ± 1.6	0.157
Thinking critically	7.6 ± 1.2	7.1 ± 1.5	7.5 ± 1.4	7.0 ± 1.8	0.097
Analysing data and using technology	7.0 ± 1.8	6.8 ± 1.9	7.0 ± 1.5	6.8 ± 1.4	0.889
Problem-solving	7.1 ± 1.6	7.2 ± 1.5	7.3 ± 1.5	7.0 ± 1.5	0.889
Developing initiative and enterprise	7.5 ± 1.2	6.9 ± 1.3	7.0 ± 1.4	7.0 ± 1.7	0.058
Self-management	7.6 ± 1.3	7.3 ± 1.4	7.4 ± 1.7	6.7 ± 2.0	0.124
Social responsibility and accountability	8.0 ± 1.5	8.1 ± 1.3	8.5 ± 1.3	7.4 ± 1.9	0.032
Professionalism	7.6 ± 1.4	8.0 ± 1.2	8.1 ± 1.4	7.3 ± 1.6	0.030
Development within study					
Working effectively with others	7.0 ± 2.6	6.5 ± 2.3	6.5 ± 2.6	6.6 ± 1.9	0.599
Communicating effectively	7.2 ± 2.3	6.6 ± 2.4	6.4 ± 2.3	7.2 ± 1.7	0.218
Self-awareness	6.6 ± 2.8	6.4 ± 2.5	6.4 ± 2.2	6.9 ± 2.0	0.874
Thinking critically	7.1 ± 2.0	6.5 ± 2.5	7.0 ± 2.3	6.9 ± 2.0	0.381
Analysing data and using technology	6.6 ± 2.7	6.3 ± 2.5	6.6 ± 1.8	6.0 ± 3.2	0.765
Problem-solving	6.8 ± 2.2	6.7 ± 2.5	6.7 ± 2.0	7.1 ± 2.1	0.912
Developing initiative and enterprise	7.0 ± 2.3	6.5 ± 2.4	6.5 ± 2.1	6.3 ± 2.6	0.526
Self-management	6.7 ± 2.6	6.4 ± 2.6	5.9 ± 2.6	5.5 ± 2.8	0.133
Social responsibility and accountability	7.2 ± 2.8	6.9 ± 2.8	6.6 ± 3.0	6.6 ± 2.3	0.633
Professionalism	7.3 ± 2.3	7.0 ± 2.8	6.8 ± 2.5	7.3 ± 2.2	0.740

