

Capstone curriculum across disciplines: A snapshot of current practice in Australia and beyond

Survey report

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Support for the production of this report has been provided by the Australian Government Office for Learning and Teaching. The views expressed in this report do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.



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2015

ISBN PRINT: 978-1-76028-539-5
ISBN PDF: 978-1-76028-540-1
ISBN DOCX: 978-1-76028-541-8

Acknowledgements

This report is an outcome of research undertaken for the National Senior Teaching Fellowship *'Capstone Curriculum Across Disciplines: Synthesising theory, practice and policy to provide practical tools for curriculum design'*, awarded by the Australian Government Office for Learning and Teaching (OLT) in 2013.

Sincere thanks are due to the OLT, and its staff, for their unflagging support and advice in achieving the fellowship goals. Thanks are also due to the fellowship advisory group. Comprised of outstanding experts in higher education research and practice, the group provided critical guidance throughout the fellowship program, including the design of the survey and other research activities, which form the basis of this report. The complete list of advisory group members is listed in the accompanying final report for the fellowship program.

With a keen understanding of the demands of academic workload, we also must sincerely thank all participants who completed the survey, contributed through interviews, case studies and workshops. The contribution of detailed information about capstones provided by each participant is a testament to the dedication of individuals to improving learning and teaching across the higher education sector in Australia and across the world.

Thanks must also go to senior staff at Victoria University in Melbourne, Australia - the home institution of the Fellow. Particular thanks are due to Professor Margaret Mazzolini, Professor Anne Jones, and Professor Kerri-Lee Krause, each of whom have provided invaluable support throughout the process.

Finally, we thank the many individuals who provided specific support in preparation of this report: Professor Jon Grahe of Pacific Lutheran University, Daniel Tout and Associate Professor Anthony Watt and Sandra Sampayo-Vargas, who provided additional editorial reviews.

Particular thanks are due to Sophie Edwards at Victoria University, who provided comprehensive editorial and statistical review in the final stages of the preparation of this report.

List of acronyms used

ALTC	Australian Learning and Teaching Council (now OLT)
AQF	Australian Qualifications Framework
FTE	Full-time equivalent
LTAS	Learning and Teaching Academic Standards
OLT	Office for Learning and Teaching (formerly ALTC)
PBL	Project or problem-based learning
TEQSA	The Australian Tertiary Education Quality Standards Agency
WIL	Work-integrated learning
UK	United Kingdom
US	United States

Other terminology

Contact hours: Hours students spend in contact with an educator. These contact hours can be in both offline and online environments. They are distinct from student independent hours, in which students complete educational tasks independently and not in direct contact with an educator.

Course: A collection of units, modules or subjects collectively leading to a qualification, and usually named by that qualification, otherwise termed a *program*.

Duration: The period of time during which a capstone is delivered.

Dual sector: A term commonly used in Australia to describe universities that provide post-compulsory vocational and further education or training courses as well as higher education bachelors, masters and doctoral degrees.

Semester: A common teaching period in Australia, generally 12 weeks in length.

Teaching period: The period of time in which a unit may be delivered, generally a semester, trimester or term. A semester is typically the longest of these teaching periods at around 12 weeks. Trimesters are generally slightly shorter and terms are generally 6-8 weeks. However, these timeframes vary enormously.

Unit: A set of activities grouped for enrolment and assessment purposes, and may alternatively be referred to as a subject or module.

Weighting: The proportion of total marks allocated to a particular unit within a course and to an assessor, criterion or assessment piece within a unit.

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Chapter 1: Introduction

1.1 Background

Capstones occupy a unique pedagogical and curriculum space in higher education. They are a significant, culminating learning experience that provide opportunities for students to consolidate, interrogate and apply prior and new learning, develop skills in decision-making and interpersonal management, and develop maturity as independent learners (Lee & Loton, 2015). They provide both closure and transition to post-graduation life (McNamara et al., 2011). This can mean a significant degree of focus on the development of skills for employability, such as teamwork, communication and leadership (McNamara et al., 2012). Capstones are also playing a growing role in quality assurance within higher education, as a means of evaluating course-level learning outcomes, as well as the employability and overall quality of graduates.

At the commencement of this study, anecdotal evidence and international research suggested capstones are delivered using a diverse range of curriculum approaches such as project or problem-based learning, the involvement of external industry or community partners, placements, simulations or portfolios. Length, delivery mode and assessment style and scope also vary significantly.

Some recent discipline-specific studies in Australia also indicate an emerging evidence base (for example, van Acker et al., 2013, in business and Rasul et al., 2012, in engineering). Nonetheless, at the outset of this study, little was known about the prevalence of capstones, or approaches to their delivery, across the disciplines in Australia. In contrast, sector-wide and cross-disciplinary studies of capstones have been undertaken in the US. These include *Professing the Disciplines: An Analysis of Senior Seminars and Capstone Courses* (Henscheid, 2000) and, more recently, surveys and analyses of course offerings carried out at the state (Hauhart & Grahe, 2010) and national (Hauhart & Grahe, 2012) levels. While some of these studies focus primarily on the social sciences, they provide empirical evidence of current practice in the US higher education sector. In the United Kingdom, recent work by Professor Emeritus Mick Healey has also explored the role of the final year honours project or dissertation – a traditional component of the English undergraduate experience (Healey et al., 2012). This work has demonstrated the many similarities in concepts and approaches to culminating educational experiences.

1.2 The fellowship

In 2013, the Australian Government Office for Learning and Teaching (OLT) funded a National Senior Teaching Fellowship on the topic of capstone curriculum across disciplines.¹ At that time, there was anecdotal and some discipline-specific empirical evidence indicating a rapid uptake and increasing focus on capstones in the Australian higher education sector. However, there were few empirical studies aimed at mapping the characteristics of these capstones across disciplines, and little guidance available to staff tasked with their design and delivery.

As part of the fellowship program, a range of engagement, support, resource development and research activities was undertaken. The research activities were wide-ranging,

¹ For more information on the fellowship, see www.capstonecurriculum.com.au.

comprising desktop reviews of course and curriculum documents, case study collection and interviews with staff, and a survey of staff engaged with capstones. More information on the fellowship activities and outcomes can be found on the fellowship website and in the final fellowship report.

The aim of the survey was to provide a broad empirical overview of how capstones are structured and delivered, as well as participant perceptions of factors impacting their effectiveness and the benefits and challenges they present. As such, it was designed to seek input from staff who are currently, or have recently been, involved with a capstone unit. The emphasis was on undergraduate capstones, but not exclusively so. Examples from postgraduate masters and associate degrees were also accommodated.

As described in the body of this report, the survey was designed to provide a broad descriptive snapshot of current capstone activity. The norms uncovered in the data should not be considered the only acceptable approaches to capstone design and delivery, and the report is not intended to limit innovation or define what should be in a capstone. Rather, by unpacking some of the ways in which capstones are commonly or less commonly delivered, it is hoped that staff from across the sector will be further enabled in their own capstone design activities. Further practical resources in support of this goal can be found on the capstone website at www.capstonecurriculum.com.au.

1.3 Structure of the report

The report of data and findings in this report is broken into seven chapters. Chapter two outlines the method for the study. Chapter three describes the demographics of the capstones, including age, location in course and weighting. Chapter four presents some common characteristics of capstones. Chapter five details organisational aspects of capstones, such as staff-student ratios and the use of group and individual work. Chapter six explores assessment activities and assessors. Chapter seven outlines perspectives on the purposes of capstones. Chapter eight presents participants' perspectives on the best things and key challenges about their capstones, opportunities for improvements, and support mechanisms for capstone design and delivery.

Graphs are provided through the body of the report, generally with percentage figures. Case numbers and other data are provided in Appendix 1: Data tables. Notes regarding tables corresponding to each item are included in footnotes throughout.

Chapter 2: The survey

2.1 Method

The survey was designed to gather data on contemporary capstone models-in-use. For the purposes of the survey, a capstone was defined very broadly as:

A significant, culminating and assessed learning experience within a qualification, although it may also be non-credit bearing. Capstones are likely to implicitly or explicitly focus on providing students with an opportunity to integrate and apply prior learning, and to support the transition to professional life or post-graduate studies. It may be called a capstone, a final year project or dissertation, depending on the country and nature of the curriculum.

The survey design drew on previous studies in the US (see Hauhart & Grahe, 2015 for a summary) and relevant themes in the literature, and was adapted for the Australian context. This adaptation was informed by the fellow's prior work in the field, as well as a desktop review of capstones in Australia and responses to a small-scale pilot.

A mixed-method approach was used within the survey, which comprised a combination of ranking, multiple-choice, sliding scale and open comment question formats. There were two primary reasons for using a variety of question formats. Firstly, because the categorisation of educational concepts is open to interpretation, most quantitative items in the survey were accompanied by an open-ended response that allowed participants to elaborate on their choices. This allowed the researchers to confirm and triangulate responses, particularly where participants felt that the available multiple-choice categories did not clearly describe their capstone. Secondly, a number of open-ended questions were provided. These questions were intended to generate descriptions of staff perceptions of working with capstones, including the best things about their capstone, the major challenges and how the capstone might be improved.

The survey was substantial and questions were wide-ranging, covering the following areas:

- Institutional and course context, including capstones' place in the wider course, as well as their duration and weighting;
- Structural components, such as cohort sizes, delivery formats and timing, proportions of full-time study load and staff–student ratios;
- Overarching characteristics, including whether capstones were project- or problem-based, work integrated, multi-disciplinary and/or international;
- Methods of delivery and organisation, including how contact hours and independent working time were organised, assessment products and methods, and assessors;
- Purposes, mapped against a list of 28 different capstone purposes derived from the literature; and
- Challenges and benefits, as well as support mechanisms available and/or needed via institutions, professional bodies and other agencies.

The full list of survey items can be found in Appendix 2: Survey questions.

2.2 Recruitment strategy

A comprehensive communications plan was formed as part of the fellowship, and this plan supported advertisement of the survey. A number of methods were used to advertise the study and to recruit participants.

Firstly, keyword searches were undertaken on the websites of Australian higher education providers, in order to identify potential capstones and academics working with them. Seven hundred potential participants were identified in this manner and sent an individual email, with two follow-up reminders for those who did not respond.

In addition, advertisements for the study were circulated through the fellow's professional network, which included academic leaders at Australian institutions. These advertisements requested circulation of the invitation to relevant staff. Links to the study website were also provided in all events and publications where the fellowship was represented, and in all correspondence related to the fellowship.

While recruitment was originally confined to staff working with capstones in Australia, expressions of interest were also received from international academics. As a result, a smaller sample of capstones based outside of Australia has also been included in the analysis. Further details on the sample are provided in Chapter 3: Capstone demographics.

2.3 Analysis strategy

Quantitative analysis

The quantitative analysis presented in this report is primarily descriptive, focussing on identifying the key characteristics of capstone models. Where appropriate, further statistical analysis was undertaken to determine whether these characteristics are related to other factors of interest.

Descriptive statistics specifying the frequency of the survey responses across categories are presented as percentages in the graphs within this report. Frequency tables with explanatory notes on sample size, missing data and subgroups are presented in Appendix 1: Data Tables.

The inferential investigation utilised non-parametric tests to explore relationships between groups because almost all the survey data collected was either categorical or ordinal data, and the continuous data collected did not conform to normality testing. The analysis of categorical data utilised the Pearson's Chi-Square to discover whether there were significant relationships present between factors. Where sample size and the type of data allowed, Mann-Whitney-*U*, Kruskal-Wallis, and Kendall's Tau-b tests were used to further explore relationships between factors. More detailed explanation of the statistical analysis, including explanation for the choice of tests used and the results of inferential testing can be found in Appendix 1: Data Tables.

Qualitative analysis

The qualitative analysis strategy had two key components. First, the open-ended fields, which accompanied many of the quantitative items, were used for triangulation and elaboration of the quantitative results, as well as data cleaning (removing inapplicable cases from analysis). Secondly, more detailed open-ended items that prompted participants to provide descriptions of aspects of their capstones, such as benefits and challenges, were analysed thematically. These themes emerged through a process of

coding participants' responses, both within and between survey items. To elaborate, certain themes are evident in response to the same survey question, but other themes became evident as participants described similar aspects of capstones in response to different prompts in the survey. These qualitative results are presented primarily in Chapter 7: Perspectives on capstone design and delivery, but are also occasionally interspersed with quantitative analysis where this provides further insights.

2.4 Limitations

In addition to the general nature of the analyses reported here, the measurement and quantitative analysis of capstones, as with many educational subjects, is limited for several reasons. This section considers some applicable limitations and, where appropriate, describes the ways in which these were addressed or managed in the study.

Rapid change

The higher education sector, institutions, and indeed many individual higher education courses, are prone to rapid change due to a wide range of contextual and internal drivers. This includes changing student cohorts, ongoing quality improvement activities, the availability of resources, and shifts in institutional and government policy. Australian capstones are additionally prone to rapid change at this point in time, with anecdotal evidence suggesting that the implementation and evaluation of capstones is currently occurring across the Australian sector. The survey data presented in this report can, therefore, only describe a snapshot of a selection of activities at a particular point in time.

Differing or contested interpretation of terms

The use and definitions of key terms vary across countries, institutions, disciplines and qualifications. Many terms or concepts utilised in the higher education literature, or in practice by educators in the sector, are interpreted differently or have contested definitions. The term capstone itself is an example of a term that is not easily defined. Other such terms include those relating to the duration of study, sector types and boundaries (e.g. tertiary or higher education), differences between private and public institutions, and curriculum structures, such as project-based, work integrated or multi-disciplinary learning. To manage possible confusion, participants were encouraged via open-ended questions to elaborate on their quantitative choices where appropriate, and these comments were cross-checked during analysis. Nonetheless, we should not exclude the possibility of variable interpretation of terms in some aspects of the survey.

Potential information loss from quantification

A general limitation of quantitative studies in this context is the potential loss of information when aspects of education are reduced to discrete categories or a measurement scale. This limitation was mitigated in the present study by including an open-ended component with most categorical or measurement items in the survey. This encouraged participants to explain why a given set of choices did or did not reflect that element of their capstone, and the researchers were then able to confirm the quantitative data and take into consideration new category information during analysis. Nonetheless, the analyses presented here are generally high-level, and do not explore outliers or novel cases in great detail.

Limitations of discipline categories and subsamples

Subsamples were reviewed throughout the analysis to identify where particular countries, disciplines or characteristics showed significantly different patterns of delivery. In many

cases, this resulted in small case numbers. Where possible, this was mitigated by collapsing subsamples to broader categories. Similarly, the collapse of disciplines into broad fields of education (as noted below in section 1.6) means that distinctive discipline approaches are not necessarily represented. The limitations of this and the capacity of small subsamples to demonstrate patterns should be noted. To aid the reader, sample numbers are provided in the tables in Appendix 1: Data tables and occasions of very small subsample numbers are noted in the body of the report.

2.5 Participation

A total of 220 participants commenced the survey and 216 completed most items, each detailing a capstone.

International representation

A total of 45 international participants represented 20.8% of the overall sample, from 27 different institutions. The two most prominent cohorts were from New Zealand ($n=20$) and the United States ($n=17$), with smaller cohorts from elsewhere, including two each from Canada, Hong Kong and the UK, and one each from the Czech Republic and Singapore. Although limited, these international cases provide some opportunity for comparison against the Australian cases. Like the Australian providers, higher education institutions dominated the international sample (86.4%), with only six international private providers represented (13.6%); one participant from an international provider did not indicate whether their institution was private or public.

Australian representation

In total, there were 171 Australian participants, representing 79.2% of the total sample. Universities dominated the Australian responses (97.1%), with far fewer responses from private providers (2.9%). To calculate sector response rates, the number and types of higher education providers present in the Australian sample were compared to the National Register of higher education providers available via the Tertiary Education Quality and Standards Agency (TEQSA),² as at November 2014. They are as follows:

- 5 of 138 private providers were present, a sector representation of 3.6%;
- 36 of 41 universities were present, a sector representation of 87.9%;
- 29 of the university responses were from dual-sector institutions, 173 from higher education only.

In terms of institutional coverage, the sample provides very good representation of Australian universities. Response rates tended to be consistent with the size of institution (by student enrolment); larger providers tended to have more capstones represented than smaller institutions. Nonetheless, it is important to note that the variations of practice within institutions mean that the data are not necessarily representative of each institution. In our analyses we focused on country and discipline, rather than institutional, comparisons.

Although invitations were sent to every registered private provider, limited responses were received from these organisations. There are a number of possible reasons for this. While we were able to access contact details for staff delivering capstones in public institutions, this was usually not the case for private providers. As a result, invitations were

² For more information, see: <http://www.teqsa.gov.au/national-register>.

sent through generic email addresses, or to a central point of contact following telephone queries. Feedback from private provider staff suggests that there are a range of other possible reasons for the lower participation rates, including limited offerings at bachelor level, a desire to maintain commercial confidentiality, and less encouragement for staff to engage in sector-wide research activities.

2.6 Discipline representation

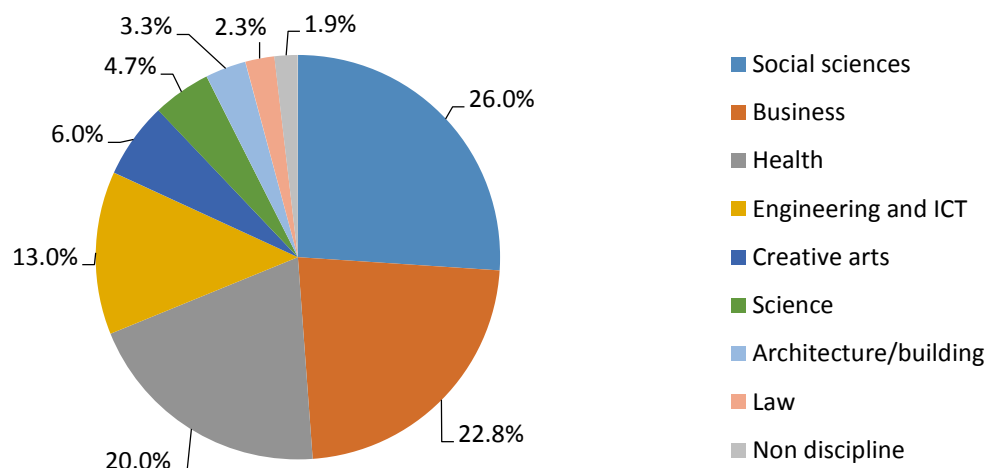
Although boundaries between fields and disciplines blur and shift over time, variations in capstone curricula and pedagogical approaches between disciplines are often cited (Henscheid, 2000). In our survey, participants were asked to indicate the discipline in which they work. Those working outside of their own discipline for capstone purposes, particularly in inter-disciplinary capstones, indicated this separately, and the submitted discipline was also cross checked with the capstone data to ensure that no anomalies appeared between discipline of participant and discipline of capstone.

For simplicity and consistency with common Australian usage, responses were mapped to the eight discipline groupings identified in the Learning and Teaching Academic Standards (LTAS) (Australian Learning and Teaching Council (ALTC), 2011). As some of these have lengthy descriptors, some shortened terms were used to represent these groups through the report (see Table 1).

Table 1: LTAS discipline groups and abbreviations

LTAS discipline group	Term used in this report
Architecture and building	Architecture/building
Arts, social sciences and humanities	Social sciences
Business, management and economics	Business
Creative and performing arts	Creative arts
Engineering and ICT	Engineering/ICT
Health, medicine and veterinary science	Health
Law	Law
Science	Science

A reasonable spread of discipline groups was present in the data. The strongest representation was from the social sciences, followed by business, health and engineering/ICT, in that order. The remaining responses represented creative arts, science, architecture/building, and lastly law (Figure 1). Four participants indicated that their capstone did not have a particular discipline orientation.

Figure 1: Discipline groups in the sample ³

2.7 Participant involvement in the capstone

Length of involvement in the capstone

Participants were asked to provide an indication of the length of time they had been involved in the capstone. The majority of participants had been involved with their capstone for less than five years, with 80 participants (40.8%) indicating 2–5 years, followed by 51 (26.0%) reporting less than two years' involvement, 36 (18.4%) reporting 5–10 years and 29 (14.8%) involved for more than ten years.⁴

Major duties undertaken in the capstone

Participants were asked to indicate and rank the prevalence of their role in the capstone. The options were: managing/coordinating, developing curriculum, teaching/supervising, and providing curriculum advice. Of the 199 responses received for this question, 83 participants selected all four items, and 66 chose three. The most commonly selected item was teaching ($n=174$), followed closely by managing or coordinating ($n=167$), developing curriculum ($n=163$) and providing curriculum advice ($n=109$). Managing/coordinating was generally considered the most prevalent role (73.1% in rank 1 among the valid ratings). Curriculum advice was ranked as the least prevalent (45.0% in rank 4).⁵

³ Table 3: Discipline groups in the sample

⁴ Table 4: Length of involvement in the capstone

⁵ Table 5: Duties undertaken in the capstone

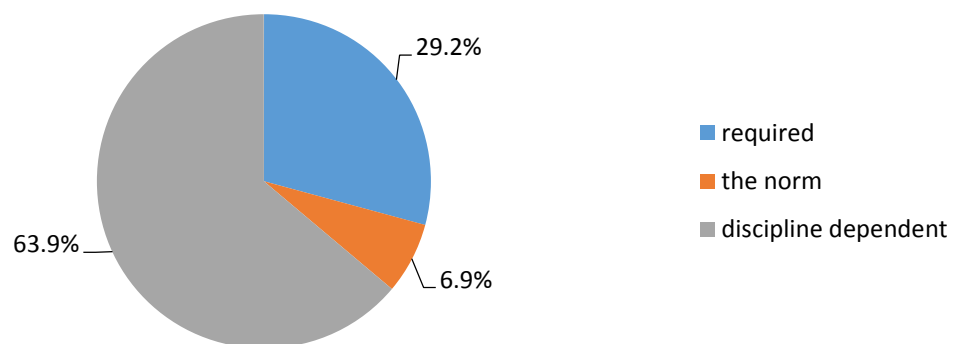
Chapter 3: Capstone demographics

3.1 Capstone imperatives

Within institutions

Participants were asked to indicate if capstones are ‘required’ or ‘the norm’ in their institution. In addition, participants could also select whether these expectations were ‘discipline dependent’. By far the most common response was that the use of capstones was dependent on discipline (63.9%), followed by 29.2% required and 6.9% simply the norm (Figure 2).

Figure 2: Institutional expectations ⁶



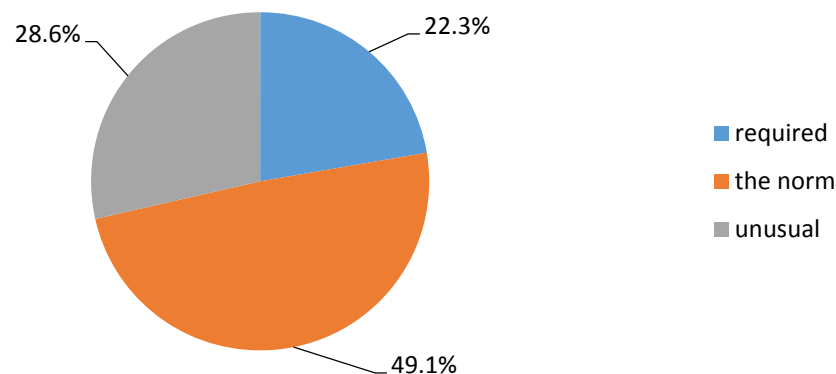
Within disciplines

Participants were then asked to characterise expectations around capstones in their discipline as ‘required’, ‘the norm’ or ‘unusual’. Of those that responded to this question, the largest proportion indicated that capstones were the norm (49.1%), demonstrating some permeation of capstones at discipline level. The remaining responses showed a reasonably even spread between required and unusual (Figure 3).

Capstones were perceived more often as unusual in the disciplines of law and science, as normal in engineering/ICT, health and business, and required in architecture/building and creative arts. Unsurprisingly, given the breadth of the fields of education, substantial participant disagreement was found within the groups, which suggests some caution is necessary when interpreting the findings. This was especially apparent in the social sciences, which is perhaps the broadest field of education, in which 34.1% of participants reported capstones as being required or normal, and 31.8% indicated that capstones were unusual.⁷

⁶ Table 6: Institutional expectations

⁷ Table 8: Discipline expectation across discipline groups

Figure 3: Discipline expectations⁸

Institutional policies

A reasonable proportion of participants (21.5%) indicated their institutions had a policy on capstone implementation or design, but a larger proportion reported that their institutions did not have such a policy (43.5%), and another large group did not know (35%).⁹

Professional bodies

Participants were asked whether a professional body governs their discipline. The sample was almost equally divided between disciplines governed by a professional body (47.0%), and those not governed by a professional body (47.4%). A further 5.6% of participants indicated that they didn't know.¹⁰

Participants whose discipline was governed by a professional body were also asked whether that body provided a definition of capstones. A minority of 17.2% selected yes, but most indicated their professional body did not provide a definition (55.6%) and 27.3% reported that they were unaware of whether or not any definition was provided.¹¹

3.2 Reasons for introduction

Participants were asked to comment on why their capstones were first introduced. A total of 199 participants provided a response to this question, often covering more than one topic. These responses fell into two general themes: the mandated introduction of capstones and their perceived educational benefits.¹²

Recent mandates to introduce a capstone within a university, whether by policy or other means, were reported by 22.1% of participants. An additional 5.5% referred to a general quality imperative. A small number specifically reported that the introduction of the capstone was motivated by a need to comply with the Australian Qualifications Framework (AQF) (4%).

