

# The academic skill needs and competency of first year health science students: Views of educators

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Evidence identifies that many students commence university with academic skill deficits. With a focus on educator expectations, this research investigated perceptions about the academic skills commonly required for a multidisciplinary cohort of first year health science students, where typically students have diverse prior learning. Via an online survey, participants completed questions focusing on specific academic skills, where they rated their perception of the importance of the skill and student competency. The questions included open and closed responses. Additionally, participants recorded academic skill development strategies that were currently embedded and their perceived helpfulness. Thirty-three first year educators responded. Academic integrity skills, finding information, writing skills, and reading and understanding skills were generally rated as important; however, student ability was frequently considered to be poor. Findings for numeracy were inconsistent. In contrast, digital literacy was rated adequate or above. In terms of embedding academic skills, 59% reported implementing these, with 95% identifying that they were helpful. Overall, findings showed that a broad range of academic skills are deemed important in first year health sciences, yet the overall educator perception of student skill competency is mostly poor. There was evidence of strategies to embed academic skills, for example, writing and numeracy; however, some of the educators did not adopt such approaches. The extent of educator expectation was clearly evident in this group of first year health science educators. There is a need for this to be balanced with a considered approach to student academic skill development.

**Key Words:** teacher attitudes; generic skills; academic writing; numeracy; information literacy.

## 1. Introduction

Increased accessibility has changed the demographic of students entering higher education in Australia (Norton, 2013; Oriol, 2011) and worldwide (Oriol, 2011). The widening participation route has resulted in an increasingly diverse student profile in terms of readiness for study in higher education (Bradley, Noonan, Nugent, & Scales, 2008). As discussed by Lawrence (2005), student diversity includes alternative entry pathways as well as targeted equity groupings (for example, low SES, Indigenous Australians, remote and rural). This creates cohorts of students with a range of individual qualities based on varying skills levels, attributes and attitudes. With

this diversity, varied skills sets and needs are required for successful transition into higher education and many undergraduates report that they are not prepared for their academic experience (Krause, Hartley, James, & McInnis, 2005).

First year students have identified that they need skills and support to cope with the new demands placed on them at the commencement of their higher education (Fazey & Fazey, 2001). Traditionally, academic skills have been identified as the ability to successfully participate in and complete an educational course based on reading, writing and citation skills (Hitch et al., 2012). More broadly, academic skills include generic abilities such as critical thinking, problem solving and information literacy (Gunn, Hearne, & Sibthorpe, 2011) as well as skills in information technology, time management and planning, communication and working with others (Goldfinch & Hughes, 2007). Ability in these areas is reported to be necessary for the successful participation and retention of undergraduate students (Fergy, Heatley, Morgan, & Hodgson, 2008; Goldfinch & Hughes, 2007; Hafford-Letchfield, 2007).

Sacre and Nash (2010), with an Australian cohort, used the Measuring the Academic Skills of University Students (MASUS) diagnostic tool to assess academic writing skills of first year health undergraduates across four courses (Nursing, Social Work, Human Movement and Public Health). Here, 37% of students achieved below the MASUS tool benchmark score for academic literacy standards. Further evidence is provided in a recent Australian study with a diverse nursing cohort with non-traditional entry pathways (Palmer, Levett-Jones, Smith, & McMillan, 2014). In this study, 59% of students entered the course via vocational education and training or an alternate university entry programme and 35% were from a low socio-economic background. At the start of their undergraduate course, just over half of the students (52%) achieved suitable academic literacy standards (based on the MASUS diagnostic tool). Literacy problems in multiple areas were identified for 92 students (18%), with these students scoring in the lowest MASUS band. These findings from Palmer et al. (2014) further support the need for academic literacy skill development. Similarly, research with specific student cohort groups commencing study in the health sciences (for example, Indigenous students (Rose, Rose, Farrington, & Page, 2008); Pacific students in New Zealand (Kokaua, Sopoaga, Zaharic, & Van der Meer, 2014)) have shown that early screening identified the need for targeted academic skills development.

With growing recognition that higher education students need support to develop specific academic skills for success (Kimmins & Stagg, 2009), most universities have study skills support services and many also offer specific workshops assisting students to adjust to the university way of learning (Alter & Adkins, 2001; Brunhofer, Weisz, Black, & Bowers, 2009). While such services exist, supplementary approaches are frequently adopted as opposed to a context-rich embedded delivery (Gunn et al., 2011). The term *embedded* is used frequently in the academic and information literacy fields (for example, Cassar et al., 2012; Chanock et al., 2012; Goldingay et al., 2014; Gunn et al., 2011) with varied meaning but commonly refers to strategies that are aligned to curriculum and included within a unit or across a course, as opposed to supplementary strategies outside a unit and disciplinary context. For health sciences, trends in Australia show individual student consultation, followed by discipline specific workshops and resource provision as the most frequent approach where academic skills development is supported by academic language and learning educators (Fenton-Smith & Frohman, 2013). This indicates that embedded approaches are unlikely to be the conventional approach used for health science students.