**p*-value generated employing ANOVA.

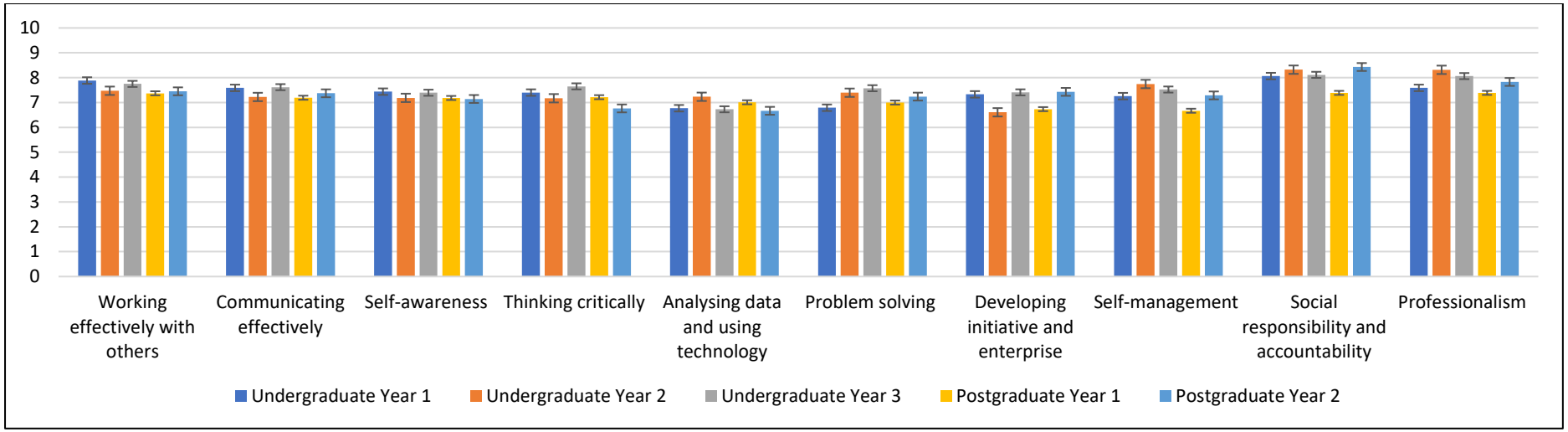

Figure 3(a): Capability to Perform across Degree type and Year level

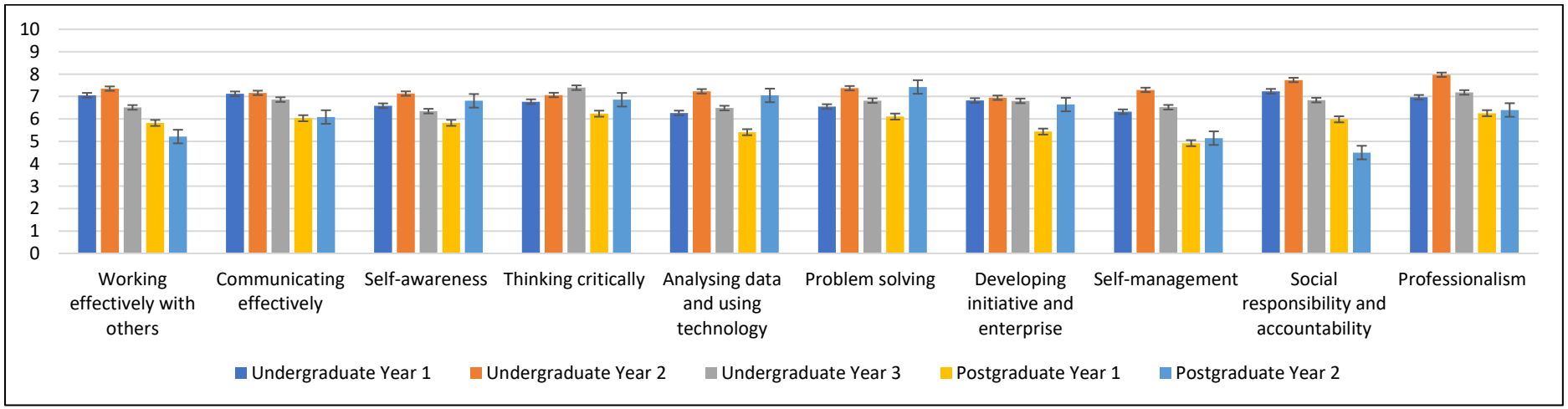

Figure 3(b): Development across Degree type and Year Level

Table 3: Relationship between Perceived Capability to Perform and Development within Study

Skill set	Capability to perform		Development within study		*r*	Adjusted *β* Coefficient[#]	Standard error	Adjusted R^2
	Mean	SD	Mean	SD				
Working effectively with others	7.66	1.13	6.68	2.42	0.22*	0.44*	0.147	0.101
Communicating effectively	7.44	1.38	6.83	2.27	0.259*	0.42*	0.110	0.101
Social responsibility and accountability	8.05	1.47	6.87	2.80	0.272*	0.61*	0.109	0.140
Problem solving	7.15	1.53	6.77	2.21	0.32*	0.615*	0.105	0.158
Professionalism	7.83	1.4	7.08	2.46	0.341*	0.554*	0.098	0.141
Self-awareness	7.31	1.48	6.55	2.46	0.367*	0.457*	0.097	0.099
Analysing data and using technology	6.88	1.69	6.44	2.52	0.372*	0.794*	0.108	0.213
Thinking critically	7.33	1.39	6.89	2.23	0.393*	0.827*	0.105	0.276
Developing initiative and enterprise	7.10	1.36	6.62	2.31	0.433*	0.434*	0.128	0.125
Self-management	7.33	1.53	6.28	2.65	0.507*	0.557*	0.119	0.124

β Coefficients were generated employing multivariable linear regression adjusted for gender, degree level and discipline

*Statistically significant ($p<0.01$)

The relationship between the two variables—perceived capability and perceived development—was first assessed through univariate correlation using Pearson correlation coefficient (*r*). Overall, there was a moderate positive correlation between the two variables, with high levels of perceived capabilities with high levels of perceived development. The magnitude of correlation across ten skills ranges from 0.220 to 0.506, and all correlations were determined to be statistically significant ($p<0.01$) (Table 3). The association between the two variables was further assessed employing multivariable linear regression adjusted for gender, degree level and discipline of study. As Table 3 shows, for all of the skills, student' perceived capability is positively associated with their perceived development. The higher impact was seen for 'self-management', 'developing initiative and enterprise', 'thinking critically' and 'self-awareness'.