The majority of participants reported educational benefits as the driving factor. This included comments on improving work-readiness, the application of knowledge and ensuring a course remains relevant to professional settings (41.7%). Integration or

⁸ Table 7: Discipline expectations

⁹ Table 9: Institutional policies

¹⁰ Table 10: Professional body

¹¹ Table 11: Professional body capstone definition

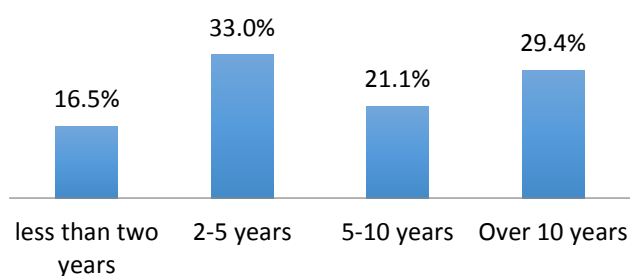
¹² Table 12: Reason for introduction

consolidation of learning was the second most prevalent educational benefit identified (23.6%), followed by providing culminating experiences (4.5%); improving the overall student experience (4%); and research preparation (4%). Additional benefits, including a perception that a capstone is a sensible or pragmatic inclusion to the course, students wanting it, and/or the capstone providing differentiation from competing education providers, were identified in a small number of cases.

3.3 Age

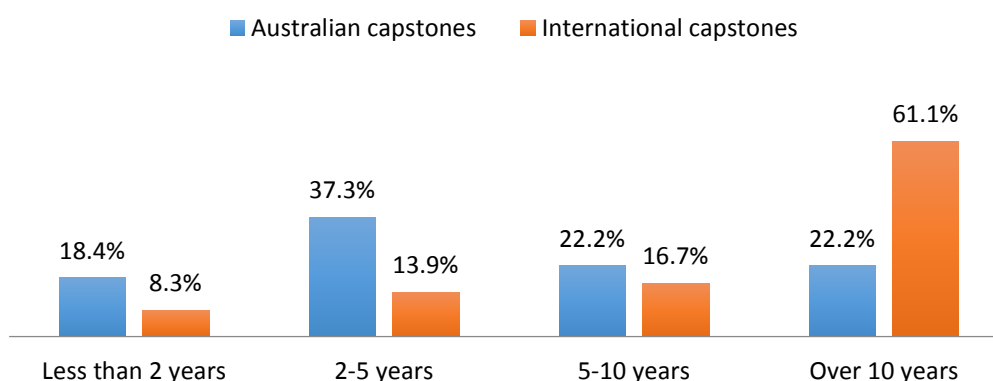
The literature suggests that capstones have long been delivered in some discipline areas, but are a recent phenomenon in others, especially in Australia. In order to understand the degree to which capstones are newly introduced, participants were asked about the age of their capstone. A fairly even spread was evident across the age categories utilised, with a mix of young and old capstones in the sample (Figure 4). Around half of all capstones (49.5%) had been created less than five years ago.

Figure 4: Age of capstones ¹³



Generally, Australian capstones were much younger than those from other countries, with just 44.4% of Australian capstones over five years old, compared with 77.8% of international capstones (Figure 5). A chi-square test indicated that international capstones were significantly more likely to be older than Australian capstones.¹⁴

Figure 5: Age of Australian and international capstones ¹⁵



¹³ Table 13: Age of capstones

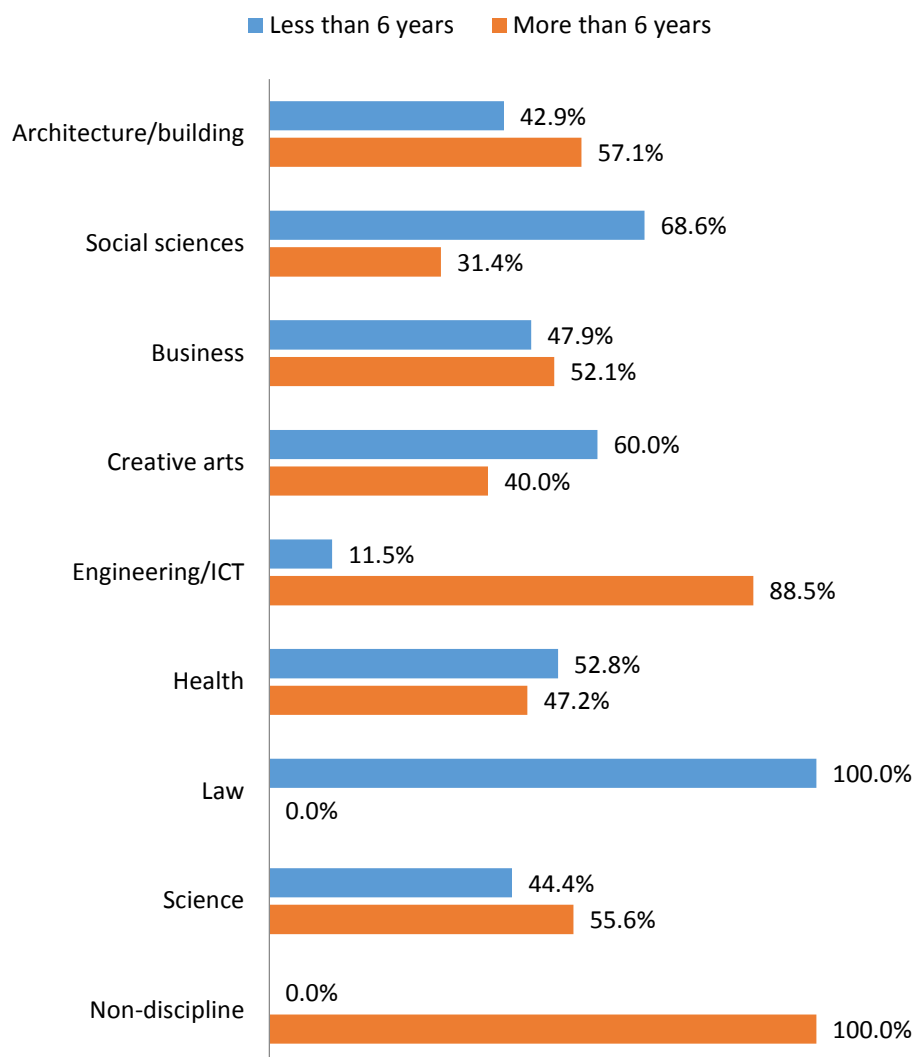
¹⁴ Chi-square $\chi^2(3, n=194)=22.23, p=0.001, \Phi=.34$

¹⁵ Table 14: Age of Australian and international capstones

Age across disciplines

Most disciplines showed a similar proportion of old and young capstones. However, engineering/ICT tended to house older capstones, while law housed younger capstones (albeit with very small sample numbers). For ease of reading, Figure 6 shows these data in two categories: less than, and more than, six years old. This finding is consistent with the literature on capstones, which shows a long history of capstones in the fields of engineering and ICT. A chi-square test of independence found that the differences in age of capstones across the discipline groups were large and significant.¹⁶

Figure 6: Prevalence of capstones more or less than six years old across disciplines¹⁷



Note: Law, architecture/building, science and non-discipline subsamples are characterised by very small response numbers.

3.4 Regularity of revisions

Participants were asked whether major changes had taken place in their capstones, when this had occurred and why. 116 participants indicated that changes had occurred, and

¹⁶ Chi-square $\chi^2(9, n=161)=34.15, p=0.001, \Phi=.46$

¹⁷ Table 15: Age of capstones across discipline groups (two categories)

many of these indicated their capstones were subject to annual review that usually resulted in some changes, albeit minor rather than major.¹⁸

Where participants indicated a year ($n=111$), this was analysed. The great majority of changes occurred recently, with 49.5% of cases within the previous 1.5 years and a further 38.7% revised between 1.5 and 5 years ago. Of those who completed this question, twelve years was the longest period without major changes listed, while only 11.7% of cases indicated major changes had last taken place more than five years ago. This suggests that most capstones are dynamic and undergo major changes on a regular basis.

Participants were also asked for the reasons their capstones had undergone changes. Reasons for these changes included: refreshing a capstone to ensure authenticity to changing external conditions; adjustments to projects and how they are supported; increasing alignment with awards or to meet registration requirements; coordinators inheriting capstones then personalising them; adapting to changes in resources; changing the duration of the capstone to better accommodate the goals; and adjustments in response to feedback from students and annual course reviews. The types of changes were highly variable, although many included significant changes to teaching and learning strategies, such as substitution of a work placement with a simulation, and vice versa.

3.5 Course level

Consistent with the literature and current focus on undergraduate capstones in Australia, the sample was dominated by capstones that take place in the final year of an undergraduate degree (74.5%). A further 12.7% were masters' level courses, and 3.8% honours. Fifteen participants (7.0%) selected 'other' in response to this question, most of whom explained that their capstones take place at varied times within a course for different cohorts of students, or that the relevant option was not provided on the survey. These included references to the final year of an Associate Degree, a single-year Graduate Diploma, and at the conclusion of courses with unusual lengths (for example, 3.5 years).¹⁹

Required/elective

We also asked whether the capstone was required or optional for students. Of the 194 participants who completed this question, 75.8% indicated that their capstones were a compulsory part of a course. A further 7.7% were elective, while 16.5% were a combination, that is, required for some streams but elective for others.²⁰

3.6 Credit

Participants were asked to classify the general structure of their capstone in relation to courses. The vast majority ($n=135$) were a single unit in which students were assessed for their capstone work. Smaller numbers reported multiple units, an activity assessed in multiple units, or an activity that occurred across multiple units but was assessed in one. Only two participants reported non-credit bearing capstones, one of which was assessed (Figure 7).

While there was relatively poor delineation of differences between the categories of multiple units, multiple activities and multiple assessments, taken together, 27.2% of

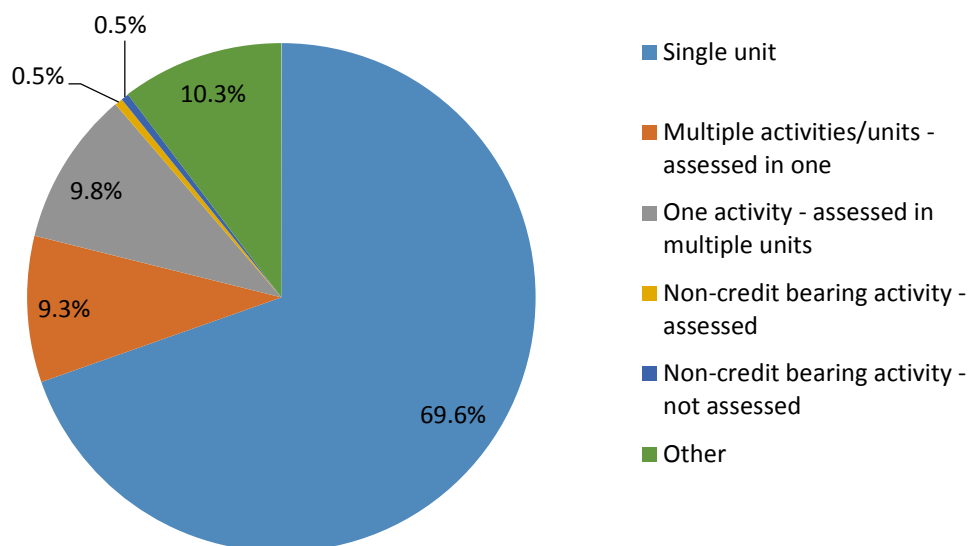
¹⁸ Table 16: Recent revisions

¹⁹ Table 17: Course level

²⁰ Table 18: Required or elective

capstones in the sample involve more than one unit or activity. Some caution should be applied to the reading of these data as well as the proportion of single units, however. Comments suggested that some units may have been reported in the single unit category may also be part of a sequence.

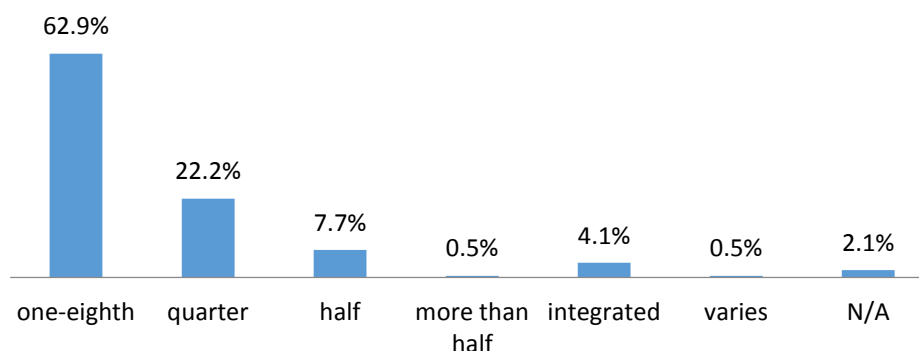
Figure 7: Distribution of credit/non-credit capstones ²¹



3.7 Proportion of FTE studies

The proportion of full-time equivalent (FTE) studies accounted for by a capstone is an indicator of how substantial the capstone is in relation to an overall course of study. Participants were asked to indicate the proportion of FTE as reflected in credit applied to the capstone. As shown in Figure 8, the majority of capstones (62.9%) were reported as representing one-eighth of FTE. Substantially fewer capstones (34.5%) took up a quarter or more of FTE, including those that were integrated across all units in the final year. This suggests most capstones are weighted similarly to standard units of study, and is consistent with the finding that most capstones in the sample ran for less than 15 weeks.

Figure 8: Proportion of FTE studies ²²



Note: The possibility that some cases were reported as one unit although part of a two-unit sequence cannot be discounted. However, the data align with the findings from the desktop review and as such the impact is not believed to be significant.

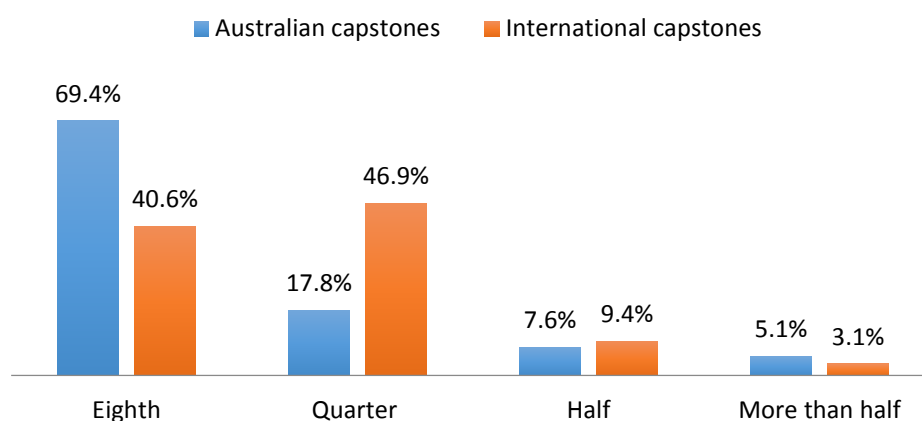
²¹ Table 19: Distribution of credit/non-credit capstones

²² Table 20: Proportion of FTE studies

Proportion of FTE studies across countries

As insufficient sample sizes were available for individual countries, the data were collapsed into two categories for comparison: Australia and international. The data show clear differentiation, with higher proportions of capstones at one eighth or less of FTE in Australia than is the case internationally (Figure 9).

Figure 9: Proportion of FTE studies across Australian and international capstones ²³



Proportion of FTE studies across disciplines

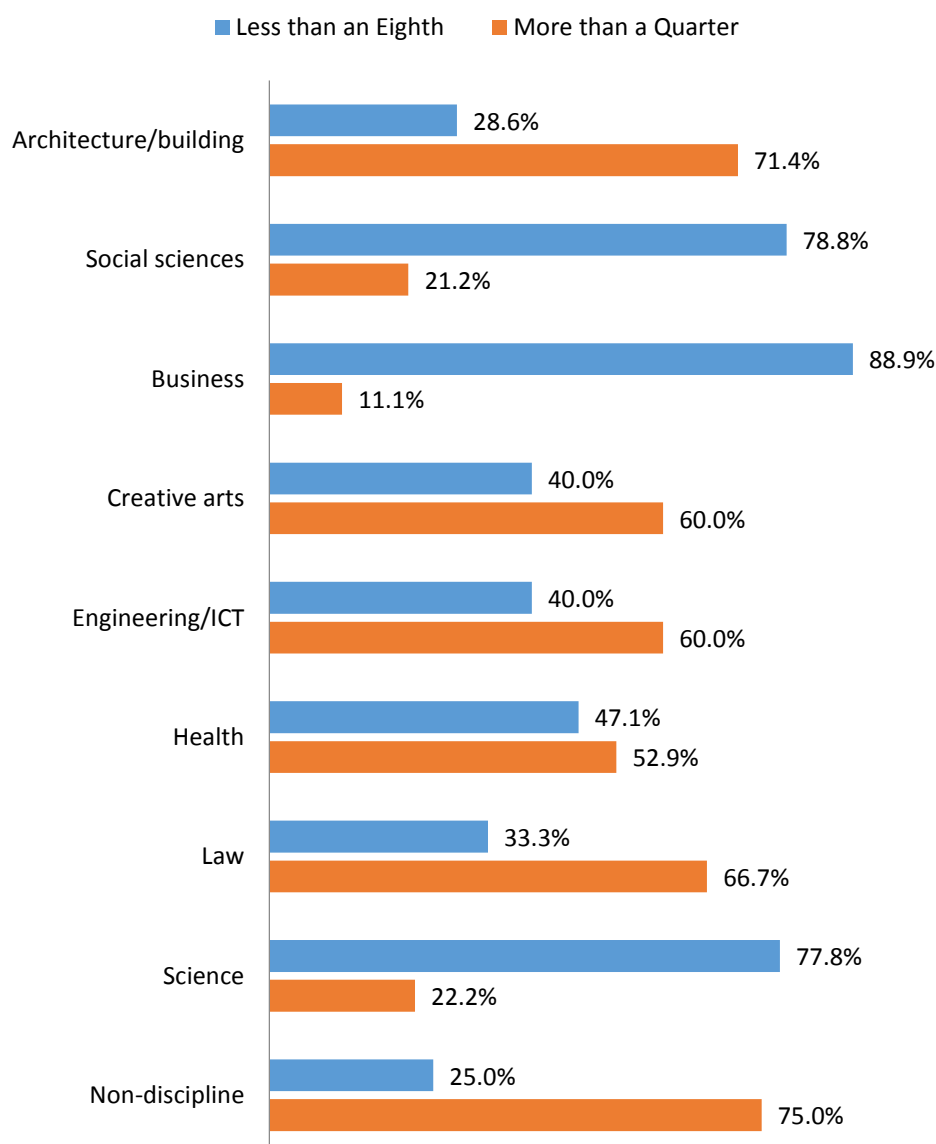
Variations of FTE across discipline groups were also analysed. Because subsample numbers were low above one quarter of FTE, categories were collapsed to create two: less than or equal to one eighth, or equal to or more than one quarter of FTE.

The proportion of FTE accounted for by capstones in engineering/ICT and health is larger than in the case of the social sciences or business (Figure 10). A chi-square test of independence confirmed these differences were significant in the most well represented discipline groups.²⁴

²³ Table 21: Proportion of FTE studies across countries

²⁴ Chi-square $\chi^2(3, n=156)=27.95, p<.001, \Phi=.41$

Figure 10: Proportion of capstones above or below one-eighth of FTE studies across disciplines ²⁵



Note: Law, architecture/building science and non-discipline subsamples are characterised by very small response numbers.

3.8 Capstone duration

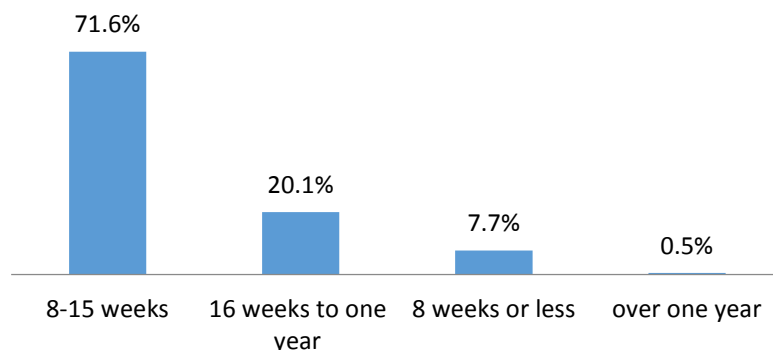
The length of time allocated to a capstone provides an indication, together with FTE, of the scope and intensity of the activity. Broadly speaking, these two items were in accord with one another.

The vast majority of capstones corresponded to roughly one Australian semester, or 8–15 weeks (71.6%) (Figure 11). The next most frequent duration of capstones was between 16 weeks and one year (20.1%), in the Australian context likely meaning two semesters. Capstones which are shorter in duration were present, but rare, accounting for a total of

²⁵ Table 22: Proportion of FTE studies across disciplines (two categories)

7.7% of the sample. Unsurprisingly, capstones over one year in duration appear very rare, with only one participant indicating this was the case.

Figure 11: Duration of capstones²⁶



Note: As with the previous item, the possibility that some cases were reported as one unit although part of a two-unit sequence cannot be discounted. However, the data align with the findings from the desktop review and as such the impact is not believed to be significant.

Duration across countries

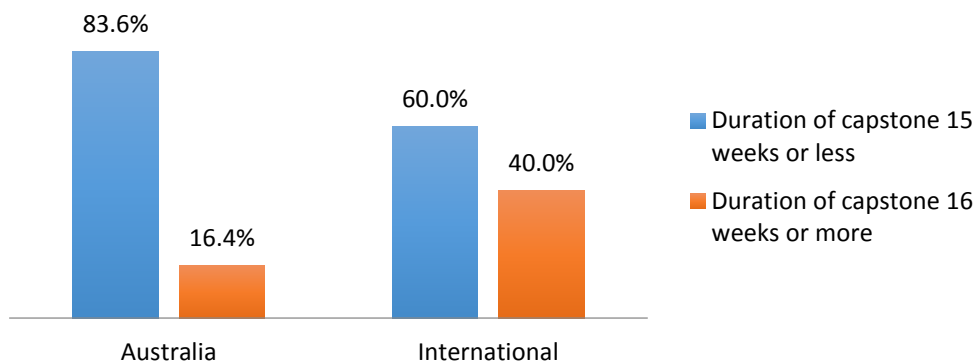
We also reviewed the data for variation between Australia and other countries. As the subsamples for each country were small, the data were collapsed into Australian and international categories, and those less than or equal to 15 weeks and equal to or more than 16 weeks in duration (Figure 12).

Although the international sample size was still relatively small, it appears that international capstones more often run for more than 15 weeks (40%) than Australian capstones (16.4%) and a chi-square test of independence found that this difference between the duration of international and Australian capstones was significant²⁷. This accords with the data on the weighting of international capstones. Nonetheless, the high number of international capstones at weighting above one quarter of full time load but still delivered in less than 15 weeks suggests that international capstones more often involve intensive experiences.²⁸

²⁶ Table 23: Duration of capstones

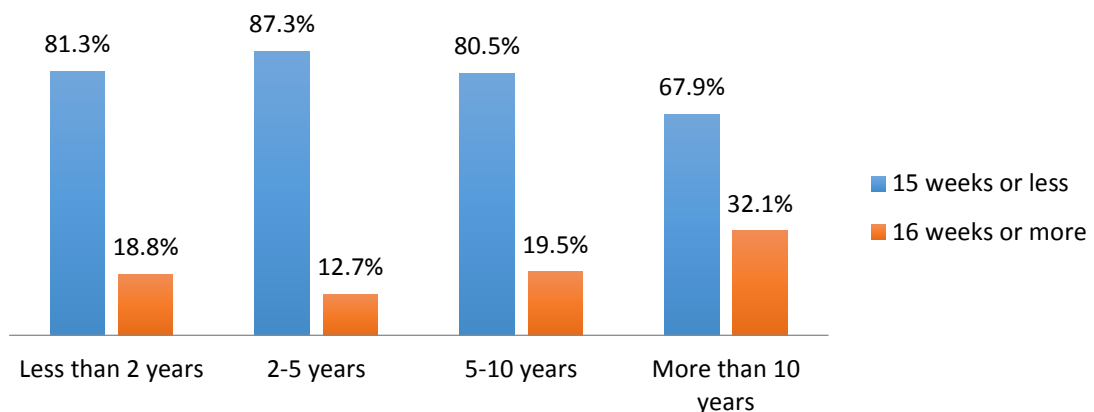
²⁷ Chi-square $\chi^2(1, n=194)=9.80, p=0.002, \Phi=-.22$

²⁸ Table 24: Duration of capstones across Australian and international capstones

Figure 12: Duration of Australian and international capstones ²⁹

Duration by age

The sample was also examined to determine whether there was a relationship between the age and duration of capstones. Initial inspection of data suggested that capstones introduced more than ten years ago are more likely to be longer in duration than those introduced at any time since (Figure 13). A Kendall Tau-b test was utilised, indicated a small but significant increase in duration of capstone with age.³⁰

Figure 13: Prevalence of short and long capstones by age ³¹

²⁹ Table 24: Duration of capstones across Australian and international capstones

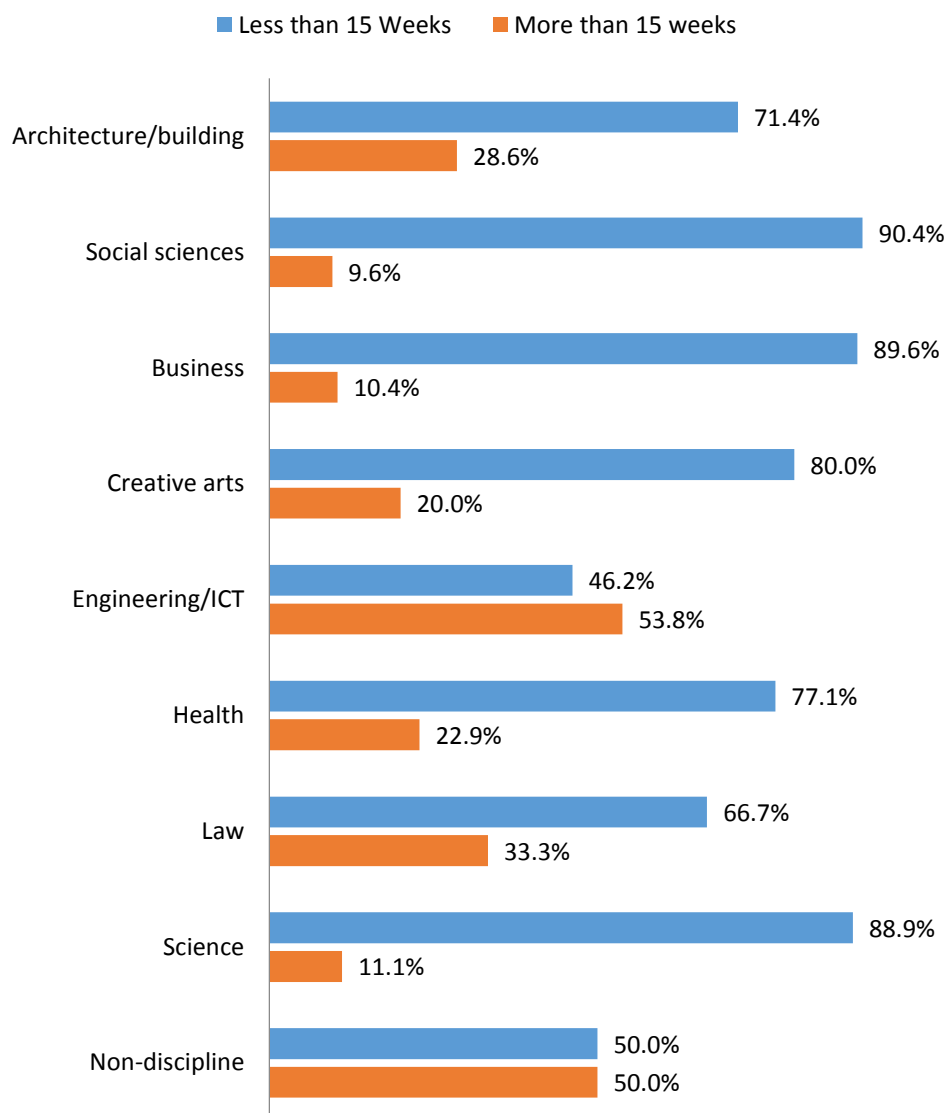
³⁰ Kendall Tau-b rank-order correlation coefficient ($\tau_b = .13$, $p = .03$)

³¹ Table 25: Duration of capstone by age

Duration across disciplines

We found also found variation across disciplines with regard to the preference for shorter or longer capstones. While some subsamples are small, it is interesting to note that most disciplines are clearly dominated by shorter capstones, and that this is not the case for non-discipline and engineering/ICT disciplines (Figure 14).