While the provision of support strategies such as embedded skill development practices are recommended, Palmer et al. (2014) advocate that it is also essential to make academic literacy expectations explicit through teaching and assessment practices. Furthermore, recommendations for student retention suggest the need for transparency of expectations as well as targeted transitional support (Scott, Shah, Grebennikov, & Singh, 2008). The importance of transparent expectations was evident in a study by Goldingay et al. (2014) for first year social work students undertaking their first degree at an Australian university. Students reported that they were uncertain about what was expected from them and the expectations and priorities regarding academic skills were often not explicit. Likewise, it is evident that there is a discrepancy in skills possessed by students and the expectations of academics in areas such as critical thinking, problem solving, integrating scientific literature and application of communication skills (Robinson & McDonald, 2014).

Fenton-Smith and Frohman (2013) report that, while academic skills needs and expectations for students in clinical practice settings are reasonably well documented, there is little research on expectations for other academic skills sets in the broader context of studying health science.

There is limited research that focuses on what university educators themselves believe are the specific academic skill requirements for successful transition into first year, particularly for health science courses. With a focus on educator expectations, this study set out to investigate perceptions about the academic skills that are commonly required of a multidisciplinary cohort of first year health science students. Academic staff teaching this group provided skill development information aimed to determine: (i) specific academic skills considered as important for first year health science students; (ii) educator perception of current student academic skill competency; and (iii) the types of strategies currently being adopted to support development of academic skills. With more insight into the skill needs and potential discrepancies between expectations and perceived skills sets, this information could provide knowledge about how to target the embedding of academic skill development strategies and ultimately provide clarity for students about what is expected.

## 2. Method

This study surveyed educators of first year health science students using a questionnaire with closed and open responses. Participants were asked to nominate those academic skills that they believe their students actually need and then to further respond to questions about their perception of the level of student competency. Ethics approval was granted for this research by the University's Ethics Committee (HREC ECN-13-157).

### 2.1. Questionnaire development

A group of discipline educators, teaching and learning professionals, academic skills consultants, librarians and information literacy and teaching and learning specialists were invited to participate in development of the questionnaire. The group focused on six key academic skill sets for tertiary students commonly reported in the literature (for example, Cassar, Funk, Hutchings, Henderson, & Pancini, 2012; Eastwood, Boyle, Williams, & Fairhall, 2011; Elander, Pittam, Lusher, Fox, & Payne, 2010; Hegarty & Carbery, 2010; Rose et al., 2008). These categories were:

- academic integrity and referencing;
- academic writing;
- reading and understanding;
- numeracy;
- information literacy;
- digital literacy and technology.

For each of the categories, academic skill items were constructed. These were discussed and agreed upon by the group. As an example, the category 'academic integrity and referencing' had three academic skill items. These were: *incorporating the ideas of others into academic writing*; *correctly acknowledging sources in-text*; and *correctly acknowledging sources in the reference list*. Open text boxes were also included for respondents to record and rate other skill items related to this category that they deemed important. Options were given in each category, as well as generally at the end of the survey, for respondents to record 'other' skills deemed important. This category was provided so as to include anything further that the researchers had not considered.

The items were designed so the participants could respond to each item using a 5-point Likert scale, rating the level of importance from 1 (not important) to 5 (extremely important). If the respondent deemed the skill as important to any degree (2–5), they would then rate their perception of the typical skill level that would be demonstrated by the majority of their first year students. This rating was on a 6-point scale; from 1 (very poor) to 5 (very good), with 6 being included in order for them to indicate if they were unsure of the particular skill level of their students.

Questions about any formal academic skill development strategies that educators had embedded into their units of study were also included. A qualitative approach was taken where they were asked to identify the types of strategies adopted and to also provide a rating of their perceived impact of these on a 6-point Likert scale from 1 not at all, 2 slightly, 3 moderately, 4 greatly, 5 enormously, or 6 unsure.

## 2.2. Participants

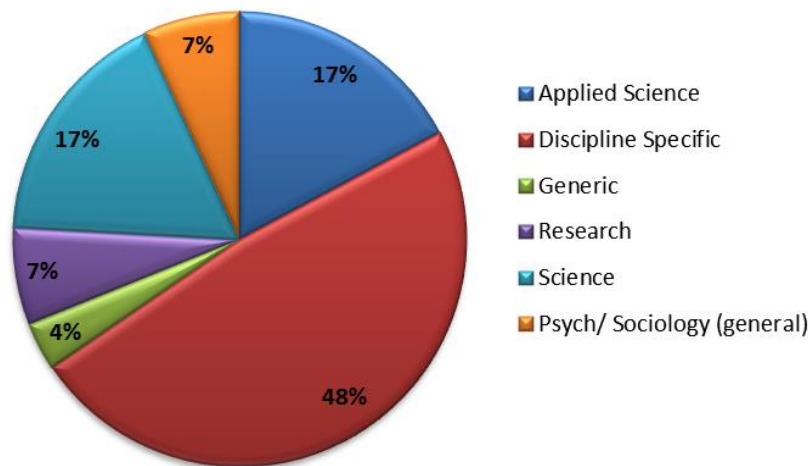
Purposive sampling was used to recruit 33 educators of first year students who were currently teaching in a health science school at an Australian university. All first year educators were invited, via email, to complete an online questionnaire which was introduced and described prior to the online launch. As the questions were to be completed online, consent to participation was considered as enacted when the participant accessed and responded to the survey.