Phase 2: Students' perspectives on the value of the process of self-assessment and the self-assessment tool

There were four focus group interviews with a total of 22 participants. A thematic framework was constructed based on the recurring themes arising from the focus group data (Figure 4) visualising students' perspectives on the value of the process of self-assessment and the self-assessment tool. We explain this framework in the following sub-sections with a set of relevant quotes from public health and health science students (PHS) and nutrition science and dietetics students (NSD).

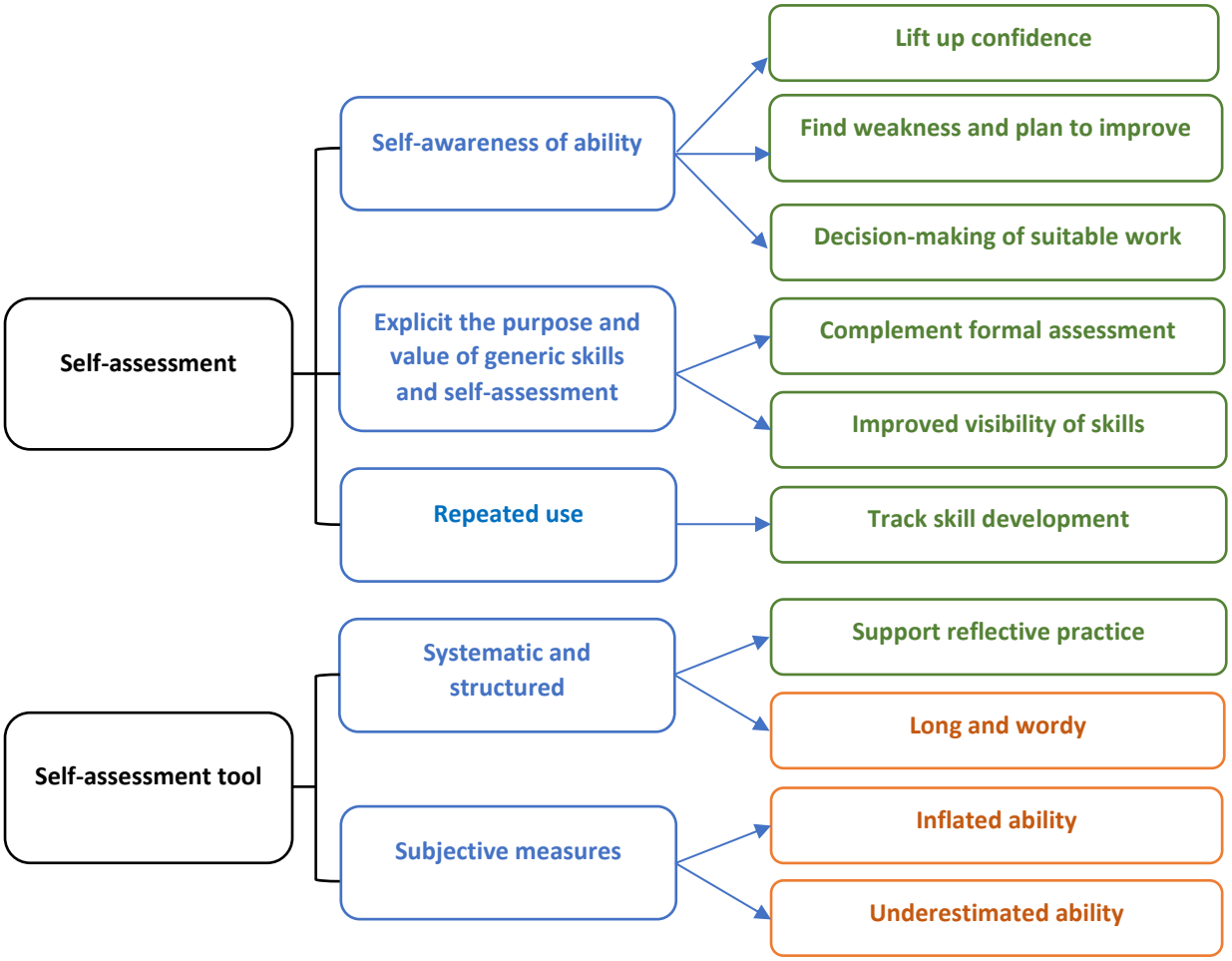

Figure 4: Thematic Framework Reflecting Students' Perspectives of the Value of the Process of Self-assessment and the Self-assessment Tool

Students' perspectives on the self-assessment process

Self-assessment generates self-awareness of one's ability

Students viewed the role of self-assessment in generating increased awareness of one's strengths and weaknesses concerning particular generic skills.