Figure 14: Duration of capstones across discipline groups ³²



Note: Law, architecture/building science and non-discipline subsamples are characterised by very small response numbers.

³² Table 26: Duration of capstones across discipline groups

Chapter 4: Types of capstone

4.1 Overview of reported characteristics: PBL, WIL, multi-disciplinary and international experiences

Participants were asked to classify whether their capstones included characteristics commonly found in the capstone literature: project- or problem-based learning (PBL), work integrated learning (WIL), multi-disciplinary and/or international experiences³³.

For the purpose of the survey, project and problem-based models were combined on the basis that the definitions of these approaches often overlap, and that they bear a number of shared features, including the presence of a driving question or problematic scenario that students must independently navigate in order to produce a response or solution.

Overall, PBL was by far the most commonly reported characteristic, at 88.1% of all capstones in the sample. The high prevalence of PBL capstones is consistent with the capstone literature, in which these approaches feature strongly. Although PBL approaches were found across all disciplines, as can be seen in Figure 15, there was still notable variation. Architecture/building and engineering/ICT disciplines comprised solely PBL capstones, with high counts found in creative arts, business, science and law. Social sciences and health PBL capstones formed a smaller majority, with none recorded for non-discipline capstones.

The next most prevalent characteristic was work-integrated learning (48.4%). This included activities such as industry guest lectures, mentoring and executive shadowing, simulations, industry-related projects, or full placement in professional positions. Work integration was most common in the creative arts, law and business disciplines, with less than 50% WIL rates in the remaining disciplines. Across the disciplines, the qualitative data showed some differentiation in the type of WIL employed. Projects for clients featured heavily in the creative arts and business, placements were common for the health disciplines, and simulations were common for law and business disciplines. In addition, placements and projects were often combined.

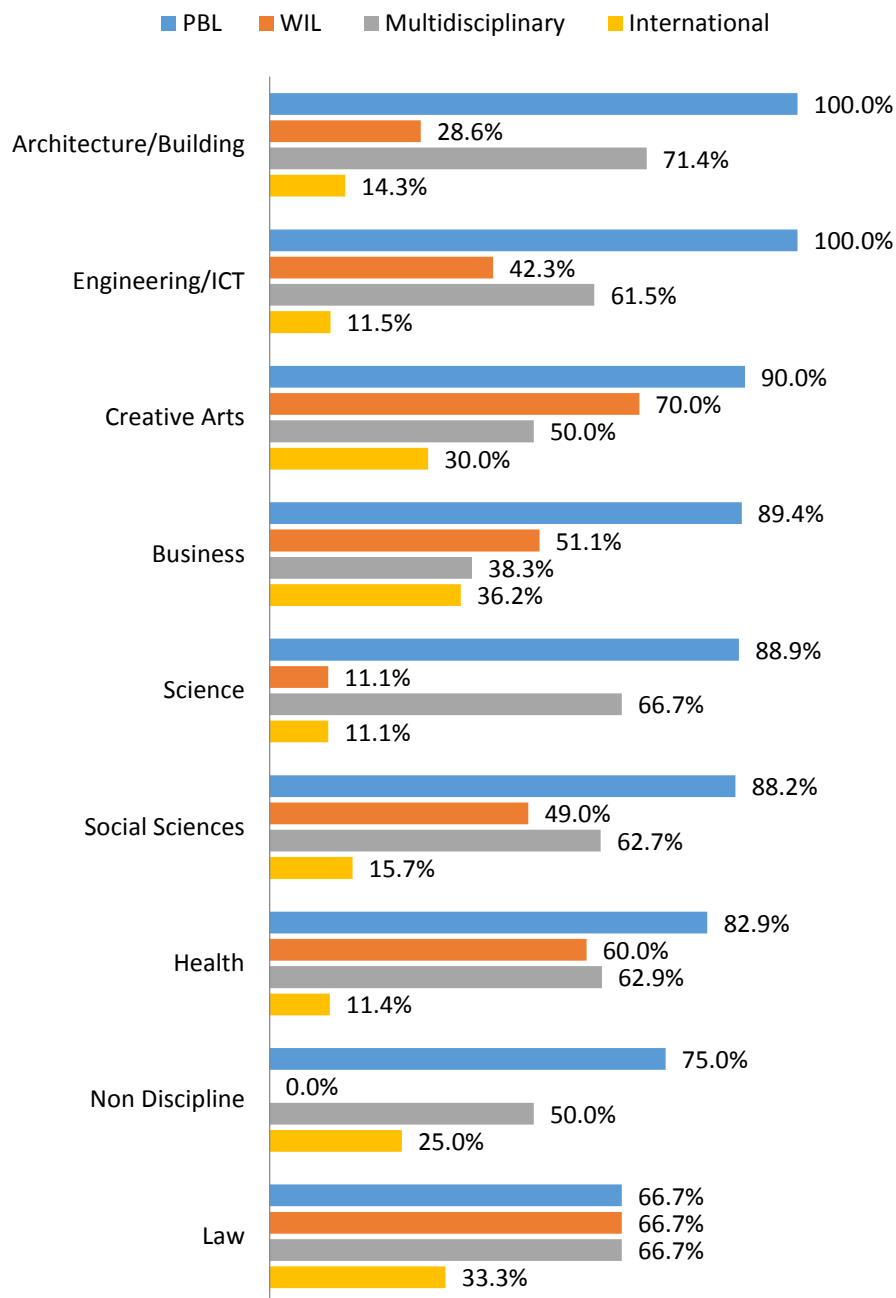
The third most common characteristic was multi-disciplinary (40.4%). For the purpose of the survey, a broad definition of the term was utilised, spanning activities that might otherwise be referred to as transdisciplinary, interdisciplinary and interprofessional approaches.³⁴

Non-discipline capstones unsurprisingly reported the 100% multi-disciplinary activity. Architecture/building was the next most prevalent user of multi-discipline activities, at 71.4%. The remaining disciplines also reported relatively high levels of engagement, at around 40-60% of each discipline sample. The reported approaches ranged from general topics relevant across more than one discipline (for example, project management), to inter-professional projects or work experiences that were highly reliant on the skills of each discipline. Some form of multi-disciplinary arrangement was most common in business, law and the creative arts.

³³ Table 27: Presence of PBL, WIL, multi-discipline and international experiences

³⁴ For definitions, see <http://www.capstonecurriculum.com.au/portfolio/resources/gallery/documents/>

Finally, international experiences were reported in 19.8% of cases. They were also much less common within the disciplines, with business reporting the highest levels of international activity (36.2%), followed by law (33.3%). The depth of international activity also appears to vary enormously. Examples provided include the use of international cases; students working with peers from international partner courses; or students undertaking work in other countries (for example, working on community development projects or an international touring performance).

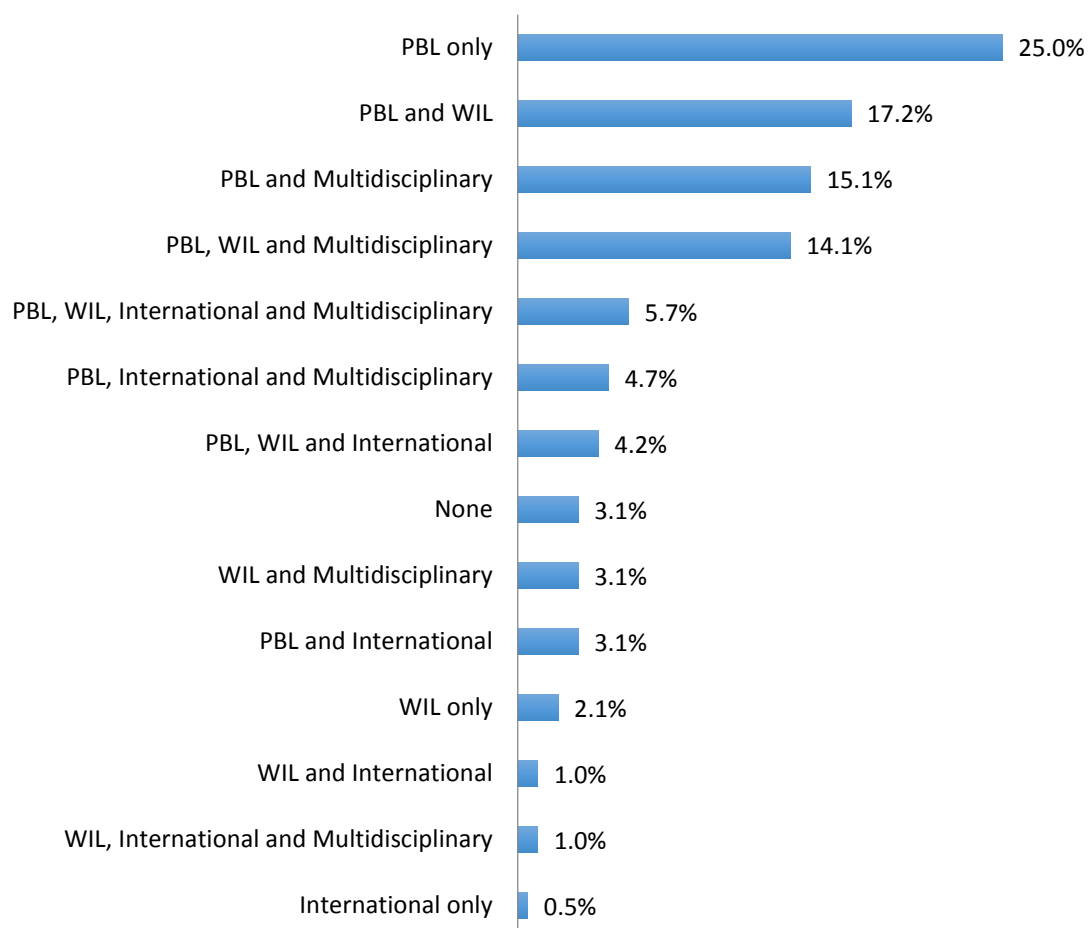
Figure 15: Presence of PBL, WIL, multi-disciplinary or international experiences across disciplines ³⁵

Note: Law, architecture, science and non-discipline subsamples are characterised by very small response numbers.

³⁵ Table 28: PBL, WIL, multi-disciplinary and international experiences across disciplines

The data were also examined to determine how these characteristics were combined. The most common approach reported was PBL only, with one quarter of all cases utilising PBL. However, WIL focused PBL was also relatively common, followed by multi-disciplinary PBL and PBL with both multi-disciplinary and WIL components. The ways in which combinations of characteristics are used within capstones is shown in Figure 16.

Figure 16: Combinations of characteristics ³⁶



4.2 Characteristics of project and problem-based approaches

Who generates the projects or problems

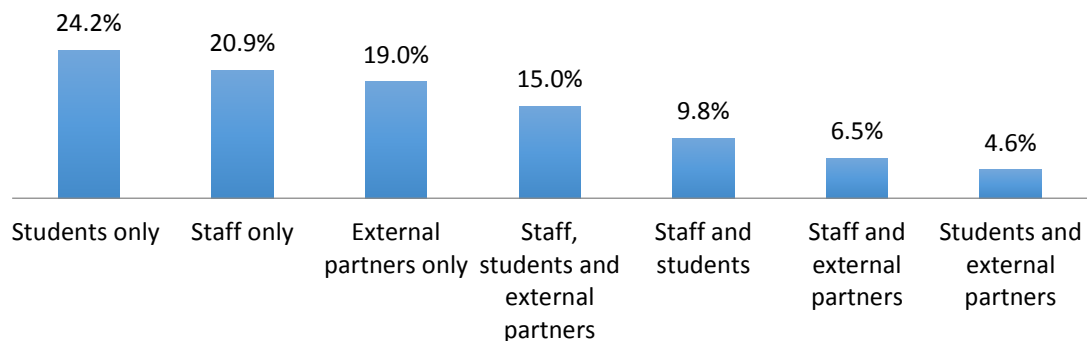
For PBL capstones, participants were asked who generated the projects or problems, including any combination of staff, students and external partners. As shown in Figure 17, these data showed a fairly even spread, with the slim majority of projects generated solely by students, but many others generated solely by staff and similar numbers solely by external partners.

A smaller number of cases indicated combinations of these, with the most prominent combination a mix of staff, students and external partners. The remaining combinations represented 20.9% of the sample. Taking into account cases where the students solely generated the projects or problems, and did so in tandem with either staff or external

³⁶ Table 29: Combinations of PBL, WIL, multi-disciplinary and international experience

partners, students were involved in project selection in just over half of all capstones (53.5%).

Figure 17: Who generates PBL topics ³⁷

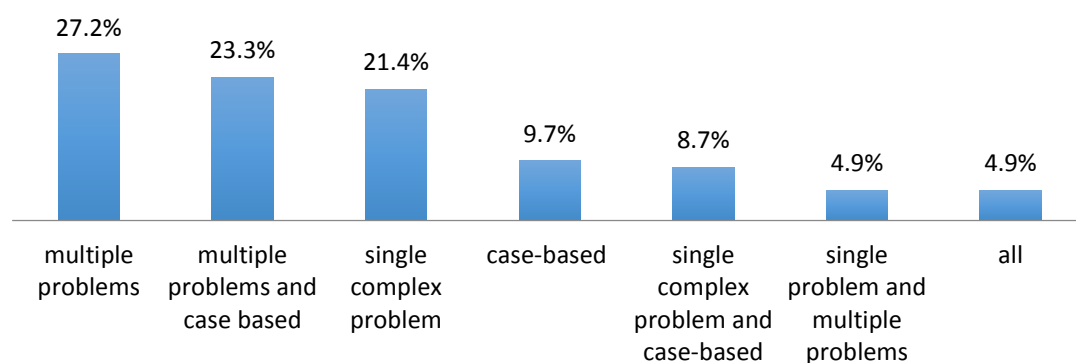


Nature of the problem

Participants were asked whether the topics of PBL capstones could best be described as a single problem, multiple problems, a case study, other, or any combination thereof. Respondents who selected 'other' were again asked to elaborate. Those that responded to the 'other' selection described simulations or less well-defined projects, in which the concept of a single complex problem overlaps with the concept of multiple problems.

Participants who selected a characteristic most frequently reported that their PBL capstones involved multiple problems for students to address (Figure 18). The next most frequent were capstones that were case-based but also involved multiple problems, followed by those involving single complex problems. The prominence of multiple problems suggests that many capstones utilise several small projects and/or involve multiple discrete components.

Figure 18: Single, multiple or case study problems in PBL capstones ³⁸



4.3 Types of work-integrated learning (WIL)

Participants who indicated that their capstones involved work-integrated learning (WIL) activities were asked to indicate whether this involved a workplace experience/internship, a project for industry, a simulated experience, or 'other', or some combination of those choices.

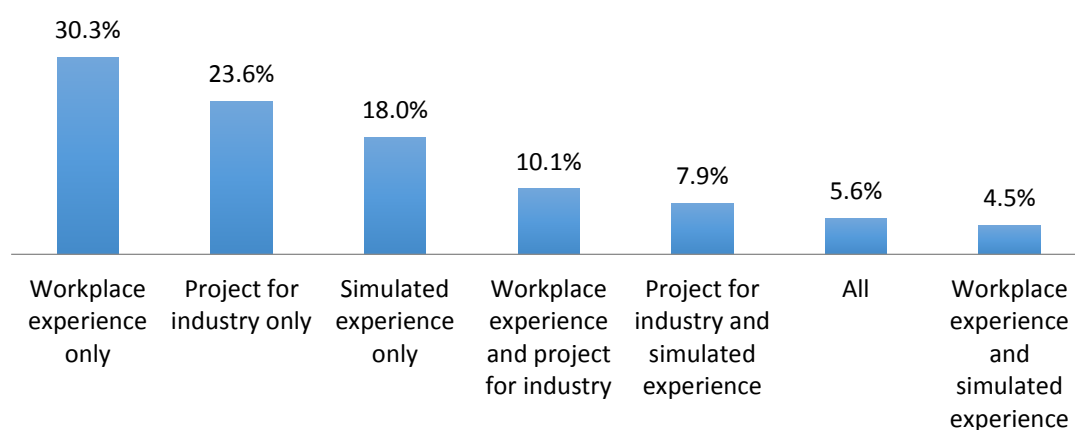
³⁷ Table 30: Who generates PBL topics

³⁸ Table 31: Nature of the problem

Of the 93 participants who reported WIL capstones, 89 completed a subsequent question on the type of experience. As evident in Figure 19, the most frequent were workplace placements/internships, followed by projects for industry, and simulated experiences. Several respondents also indicated combinations of these choices, including a small number that combined a workplace experience/internship and a project for industry, a project for industry and a simulated experience, a workplace experience/internship and a simulated experience, while five cases comprised a combination of the three.

For this question, 11 participants selected both a category and the 'other' option. Explanations provided under other reported variations either within a capstone, or depending on the student. For example, some students carried out WIL activities with a current employer, some capstones only allowed high performing students to work directly with a client, and some involved desktop research that was work-relevant but did not include industry engagement.

Figure 19: Types of WIL reported ³⁹

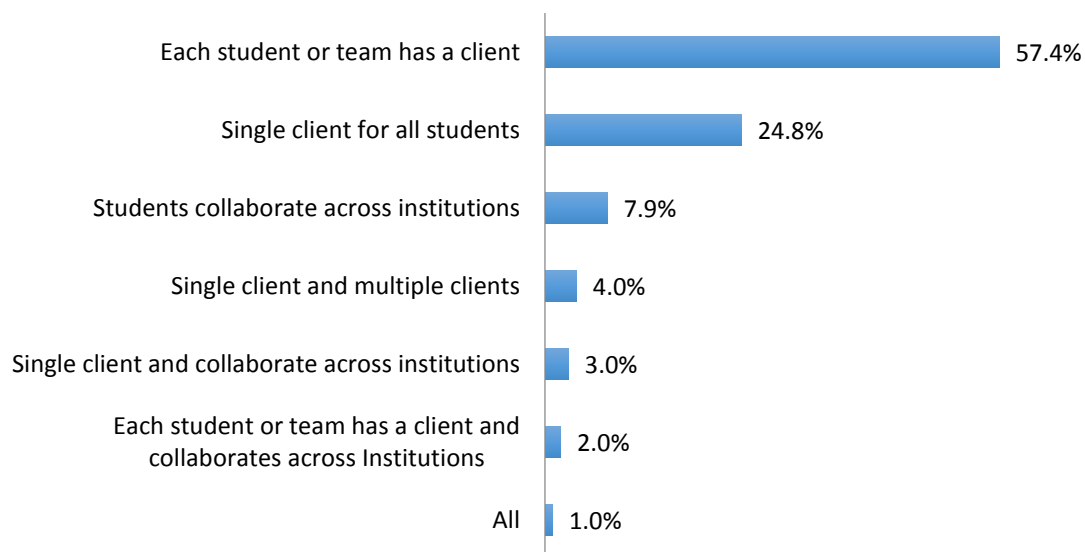


4.4 Types of external engagement

Although 93 participants indicated that their capstone had a WIL component, 101 capstones involved external clients or partners. Of these, participants were asked to classify whether their capstones engaged with single clients, each student or team had their own client, whether students collaborated across institutions, or any combination of these choices. Participants were also able to select 'other' and to elaborate.

As shown in Figure 20, the most frequent response was that each student or team had their own client, followed by single clients only, and students collaborating across institutions. For this question, 29 participants selected both a category and 'other'. Explanations were consistent with selected categories but also provided new information. These comments described community-based activities, external engagement components that vary between students, and external engagement being dependent on the availability of clients.

³⁹ Table 32: Types of WIL reported

Figure 20: Engagement with an external client or partner ⁴⁰

4.5 Types of multi-disciplinarity

Participants were asked to classify their capstones as involving a single discipline, or multiple disciplines. 56.0% of respondents classed their capstone as single discipline, and 44.0% as multi-disciplinary.⁴¹

Of the multi-disciplinary capstones, 63.9% were described as comprising multiple disciplines in a similar field. In these cases, there was evidence of purposeful interdisciplinary or interprofessional learning. For example, in business disciplines: a mix of marketing, accounting, human resources and/or management students working on a project or simulation together.

A smaller number 36.1% comprised multiple highly differentiated disciplines. The number of disciplines involved ranged from 2 to 12, with 33.3% of respondents listing 2–3 disciplines and a further 26.7% listing 4–5 disciplines, while 36.76% reported more than 6 disciplines. Within these cases, five participants indicated that their capstones could include any discipline and that this varied from semester to semester.

4.6 Types of international experiences

Participants were asked to classify the international component of their capstones as one, or any combination, of the following:

- A study tour;
- Collaboration with an overseas institution;
- An exchange program; or
- Other.

⁴⁰ Table 33: Engagement with an external client or partner

⁴¹ Table 34: Multi-disciplinary - total and no. of disciplines

Only 43 participants indicated an international experience. Of these, 17 selected one or more of the given options: collaboration with an international institution ($n=10$); a study tour ($n=8$), or an exchange program ($n=3$).⁴²

Another 22 of the participants selected 'other' and provided further elaboration indicating a wide range of understandings of, and practices relating to, internationalised education. For example, one participant indicated their unit was run on international sites but the capstone itself wasn't international; another indicated that the capstone was international as the student cohort was from many nations and included international students. Another described data being provided by an international company, while yet another indicated that the capstone was focused on international issues, rather than being an international experience per se. Three others indicated that their capstones were delivered in offshore sites. The remaining responses indicated that the international components varied from delivery to delivery or between students. For example, in some cases students were given the choice of whether to undertake a component overseas, some clients were located overseas and not available every semester, or it was dependent on the stream in which students were enrolled.

As a result of the very high variation in how internationalisation was conceptualised, international components were not included in the detailed analysis of capstone delivery that follows.

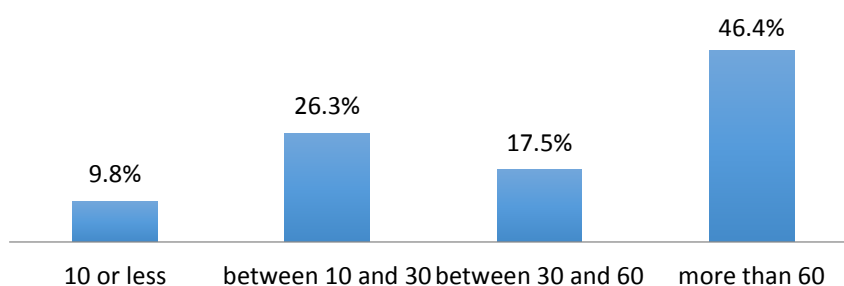
⁴² Table 35: Types of international experience

Chapter 5: Organisation

5.1 Cohort sizes

We asked participants about the average cohort sizes in their capstones. More than half of the capstones in the sample enrolled 30 or more students in their most recent delivery. Just under half enrolled more than 60 students (Figure 21). While not all participants provided precise cohort sizes, some large cohort outliers were identified in this section of the survey, with one capstone at more than 300 enrolled students, and six indicating more than 100.