## 2.3. Analysis

Descriptive statistics, including response frequencies, were determined using IBM SPSS (version 20) to determine importance and perceived level of skill. Where any item in a skill category was rated of *moderate importance* or above, the perceived skill level rating of these items was considered across the skill category rather than each skill item independently. Where participants had ranked the skill as having some level of importance but had not recorded a response for perceived level of skill, a rating of '*unsure*' was assigned rather than excluding this data. Mean scores and standard deviations were calculated for perceived level of skill.

## 3. Results

Thirty-three first year educator responses were received from 29 units of study. This provided data for 64% of possible first year units. There was a diverse range of curricula included in the sample from foundation sciences in anatomy, physiology and chemistry to biomechanics, research and analysis, communication skills, psychology and professional-based foundation subjects in specific health science disciplines (Figure 1).



**Figure 1.** Types of first year health science units, represented as a percentage of the total number of units.

At the time that this study was undertaken, the profile of students enrolled in first year health science courses was broad. For the 951 students enrolled, 60% were first in family, with 46% of students accessing university through pathways other than secondary or previous tertiary education. Almost half of the students were 25 years or older (47%) and 22% were categorised as being low socio-economic status.

The overall pattern of rating for skill importance across each of the six skill categories is shown in Figure 2. For perception of skill, data for each skill item, where respondents rated the importance of the skill as moderate or higher, were collapsed across each of the six skill categories and are presented in Figure 3.

### 3.1. Academic writing

The use of correct grammar, spelling and punctuation was regarded by all respondents as important to some extent, with 97% rating this skill as moderately important or higher (Figure 2a). For other academic writing skill items, such as following academic conventions, structuring paragraphs, and logical structure to clearly convey ideas, the importance of these skills was rated as moderate or higher for 72% to 81% of respondents across these items (Figure 2a). Other skill items identified as important for academic writing by individual respondents were clearly explained as ‘uses scientific concepts in own words’, ‘using marking criteria as a guide’, ‘analytical thinking’, ‘accurate use of words’ and similarly, ‘use of diverse and accurate vocabulary’.

Where the importance of academic writing skills was deemed moderately important or above, almost half the respondents rated perceived skill level across items in this skill category as poor or below (Figure 3). Calculated mean values for perceived skill level ratings were consistent across this category indicating poor writing skills, with means for each writing item ranging from 2.28 to 2.50 (that is, between poor, the equivalent of 2 and adequate, the equivalent of 3; see Table 1).