> *Through your self-assessment, you can see how you're going with these skills and see how you could develop further if you want to, and in which aspects you're lacking and which aspect you're capable more of* (PHS1P2).

This process promoted positive self-development and students felt encouraged to build on their areas of strength as well as working on the areas where further improvements required. Student-perceived benefits of self-awareness included improved confidence and feelings of empowerment, understanding of weaknesses for future development and reflections on potential job suitability (Table 4) with illustrative quotes.

Table 4: Student-perceived Benefits of Self-awareness

Benefit	Illustrative quote
Boost confidence of the strengths one has	*Sometimes people just underestimate their strengths, I would say. And a tool like that would actually make them feel empowered maybe and actually realise how good you are* (PHS1P4).
Help identify the areas of weakness and develop an action plan to address those areas	*It just reminds me of what is my weakness? I will reflect on what opportunity that I have missed to improve those skills. It can help me to make a plan to improve or develop some of these deficient areas* (NSD1P3).
Make informed decisions about one's suitability of a particular job	*It's important to know your strengths and weaknesses and have a better idea of if you could actually do it, because you really need to sit back and think like what are my skills? Does this job suit me? Do I suit them?* (PHS1P1).

Self-assessment helped define the purpose and value of generic skills and self-assessment

Students recognised that in order to be engaged in the process of self-assessment of generic skills, it is important that the curricula explicitly define the roles of generic skills and self-assessment, and how these relate to career development. Students reported they required support in the contextualisation and development of these skills through their learning activities and assessment: *assignments should specify which generic skills are expected to be demonstrated* (PHS2P2); … *how the skills are linked to their employability* (PHS2P4).

Students recognised the hidden nature of generic skills in formal curricula as these skills are not visibly assessed. They believed the role of generic skill self-assessment increased their visibility and could complement their formal assessment.

> *These [skills] are not assessed, so you may not see them. You're asked to self-rate them, now you can see them. It can go with the actual assessment* (NSD1P1).

Repeated use of self-assessment

Students viewed that self-assessing at different time points would help them see any development of the skills over time. They saw that the more an individual engages in self-assessing their skills, the more improvement they may make in their previously identified suboptimal skill areas.

> *It's good to compare in the long run as well, to see if you thought if you've improved. It can also help with building your skills. So, a continuous self-assessment, you can see that the more you do this, the more improve with this skill and then something that you previously saw as a weakness could become a strength* (NSD2P3).

Students' perspectives on the self-assessment tool

A systematic and structured approach to support reflection

Students viewed that the self-assessment tool gave them a systematic way to look at their strengths and weaknesses of the skills that enhanced the process of reflection. The process engaged them in consciously looking and thinking about their capabilities and experiences, and analysing them in a structured manner.

> *For me, sometimes I'll have some ideas floating around behind my brain. But this is more like a systematic and structured way for me to really analyse and gather all my thoughts together, to see which part am I better at, which part to improve on, so it helps me how to reflect better* (NSD2P5).

Students valued how the self-assessment tool broke down a skill area into several behavioural categories to demonstrate what specific behaviours they are expected to perform that eventually support the reflection process.

> *Because it kind of has all the different sections and specific skills, that I think kind of breaks it down into smaller kind of areas [behaviours], I guess. So, it's just you might even have strengths just in communication when working in smaller groups, but not larger groups or that sort of thing. And this gives you the details what specific you're reflecting on. So, yeah, I think it's beneficial* (NSD2P2).

The tool was viewed to help students understand their ability to perform specific behaviours in particular skill areas. Students recognised the specificity and breadth of the tool to support reflection. However, this breadth made the tool 'too wordy' and 'too long' which was a criticism of the tool.

Self-assessed scores are variable and subjective.

Students perceived subjectivity in the self-assessment measures and questioned its reliability viewing many variables (e.g. timing, mental condition) affecting the scores.

> *I think it's not an accurate representation of it because it really depends on what time, what condition you do it in. Because sometimes if you've experienced something bad during the week you might mark yourself really low compared to a good week* (PHS1P4).

Students also recognised the possibility of individual bias in self-assessment and found it a difficult task. Rating their abilities on a scale of 0–10 posed difficulties and students were concerned they over or underestimated their abilities. They also sought input from their peers to help determine their ratings: *maybe I'm actually four, but I'm thinking, mmm I am six* (NSD2P5); *I'm really harsh on myself, so I might give myself a four but people be like, no, you're a six* (NSD2P1).

Discussion

This paper reports on health students' perspectives on their self-assessed capability to perform a set of industry-demanded generic skills and how they perceived their development during their university study. It also identified the value of the process of self-assessment to complement and enhance their generic skills development.