Figure 21: Student numbers in capstones ⁴³

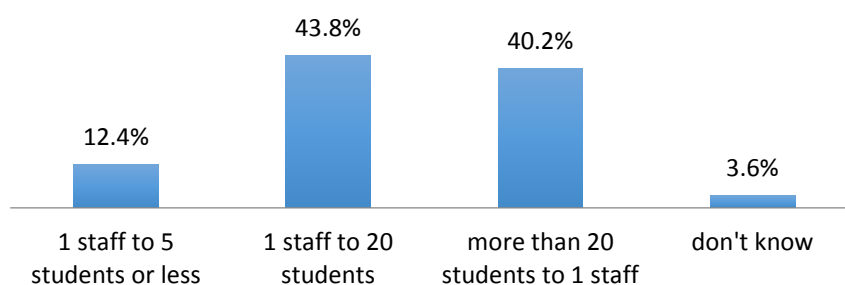


5.2 Staff–student ratios

Participants were asked to classify the staff–student ratios in their capstones. A fairly narrow set of options was provided for this purpose, reflecting broad differences in delivery approaches required between very small group or individual supervision (<5), small groups (6–20) and standard class sizes in undergraduate teaching (>20) (Figure 22).

43.8% of participants selected a ratio of 6-20 students per staff member, followed by >20 students (40.2%). The most resource intensive ratio of one staff member to five or fewer students was relatively rare (12.4%). Seven participants (3.6%) did not know the staff–student ratios in their capstones. Six participants indicated elsewhere in the survey that their capstones involved ~100 students, delivered by a coordinator and, for classes of 150 or more, supported by two or three teaching staff.

Figure 22: Staff–student ratios ⁴⁴



⁴³ Table 36: Student cohort size

⁴⁴ Table 37: Staff–student ratios

Staff–student ratios across countries

Differences in staff–student ratios across countries were also examined. In this sample staff–student ratios of 1:5 were more common in Australia and New Zealand than the remaining participating countries. However, sample sizes are low in many countries and no inferential test was undertaken.⁴⁵

Staff–student ratios across PBL, WIL and multi-disciplinary capstones

We also looked at differences between staff–student ratios across the identified overarching characteristics. Responses to the different staff–student ratios were low in the non-project or problem-based subsample. To allow for further analysis, the ratios were collapsed to two categories: less than and more than 20 students. Staff–student ratios were slightly lower in PBL capstones than in other models. However, these differences did not reach the significance threshold in a chi-square test.⁴⁶

WIL capstones showed some tendency toward higher staff–student ratios, with very slightly higher proportions in one staff member to five students and one staff member to 20 students or less, but a lower proportion having one staff member to more than 20 students⁴⁷. However, these differences were also not sufficient to be considered significant.⁴⁸

Unsurprisingly, given the high degree of variation in the way that multi-discipline capstones are configured, staff to student ratios in these capstones were similar to those found in the rest of the sample, with the majority sitting at between 1:5 and 1:20, and a substantial proportion at 1:20+.⁴⁹

5.3 Who delivers

Participants were asked whether their capstones were delivered by academic supervisors, workplace supervisors and/or an external provider (e.g. a licensed course). Participants were also able to select ‘other’ and respond using free text. Twenty-five of these 27 responses were easily categorised, with the remaining two being left blank.

Most capstones (68%) are delivered solely by academic supervisors, although academic and external workplace supervisors are also reasonably common (21.6%). A smaller number are delivered jointly between academics and external supervisors (4.6%), or by a combination of academics, external providers and workplace providers (5.2%). Delivery only by a workplace supervisor is very rare, with only one reported case (Figure 23).

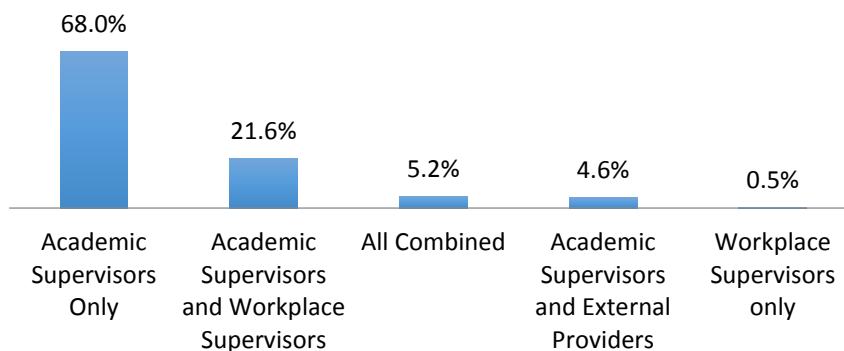
⁴⁵ Table 38: Staff–student ratios across countries

⁴⁶ Chi-square $\chi^2(1, n=185)=1.79, p=0.18, \Phi=.09$

⁴⁷ Table 40: Staff–student ratios in WIL capstones

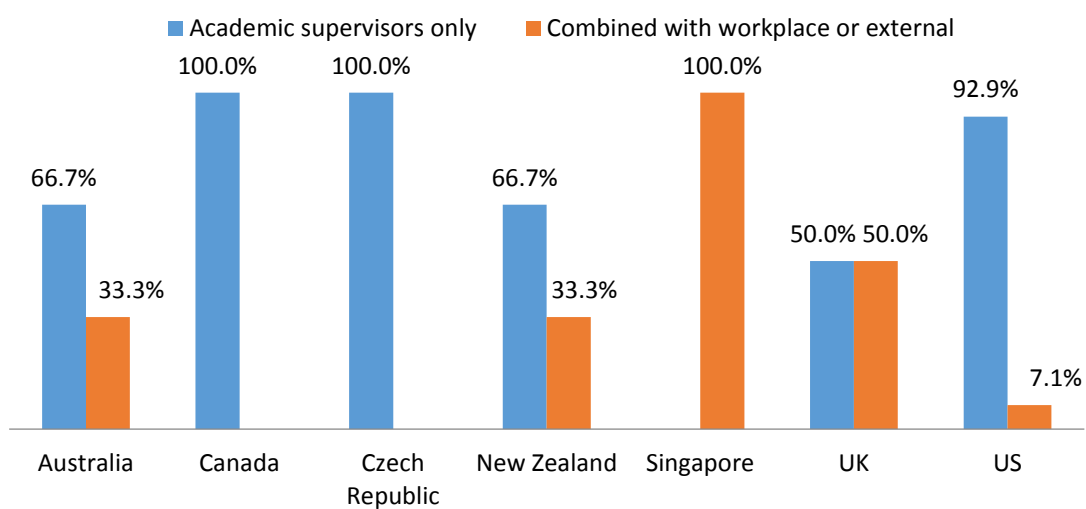
⁴⁸ Chi-square $\chi^2(1, n=185)=2.21, p=0.13$

⁴⁹ Table 41: Staff–student ratios in multi-disciplinary capstones

Figure 23: Who delivers ⁵⁰

Who delivers across countries

Differences in who delivers capstone units were examined across countries. Although sample sizes in many countries were very small, in this item we looked at each country rather than a straightforward comparison between Australia and others in order to understand whether there might be cultural differences in the way that academic supervision is managed. Indeed, some differences were found: Australia and New Zealand had identical proportions falling into the academic only and combined academic workplace/external categories, at 66.7%. The US on the other hand had all but one capstone being delivered solely by academic supervisors (92.9%). While not showing a significant relationship in a chi-square test⁵¹, this data does indicate an interesting possible difference in approach.

Figure 24: Who delivers across countries ⁵²

Note: International subcategories were very low with Canada, Czech Republic, all n=1 and the UK with n=2.

Who delivers across disciplines

Delivery responsibility was also examined across discipline groups. Some differences were found across the disciplines, noticeably (albeit with small sample numbers) in multi-discipline and law capstones, which respectively showed the highest and lowest percentage of purely academic supervised capstones (Figure 25).

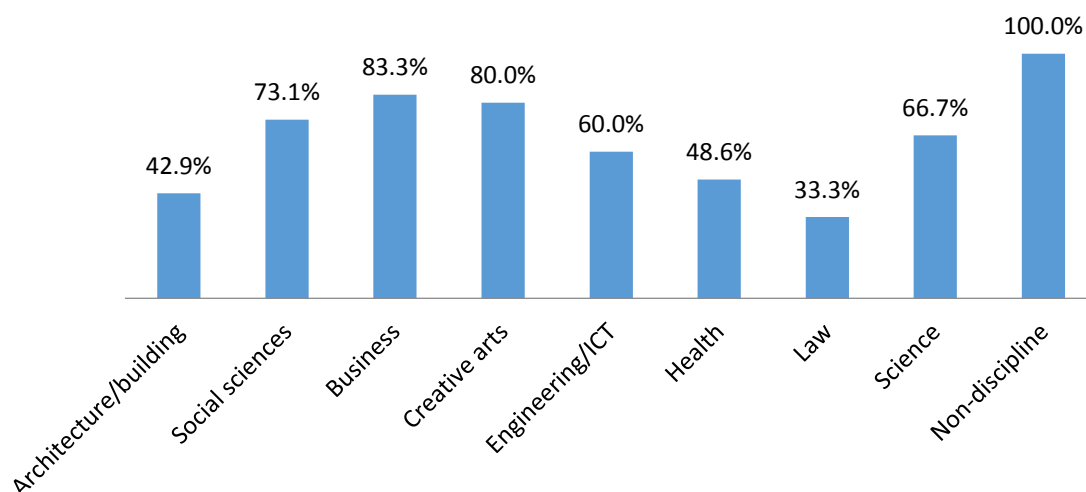
⁵⁰ Table 42: Who delivers

⁵¹ Chi-square $\chi^2(2, n=188)=4.13, p=.13, \Phi=.15$

⁵² Table 43: Who delivers across countries

Sub-samples were large enough in the social sciences, business, engineering/ICT and health to facilitate an inferential comparison. It is apparent that academic staff in the social sciences and business more often supervise their capstones alone in comparison to those in engineering/ICT and health. The prevalence of external supervisors in the latter discipline groups is perhaps unsurprising given the greater proportion of WIL in engineering/ICT and health disciplines. A chi-square test confirmed these differences were significant.⁵³

Figure 25: Sole academic delivery across disciplines⁵⁴

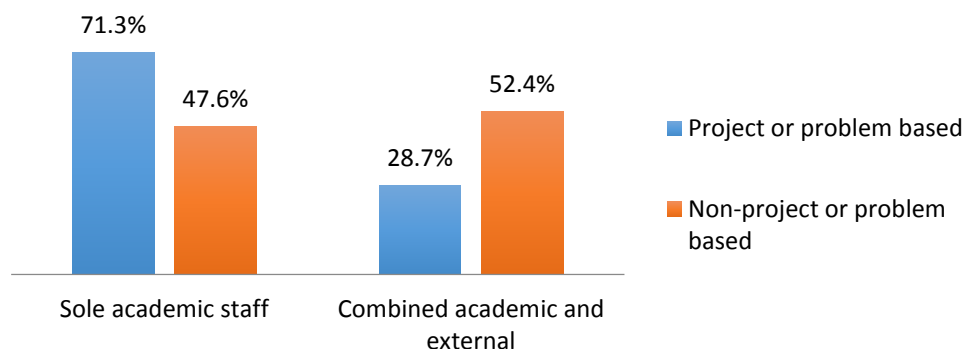


Who delivers across PBL, WIL and multi-disciplinary capstones

We also analysed whether delivery responsibility varied across the major characteristics provided. For the purposes of these analyses, capstone delivery categories were collapsed into either sole academic delivery, or joint delivery with a workplace or other kind of external supervisor. We found variation in delivery approach dependent on the presence of characteristics.

In PBL capstones, academic staff more often have sole responsibility for delivery (Figure 26). This difference is statistically significant.⁵⁵

Figure 26: Who delivers in PBL capstones⁵⁶



⁵³ Chi-square $\chi^2(3, n=160)=12.73, p=.005, \Phi=.27$

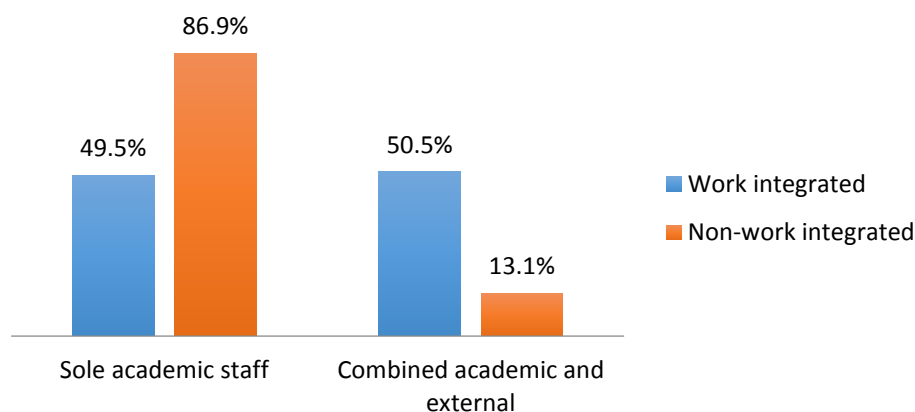
⁵⁴ Table 44: Who delivers across disciplines

⁵⁵ Chi-square ($\chi^2(1, n=192)=4.90, p=.027, \Phi=.16$)

⁵⁶ Table 45: Who delivers in PBL capstones

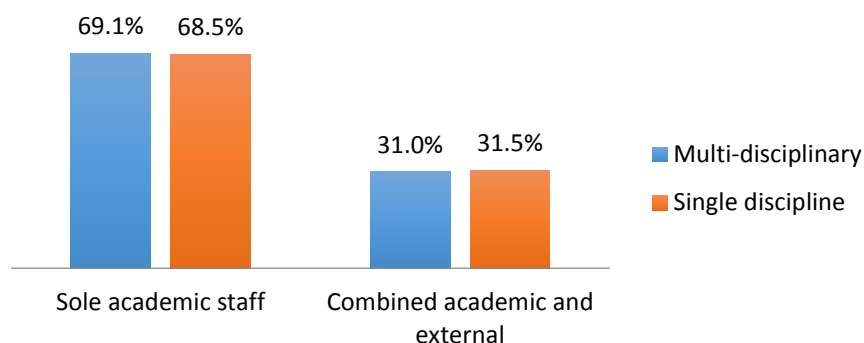
As expected, WIL capstones had a much higher proportion of workplace supervisors than non-WIL capstones (Figure 27). Work integrated capstones exhibited a nearly even split between sole academic delivery and a combination of academic and workplace or external supervisors, whereas non-work integrated capstones were dominated by sole academic delivery. This difference was statistically significant.⁵⁷

Figure 27: Who delivers in WIL capstones⁵⁸



Both multi-disciplinary and single discipline capstones were evenly distributed between sole academic delivery and a combination of academic and external delivery (Figure 28).

Figure 28: Who delivers in multi-disciplinary capstones⁵⁹



5.4 Primary work as individuals, teams or a combination

Participants were asked a range of questions about how student work was directed in their capstone. Specifically, we asked whether students primarily work as individuals, in groups, or in a combination of the two.

Individual, group, or combined work

The majority of responses indicated a combination of individual and group work, while students primarily work as individuals in one third of cases (33.3%), and a quarter work primarily in teams (Figure 29). Participants were invited to explain how these combinations functioned, and 65 elaborated on their choice. Many described varied ways in which students combine individual and team work. These comments were largely about assessment, but 12 participants also commented that students could choose whether they

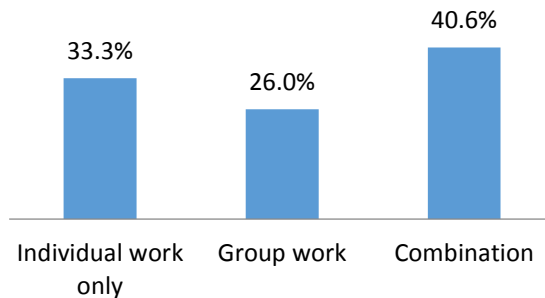
⁵⁷ Chi-square ($\chi^2(1, n=192)=31.23, p=.001, \Phi=-0.40$)

⁵⁸ Table 46: Who delivers in WIL capstones

⁵⁹ Table 47: Who delivers in multi-disciplinary capstones

worked in teams, either through selecting particular types of activity or simply as a matter of preference.

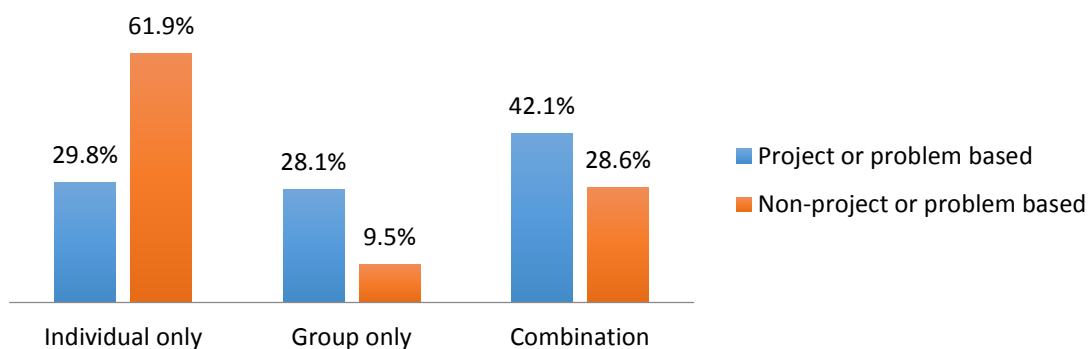
Figure 29: Individual, group or combined work ⁶⁰



Individual, group, or combined work across PBL, WIL and multi-disciplinary capstones

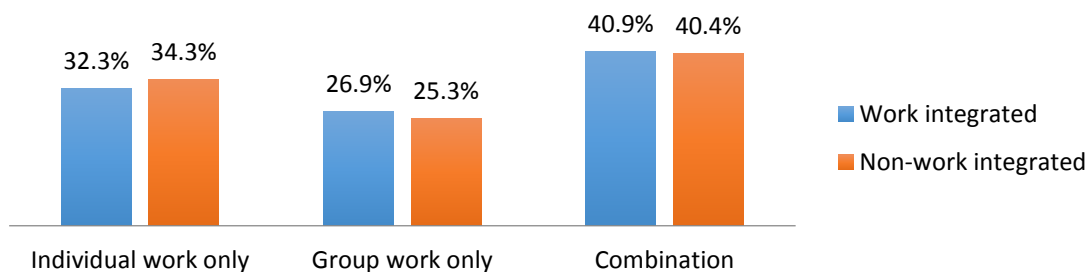
Overall, group work or a combination of group and individual work were more prevalent as the primary mode of working in PBL capstones (Figure 30), with individual work significantly more frequent in capstones that were not classed as PBL. ⁶¹

Figure 30: Individual, group work or a combination in PBL capstones ⁶²



WIL capstones demonstrated no difference in selection of individual, group or combinations of approach to those without WIL components. ⁶³

Figure 31: Individual, group work or a combination in WIL capstones ⁶⁴



⁶⁰ Table 48: Individual, group work or a combination

⁶¹ Chi-square ($\chi^2(2, n=192)=9.08, p=.01, \Phi=.21$)

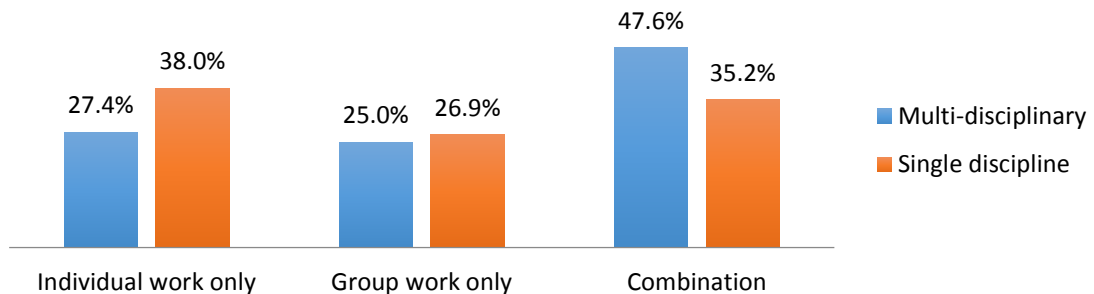
⁶² Table 49: Individual, group work or a combination in PBL capstones

⁶³ Chi-square ($\chi^2(2, n=192)=0.11, p=.94, \Phi=.02$)

⁶⁴ Table 50: Individual, group work or a combination in WIL capstones

In contrast, multi-disciplinary capstones tended to make more use of combinations of individual and group work, and less use of individual work alone, than single discipline capstones but these differences were not significant (Figure 32).⁶⁵

Figure 32: Individual, group work or a combination in multi-disciplinary capstones⁶⁶



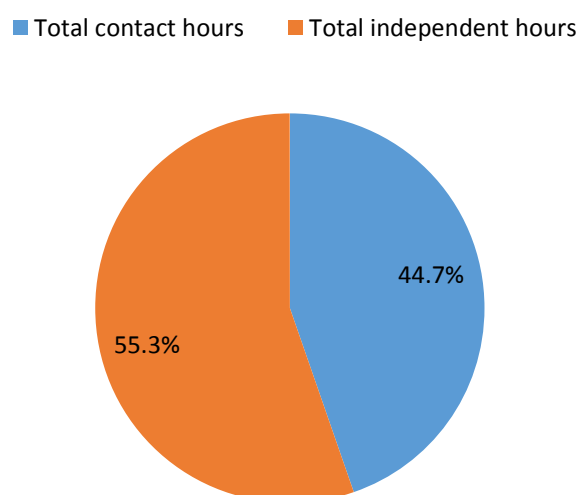
5.5 Student work hours in different learning environments

Participants were asked to estimate the total number of student independent working and the contact hours related to the capstone. For contact hours, participants could choose a number on a range from 0 to 100 hours in the categories of classes/group seminars, lectures, online, group supervision meetings and individual supervision meetings. Participants were also given options for independent hours, but responses indicated a degree of uncertainty regarding location of independent work, so these results should be interpreted with some caution.

Distribution of student working hours

Overall, estimates suggest expectations of slightly more independent (55.3%) than contact (44.7%) working hours in capstones (Figure 33).

Figure 33: Average student contact and independent work hours⁶⁷



⁶⁵ Chi-square ($\chi^2(2, n=192)=0.11, p=.94, \Phi=.02$)

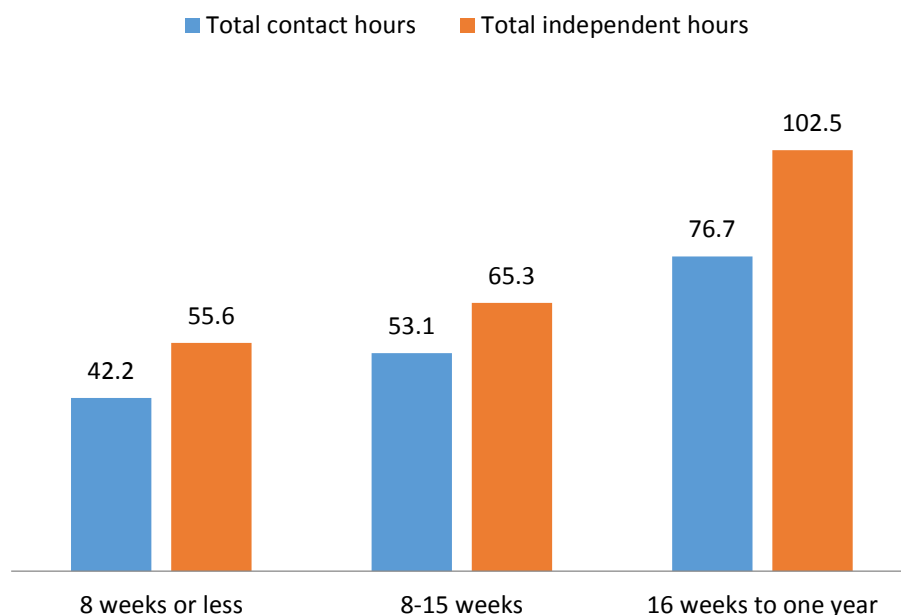
⁶⁶ Table 51: Individual, group work or a combination in multi-disciplinary capstones

⁶⁷ Table 52: Contact and independent hours

As would be expected, the average number of contact hours and independent hours both increase with the duration of the capstone (Figure 34) and Kruskal-Wallis tests showed these differences were significant for both contact hours and independent hours⁶⁸.

Students spend more time in independent work hours than contact hours regardless of the duration of the capstone. The most common duration (8-15 weeks) showed a mean of 65.3 hours in independent and 53.1 hours in contact time. While contact hours typically vary across units and particularly disciplines, this suggests that the reported capstones have a higher than average contact time, and significantly higher than normal expectations for independent learning. This average expectation of time commitment can be compared with a common formulation of three hours per week over a 12 week semester for units of one eighth FTE or a quarter of a single semester, equating 36 hours of contact.