### 3.2. Academic integrity and referencing

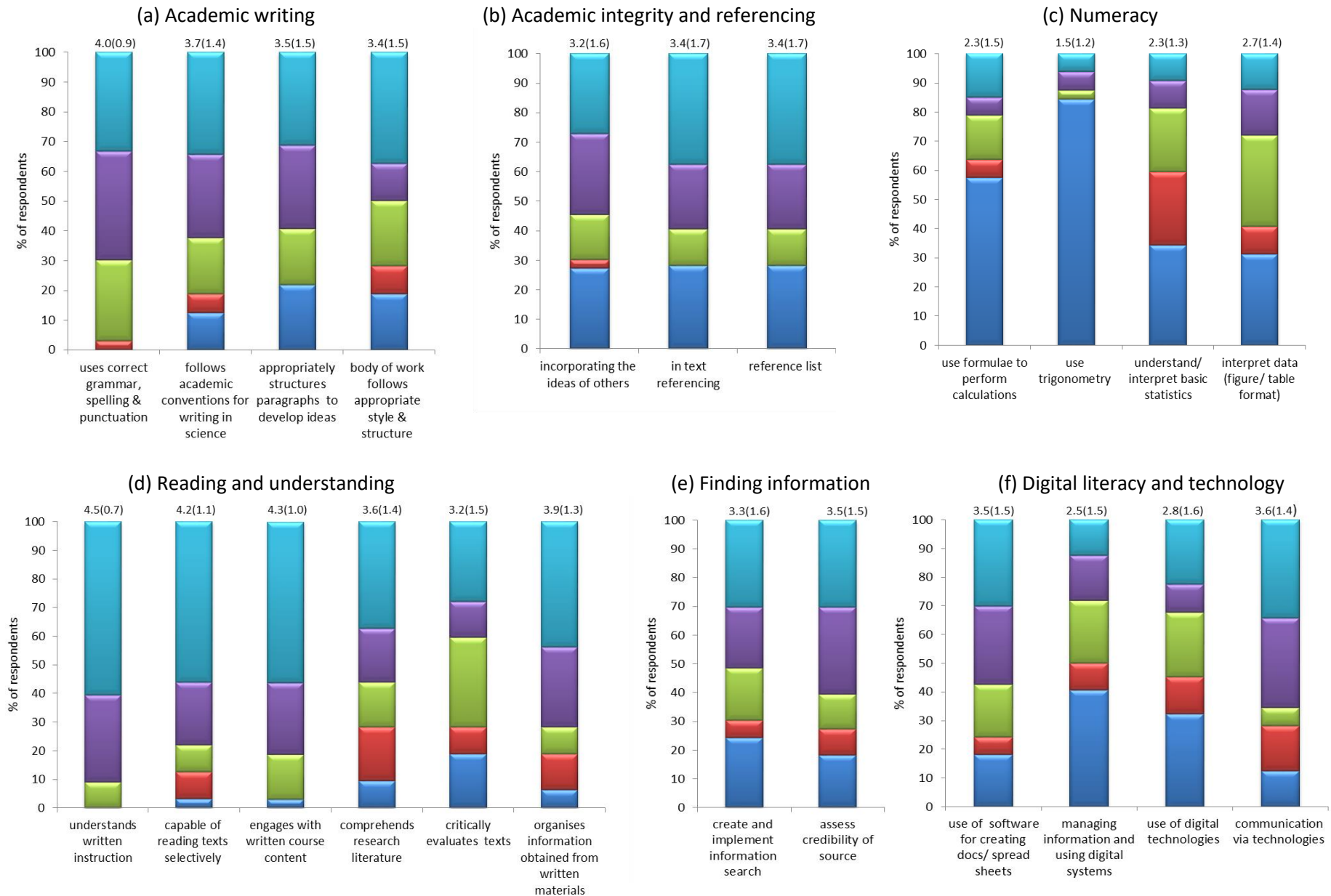
Across skill items, academic integrity and referencing was consistently considered moderately important or higher by around 70% of respondents (range across skill items 70% to 72%; see Figure 2b). A further skill identified by one respondent in the ‘other’ response option of the survey was ‘awareness of an institution’s academic integrity policy’.

Overall, for academic integrity, the perceived skill level of students was rated as poor or below in almost half (49%) of the responses (Figure 3). Where the perceived skill level was rated, calculated mean scores for ‘incorporating the ideas of others’ and ‘correct acknowledgement of the source (in-text and in a reference list)’ ranged from 2.50 to 2.64 (that is, between poor, the equivalent of 2 and adequate, the equivalent of 3; see Table 1).

### 3.3. Numeracy

Compared to other academic skill categories, overall numeracy was deemed to be less important (Figure 2c). These were considered not important for 31% to 84% of respondents’ units of study across numeracy skill items (Figure 2c). Numeracy based skills most frequently considered important were ‘interpretation of data from tables and figures’ (69% of respondents) and ‘understanding basic statistics’ (66% of respondents) (Figure 2c). Regarding other skills relevant to numeracy, ‘basic arithmetic’ (including working out percentages, understanding ratios, and recognising decimal places); ‘connecting data with real concepts’; and similarly, ‘understanding the connection between numbers and the concepts they represent’ were also identified as being important.

Respondents were commonly uncertain about their students’ numeracy skill level, with 19% of respondents either omitting the skill rating or choosing ‘unsure’ (Figure 3). Where the perceived skill level was rated, ‘understanding basic statistics’ was poor or below in 50% of responses and only perceived to be adequate or superior by 14% of respondents. For ‘interpretation of data from tables and figures’, responses rating were evenly distributed between either poor and below, or adequate and superior (35%).



**Figure 2.** Accumulative frequencies for rating of skill importance for each skill item across the 6 skill categories: (a) Academic writing, (b) Academic integrity and referencing, (c) Numeracy, (d) Reading and understanding, (e) Finding information, (f) Digital literacy and technology. Mean (SD) values for level of importance are provided for each skill (1 = not important ■; 2 = slightly important ■; 3 = moderately important ■; 4 = very important ■; 5 = extremely important ■).

### 3.4. Reading and understanding

Overall, responses in this category indicated reading and understanding skills were generally considered important. All rated 'understands written instruction' as moderately important or higher, with all but one also rating 'engaging with course materials' as having moderate importance or higher (Figure 2d). In terms of other skills underpinning reading and understanding, 'comprehension of statements that contain scientific terminology'; 'summarising lecture notes and identifying key concepts'; 'interpreting diagrams, flow charts and feedback loops'; and 'connecting stylised information with real concepts' were offered by respondents as additional important skills.