The self-assessment data indicated that with some variations across study levels and disciplines, students viewed having some capabilities to perform the generic skills as well as their university studies partly contributing to the development of these skills. Data also suggested that students' perceived capability to perform most of the skills remained similar across study levels. This seems to

cast doubt on the university's contribution to generic skills development, suggesting little improvement in perceived capability in generic skills as students' progress in their university studies. Not surprisingly, a positive relationship was found between the perceived development and capability data, meaning that the more the university study contributed to skills development, the more students would feel capable of performing those skills. Given the importance of generic skills for work readiness, this finding suggests a need for not only a greater focus on the development of generic skills within the university studies, but to be explicit when teaching and assessing these skills to better prepare students for future work. This aligns with industry and student expectations of universities to promote generic skills as part of the curricula (Boden & Nedeva, 2010). Strong university–industry partnerships may promote a shared understanding of generic skill development needs to ensure relevant and responsive academic curricula to meet the industry expectations (Gibson & Molloy, 2012).

Many educational approaches are used to help promote the development of generic skills including group projects and assignments which utilise interpersonal, team-working and problem-solving skills. Whilst explicit embedding of generic skills in formal assessments provides students with convincing evidence of the importance of these skills (Murdoch-Eaton & Whittle, 2011), students in our focus group, pointed to the hidden nature of these skills in curricula due to the fact that these skills are rarely assessed. When generic skills are not exclusively assessed, students may not prioritise these for learning (Boud & Falchikov, 2007). Educators need to make the skills explicit for students so that they are aware of the skills they are expected to develop for their employability and career purposes (Gibson & Molloy, 2012; Jorre de St Jorre & Oliver, 2018). Self-assessment activities focusing on generic skills, as suggested in the focus group data, were seen as raising the profile of generic skills.

Self-assessment data are self-reported, rather than a measure of how capable students actually are in the skills described or how well the skills are developed within their university studies. While some students might overestimate their ability, more capable and reflective students could be harsher on themselves (Panadero, Brown, & Strijbos, 2016). Students were aware of the limited objectivity and reliability and recognised the variables affecting the measure (e.g. timing, mental condition, individual bias). Students' overestimation of their ability to perform skills-associated behaviours can be seen as problematic from the skills development perspective and students' self-assessed scores tend to be higher than their teachers when self-assessed scores are counted in student grades (Tejeiro et al., 2012). In the present study, we engaged students in the process of self-assessment, as an exercise with a learning-oriented purpose rather than a formal assessment. Concurring with previous research (e.g. Barney, et al., 2011; Leach, 2012), we believe that for the purpose of our use, students' self-assessments might be relatively consistent with their teachers and fairly reflective of their ability. Students, as Leach (2012) commented, would need to be clearly informed of the purpose of the self-assessment and the benefits of engaging in it.

Whilst there may be some subjectivity in the measures, students recognised that being aware of their strong skill areas, through the process of self-assessment, may potentially improve their confidence. Drawing on the self-efficacy literature (Bandura, 1982, 1997), students' beliefs in their abilities to perform the skills-associated behaviours can be seen as important. A high sense of self-efficacy encourages individuals to set more challenging goals with stronger commitment and persistence to achieving the goals even when challenges occur (Bandura, 1997; Gist, 1987; Zimmerman, 2000). This also means that a high sense of self-efficacy can act as a motivator for student learning and help them to regulate their own approach to learning (Zimmerman, 2000). As Murdoch-Eaton and Whittle (2011) pointed out, effective self-regulation, through the process of self-assessment, helps students develop the skills to make a realistic reflection on their cognition, actions and behaviours—all of these underpin the continued professional development and act as a propensity of lifelong learning.

Students valued how the self-assessment tool provided them with a structured and systematic way to look at their skills along with its specificity and thoroughness that provided a clear structure of what to reflect on. They viewed that these features together can potentially contribute to enhancing the process of reflection. Developing students' capacity in reflection has importance from both the

learning and employability perspectives (Di Stefano, Gino, Pisano, & Staats, 2016; Ryan, 2013). Engaging students in the reflection process potentially can influence their self-efficacy and task understanding with a result of productive learning experiences (Di Stefano et al., 2016). To improve employability potential, students need to identify what their strengths and weaknesses are regarding the key employability skills they need to develop expertise, focus on those skills they find weaker and articulate a plan of action to improve them (Darce Pool & Sewell, 2007). Further, reflective processes underpin the career management skills graduates will need to master as part of their lifelong learning for the utmost utilisation of their capabilities and to contribute to society (Bridgstock, 2009). Given that scaffolded reflection can contribute in this process by improving students' thinking and action capabilities (Moon, 2006), it seems important for educators to actively guide students through the reflective practice to get most out of the self-assessment process.