Figure 34: Average hours across capstone duration⁶⁹

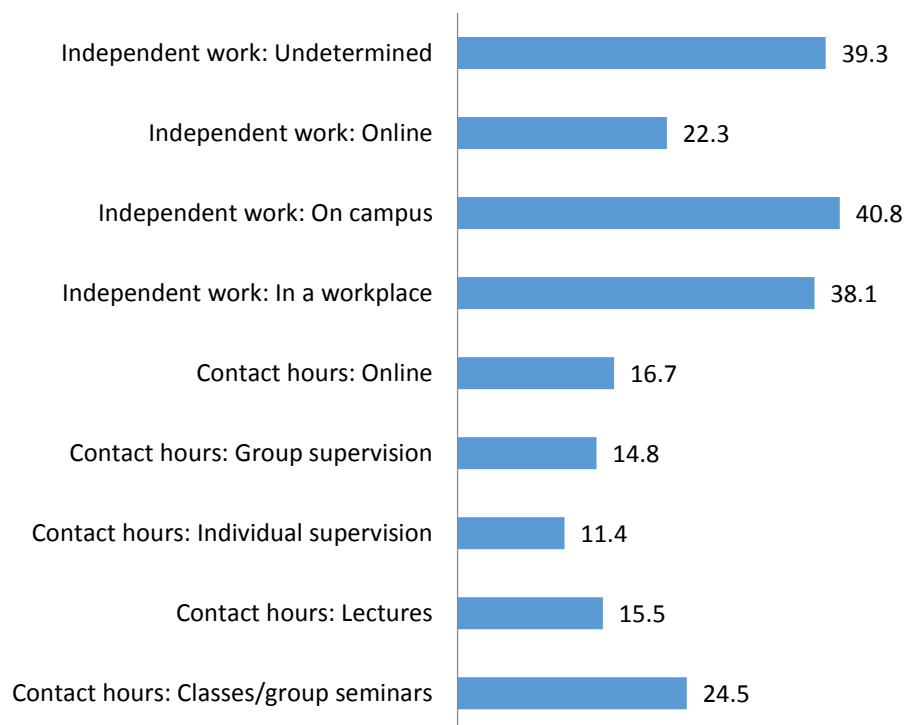


Contact time in capstones is spent predominantly in classes/group seminars, followed by online, lectures, group supervision meetings, and individual supervision meetings. Independent work was reported as being predominantly undertaken on campus or in a workplace (Figure 35).

⁶⁸ Contact hours Kruskal Wallis $\chi^2(2, n=189)= 13.60, p< 0.004$

Independent hours Kruskal Wallis $\chi^2(2, n=177)= 13.31, p< 0.004$

⁶⁹ Table 53: Contact and independent hours according to capstone duration

Figure 35: Average student hours in different learning environments ⁷⁰

Comparing contact and independent hours across PBL, WIL and multi-disciplinary capstones

Average contact and independent hours were compared across the overarching characteristics for capstones of 8 – 15 weeks duration. All capstones had higher average independent work hours compared to contact hours regardless of whether they were PBL, WIL or multi-disciplinary (Figure 36, Figure 38, Figure 40).

PBL capstones had higher average contact hours than non-PBL capstones but this difference was not significant⁷¹. PBL capstones had significantly higher⁷² average contact hours for group supervision and independent work on campus⁷³. Average hours for non-PBL Independent work in a workplace was higher than for PBL capstones however this difference was not significant⁷⁴ (Figure 37).

WIL capstones had higher average independent hours than non-WIL capstones but this difference was not significant⁷⁵. WIL capstones had significantly higher average hours for Independent work in a workplace⁷⁶ (Figure 39).

There were no significant differences in either contact or independent hours when comparing multi-disciplinary and single discipline capstones or across learning environments for single and multi-disciplinary (Figure 41).

⁷⁰ Table 52: Contact and independent hours

⁷¹ PBL Contact hours Mann-Whitney *U* test (M=53.09), U= 742.00 Z= -1.77 p<0.08

⁷² PBL Group supervision Mann-Whitney *U* test (M=12.48), U= 87.00 Z= -2.75 p<0.01

⁷³ PBL Independent work on campus Mann-Whitney *U* test (M=36.14), U= 170.00 Z= -2.01 p<0.04

⁷⁴ PBL Independent work in a workplace Mann-Whitney *U* test (M=35.80), U= 154.50 Z= -1.78 p<0.08

⁷⁵ WIL Independent hours Mann-Whitney *U* test (M=65.34), U= 1684.50 Z= -1.72 p<0.09

⁷⁶ WIL Independent hours in a workplace Mann-Whitney *U* test (M=35.80), U= 148.00 Z= -2.18 p<0.03

Figure 36: Average student hours spent in contact and independent work in PBL capstones ⁷⁷

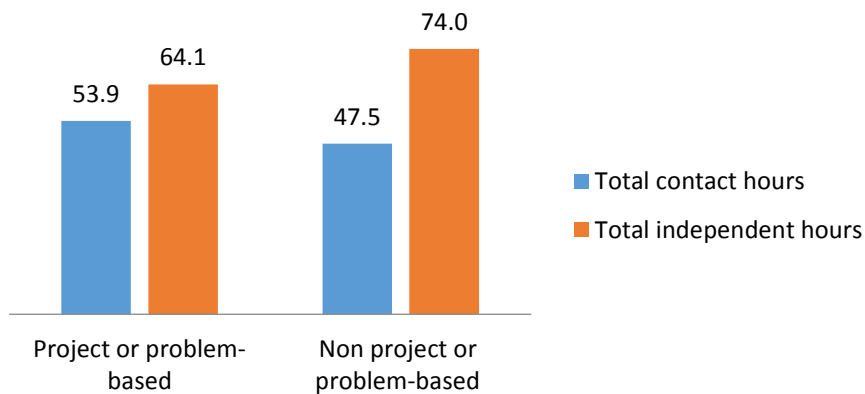
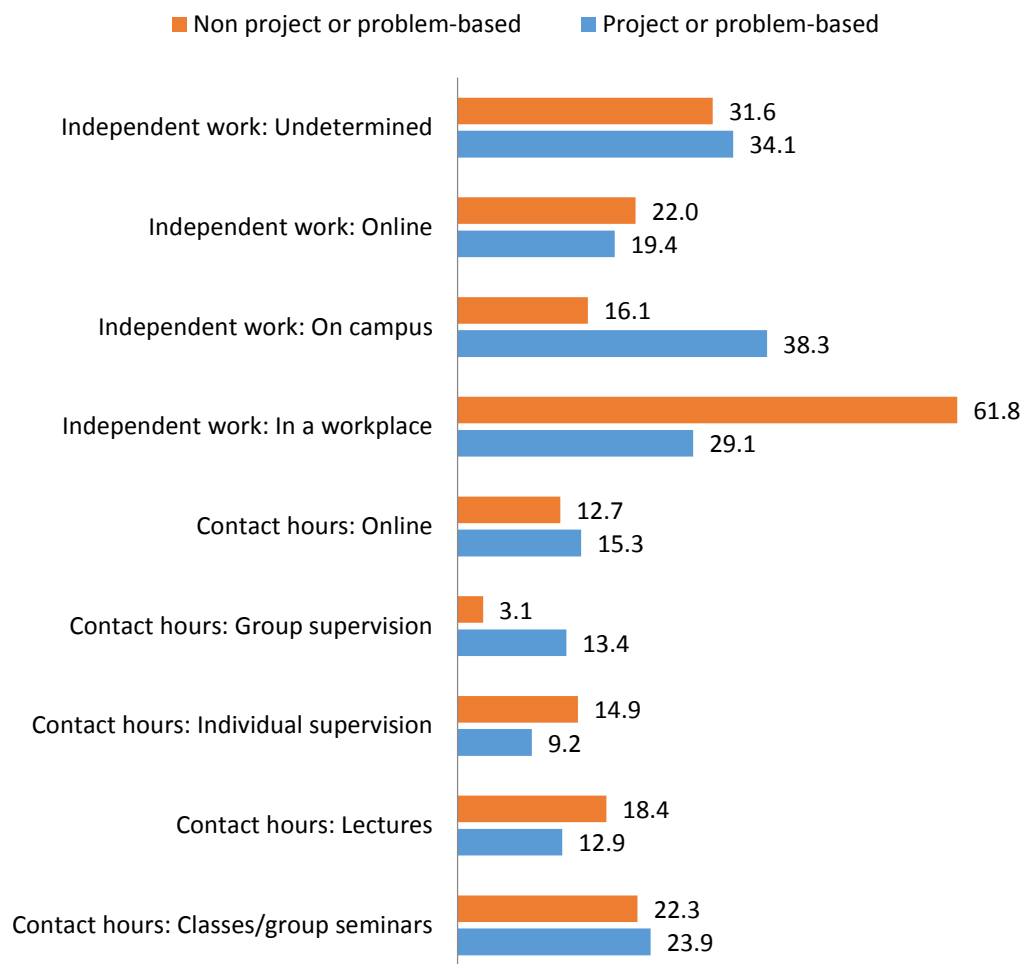


Figure 37: Average student hours spent in different learning environments for PBL capstones ⁷⁸



⁷⁷ Table 54: Average student hours spent in contact and independent work in PBL capstones

⁷⁸ Table 54: Average student hours spent in contact and independent work in PBL capstones

Figure 38: Average student hours spent in contact and independent work in WIL capstones ⁷⁹

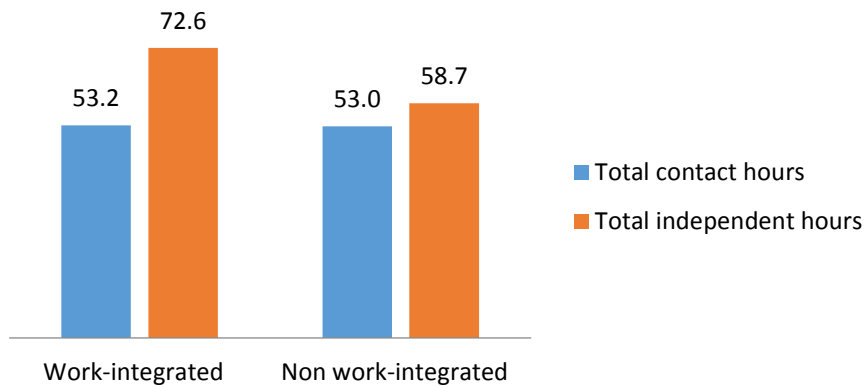
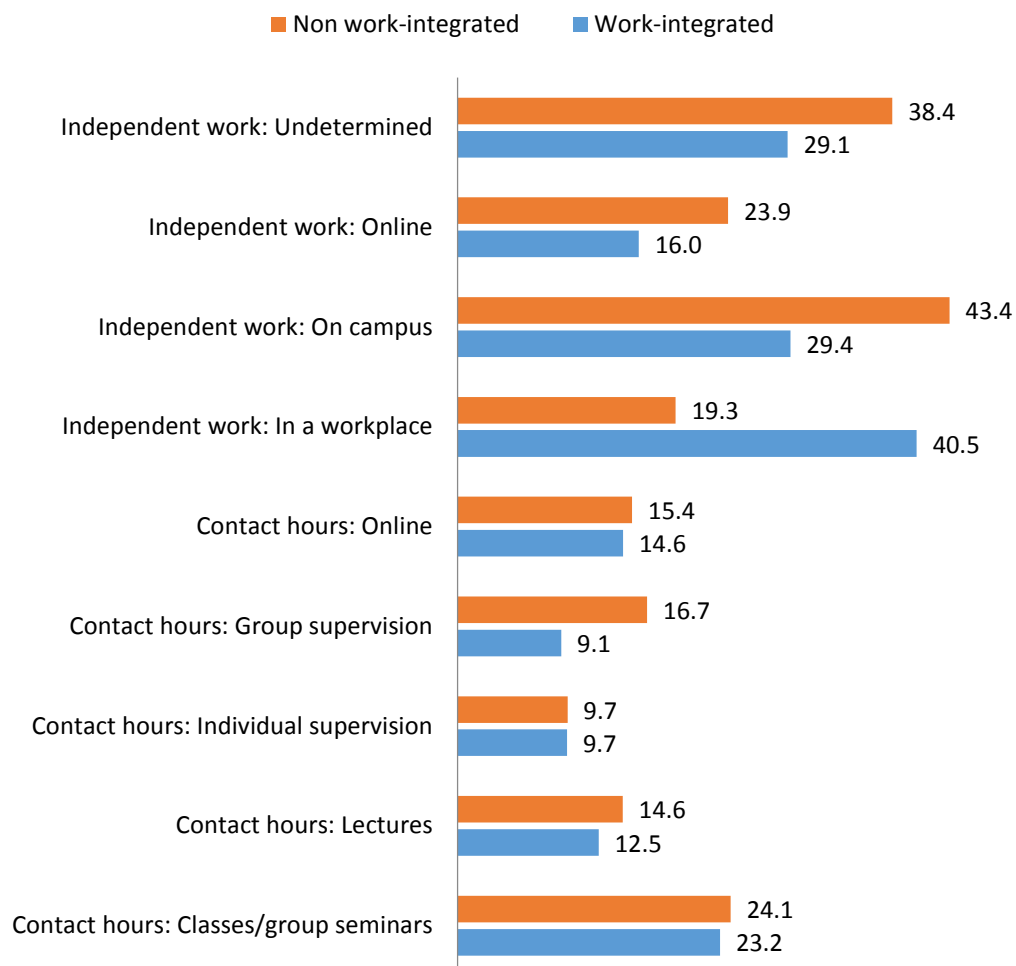


Figure 39: Average student hours spent in different learning environments for WIL capstones ⁸⁰



⁷⁹ Table 55: Average student hours spent in contact and independent work in WIL capstones

⁸⁰ Table 55: Average student hours spent in contact and independent work in WIL capstones

Figure 40: Average student hours spent in contact and independent work in multi-disciplinary capstones ⁸¹

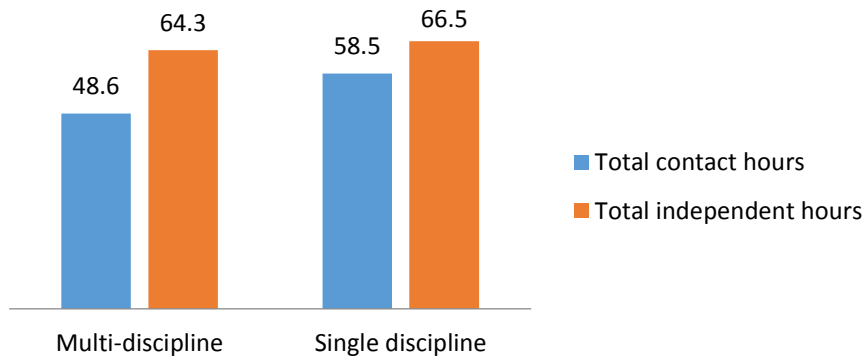
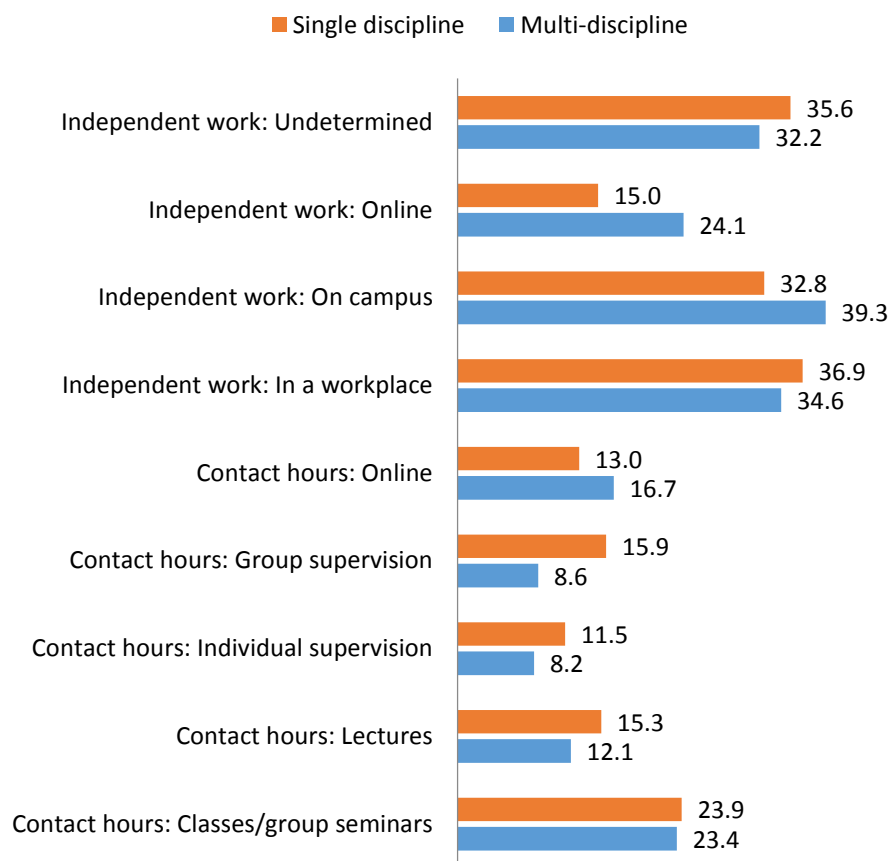


Figure 41: Average student hours spent in different learning environments for multi-disciplinary capstones ⁸²



⁸¹ Table 56: Average student hours spent in contact and independent work in multi-disciplinary capstones (8 – 15 weeks duration)

⁸² Table 56: Average student hours spent in contact and independent work in multi-disciplinary capstones (8 – 15 weeks duration)

Chapter 6: Assessment

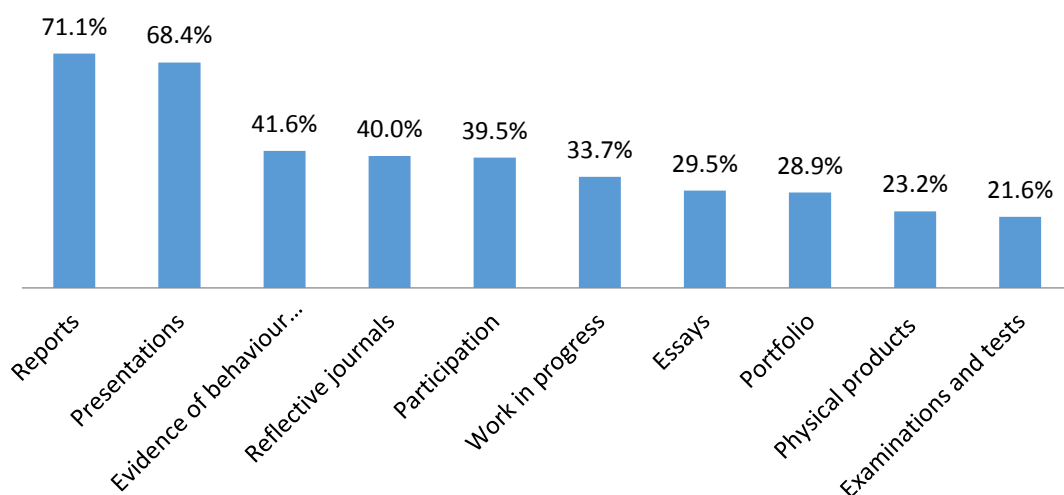
6.1 Assessment activities

Participants were asked to identify graded assessment activities or products, from a choice of ten items commonly found in the literature. In addition, participants were able to select 'other' and explain any assessment not captured by the available choices.

As shown below (Figure 42), reports and presentations were commonly selected. Evidence of behaviour, reflective journals, participation and work-in-progress activities were also popular selections. Essays, portfolios and physical products appear less common. Finally, examinations and tests were the least commonly reported assessment activities, although these were still present in sufficient numbers to be considered significant.

Participants also described a wide range of creative and alternative assessment activities. These included: mock review boards or panels; clinical assessments; proposals and pitch documents; project diaries; participation in student communities; development of blogs and websites; workplace observations and evaluations. Job-oriented assessments, such as undertaking an interview and/or completing curriculum vitae, were also described, as were research-oriented activities such as development of abstracts, minor theses, literature reviews, journal articles and conference papers or posters.

Figure 42: Graded assessment activities ⁸³

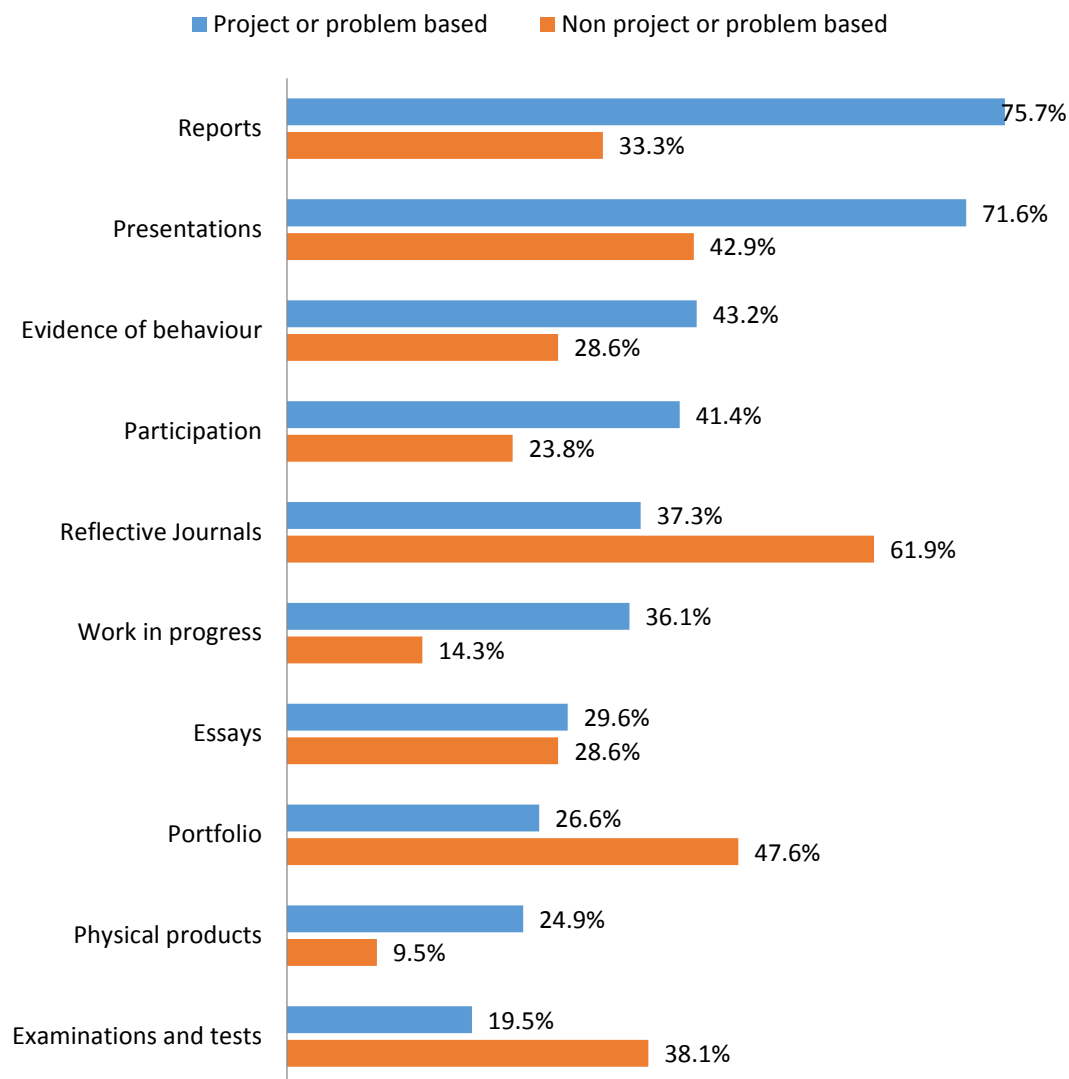


⁸³ Table 57: Graded assessment products/activities

Types of graded assessments in PBL capstones

The utilisation of different types of graded assessment was analysed across PBL capstones and the remainder of the sample (Figure 43). Several significant differences were apparent, with PBL capstones utilising reports, presentations, essays, work-in-progress and physical products more often; examinations and tests, reflective journals and portfolios less, than non-PBL capstones.⁸⁴

Figure 43: Types of graded assessments in PBL capstones⁸⁵



⁸⁴ Chi-Square Work in progress $\chi^2(1, n=169)= 3.98, p<0.05, \Phi=-0.15$

Chi-Square Reports $\chi^2(1, n=169)= 16.33, p<0.00, \Phi=-0.29$

Chi-Square Presentations $\chi^2(1, n=169)= 7.14, p<0.01, \Phi=-0.19$

Chi-Square Portfolio $\chi^2(1, n= 169)= 4.00, p<0.05, \Phi=-0.15$

Chi-Square Reflective Journals $\chi^2(1, n=169)= 4.72, p<0.03, \Phi=-0.16$

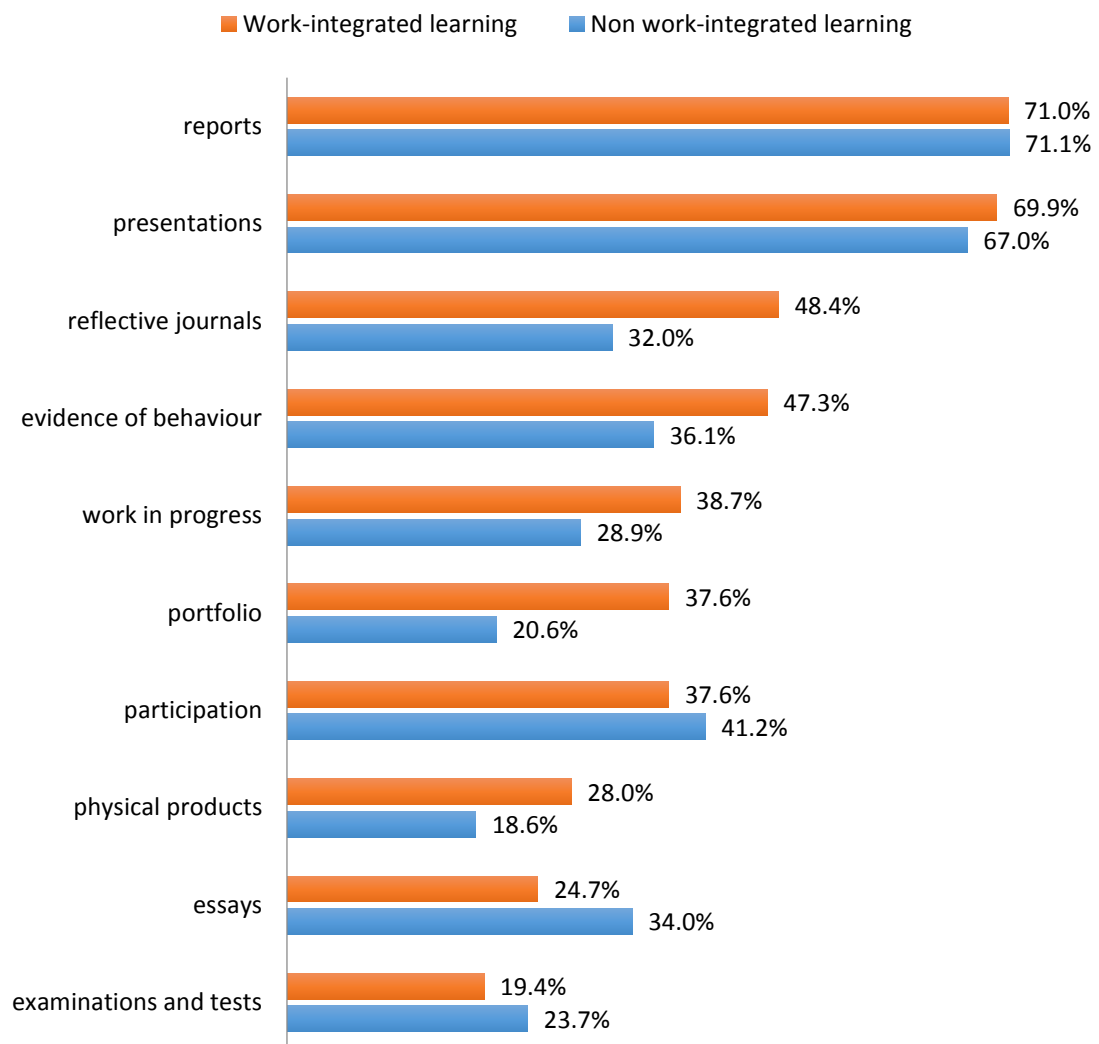
Chi-Square Examinations and tests $\chi^2(1, n=169)= 3.18, p<0.05, \Phi=-0.14$

⁸⁵ Table 58: Graded assessment products/activities in PBL capstones

Types of graded assessments in WIL capstones

The utilisation of different types of graded assessment was analysed across WIL capstones and the remainder of the sample (Figure 44). A chi-square test showed that portfolios and reflective journals were used significantly more often in WIL than non-WIL capstones⁸⁶. Physical products, work-in-progress and evidence of behaviour activities were also more common in WIL capstones, with essays being a less common form of assessment, however, these differences were not statistically significant.