Skill ratings for reading and understanding were similar to that for writing and academic integrity and referencing with almost half of the responses rating skills in this category as poor or lower (48%; Figure 3). Within this category, perceived skill levels for 'understands written instruction' was rated higher overall (mean  $\pm$  SD = 2.97  $\pm$  0.85) compared to other skill items where all skill levels were below a rating of adequate (that is, the equivalent of 3; see Table 1).

### 3.5. Finding information

For over two thirds of respondents, skill items in this category were classified as moderately important or higher (Figure 2e). A high level of importance was placed on 'assessing the credibility of a source' with the majority of respondents (61%) rating this skill as very important or extremely important for their unit. Also noted by respondents as important in this category was 'the use of a variety of credible information sources'. Examples provided were textbooks, websites and journal papers.

For the skill category of finding information, 56% of respondents rated perceived skill level as poor or below. Figure 3 shows that perceived student skill levels for finding information were ranked lower than for any of the other academic skills categories. There was also an element of uncertainty in rating skill level in this category (20% of responses; Figure 3). Taking this into account, around one quarter (24%) of respondents rated perceived student skill as adequate or above. Consistent with this, calculated mean scores for the two skill items in this category, 'creating and implementing search strategies' and 'assessing the credibility of a source', represent perceived skill levels as being below adequate (Table 1).

### 3.6. Digital literacy and technology

Across this category, around three quarters of respondents rated the skill items 'communication via technologies' (72%) and 'use of software for creating documents and spreadsheets' (75%) as moderately important or above (Figure 2f). 'Managing information and documents using digital file systems' and 'use of digital technologies' (for example, software, wikis, blogs) had lower ratings of importance with scores of moderately important or above in 50% and 55% of cases respectively (Figure 2f).

For this category, skill levels tended to be rated higher than for any other skill categories. Digital literacy skills were rated adequate or above in the large majority of cases (73%) and only perceived as poor by 10% of respondents (Figure 3). This is reflected by the mean scores for each item in the skill category being 3 or above (the equivalent of adequate; Table 1).

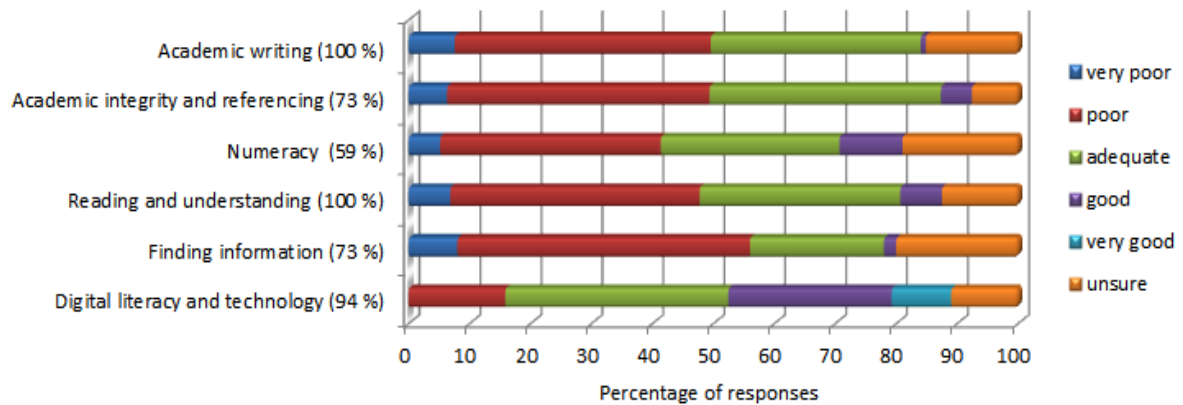
### 3.7. Other general skills

In addition to the six skill categories identified in the questionnaire, responses for other generic skills not listed identified several other important skill areas. These included 'study skills' and techniques such as 'utilising resources to aid study', 'learning tools such as flash cards and mnemonics, memorising names', 'organisation and time management', 'self-directed learning', 'communication skills inclusive of academics and student peers', 'working together in groups to effect required outcomes', 'ethical reasoning', 'reflective writing', and 'presentation of ideas and knowledge'.

**Table 1.** Ratings of perceived skill level for skill items rated as having some level of importance. Mean scores and standard deviations were calculated by assigning ordinal values of 1 through to 5 to ratings of *very poor* through to *very good* at each interval. A rating of *unsure* was not included when calculating means.