Conclusion

This paper has important implications for health students preparing for their careers. Dietetics graduates are increasingly embarking upon self-employment and private practice, while health promotion is a common vocational outcome of public health, health science and nutrition courses. Engaging in projects and practices with academics, policy makers, clinicians and community requires the skillsets explored in this paper. Furthermore, it provides students in non-vocational programs with a clear suite of skills directly applicable across the healthcare sector. In today's dynamic employment landscape, graduates may not be employed in industries or roles that are directly related to their studies. They need to be able to articulate, appreciate and demonstrate their skillsets beyond traditional competency standards to consider, and be considered for, emerging and novel employment.

Limitations of this study include the cross-sectional design with a relatively smaller sample that could not explain any causality which occurred (Jackson & Tomlinson, 2020). The voluntary nature of student focus groups might have had a more positive view on the use of the self-assessment tool. Given students' qualitative responses were fairly uniform across disciplines, there appears to be some merit in considering the notion of self-assessment for facilitating health students' generic skills development. This suggests the need for contextualising and embedding self-assessment in formal curricula for the development of generic skills as part of better preparation for health students for their future work. This will need educators to actively promote the benefits of self-assessment to engage students in the self-assessment process and to nurture their confidence and understanding of the process. The self-assessed data can be used to generate a dialogue between students and educators to gauge learning towards their development. Future research may explore the accuracy of student self-assessment as compared with their educator observation along with investigating the reasons for any mismatch. Future research may also include educators' perspectives, across more health disciplines, on the value of the self-assessment tool and how the tool can be contextualised and implemented to enrich health curricula.

Acknowledgements

We wish to acknowledge all study participants for their contribution. We also express our gratitude to the Monash Education Academy for funding this study.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Acemoglu, D., & Restrepo, P. (2018). *Artificial intelligence, automation and work*. US: NBUR. Retrieved from https://www.nber.org/papers/w24196

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122–147. doi:10.1037/0003-066X.37.2.122

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Barney, S., Khurum, M., Petersen, K., Unterkalmsteiner, M., & Jabangwe, R. (2011). Improving students with rubric-based self-assessment and oral feedback. *IEEE Transactions on Education, 55*(3), 319–325.

Biesma, R. G., Pavlova, M., Vaatstra, R., van Merode, G. G., Czabanowska, K., Smith, T., & Groot, W. (2008). Generic versus specific competencies of entry-level public health graduates: Employers' perceptions in Poland, the UK, and the Netherlands. *Advances in Health Sciences Education, 13*(3), 325–343. doi:10.1007/s10459-006-9044-0

Biesma, R. G., Pavlova, M., van Merode, G. G., & Groot, W. (2007). Using conjoint analysis to estimate employers preferences for key competencies of master level Dutch graduates entering the public health field. *Economics of Education Review, 26*(3), 375–386. doi:10.1016/j.econedurev.2006.01.004

Boden, R., & Nedeva, M. (2010). Employing discourse: Universities and graduate 'employability'. *Journal of Education Policy, 25*(1), 37–54. doi:10.1080/02680930903349489

Boud, D., & Falchikov, N. (2007). *Rethinking assessment in higher education: Learning for the longer term*. New York, NY: Routledge.

Bridgstock, R. (2009). The graduate attributes we've overlooked: Enhancing graduate employability through career management skills. *Higher Education Research & Development, 28*(1), 31–44. doi:10.1080/07294360802444347

Choate, J., Green, J., Cran, S., Macaulay, J., & Etheve, M. (2016). Using a professional development program to enhance undergraduate career development and employability. *International Journal of Innovation in Science and Mathematics Education, 24*(3), 49–70.

Colthart, I., Bagnall, G., Evans, A., Allbutt, H., Haig, A., Illing, J., & McKinstry, B. (2008). The effectiveness of self-assessment on the identification of learner needs, learner activity, and impact on clinical practice: BEME Guide no. 10. *Medical Teacher, 30*(2), 124–145. doi:10.1080/01421590701881699

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Thousand Oaks, CA: Sage.

Darce Pool, L., & Sewell, P. (2007). The key to employability: developing a practical model of graduate employability. *Education+ Training, 49*(4), 277–289.

DeVellis, R. F. (2012). *Scale development: Theory and applications* (4th ed.). Los Angeles, CA: Sage.