Figure 44: Types of graded assessments in WIL capstones⁸⁷



⁸⁶ Chi-Square Portfolio $\chi^2(1, n=93)=6.68, p<0.01, \Phi=-0.19$

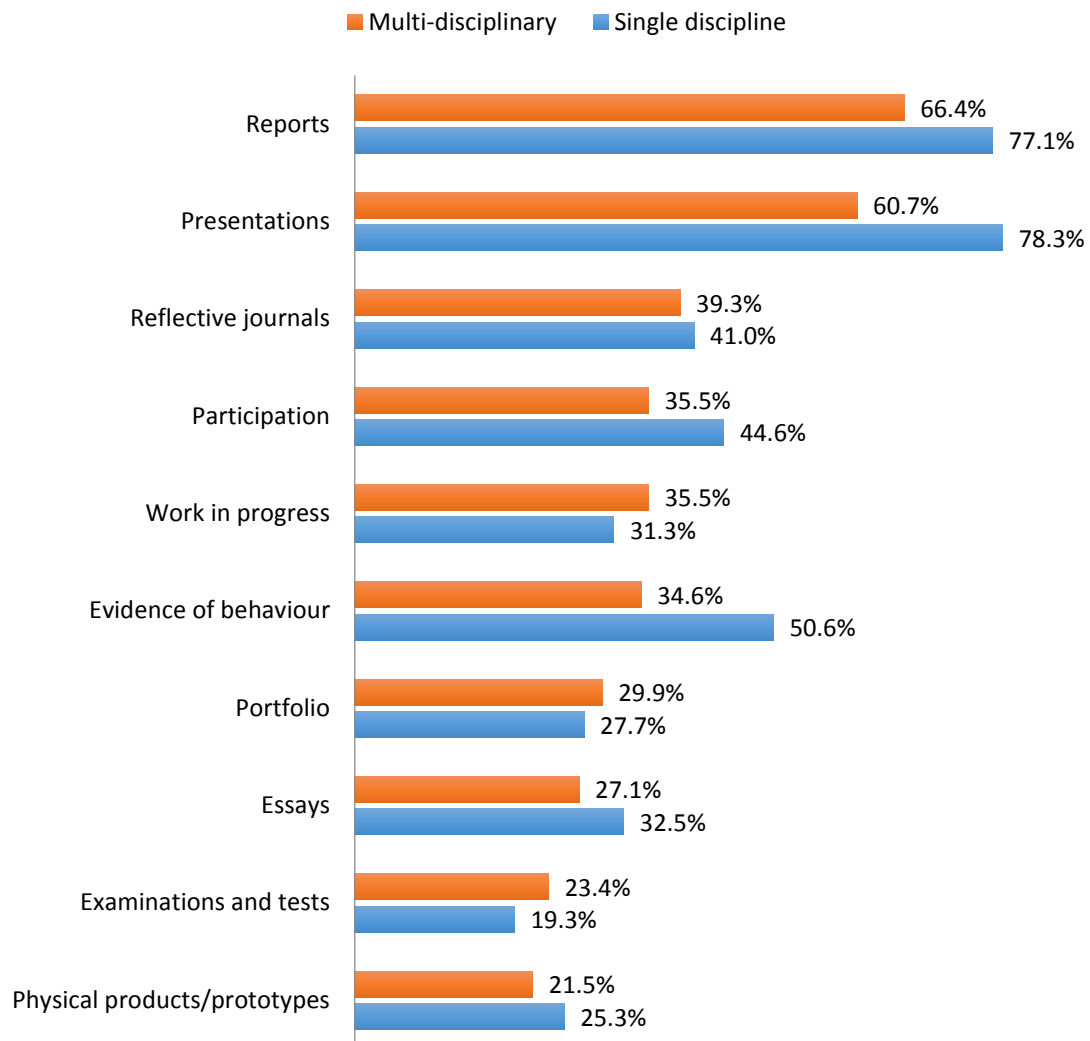
Chi-Square Reflective Journals $\chi^2(1, n=93)=5.34, p<0.02, \Phi=-0.17$

⁸⁷ Table 59: Graded assessment products/activities in WIL capstones

Types of graded assessments in multi-disciplinary capstones

The utilisation of different types of graded assessment was analysed across single and multi-disciplinary capstones (Figure 45). Both presentations and evidence of behaviour were significantly⁸⁸ more commonly utilised in single discipline capstones than multi-disciplinary capstones. Other types of assessment showed a similar prevalence.

Figure 45: Types of graded assessments in multi-disciplinary capstones⁸⁹



⁸⁸ Chi-square Presentations $\chi^2(1, n=107)=6.68, p<0.01, \Phi=-0.19$

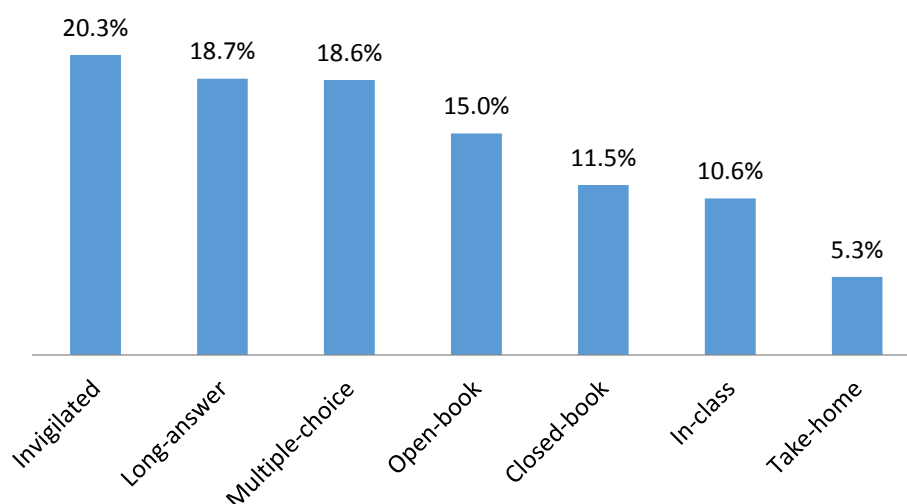
Chi-Square Evidence of behaviours $\chi^2(1, n=107)=4.94, p<0.03, \Phi=-0.16$

⁸⁹ Table 60: Graded assessment products/activities in multi-disciplinary capstones

Types of examinations

There is relative absence of information in the literature on the use of examinations as a method of assessment for capstones. Given the nature of capstones, we were interested exploring the types of examinations used. The 41 participants who indicated that examinations were a part of their capstones were asked further questions about how examinations the type of exam that was used. Participants were given a choice of seven types of examinations. Invigilated, long-answer and multiple-choice exams were present in around half of the small sample that included exams and tests (21.7%). Open-book, closed-book and in-class tests or examinations were also moderately frequent, but take-home exams were very rarely used (Figure 46).

Figure 46: Types of examination ⁹⁰



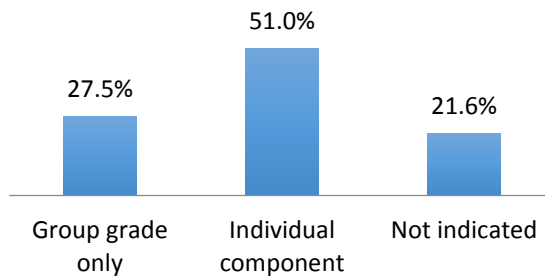
A review of examination use in PBL, WIL and multi-disciplinary capstones found higher numbers of examination assessment in PBL and less in those that included WIL or multi-discipline characteristics. This suggests that the use of WIL and multi-disciplinary activities may be associated with a reduction in the use of examination assessment.⁹¹

6.2 Group and individual assessment

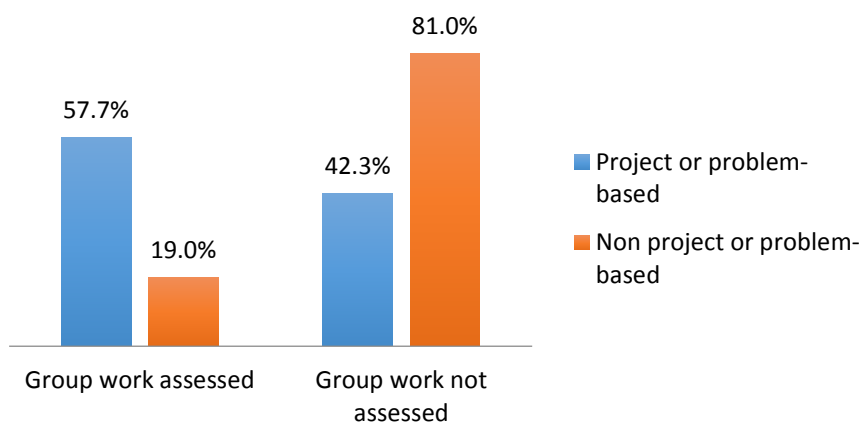
Participants were asked, regardless of whether they had indicated group work was the primary mode of work, whether or not any group work was assessed. A total of 190 participants responded to this question, compared to 137 who indicated that group work was the primary mode of student work. 102 of these indicated that group work is assessed in their capstone. Of the positive responses that could be allocated (n=80), the majority indicated that group work assessment involved a component of individual assessment (51.0%), while only 27.5% suggested that group work is assessed solely as a group grade (Figure 47). By far the majority of these comments referred to the use of individual moderation of assessment through self, peer, or teacher evaluation of contributions. Three participants referred to discrete components of the group outcome being assessed, rather than the group outcome as a whole.

⁹⁰ Table 61: Examination types utilised

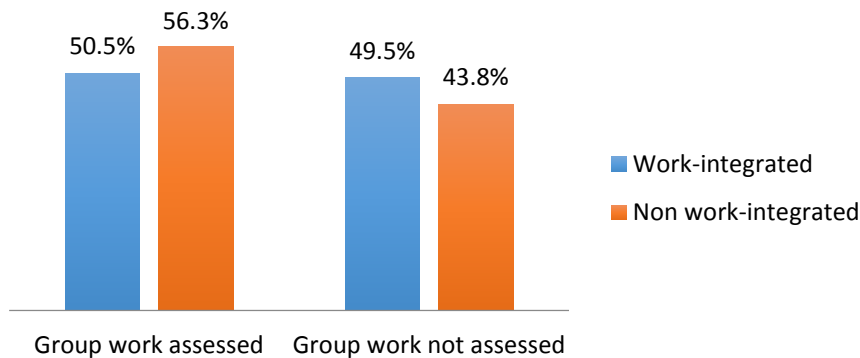
⁹¹ Table 62: Examinations and tests in PBL capstones; Table 63: Examinations and tests in WIL capstones; Table 64: Examinations and tests in multi-disciplinary capstones

Figure 47: Individual vs group grade in group work ⁹²

Whether group work was assessed was also compared across PBL capstones and the remainder of the sample (Figure 48). PBL capstones were far more likely to assess group work than non-PBL capstones and chi-square showed this difference was statistically significant. ⁹³

Figure 48: Group work assessment in PBL capstones ⁹⁴

Whether group work was assessed was also compared across WIL capstones and the remainder of the sample. Differences in utilising group work assessment between WIL and Non-WIL capstones were not significant ⁹⁵. Both work integrated and non-work integrated capstones showed a roughly even split in the assessment of group work (Figure 49).

Figure 49: Assessment of group work in WIL capstones ⁹⁶

⁹² Table 65: Assessment of group work

⁹³ Chi-square χ^2 (1, n=189) = 11.23, p<.001, Φ =.24.

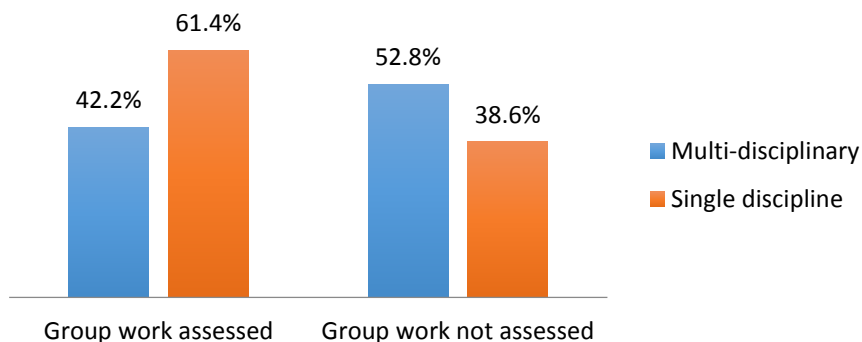
⁹⁴ Table 66: Group work assessment in PBL capstones

⁹⁵ Chi-square χ^2 (1, n=189) = .62, p=.43, Φ =-.06

⁹⁶ Table 67: Group work assessment in WIL capstones

Whether group work was assessed was also compared across single and multi-disciplinary capstones. Group work assessment was more common in single discipline capstones, utilised in 61.4% of cases, compared with only 42.2% in multi-disciplinary capstones (Figure 50), and this approached significance⁹⁷..

Figure 50: Assessment of group work in multi-disciplinary capstones⁹⁸



6.3 Who assesses

Participants were asked about the utilisation of four types of assessors in their capstones: self, peer, teacher and external (such as a workplace supervisor). Participants were also given the option of selecting 'other', and were then asked to elaborate. In addition, participants were asked to indicate the weighting given to the assessment of each assessor.

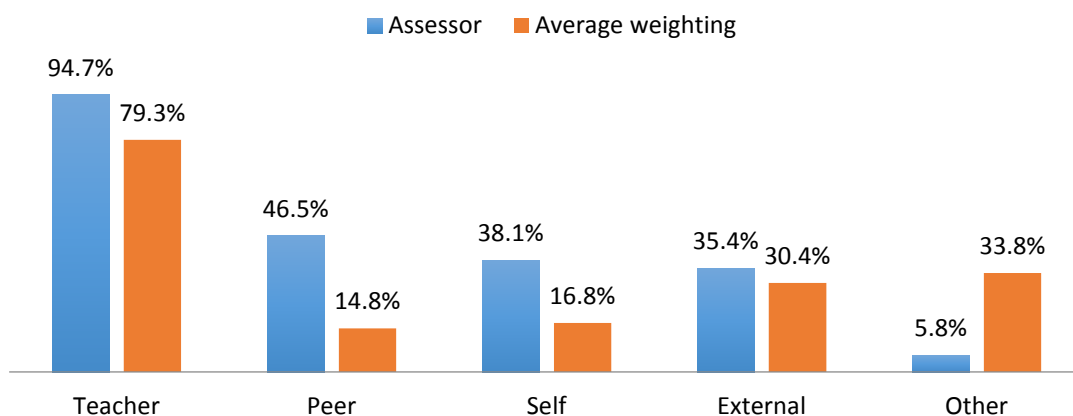
It is clear from the data that teachers are the most usual assessors in capstone units (Figure 51). Not only was this the most frequent assessor type, but it also accounted for the largest average weighting. In fact, 40.4% of capstones that utilise teacher assessors relied solely on teacher assessment. Only two capstones did not use teacher assessment at all.

Peer and self-assessment were utilised in just under half of the sample (46.5% and 38.1% respectively), but each accounted for only a small average weighting (14.8% and 16.8%). External assessment was almost equally prevalent, and was allocated a higher weighting (30.4%) than self and peer assessors. A small number of cases utilising external assessors allocated 100% of their assessment to these assessors. Some also explained that external assessors were included in assessment practices but not assigned a weighting.

Together, teacher, self, peer and external assessors captured the assessor types used in most capstones, with the 'other' category selected in only 5.8% of cases. However, in this small sub-sample where 'other' was selected, weightings were highly allocated to these other assessors, with a mean of 60.11%, although with substantial variation ($SD=42.35$).

⁹⁷ Chi-square χ^2 (1, 189) = 3.81, $p=.05$, $\Phi=.14$

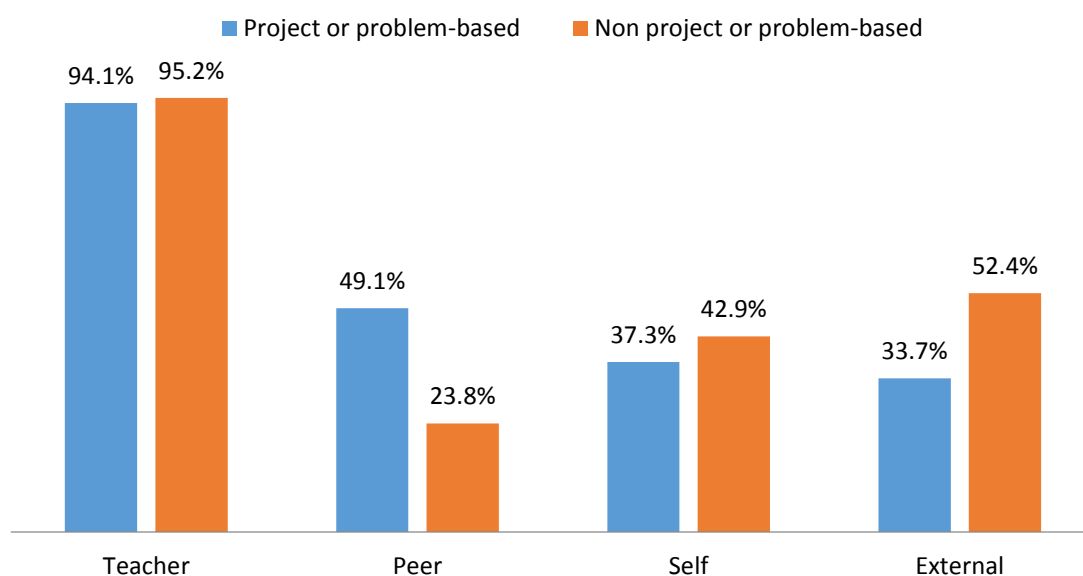
⁹⁸ Table 68: Group work assessment in multi-disciplinary capstones

Figure 51: Assessors and their average weighting ⁹⁹

The responses in the 'other' category were not included in the subsequent analysis of assessor by capstone type.

Assessors in PBL capstones

All PBL capstones except one included assessment. The utilisation of peer, self, teacher and external assessors was compared to non-PBL capstones (Figure 52). Project or problem-based capstones utilised teachers more than non-PBL capstones, but external and peer assessors, and self-assessment were used less frequently. A chi-square test indicated that PBL capstones differed significantly from other models only with regard to the higher utilisation of peer-assessment.¹⁰⁰

Figure 52: Assessors in PBL capstones ¹⁰¹

Assessor weightings in PBL capstones

The weightings allocated to each type of assessor were also compared (Figure 53). Mean scores indicated that project- or problem-based capstones placed a higher weighting on

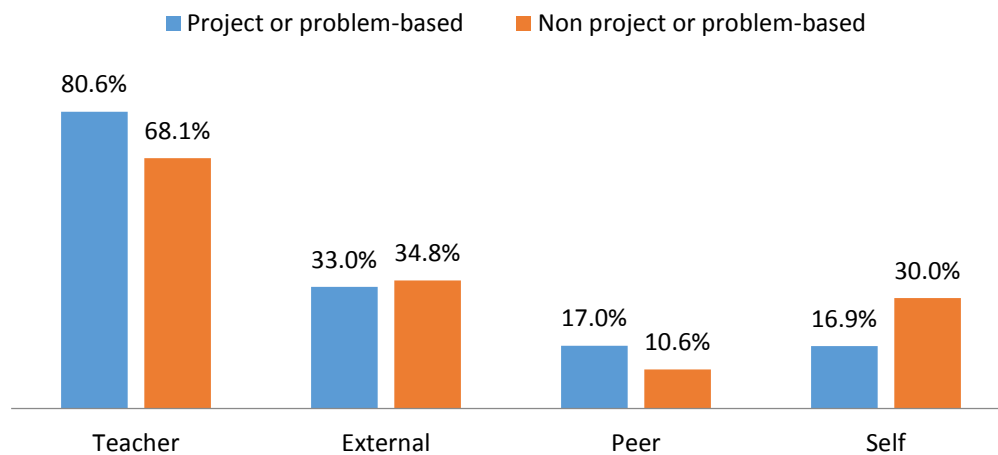
⁹⁹ Table 69: Assessors and their weightings

¹⁰⁰ Chi-square χ^2 (1, $n=190$) = . 4.810, $p=.0.03$, $\Phi=-0.16$

¹⁰¹ Table 70: Assessors in PBL capstones

teacher and peer assessors, and a lower weighting on self-assessors. External assessors were very similar. A statistical analysis of weightings, based on ranking of median scores, found that self-assessment was more highly ranked in non-PBL capstones and approached significance, but did not reach the threshold (likely due to the small sample size). Differences in weightings for all other assessors did not reach statistical significance.

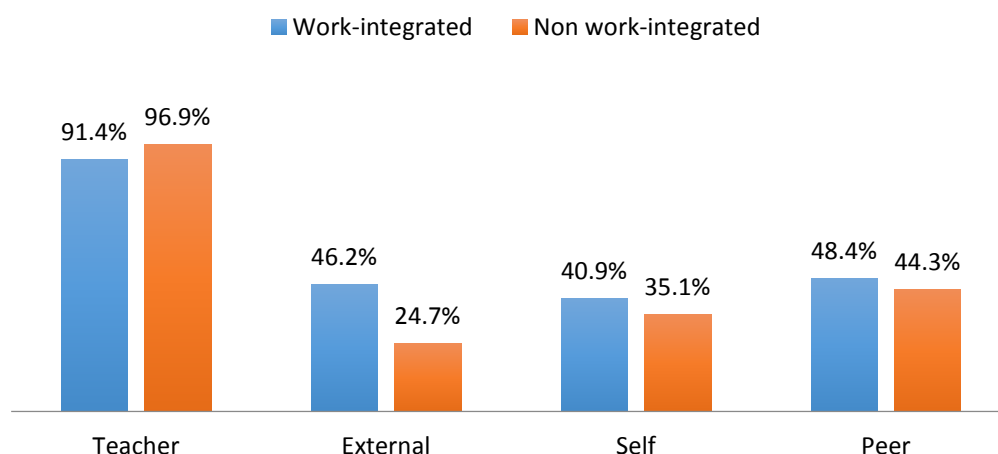
Figure 53: Mean weighting of assessors in PBL capstones ¹⁰²



Assessors in WIL capstones

The prevalence of peer, self, teacher, external and other assessors was examined and compared to non-WIL capstones (Figure 54). As might be expected, external assessors were utilised significantly more in WIL capstones; other assessors showed a similar prevalence to non-WIL capstones. ¹⁰³

Figure 54: Assessors in WIL capstones ¹⁰⁴



Assessor weightings in WIL capstones

The weightings allocated to assessors were compared across WIL capstones and the remainder of the sample. The weightings allocated to self-assessment were higher in WIL capstones, while weightings allocated to teacher assessors were lower than for non-WIL capstones (Figure 55).