<b>Skill</b>	<b>Mean</b>	<b>SD</b>
<b>1. Academic integrity and referencing</b>		
Incorporating the ideas of others into academic writing	2.64	0.85
Correctly acknowledging sources in-text	2.50	0.51
Correctly acknowledging sources in the reference list	2.50	0.51
<b>2. Writing</b>		
Uses correct grammar, spelling and punctuation	2.41	0.68
Follows academic conventions for writing in science (language and style)	2.28	0.54
Appropriately structures paragraphs to develop main ideas	2.32	0.72
Body of work follows appropriate style structure to clearly convey ideas	2.50	0.51
<b>3. Numeracy</b>		
Use formulae to perform calculations	2.64	0.92
Use trigonometry to solve problems	2.75	0.96
Understand and interpret basic statistics	2.14	0.77
Interpret data represented in figure and table format	2.63	0.72
<b>4. Reading and understanding</b>		
Understands written instruction	2.97	0.85
Capable of reading texts selectively; understands the purpose of reading	2.45	0.83
Engages with written course content	2.52	0.74
Comprehends health science research literature	2.36	0.57
Critically evaluates written academic texts	2.17	0.58
Organisation of information obtained from written materials	2.42	0.70
<b>5. Finding information/ information literacy</b>		
Create and implement information search strategies (for databases)	2.11	0.50
Assess the credibility of a source	2.13	0.69
<b>6. Digital literacy and technology</b>		
Use of computer software for creating word documents / spreadsheets	3.38	0.88
Managing information and documents using digital file systems	3.00	1.04
Use of digital technologies (social networking, software, wikis, blogs etc.)	3.65	0.88
Communication via technologies such as email, video, Collaborate	3.38	0.94





**Figure 3.** Academics' rating of student skill competency for academic skills considered moderately important or above. Percentage values labelled next to each skill category on the vertical axis represent the percentage of respondents rating 1 or more of the skill items in the category as moderately important or above.

### 3.8. Embedded strategies

Fifty-nine percent of respondents reported having academic skills embedded into their unit. From this, 16 open-ended responses were received identifying the types of strategies employed. Such strategies varied in approach and included those both clearly embedded in an integrated manner into curricular such as scaffolding of assessment tasks to more peripheral adjunctive approaches such as referral to academic skills services or resources (Table 2). For units with embedded academic skill strategies, it was felt that the strategies enhanced the students' academic skills in the targeted area from moderately to enormously by 95% of respondents with embedded strategies.

**Table 2.** Summary of open-ended responses for academic skills development strategies embedded into first year health science units as identified by respondents.

#### Embedded strategies

- Basic numeracy embedded in unit content
- Peer Assisted Study Sessions (PASS)
- Targeted workshops/ tutorials (delivered by academic skills lecturers and / or librarians)
- Targeted skills development tutorials/ lectures (delivered by unit academics)
- Online, self-paced academic integrity and writing modules integrated in unit
- Creation of tasks that integrate scaffolding of resources
- Scaffolded assignment tasks
- Assignment structured to target academic skills development
- Exam based on the development of skills across topics covered
- Marking criteria (explicit for academic and information literacy skills)
- Online links to resources
- Unit information guide provides information on academic writing
- Discipline-specific journal articles on academic writing provided
- Blackboard™ (online unit information platform) question and answer forum with feedback
- Introduction and / or referral to academic skills development support services at the university

With regards to optional and informal support services the following insights were provided:

*“Anecdotally, I would say that the majority of students who needed this form of assistance did not take it. Again, anecdotally, those who did require the assistance of the ASDU [Academic Skills Development Unit] and who did seek it, benefited greatly” [Respondent 1]*

*“I realise the strategies are more informal, such as including the link to the Numeracy resources on MySCU and an introduction to [academic skills lecturer named], who also attended lectures. Because they are informal, not all students access them” [Respondent 31]*

These comments show that there is awareness that support services, although available, will not necessarily be accessed by those that need them, particularly where they are adjunct or supplementary to a unit’s learning activities.

#### 4. Discussion

This study has identified what academic skills health science educators consider important for studying first year health science units. There were only two skill items deemed important by all educators for study in their specific unit. These were ‘understands written instruction’ and ‘use of correct grammar, spelling and punctuation’. Overall, however, skill items across the categories of academic writing, reading and understanding, finding information and academic integrity and referencing were consistently rated moderately important or above by 70% or more of participants. The perceived importance of numeracy varied within this category. Overall, numeracy skills were less frequently rated as important compared to other skill sets. Numeracy skills most frequently rated as important tended to be those that were more generic, namely, ‘interpreting data’ and ‘understanding basic statistics’. For digital literacy, skill importance also varied across the category. Two skill items were considered moderately important or above by over 70% of educators with the other two categories (including ‘use of digital technologies’) only considered moderately important by around half of the educators surveyed. This finding pertaining to use of digital technology seems curious. In fact, over 30% of participants rated this skill as having no importance at all yet all units utilised an online delivery system of information (Blackboard™), regardless of whether they are categorised as internal or external units.

The findings reported here provide insight into educators’ expectations of the skills required to successfully engage with first year study. A first year student enrolled across a health science course would be expected to have a wide academic skill set. This is likely to represent the diverse nature of units included across a first year programme as evidenced by the types of first year units represented in this study (see Figure 1). While some skills, such as those associated with academic writing, integrity, finding information, and reading and understanding, are considered as important by a greater number of educators, other skills such as numeracy and digital literacy are also deemed important but less frequently. The educators who participated in this study were not responding to a discipline as a whole, but rather to what they considered as important to their particular teaching focus.