Di Stefano, G., Gino, F., Pisano, G. P., & Staats, B. R. (2016). Making experience count: The role of reflection in individual learning. *Harvard Business School NOM Unit Working Paper No. 14–093*. doi:10.2139/ssrn.2414478

Dodd, T. (2016, August 7). Grattan Institute's Andrew Norton says science graduates struggle more than others to find their first job. *Australian Financial Review*. Retrieved from http://www.afr.com/leadership/careers/grattan-institutes-andrew-norton-says-science-graduates-struggle-more-than-others-to-find-their-first-job-20160804-gqlcnd

Eva, K., & Regehr, G. (2007). Knowing when to look it up: A new conception of self-assessment ability. *Academic Medicine, 82*(10). doi:10.1097/ACM.0b013e31813e6755

Evans-Greenwood, P., O'Leary, K., & Williams, P. (2015). *The paradigm shift: Redefining education*. Australia: Centre for the Edge, Deloitte Australia.

Frenk, J., Chen, L., Bhutta, Z. A., Cohen, J., Crisp, N., Evans, T., . . . Zurayk, H. (2010). Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *The Lancet, 376*(9756), 1923–1958. doi:10.1016/S0140-6736(10)61854-5

Gibson, S., & Molloy, E. (2012). Professional skill development needs of newly graduated health professionals: A systematic literature review. *Focus on Health Professional Education: A Multi-disciplinary Journal, 13*(3), 71–83.

Gilbert, R., Balatti, J., Turner, P., & Whitehouse, H. (2004). The generic skills debate in research higher degrees. *Higher Education Research & Development, 23*(3), 375–388. doi:10.1080/0729436042000235454

Gist, M. E. (1987). Self-efficacy: Implications for organizational behavior and human resource management. *The Academy of Management Review, 12*(3), 472–485. doi:10.2307/258514

Hill, M. A., Overton, T. L., & Thompson, C. D. (2019). Evaluating the impact of reflecting on curriculum-embedded skill development: The experience of science undergraduates. *Higher Education Research & Development*, *39*(4), 672–688. doi:10.1080/07294360.2019.1690432

Hill, M. A., Overton, T. L., Thompson, C. D., Kitson, R. R. A., & Coppo, P. (2018). Undergraduate recognition of curriculum-related skill development and the skills employers are seeking. *Chemistry Education Research and Practice, 18*(3), 420–434.. doi:10.1039/C8RP00105G