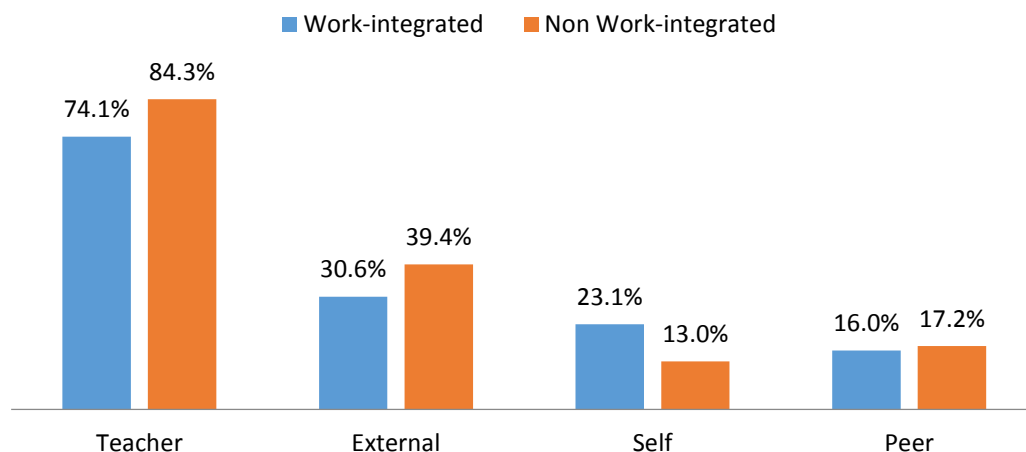
¹⁰² Table 71: Assessor weightings in PBL capstones

¹⁰³ Chi-square χ^2 (1, n=190) = .9.61, p<.0.001, Φ =-0.24

¹⁰⁴ Table 72: Assessors in WIL capstones

Interestingly, external assessment weighting allocation was slightly higher in the non-WIL capstones. However, the number of capstones that utilised external assessment and were not work integrated was small ($n=19$). As a few cases in this group selected very high external assessor weightings, and the sub-sample was relatively small, measures of central tendency must therefore be treated with caution. These cases were not deemed to be univariate statistical outliers. It is also likely due to small sample size in the non-WIL group that this difference did not reach statistical significance.

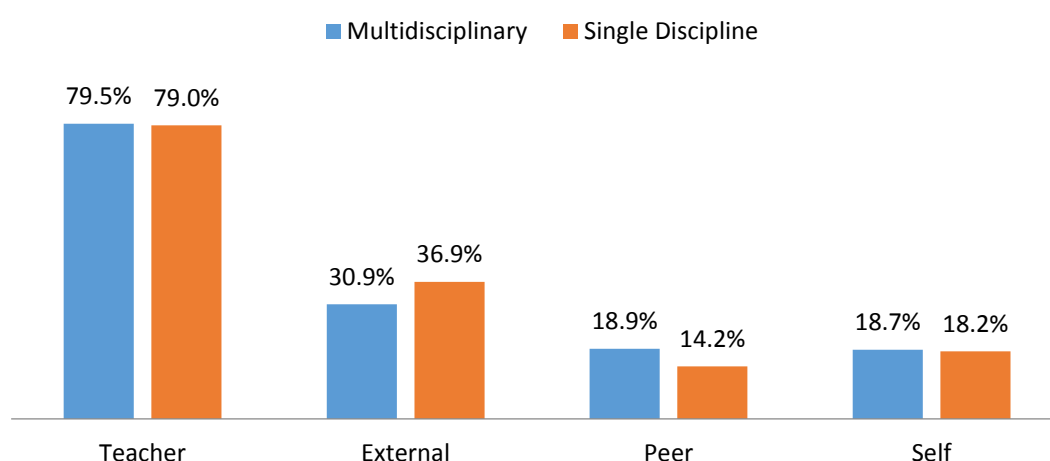
Figure 55: Mean weighting of assessors in WIL capstones ¹⁰⁵



Assessors in multi-disciplinary capstones

The prevalence of peer, self, teacher, external and other assessors was compared across single and multi-disciplinary capstones (Figure 56). No significant differences were apparent across single and multi-disciplinary capstones in their utilisation of assessors, although participants reported making slightly more use of peer assessment.

Figure 56: Assessors in multi-disciplinary capstones ¹⁰⁶



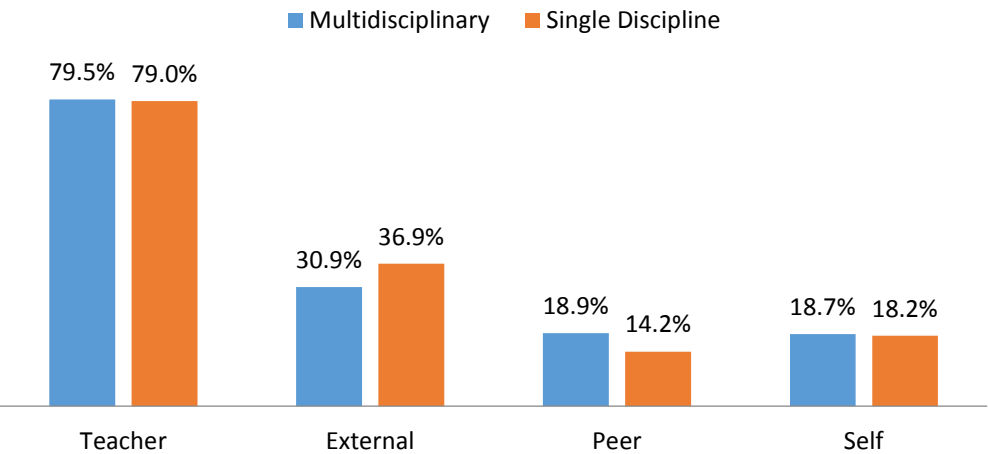
¹⁰⁵ Table 73: Assessor weightings in WIL capstones

¹⁰⁶ Table 74: Assessors in multi-disciplinary capstones

Assessor weightings in multi-disciplinary capstones

Weightings allocated to each assessor type were compared across single and multi-disciplinary capstones. Single and multi-disciplinary capstones both assigned very similar weightings to all assessor types (Figure 57).

Figure 57: Mean weighting of assessors in multi-disciplinary capstones ¹⁰⁷



6.4 Other comments on assessment

Participants were also asked to describe any additional aspects of their assessment that were not adequately captured by the quantitative responses provided. The overall theme in responses was that students were given a wide range of assessment options, and that assessment practices in capstones are often somewhat tailored to the needs of a specific student, group of students, project or situation.

¹⁰⁷ Table 75: Assessor weightings in multi-disciplinary capstones

Chapter 7: Capstone purposes








We asked participants to rate a series of 28 purposes of capstones, derived from the literature. The provided items represented a wide range of purposes across the domains of knowledge, skills, personal development, quality assurance, preparation for post-graduation and meeting external requirements. Participants were asked to rate the importance of these purposes, with items scored on a 5-point response range from 'not at all important' to 'extremely important'.

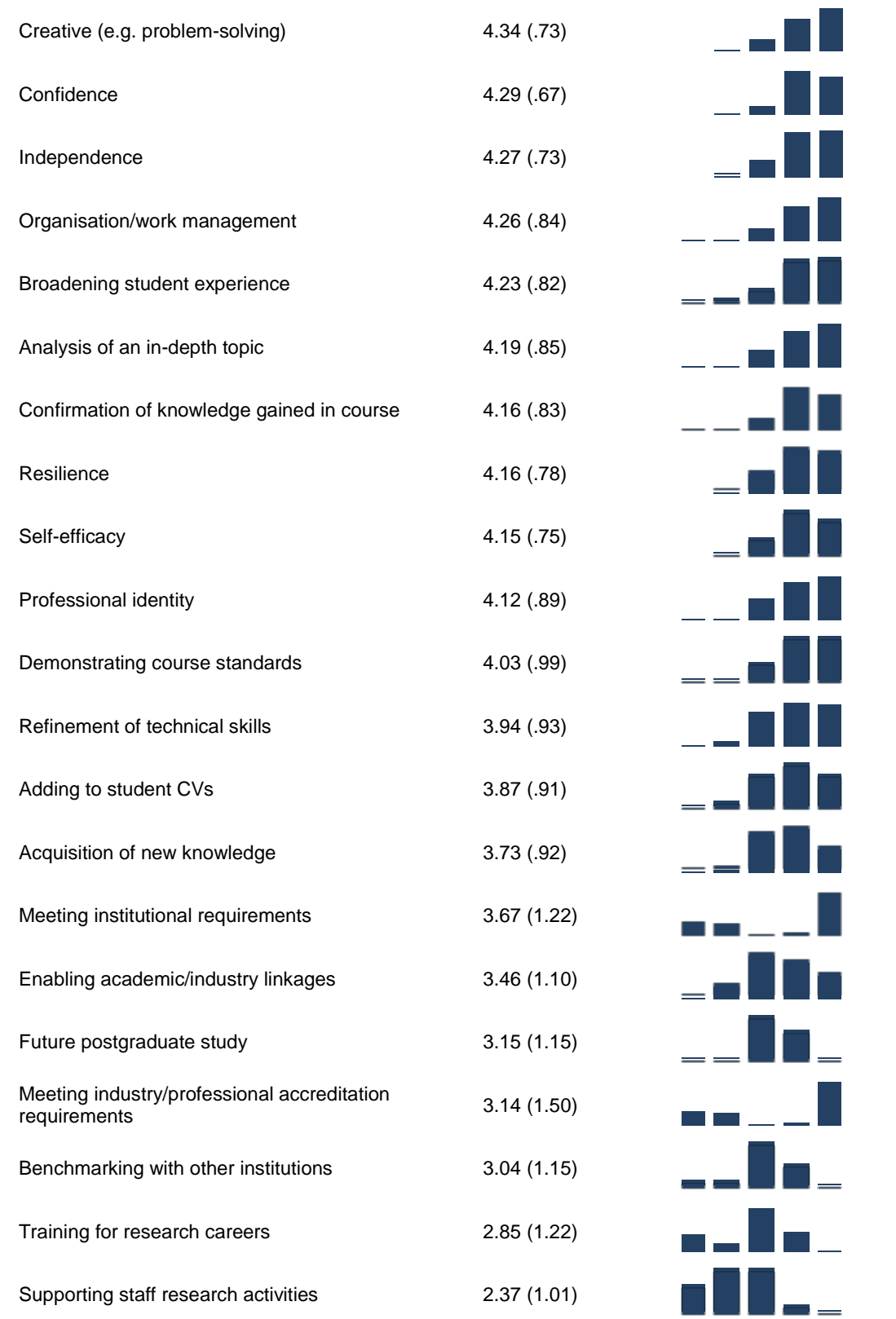
The overall results suggest that capstones must be designed to meet many purposes, with most items rated as highly important and differences across mean scores very small. Almost all capstone purpose items were rated as important on average. The most highly rated capstone purposes overall were a mix of skills, knowledge and personal qualities. Most important were communication and thinking skills, application to practice, synthesis of prior learning, ensuring quality of graduates, and increasing responsibility and preparation for industry/employability. These purposes were closely followed by responsibility, and the preparation of graduates for employment. Fostering the skills of creativity (problem solving) and personal traits of confidence and independence were rated the next highest.

Nonetheless, some items attracted more variation in their ratings. It is evident in that items with lower mean scores there is more variation across participants, with standard deviation figures increasing, and therefore higher levels of disagreement among participants. This was especially the case in the purposes of meeting industry/professional accreditation requirements, meeting institutional requirements and training for research careers. Many participants rated these items as important, while a small but substantial cohort rated them as unimportant.

These items and their respective descriptive statistics are presented in Table 2 in rank order.

Table 2: Capstone purposes in the overall sample

Item: "In your view, what are the primary purposes of this capstone?"	M (SD)	Histogram importance <-low-high->
Communication (verbal, written)	4.64 (.56)	
Thinking (e.g. critical decision making)	4.60 (.58)	
Application to practice	4.58 (.66)	
Synthesis of prior learning	4.55 (.61)	
Ensuring quality of graduates	4.54 (.66)	
Responsibility	4.52 (.56)	
Preparation for industry/employability	4.41 (.77)	



Note: Histograms represent the number of cases falling into each of the five response categories, with “not at all important” on the far left and “extremely important” on the far right.

7.1 Capstone purposes across disciplines

To identify whether any of the noted differences in ratings were due to discipline, capstone purposes were compared across the four largest discipline groups within the

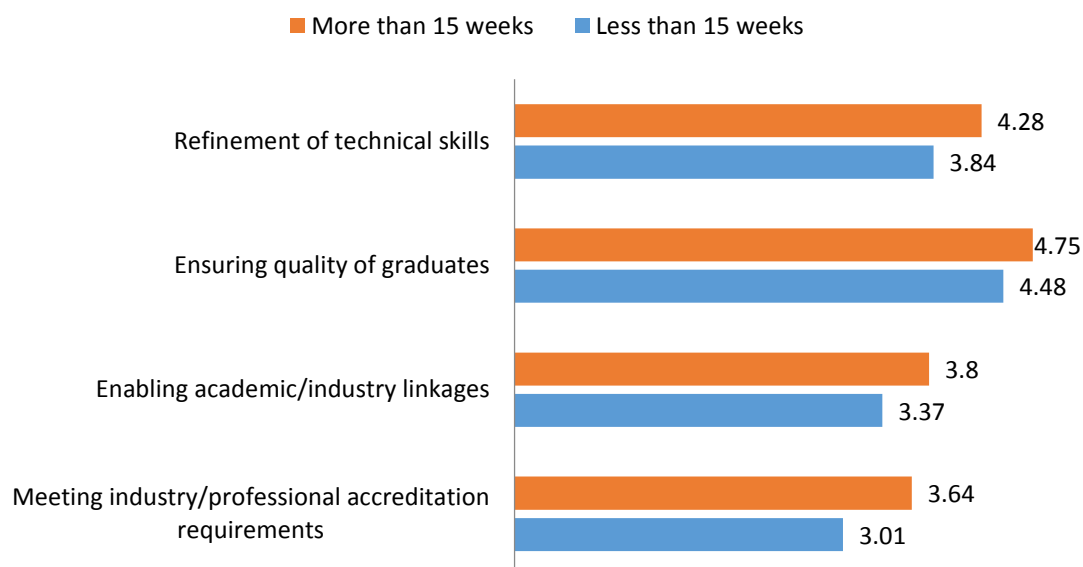
sample, namely the social sciences, health, business and engineering/ICT. Kruskal-Wallis tests were carried out, with Dunn-Bonferri post-hoc tests used to identify the differences between groups¹⁰⁸. While most capstone purposes were not rated significantly differently across these discipline groups, some notable variations were found and all significant results are presented in Table 76: Capstone purposes across discipline groups. These different purposes primarily related to the broader domains of preparation for post-graduate settings, meeting external and quality requirements, and an emphasis on application to practice or synthesis of prior learning. Generally, engineering/ICT and business placed less emphasis on their capstones preparing students for future study or research, and more emphasis on demonstrating course standards and application to practice.

7.2 Capstone purposes across durations

Given the substantial differences in scope likely for capstones of one semester or two, we undertook Mann-Whitney *U* tests¹⁰⁹ to identify where the mean rating of purposes differed significantly dependent on capstone duration (Figure 58).

In general, rating of purpose was similar across capstone durations, indicating that shorter capstones have imposed no major limitation on the expectations for a complex range of student outcomes. However, longer capstones did rate slightly higher in relation to four purposes. These were: refining technical skills, ensuring quality of graduates, enabling academic/industry linkages and meeting industry/professional accreditation requirements. This may reflect the larger proportions of longer capstones in engineering and ICT, and the typically strong professional and technical focus of those disciplines.

Figure 58: Capstone purposes that differed across the duration of capstones¹¹⁰



¹⁰⁸ Table 76: Capstone purposes across discipline groups

¹⁰⁹ Meeting industry/professional accreditation requirements Mann-Whitney *U* test (Mdn=4), $U=2186.00$ $Z=-2.38$ $p<0.02$

Enabling academic/industry linkages Mann-Whitney *U* test (Mdn=4), $U=2335.00$ $Z=-2.12$ $p<0.03$

Ensuring quality of graduates Mann-Whitney *U* test (Mdn=5), $U=2371.00$ $Z=-2.32$ $p<0.02$

Refinement of technical skills Mann-Whitney *U* test (Mdn=4), $U=2209.00$ $Z=-2.59$ $p<0.01$

¹¹⁰ Table 77: Purposes across ≤ 15 week and ≥ 16 week capstones

7.3 Other comments on purpose

Participants were also asked whether any key purposes of their capstone had not been captured by the items provided, and if so, to elaborate. Of the 31 responses to this question, many reflected the existing purposes. Of those that could be identified as distinct, five comments related to specific discipline contexts, such as teaching business ethics. Two mentioned self-reflection skills. Three mentioned providing inter-disciplinary experiences. Two mentioned helping students to foster career direction. One participant listed several broad purposes, including leadership, meeting industrial requirements for pay scale increases, fostering entrepreneurialism, the ability to talk to external audiences about their learning, developing pride, ownership, and team work in high pressure conditions and fulfilling student passions.

Chapter 8: Perspectives on capstone design and delivery

The qualitative section of the survey offered opportunities for participants to provide their views on the benefits and challenges of capstones, the use of capstone outcomes as a quality assurance mechanism, and the supports provided to them. These data were thematically analysed, with some counts for prevalence. The themes are presented here in summary form.

8.1 The best things about delivering capstones

Exploring the perceptions of academics who deliver capstones was an important component of this research. This question focussed on the positive aspects of delivering capstones. Participants were asked to describe the best things about delivering a capstone. The passion and commitment of participants to the student experience in capstones was evident throughout this data, with strong themes emerging around the satisfaction of seeing students develop independence, personally engaging teaching processes and authentic curriculum tied to industry or community engagement.

Seeing students develop

The most prominent theme was the intrinsic satisfaction gained from witnessing student development, both academic and personal, in a capstone unit. One participant stated: *"I really love watching them manage both a big workload with skill and precision and their feelings as they develop their professional selves"*. Another enjoyed *"The changes that it brings in the students. They are challenged to extend themselves personally and increase their knowledge and skills"*. Another participant stated that the best thing was the *"Satisfaction at seeing how the students develop as a result of their experiences"*.

Traits and learning outcomes that were reportedly developed included project and workload management skills, maturity, confidence, independence, autonomy, agency, and an integrated understanding of the field. Substantial achievements for students were also mentioned as end-products of the capstone, including the attainment of professional accreditation and receipt of job offers. Many capstone teachers described their enjoyment at witnessing students achieving beyond their own expectations, and producing work of such high quality that it surpassed what they felt they could have themselves produced. This was variously described as sophisticated, mature and graduate level.

Flexibility in teaching approaches and a coaching style

Teachers also indicated that capstones provide a unique opportunity to work with highly engaged students in what was often described as a supervisory or coaching role, highly attuned to students' individual needs. This *"freedom"* - the term used by many participants - affords teachers a degree of flexibility in their teaching approaches that they found to be unique and personally satisfying.

This freedom also posed a creative challenge in forming and delivering learning activities and assessments that were flexible enough for each student's, or group of students', projects. Many teachers described this as a challenge but one that they relished. The coaching style meant they developed productive and close relationships with many

students, and worked with students at a level of individuality uncommon at the undergraduate level.

Working on complex projects or problems connected with industry and community

Another commonly expressed benefit of delivering capstones was the authentic, real-world nature of the activities and outcomes. Problems with no immediate solution, projects that aimed to meet the needs of industry or community – needs that could be tackled in multiple ways – were described as challenging and enjoyable for staff and students. Participants described the benefits of applying and testing limits of prior learning through engaging students with ill-formed scenarios, prompting them to form their own learning goals and to plan, work together, execute and track progress towards their goals. One participant described the use of real-life problems or industry and community needs as cues to learning as a *“profound simplicity”*.

Teachers also enjoyed the interaction with industry or community that was sometimes a component of this approach, with this industry engagement offering a different perspective on learning. This engagement did, however, also often bring challenges of increased workload (see key challenges, below).

8.2 Key challenges

Directly following from the benefits of capstone delivery, participants were asked to describe what they perceive to be the key challenges of delivering capstones. Several themes emerged, including establishing the credibility of non-traditional elements of capstones (and gaining the required support for these), managing external relationships, resource constraints and student preparedness. Participants also mentioned challenges arising from changing policy or accreditation environments and a lack of guiding literature, including case studies that match the discipline, nature and scope of their desired capstone.

Credibility and acceptance

Many participants described the difficulty in explaining the value of capstone delivery models to others. This included both peers and management structures. They also largely attributed this to conservative or traditional institutional culture. These concerns included whether institutions could accommodate a high level of flexibility and independence in student learning; individualised student engagement and activities; difficulties with timetabling outside of standard delivery; recognition of workload; and managing the time students spent working in industry or community and outside the traditional academic environment.

Staff described these challenges in several ways. One stated *“Allowing innovation in learning is a big challenge for those who enjoy traditional teaching models”*. Others described a consistent faculty *“resistance to complexity”*, and that certain elements of the capstone take *“staff to places where they are not ‘comfortable’”*, while one described the biggest challenge as ensuring *“credibility of the course in the eyes of Faculty”*.

Compounding resistance to non-traditional capstone models were the sometimes competing interests of units running alongside capstones, which were occasionally vying for the same resources, such as administrative or teaching staff allocation. Some participants described *“territory wars”*, *“internal politics”* and *“overlapping interests”*. A sub-element of these disputes was the capacity for capstone work to take up more

student time than assumed by the allocated FTE. This sometimes came at the expense of students' work in other activities.

Managing external relationships

This theme comprised the complexities involved in managing external relationships, including internships, placements and projects for industry. Academics reported difficulties in finding good clients, and that these arrangements required ongoing attention to ensure activities undertaken were of benefit for all parties. Specifically, managing industry or community partners while ensuring the appropriate academic development of students, or *"keeping some sponsors engaged and providing the necessary feedback"* was described as being challenging and time consuming.

Others described experiencing ongoing stress around ensuring a pipeline of suitable industry partners for projects, and these appear to be exacerbated in placements. Several participants noted that placements come with an inbuilt complexity around simply matching the number of placements and students *"sourcing placements and/or filling excess placements"*, and ensuring the quality of those experiences. This was especially the case when some placements and/or students were from regional locations, or the unit had specific requirements. In some cases, participants reported substantial administrative activity in managing these relationships.

Resource constraints, particularly time

An overriding theme that fed into many others was that resource constraints posed a challenge, especially in the form of limited time being available to staff to ensure the best possible capstone experience for students. Many participants noted they had extremely limited time to manage their capstone, which sometimes required additional time compared with other units, such as in-training teaching staff, training administrative staff supporting the unit, managing external relationships, as well as the sometimes intensive time required for each student.

Some participants indicated it took multiple years for the capstone model to become bedded down and for the associated processes to satisfactorily develop and be made sustainable. These early years were often characterised by staff devoting additional time outside their workload allocation. One participant with a WIL capstone indicated that their biggest challenge that *"capstones such as this are time-intensive"*, most used the term *"lack of time"*, while another said, emphatically, *"never enough time!"*. Ongoing funding was also described as a challenge, with many capstones having to vie for, and occasionally losing, their funding.

Student preparedness

Most capstone models had requirements for entry such as successful completion of earlier units, and some set the bar higher requiring a high grade average in past units. Nonetheless, many participants indicated that some students needed additional support to successfully complete the capstone unit and that they experienced substantial challenges in ensuring students had the necessary level of skill development in the early stages. Many described having to return to earlier course content and develop students' knowledge and skills further through intensive coaching. One participant described the challenge as being *"patchy prior knowledge of students"*. Another reinforced these views specifically as *"inconsistency in previous research skills development and capacity for independent thought and project management skills"*. Yet another added the

individualistic nature of capstones to the challenge as *“supporting students of different levels of skills and interest”*.

The second most common reported challenge in teaching was in the effective management of group work. One described this as requiring additional training to equip new teaching staff, and the students, with the skills required. Participants also commented on the need to spend time *“making it run smoothly”* and *“sorting out conflicts”*. Some also described a need to help students to form and develop a productive approach to group work, cognisant of each particular mix of skills and working styles. Detailed comments described the importance of developing student (and staff) skills in managing projects and group conflict, including the common issues of poor task delineation and free-riding.

8.3 Improvements: Longer, deeper and more supported capstones

Participants were asked what they would do with their capstones, given unlimited resources. Themes emerging from this data focused on curricula innovation, increased scope and improving the way the capstone is integrated in the overall course experience.

Curricula innovations

Curricula innovations were a consistent theme throughout the responses. Some suggested learning activities involving minor curriculum changes, such as *“make participation in online forums compulsory and assess it”*, or *“increase the components of self and peer assessment”*. Others suggested additional learning activities or curriculum that was unaffordable or required resources that were currently unavailable, and these represent more substantial changes to current models. These included establishing a *“‘Transition to Professional Work’ unit, with staff who can identify and manage work-based placements”*, and introducing an international experience to the capstone.

Similar to the desire to bring industry or community into the capstone, a number of participants indicated their desire to set up a simulation, with some including the physical spaces required to simulate a unique workplace, e.g. *“a simulated design space to replace industry”*. Others suggested greater connectedness within and between universities and departments. These suggestions took various forms, with some suggesting larger national or international cross-institution collaboration, e.g. *“I would like to link up with other schools that offer my brand of simulation so that we could have a national or international experience”*. Others expressed interest in moving from single to multi-disciplinary, or broadening the discipline mix: *“I would also try to create truly multi-disciplinary project teams ... not just with a mix of engineering disciplines. I would try to include business, law, and other students in the team”*.

The next most common idea expressed was the introduction of, or increase in, industry or community engagement. One participant would *“apply further funds to extend the industry reach”*; another would *“add better links to industry ... if I could”*; and another would *“engage community members in assisting with project proposals, project feedback, workplace coaching”*. One would introduce *“paid industry panels for a mid-term formative look at what’s going on with the work”*; yet another would like students *“to participate in a board of director’s session”*; another would *“add more site visits”*. Another would add *“more contact with sponsors and teams”*; another *“expand creative assessment, with external organisation and peers”*; and another *“work with agencies to develop projects”*. Several participants also indicated they would like to increase both the frequency and duration of guest speakers. Some comments indicated participants would like to develop

external input mechanisms, such as *“create an advisory board that has input into the curriculum design”*.