This study has identified, from the educators’ perspective, academic skill sets that are important for studying first year health science courses. As indicated by Fenton-Smith and Frohman (2013), skills needs and expectations for students in clinical practice, such as communication competence, have been identified, while academic literacy needs for other aspects of health science study are less clear. Looking more broadly, literature commonly reports the importance of academic skills to improve retention and increase success across first year tertiary programmes (Fergy et al., 2008; Goldfinch & Hughes, 2007; Hafford-Letchfield, 2007). However, while it is identified that these skills may vary across disciplines (Chanock, Horton, Reedman, & Stephenson, 2012), specific expectations for the health sciences are not clearly reported in the literature. Considering the importance of making expectations transparent in a way that is accessible to students (Devlin, 2013), the identification of academic skill needs for first year health science students is considered important, as it is a precursor to making these explicit for students.

Results reveal that educators perceive student skill levels as inadequate for the majority of academic skills that they had deemed important. Overall, the perception of student skill level for skills deemed moderately important or above was poor close to half the time with the exception of skills for digital literacy and technology. Educators were more frequently uncertain of their students' skill level in numeracy and finding information than for other categories. Overall, perceived student skill levels for finding information were lower than for any other skill category, with over half of the respondents rating student skill here as poor or below. Of interest is the finding regarding perceived digital technology skill as this varied in comparison with other categories. Here, student skill levels were perceived as being adequate or above in the majority of cases, in contrast with other skills categories for which close to half of educators' responses indicated students' skills as poor or below.

In general, variation observed for ratings of importance are also likely to represent the nature of units and the diverse skill sets needed in such units. For example, numeracy or anatomy based units may not require skills for referencing and academic writing compared to other units with assessments involving written assignments following academic conventions.

This study did not assess demonstrated student skill but student skill level as perceived by the educator. Despite this, findings are consistent with other research on educators' perceptions of their students' academic skill competence. Allowing for differences in unit content with regards to proficiency in finding and using information, studies conducted in the USA support our findings (Birmingham et al., 2008; Dubicki, 2013). Furthermore, Stevens and Miretzky (2012) also showed that when it comes to lecturer satisfaction with competence, perceptions of low work ethic and poor skill level pre-university were held by faculty staff.

The frequent perception of students having poor skill levels found in this study is also consistent with research that directly measures academic skill competence of first year health science students. For example, studies by both Palmer et al. (2014) and Sacre and Nash (2010) assessed academic literacy skills in such students finding shortfalls in skill levels. So while the current study is based on perceptions of the educator regarding their students' academic skill competence, findings are consistent with studies measuring student skill competency.

Another consideration regarding skill perception relates to a student's self-perception. While not assessed here, this has been reported to be incongruent with actual skill and has implications for embedding support strategies. For example, many studies show that first year students' self-perception of their information literacy proficiencies are mismatched when assessed with standard tests or as reflected in their assignments (Gross & Latham, 2012; Head & Eisenberg, 2009; Milne, Thomas, & Dawson, 2009; Wilkes & Gurney, 2009). This has implications for strategies devised for students to self-select support. If there is a self-perception of skill competency that is incongruent with real skill level, it would be difficult for an individual to identify the benefit of or need for skill building strategies. Embedded strategies are, by nature, more likely to be accessed by all students as they are built into curriculum. Embedding offers an advantage over optional supplementary support because it is not dependent on students identifying their own skill level and self-selecting support (Kimmins & Stagg, 2009).

As discussed, this study investigates educators' perceptions of their students' skills rather than directly assessing student skill competency. This may be considered a limitation as findings are based on perceived not actual skill and as such may have implications for interpreting these results. While we acknowledge here that we have assessed perception, as already identified, studies measuring academic skills competency of first year health science students, consistent with this study, have shown shortfalls (Palmer et al., 2014; Sacre & Nash, 2010). Additionally, identifying perception of skill level rather than quantifying it directly is not unique to the work here (Birmingham et al., 2008; Dubicki, 2013; Stevens & Miretzky, 2012).

Another limitation relating to educators' perceptions of skill level judgement is that educators were asked for a rating based on skill levels for the majority of students in their unit. Given the non-homogenous student profile associated with diverse entry pathways into health science courses at this institution, findings do not necessarily represent all students in the course. Finally, the survey was administered at the end of the second academic session (of a tri-session academic

year). Educators ran units in either, any or all sessions. There was no uniform time point defined in terms of when students' skill levels were being judged and this may have varied across educators.

#### 4.1. Implications for practice

This study identified the importance of academic skill sets as judged by first year educators for diverse entry first year health science students. Literature supports the need to make expectations explicit and give students opportunity to develop skills to achieve success (Devlin, 2013). Furthermore, Palmer et al. (2014) emphasise the importance of making academic literacy expectations explicit in both teaching and assessment. Transparency of expectation is also suggested to support student retention (Scott et al., 2008). Students would also benefit from knowing the expectations and priorities of educators regarding academic skills (Goldingay et al., 2014). Focusing on the observation in this study that a large proportion of educator ratings indicate poor student skill levels for those skills deemed important, the implications here should be to provide *explicit* information to students about the skills academics expect students to develop.