Hinchliffe, G. (2006). Graduate employability and lifelong learning. In P. Hager & S. Holland (Eds.), *Graduate attributes, learning and employability* (pp. 91–104). Dordrecht, The Netherlands: Springer.
Jackson, D. (2014). Self-assessment of employability skill outcomes among undergraduates and alignment with academic ratings. *Assessment & Evaluation in Higher Education, 39*(1), 53–72. doi:10.1080/02602938.2013.792107
Jackson, D., & Chapman, E. (2011). Non-technical competencies in undergraduate business degree programs: Australian and UK perspectives. *Studies in Higher Education, 37*(5), 541–567. doi:10.1080/03075079.2010.527935
Jackson, D., & Tomlinson, M. (2020). Investigating the relationship between career planning, proactivity and employability perceptions among higher education students in uncertain labour market conditions. *Higher Education, 80,* 435–455. doi:10.1007/s10734-019-00490-5
Jackson, D., & Wilton, N. (2016). Developing career management competencies among undergraduates and the role of work-integrated learning. *Teaching in Higher Education, 21*(3), 266–286. doi:10.1080/13562517.2015.1136281
Jorre de St Jorre, T., & Oliver, B. (2018). Want students to engage? Contextualise graduate learning outcomes and assess for employability. *Higher Education Research & Development, 37*(1), 44–57. doi:10.1080/07294360.2017.1339183
Leach, L. (2012). Optional self-assessment: Some tensions and dilemmas. *Assessment & Evaluation in Higher Education, 37*(2), 137–147.
Leech, L., & Onwuegbuzie, J. (2009). A typology of mixed methods research designs. *Quality & Quantity, 43*(2), 265–275. doi:10.1007/s11135-007-9105-3
Leung, S.-O. (2011). A comparison of psychometric properties and normality in 4-, 5-, 6-, and 11-point Likert scales. *Journal of Social Service Research, 37*(4), 412–421. doi:10.1080/01488376.2011.580697
Lowden, K., Hall, S., Elliot, D., & Lewin, J. (2011). *Employers' perceptions of the employability skills of new graduates*. London, UK: Edge Foundation.
Marais, D., & Perkins, J. (2012). Enhancing employability through self-assessment. *Procedia - Social and Behavioral Sciences, 46*, 4356–4362. doi:10.1016/j.sbspro.2012.06.254
Matters, H. (2004). University and employer expectations of new dietetic graduates. *Focus on Health Professional Education: A Multi-disciplinary Journal, 5*(3), 43–49.
Mayer, E. (1992). *Employment-related key competencies for postcompulsory education and training*. Canberra: AEC.
Messum, D., Wilkes, L., & Jackson, D. (2015). What employability skills are required of new health managers? *Asia Pacific Journal of Health Management, 10*(1), 28–35.
Messum, D., Wilkes, L., Jackson, D., & Peters, K. (2016). Employability skills in health services management: Perceptions of recent graduates. *Asia Pacific Journal of Health Management, 11*(1), 25–32.
Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis*. London, UK: Sage.
Moon, J. (2006). *Learning journals: A handbook for reflective practice and professional development* (2nd ed.). New York, NY: Routledge.
Murdoch-Eaton, D., Manning, D., Kwizera, E., Burch, V., Pell, G., & Whittle, S. (2012). Profiling undergraduates' generic learning skills on entry to medical school: An international study. *Medical Teacher, 34*(12), 1033–1046. doi:10.3109/0142159X.2012.706338
Murdoch-Eaton, D., & Whittle, S. (2011). Generic skills in medical education: Developing the tools for successful lifelong learning. *Medical Education, 46*(1), 120–128. doi:10.1111/j.1365-2923.2011.04065.x
Newing, H., Eagle, C. M., Puri, R. K., Watson, C. W., & NetLibrary, I. (2011). *Conducting research in conservation social science methods and practice*. New York: Routledge.
Oliver, B. (2015). Redefining graduate employability and work-integrated learning: Proposals for effective higher education in disrupted economies. *Journal of Teaching and Learning for Graduate Employability, 6*(1), 56–65.
Palermo, C., King, O., Brock, T., Brown, T., Crampton, P., Hall, H., . . . Rees, C. E. (2019). Setting priorities for health education research: A mixed methods study. *Medical Teacher, 41*(9), 1029–1038. doi:10.1080/0142159X.2019.1612520
Panadero, E., Brown, G. T. L., & Strijbos, J.-W. (2016). The future of student self-assessment: A review of known unknowns and potential directions. *Educational Psychology Review, 28*(4), 803–830. doi:10.1007/s10648-015-9350-2
Pop, C., & Khampirat, B. (2019). Self-assessment instrument to measure the competencies of Namibian graduates: Testing of validity and reliability. *Studies in Educational Evaluation, 60*, 130–139. doi:10.1016/j.stueduc.2018.12.004

Prinsley, R., & Baranyai, K. (2015). *STEM skills in the workforce: What do employers want?* Canberra: Australia Government.

Rimmer, A. (2015). Doctors will need to show generic skills such as communication to complete training. *BMJ, 351*, h3678. doi:10.1136/bmj.h3678

Rowe, A., & Zegwaard, K. (2017). Developing graduate employability skills and attributes: Curriculum enhancement through work-integrated learning. *Asia-Pacific Journal of Cooperative Education, 18*(2), 87–99.

Ryan, M. (2013). The pedagogical balancing act: Teaching reflection in higher education. *Teaching in Higher Education, 18*(2), 144–155.

Sarkar, M., Overton, T., Thompson, C., & Rayner, G. (2016). Graduate employability: Views of recent science graduates and employers. *International Journal of Innovation in Science and Mathematics Education, 24*(3), 31–48.

Sarkar, M., Overton, T., Thompson, C., & Rayner, G. (2017). Undergraduate science students' perceptions of employability: Efficacy of an intervention. *International Journal of Innovation in Science and Mathematics Education, 25*(5), 21–37.

Sarkar, M., Overton, T., Thompson, C. D., & Rayner, G. (2020). Academics' perspectives of the teaching and development of generic employability skills in science curricula. *Higher Education Research & Development, 39*(2), 346–361. doi:10.1080/07294360.2019.1664998

Stalmeijer, R. E., McNaughton, N., & Van Mook, W. N. K. A. (2014). Using focus groups in medical education research: AMEE Guide No. 91. *Medical Teacher, 36*(11), 923–939. doi:10.3109/0142159X.2014.917165

Tejeiro, R. A., Gomez-Vallecillo, J. L., Romero, A. F., Pelegrina, M., Wallace, A., & Emberley, E. (2012). Summative self-assessment in higher education: Implications of its counting towards the final mark. *Electronic Journal of Research in Educational Psychology, 10*(2), 789–812.

Yorke, M. (2006). *Employability and higher education: What it is – what it is not*. York: HEA, UK.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82-91. doi:10.1006/ceps.1999.1016