Evidence from this investigation shows many unit educators implement academic skills development support, with 59% reporting use of embedded strategies. However, responses suggest that there is a broad sense as to what constitutes an 'embedded' strategy. Although this survey asked educators to identify strategies that were embedded, those conventionally classified as supplementary, such as referrals to and provision of links for academic skills support and resources, were also included. It is possible that there is a difference between what discipline educators and academic language and information literacy educators regard as constituting an embedded strategy. Despite this, many reported strategies did align with the conventional notion of embedded support, and overall, the large majority (approximately 95%) of those adopting academic skills development strategies believed they enhanced skill levels in the targeted area moderately or above.

Research over the past few decades identifies a preference for embedded academic skill support strategies (Chanock et al., 2012; Gunn et al., 2011; McWilliams & Allan, 2014), yet use of embedded strategies is still not the norm (Gunn et al., 2011). Looking specifically at health sciences courses, trends in Australia show individual student consultation, followed by discipline specific workshops and resource provision as the most frequent ways academic skills development is supported (Fenton-Smith & Frohman, 2013). While in some instances resource provision and discipline workshops may be embedded, these instances typify standalone and supplementary approaches. This pattern of support is not dissimilar to many examples identified in this study. While the overall perception was that adopted academic skill support enhanced students' academic skill, some acknowledged support strategies that may not truly engage all students and are perhaps more likely to miss the individuals that mostly need such support, as is the nature with non-embedded approaches. This view is supported in the literature and is frequently given as a reason why stand-alone or optional strategies are likely to be less effective than fully embedded approaches (Hitch et al., 2012; Kimmins & Stagg, 2009). It is suggested that adjunct or supplementary approaches could be constrained by psychological factors and stigma associated with seeking support (Hoyne & McNaught, 2013; Kimmins & Stagg, 2009) as well as time management issues associated with extra-curricular study commitments (May, Hodgson, & Marks-Maran, 2005). Furthermore, if students falsely perceive their skills are adequate, they are probably less inclined to identify the need for and to access support (Kimmins & Stagg, 2009). Embedding within curriculum not only helps to address these barriers, but also helps to contextualise the importance of academic skills sets within a discipline (Chanock et al., 2012).

Several papers identifying successful student focussed strategies for embedding academic and information literacies in first year health science courses are available. As examples, Hendricks, Andrew, and Fowler (2014) showed that in-built academic literacy programmes, utilising a blended approach, significantly improved skill levels, particularly for unpacking assignment questions. Fallahi, Wood, Austad, and Fallahi (2006) showed that embedded class activities delivered by discipline educators involving writing and referencing practice, peer-review, and feedback significantly improved the writing skills of undergraduate psychology students in the USA.

Whilst we acknowledge that the majority of research evaluating efficacy of such programmes lack comparison to a randomly allocated control, and thereby outcomes on success are potentially confounded, Thies (2012) claims that evidence of success for embedded strategies highlight the relevance of such an approach. Furthermore, the notion of collaboration between faculty, librarian and academic skills support teachers for successfully embedding academic literacy strategies is well supported (Association of College and Research Libraries, 2015; Birmingham et al., 2008; Bundy, 2004; Gunn et al., 2011). With this in mind, and in view of the current findings that many support strategies are not truly embedded, we recommend that discipline educators work more closely with literacy specialists to develop and implement embedded strategies.

#### 4.2. Future directions

As well as the implications for practice generated from this work, considerations for future research are suggested. As this study looked at perception of educators, rather than actual skill level, future work incorporating both elements would help to determine if this perception is aligned with actual skill. Further work to elucidate the reason for the apparently low importance educators put on digital literacy skill despite all units, irrespective of whether delivered in distant, blended or internal delivery modes, using online learning platforms (Blackboard™), could be helpful. Terminology sometimes eludes faculty or has different meanings for individuals. It may be useful in further surveys to ensure that concepts entailed in information and academic literacies as well as embedded support are uniformly understood.

### 5. Conclusion

Across the higher education arena there is limited data about the academic skills educators expect students to bring to their learning. In order to reach professional standards, health science students are known to face particular challenges. Educator expectations and also perceptions of student ability were considered here to provide insight about academic skill development. With a focus on the first year across a range of health disciplines, this investigation has empirically identified that educators consider a broad spectrum of academic literacy skills necessary for learning. Further to this, an overwhelming majority of these educators reported academic skills as highly important, whilst perceiving student competency to be poor, yet just over half reported actually embedding academic skills. Considering these findings further, there is a clear mismatch between educator expectations, perceived skill level and the number of educators adopting embedded skill development strategies. These results have implications for academic practice in first year health science courses. It is recommended that, along with the embedding of specific academic skills, educators provide students with clear expectations about specific skill competency.

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