Other comments related to increasing the number or quality of learning resources, with one participant indicating they would *“Create more online resources for the simulation”*. Others highlighted the need to develop teaching resources, such as rubrics and standards, with one participant stating they would *“devise a standards reference framework with analytical rubrics for all tasks and products/the portfolio; for feedback, decision making, recording and reporting”*.

Extending capstones and their resources

The next most common theme reflected the challenges participants expressed, with many indicating they would increase the available resources. Staff consistently commented that capstones are intense experiences involving high student workloads, particularly for those involving the workplace. Desired changes most commonly took the form of an increase in the duration or weighting of the capstone, to provide for things such as more trial time to become familiar with simulation software, more time to formulate and plan projects. Several simply indicated they would expand the FTE of the capstone, usually quite dramatically: *“double the credit points!”*.

Others simply wanted more time with students: *“smaller classes”* and, correspondingly, *“more intensive supervision of students”*, or *“increase teaching/contact hours”*. However, the additional time was also desired to manage student engagement with, and to provide support for, external partners. For example *“more direct contact with students and host organisations while doing their internships to enable closer monitoring of progress”*; *“additional support for students and workplace supervisors”*; *“free up more time to enable students and clients to work more closely together and staff facilitators so they devoted their full attention to just this course, not the million and one other things that distract them in their workplace lives”*.

The next most prominent type of resource desired was direct funding for student experiences. A number indicated that to *“provide a project budget”* would help to engage students and enable bigger projects utilising wider skill-sets, such as budget management. Another participant requested *“more resources for students to develop a range of possible projects”*. Another wished to expand opportunities for all students to take part in activities: *“currently only the best students are sent to a jamboree event ... I’d like to send all students”*. Three participants highlighted shortages of funds specifically being a barrier to engagement with regional areas, with one stating they would add *“more financial support for students to complete placement in regional areas”*.

Some participants asked for facilities, such as *“a bus for the use of the section for more placements and field trips”* and *“more student group working spaces”*.

Further embedding capstones within courses

Less common, but still frequent, comments revealed a desire to make changes to the alignment between the capstone and the course.

Many comments related to modifying earlier units preparing students for the capstone, including one participant’s comment that they would *“add simulations in earlier units”*; and another’s that they would change *“the units leading into it to ensure better development of core skills”*. Others indicated a wish for more expansive embedding of the capstone into the course, including one participant who would *“Offer these [capstone]*

experiences to student at every year level and incorporate the development of their portfolio from 1st year”.

8.4 Comments on using capstones to assess overall course quality

Participants were also asked to reflect on the benefits and challenges in using capstones to assess overall course quality. Just under a third of the 103 that responded agreed that capstones were an appropriate mechanism to assess course-level outcomes: *“a capstone unit is the perfect vehicle”, “definitely can be used to assess program quality”, “A capstone is an excellent vehicle for assessing all the knowledge gained in the discipline. It enables us to track the gaps and soft spots across our school. It shows us where to apply extra focus either in our capstone or in the core papers. It really is a mirror held to the face of our school”.*

Another third were at best sceptical, some emphatically so: *“there would be huge challenges”, “an enormous amount of pressure on a couple of assessment items”, “I don't think that these capstone courses really say much about the program as a whole”.* One participant lamented the utilitarian tenor of the suggestion: *“I think this is a quick and dirty strategy, which is probably being implemented globally. Although the process is defensible, it would clearly be a far better learning experience (and teaching experience), if a course-wide approach were to be implemented. I recognise the difficulties in achieving this, however”.* Others suggested that a better test was graduate capability: *“The quality of a course can only really be judged by the quality of graduates in practice”.* Another participant raised concerns about the implications of a focus on course quality assurance: *“I don't think the point of a capstone is to assess a program, it is about preparing a future graduate. When we start using a program to assess our performance (teaching, organisational) the focus shifts from the students/graduate needs.”*

Many, though, provided qualified agreement, and noted that the limitations and challenges required a balance of capstone outcomes and other measures: *“It is the simplest way to do so but this means it loses some of the complexity at issue”.* The limitations described included the timing of delivery (that a capstone can only capture the learning prior to the capstone, not concurrent with it), concerns about unrealistic expectations that a single unit could provide evidence for an entire course, particular difficulties with courses that involve multiple majors or pathways, the difficulty of managing the combined pressures of quality review with external partner expectations, and the targeted and therefore limited nature of outcomes, in some capstones.

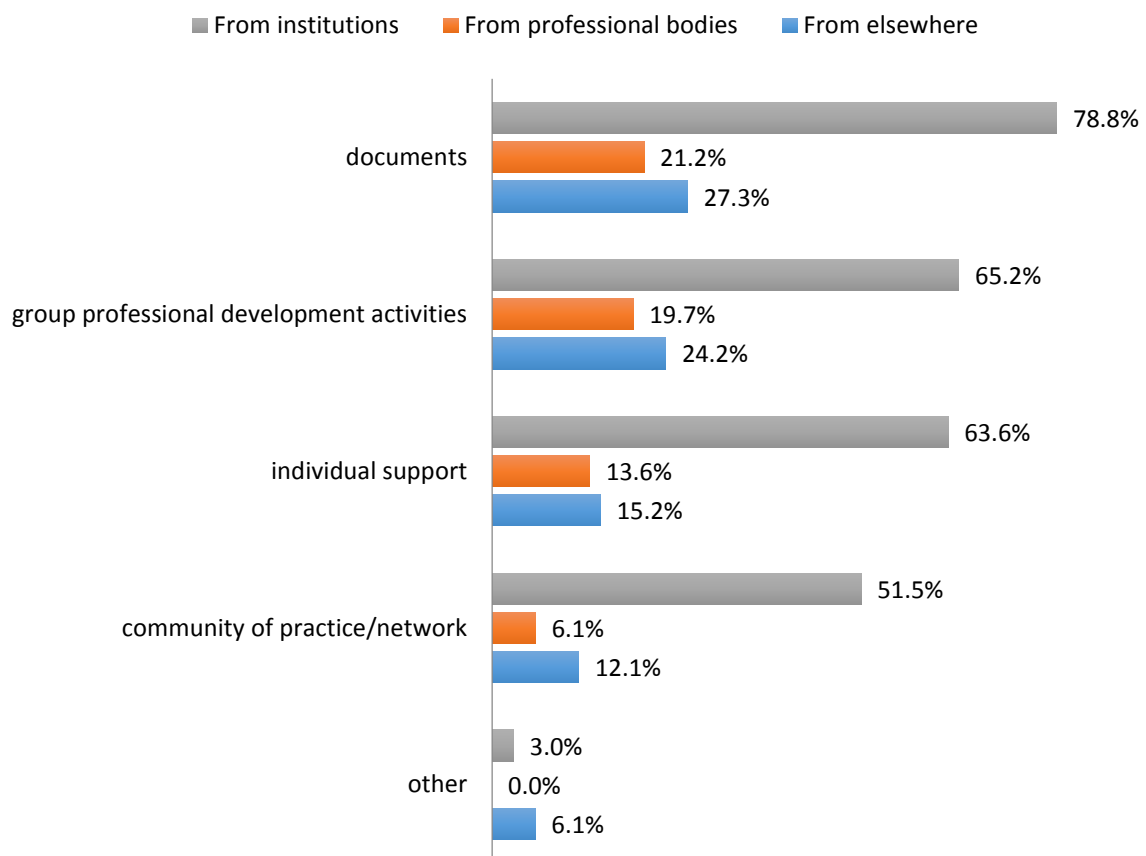
8.5 Available support mechanisms

Participants were asked to indicate whether there were any support mechanisms for developing or delivering capstones available from their institution, professional body or elsewhere. Roughly equal portions of participants responded yes, no or that they didn't know.

The vast majority of those that responded positively to this question reported some form of support being available from their institution. The most commonly available form of support were documents, followed by group professional development activities, individual support and, lastly, community of practice/network. Unsurprisingly, given the lower numbers of participants who reported a relationship with a professional body, significantly fewer support mechanisms were reported as being available from this source.

However, a similarly low number of participants reported support from other places (Figure 59).

Figure 59: Forms of support available ¹¹¹



The four participants who indicated 'other' forms of support reported four distinct types:

- Capstone design conference;
- Career advisors, volunteering network and workplace-integrated learning opportunities;
- Consultancy support; and
- Development of resources as part of a funded research project.

8.6 Desired support mechanisms

Participants were also asked what information resources or professional development they thought would be most helpful to them in supporting their capstone. A variety of responses were received from 92 participants. By far the most common form of support requested, from 43 participants, was access to information about how other capstones were run. This was generally described as being in the form of case studies or models from other institutions, but also forms of peer benchmarking, such as observing or reviewing the curriculum of other capstones. Also suggested were more specific exemplar and guideline resources, particularly for assessment and learning outcomes.

¹¹¹ Table 78: Forms of support available

The second most common response, from 23 of the participants, referred to access to the work of peers and experts through benchmarking and public fora, such as online discussion groups, symposia and networks. Ten participants suggested a desire for formal training on curriculum development for capstones. In addition to these common themes, individuals suggested greater liaison with careers staff at their institutions in order to pre-plan industry components and align them with careers' efforts, software innovation, and access to funding for students.

Appendix 1: Data tables

This section presents a complete breakdown of all analyses discussed in the body of the report. The format follows the sections of the report, and adheres to a general pattern of first presenting data for the overall sample, which are then broken down across sub-groups or factors of interest. The sample sizes vary slightly throughout the report as some participants did not complete all items in the survey. Where sub-samples are reported, percentages are calculated based on the relevant sub-sample in each instance (i.e. the valid percent) excepting where counts of responses to multiple items are provided.

Notes are provided explaining salient points for each table, including an explanation of varying sub-sample sizes. The number of cases in a particular category is denoted by *n* and percentage as %, rounded to one decimal place.

Almost all continuous variables produced in the analysis were significantly non-normal and as such distribution-free inferential tests were used to calculate the probability of the observed findings, specifically Mann-Whitney *U* tests to compare rankings of median scores. For the inferential investigation of prevalence findings, Pearson's Chi-Square (χ^2) was calculated with Phi (Φ) as a measure of effect size. Where sub-samples were below the expected cell-count of 5 for a valid Pearson's Chi-Square, other inferential test alternatives (e.g. Fisher's exact test) were not utilised, as these sub-samples were not considered to be large or representative enough of the broader population of capstones in Australia. Occasionally, non-parametric relationships with two ordinal variables were analysed using Kendall's Tau-b (*tb*). All probability figures were calculated as two-tailed, and the significance threshold of $p < .05$ is adopted throughout, although in some instances *p* figures under .10 are highlighted.

Table 3: Discipline groups in the sample

LTAS discipline group	<i>n</i> (%)
Social sciences	56 (26.0)
Business	49 (22.8)
Health	43 (20.0)
Engineering/ICT	28 (13.0)
Creative arts	13 (6.0)
Science	10 (4.7)
Architecture/building	7 (3.3)
Law	5 (2.3)
Non-discipline	4 (1.9)

Note: Most cases could be directly mapped without doubt ($n=177$). Several cases ($n=38$) presented some uncertainty, usually because participants identified a discipline that may have fallen into several of the LTAS disciplines (e.g. global studies), or a combination of disciplines (e.g. socio-legal studies). For these cases the Fellow and the project officer independently mapped the disciplines to an LTAS category and compared results. There was little disagreement, as 36 (94.7%) cases were mapped to the same disciplines. The remainder were re-checked by a third reviewer. One participant did not list their discipline.

Table 4: Length of involvement in the capstone

Length of involvement	n (%)
< 2 years	51 (26.0)
2–5 years	80 (40.8)
5–10 years	36 (18.4)
> 10 years	29 (14.8)

Note: 20 participants did not indicate how long they had been involved with the capstone.

Table 5: Duties undertaken in the capstone

Duty	Ranking of activity			
	1 st n (%)	2 nd n (%)	3 rd n (%)	4 th n (%)
Managing/coordinating	122 (73.1)	27 (16.2)	15 (9.0)	3 (1.8)
Developing curriculum	40 (24.5)	75 (46.0)	35 (21.5)	13 (8.0)
Teaching/supervising	23 (13.2)	65 (37.4)	69 (39.7)	17 (9.8)
Providing curriculum advice	14 (12.8)	16 (14.7)	30 (27.5)	49 (45.0)

Note: 17 participants did not respond to this item.

Table 6: Institutional expectations

Institutional expectation of capstones	n (%)
Required	59 (29.2)
The “norm”	14 (6.9)
Discipline dependent	129 (63.9)

Note: Eight participants selected two choices in this item and were removed from this analysis due to the response being ambiguous. Six additional participants did not answer the item.

Table 7: Discipline expectations

Discipline expectation	n (%)
Required	39 (22.3)
The “norm”	86 (49.1)
Discipline dependent	50 (28.6)

Note: 41 participants selected ‘other’ and were excluded from this analysis.

Table 8: Discipline expectation across discipline groups

LTAS discipline group	Required n (%)	Normal n (%)	Unusual n (%)
Architecture/building	3 (42.9)	2 (28.6)	2 (28.6)
Social sciences	15 (34.1)	15 (34.1)	14 (31.8)
Business	5 (12.5)	21 (55.0)	12 (32.5)
Creative arts	4 (57.1)	3 (42.9)	0 (0.00)
Engineering/ICT	9 (29.0)	20 (64.5)	2 (6.5)
Health	4 (10.8)	20 (54.1)	13 (35.1)
Law	0 (0.00)	2 (40.0)	3 (60.0)
Science	1 (14.3)	2 (28.6)	4 (57.1)

Note: 41 participants selected ‘other’ and were excluded from this analysis. Non-discipline capstones (n=3) were not included in this analysis. % reflects proportion within that discipline group.

Table 9: Institutional policies

Yes <i>n</i> (%)	No <i>n</i> (%)	Don't know <i>n</i> (%)
46 (21.5)	93 (43.5)	75 (35.0)

Note: Two participants did not answer this item.

Table 10: Professional body

Yes <i>n</i> (%)	No <i>n</i> (%)	Don't know <i>n</i> (%)
101 (47.0)	101 (47.4)	12 (5.6)

Note: One participant did not answer this item.

Table 11: Professional body capstone definition

Yes <i>n</i> (%)	No <i>n</i> (%)	Don't know <i>n</i> (%)
17 (17.2)	55 (55.6)	27 (27.3)

Note: 117 participants did not answer this item.

Table 12: Reason for introduction

Categorisation of response	<i>n</i>	%
course relevance to industry	83	41.7%
Integration/consolidation	47	23.6%
institutional rules	44	22.1%
general quality improvement	11	5.5%
AQF requirements	8	4.0%
sensible/pragmatic	5	2.5%
course differentiation	1	0.5%
student experience overall	8	4.0%
students want it	3	1.5%
improvement in research preparation	8	4.0%
need for a culminating experience	9	4.5%

Note: 17 participants did not answer this item.

Table 13: Age of capstones

Age	<i>n</i> (%)
< 2 years	32 (16.5)
2–5 years	64 (33.0)
5–10 years	41 (21.1)
> 10 years	57 (29.4)

Note: 22 participants did not select a country and were excluded from this analysis.

Table 14: Age of Australian and international capstones

Age	Australian capstones <i>n</i> (%)	International capstones <i>n</i> (%)
< 2 years	29 (18.4)	3 (8.3)
2–5 years	59 (37.3)	5 (13.9)
5–10 years	35 (22.2)	6 (16.7)
> 10 years	35 (22.2)	22 (61.1)

Note: As the number of cases in some specific countries was very low, all non-Australian capstones (n=36) were grouped into an "international" category and compared with Australian capstones (n=158). International capstones were significantly more likely to be older than Australian capstones, possibly suggestive of recent implementation efforts ($\chi^2(3, n=194)=22.23, p=0.001, \Phi=.34$). Twenty-two cases did not select a country and were not included in this analysis.

Table 15: Age of capstones across discipline groups (two categories)

LTAS discipline grouping	Age of capstone	
	<6 years n (%)	>6 years n (%)
Architecture/building	3 (42.9)	4 (57.1)
Social sciences	35 (68.6)	16 (31.4)
Business	23 (47.9)	25 (52.1)
Creative arts	6 (60.0)	4 (40.0)
Engineering/ICT	3 (11.5)	23 (88.5)
Health	19 (52.8)	17 (47.2)
Law	3 (100)	0
Science	4 (44.4)	5 (55.6)
Non-discipline	0	4 (100)

Note: As sub-samples were low in some duration categories, duration was collapsed to two categories for analysis: capstones which were created less than six years ago and capstones which were created more than six years ago. Even after collapsing duration categories into two, sub-samples were still too low for meaningful analysis in some disciplines, particularly architecture/building, law, science and non-discipline. However, sub-samples in the social sciences, business, health and engineering/ICT disciplines were sizeable and deemed large enough to warrant inferential analysis. A chi-square test of independence found that the differences in the age of capstones across these discipline groups were large and significant ($\chi^2(9, n=161)=34.15, p=0.001, \Phi=.46$). Twenty-two cases did not select duration and were not included in this analysis.

Table 16: Recent revisions

Yes n (%)	No n (%)	Don't know n (%)	Total n	Year	n	%
116 (58.9)	74 (37.6)	7 (3.6)	197	1.5 years	55	49.5%
				1.5-5 years	43	38.7%
				more than 5 years	13	11.7%

Note: 19 participants did not answer the item regarding recent revisions. Of the 116 who indicated their capstone had been revised, only 111 indicated how long ago these revisions occurred.

Table 17: Course level

Type	Final year UG n (%)	Honours n (%)	Masters n (%)	Other n (%)
	161 (74.5)	8 (3.8)	27 (12.7)	15 (7.0)

Table 18: Required or elective

Required/elective	Required n (%)	Elective n (%)	Other n (%)
	147 (75.8)	15 (7.7)	32 (16.5)

Note: 22 participants did not answer this item.

Table 19: Distribution of credit/non-credit capstones

General type of capstone	n (%)
Single unit	135 (69.6)
Multiple activities/units - assessed in one	18 (9.3)
One activity - assessed in multiple units	19 (9.8)
Non-credit bearing activity - assessed	1 (0.5)
Non-credit bearing activity - not assessed	1 (0.5)
Other	20 (10.3)

Note: 22 participants did not answer this item.

Table 20: Proportion of FTE studies

FTE	n (%)
Eighth	122 (62.9)
Quarter	43 (22.2)
Half	15 (7.7)
> Half	1 (0.5)
Integrated	8 (4.1)
Varies	1 (0.5%)
N/A	4 (2.1%)

Note: 22 participants did not answer the FTE item. This item was limited in its ability to accurately capture capstones that were integrated with other units of study, or were part of a sequence of experiences. As such all analyses of FTE must be interpreted with caution.

Table 21: Proportion of FTE studies across countries

	Eighth or less n (%)	Quarter n (%)	Half n (%)	More than half n (%)
Australia	109 (69.4%)	28 (17.8%)	12 (7.6%)	8 (5.1%)
International	13 (40.6%)	15 (46.9%)	3 (9.4%)	1 (3.1%)

Note: 21 participants did not complete this item. Subsamples for all individual countries were deemed too low to provide meaningful analysis. Collectively the international responses had adequate sample sizes for comparison and so were subjected to analysis. Percentages reflect proportion within each category. For the purposes of this analysis, participants who selected “varies” (n=1) and “not applicable” (n=4) were first removed. Only one case in Australia selected the option “whole of year”. This was amalgamated into “more than half”.

Table 22: Proportion of FTE studies across disciplines (two categories)

LTAS discipline grouping	FTE	
	≤ Eighth n (%)	≥ Quarter n (%)
Architecture/building	2 (28.6)	5 (71.4)
Social sciences	41 (78.8)	11 (21.2)
Business	40 (88.9)	5 (11.1)
Creative arts	4 (40.0)	6 (60.0)
Engineering/ICT	10 (40.0)	15 (60.0)
Health	16 (47.1)	18 (52.9)
Law	1 (33.3)	2 (66.7)
Science	7 (77.8)	2 (22.2)
Non-discipline	1 (25.0)	3 (75.0)

Note: As cell-counts were low above one-quarter of FTE, categories were collapsed to form two: less than or equal to one-eighth and equal to or more than a quarter of FTE. Cell-counts were large enough to allow inferential comparison across the disciplines of the social sciences, business, engineering/ICT and health. A chi-square test of

independence in these disciplines indicated the differences across these distributions was large and significant ($\chi^2(3, n=156)=27.95, p<.001, \Phi=.41$).

Table 23: Duration of capstones

Duration	<i>n</i> (%)
< 8 weeks	15 (7.7)
8–15 weeks	139 (71.6)
16 weeks–1 year	39 (20.1)
> 1 year	1 (0.5)

Note: 22 participants did not complete this item.

Table 24: Duration of capstones across Australian and international capstones

Location	Duration of capstone	
	≤ 15 weeks	≥ 16 weeks
	<i>n</i> (%)	<i>n</i> (%)
Australia	133 (83.6)	26 (16.4)
International	21 (60.0)	14 (40.0)

Note: Cell counts were too low within individual countries and in the lowest and highest duration categories, so duration categories were collapsed to two and analysed across Australian and international cases for further analysis. $\chi^2(1, n=194)=9.80, p=0.002, \Phi=-.22$.

Table 25: Duration of capstone by age

Age of capstone	Duration of capstone	
	≤ 15 weeks	≥ 16 weeks
	<i>n</i> (%)	<i>n</i> (%)
< 2 years	26 (81.3)	6 (18.8)
2–5 years	55 (87.3)	8 (12.7)
5–10 years	33 (80.5)	8 (19.5)
> 10 years	38 (67.9)	18 (32.1)

Note: Cell counts in the smallest and largest duration categories were low and as such duration was collapsed to form two categories: 15 weeks or less (a combination of the categories “8 weeks or less” and “8–15 weeks”), and 16 weeks or more (a combination of “16 weeks–1 year” and “over one year”). These mostly correspond to one or two-semester durations in terms of the Australian higher education sector. A Kendall Tau-b rank-order correlation coefficient (τ_b) was utilised as a test of relationship, which indicated a small but significant increase in duration of capstone with age ($\tau_b=.13, p=.03$).

Table 26: Duration of capstones across discipline groups (two categories)

LTAS discipline grouping	Duration of capstone	
	≤ 15 weeks n (%)	≥ 16 weeks n (%)
Architecture/building	5 (71.4)	2 (28.6)
Social sciences	47 (90.4)	5 (9.6)
Business	43 (89.6)	5 (10.4)
Creative arts	8 (80.0)	2 (20.0)
Engineering/ICT	12 (46.2)	14 (53.8)
Health	27 (77.1)	8 (22.9)
Law	2 (66.7)	1 (33.3)
Science	8 (88.9)	1 (11.1)
Non-discipline	2 (50.0)	2 (50.0)

Note: The highest and lowest duration categories were not highly utilised and as such duration was collapsed into two variables for examination. However cell counts remained too low across some disciplines for meaningful inferential comparison.

Table 27: Presence of PBL, WIL, multi-discipline and international experiences

Curriculum type	n (%)
PBL	171 (88.1)
WIL	93 (48.4)
Multi-disciplinary	84 (40.4)
International	39 (19.8)

Note: Data drawn from four items. 22 participants did not answer the item on PBL; 24 participants did not answer the item on WIL; 8 participants did not answer the item on discipline; 19 participants did not answer the item on international characteristic. Participants could select more than one curriculum feature; percentages are of total responses per feature.

Table 28: PBL, WIL, multi-disciplinary and international experiences across disciplines

LTAS Discipline Group	Curriculum Type			
	PBL n (%)	WIL n (%)	Multi-disciplinary n (%)	International n (%)
Architecture and Building	7 (100.0)	2 (28.6)	5 (71.4)	1 (14.3)
Arts, Social Sciences and Humanities	45 (88.2)	25 (49.0)	32 (62.7)	8 (15.7)
Business, Management and Economics	42 (89.4)	24 (51.1)	18 (38.3)	17 (36.2)
Creative and performing arts	9 (90.0)	7 (70.0)	5 (50.0)	3 (30.0)
Engineering and ICT	26 (100.0)	11 (42.3)	16 (61.5)	3 (11.5)
Health, Medicine and Veterinary Science	29 (82.9)	21 (60.0)	22 (62.9)	4 (11.4)
Law	2 (66.7)	2 (66.7)	2 (66.7)	1 (33.3)
Science	8 (88.9)	1 (11.1)	6 (66.7)	1 (11.1)
Non Discipline	3 (75.0)	0 (0.0)	2 (50.0)	1 (25.0)

Note: Percentage reflects proportion of total discipline sample.

Table 29: Combinations of PBL, WIL, multi-disciplinary and international experience

Combination of curriculum features	n (%)
PBL only	48 (25.0)
PBL and WIL	33 (17.2)
PBL and multi-disciplinary	29 (15.1)
PBL, WIL and multi-disciplinary	27 (14.1)
PBL, WIL, multi-disciplinary and international	11 (5.7)
PBL, multi-disciplinary and international	9 (4.7)
PBL, WIL and international	8 (4.2)
None	6 (3.1)
WIL and multi-disciplinary	6 (3.1)
PBL and international	6 (3.1)
WIL only	4 (2.1)
WIL and international	2 (1.0)
WIL, international and multi-disciplinary	2 (1.0)
International only	1 (0.5)

Table 30: Who generates PBL topics

Who generates	n (%)
Students only	37 (24.2)
Staff only	32 (20.9)
External partners only	29 (19.0)
Staff, students and external partners	23 (15.0)
Staff and students	15 (9.8)
Staff and external partners	10 (6.5)
Students and external partners	7 (4.6)

Note: Only cases that utilised a project or problem-based curriculum were included in this analysis (n=171). A total of 153 participants selected one of the three choices of who generates problems or projects.

Table 31: Nature of the problem

Nature of the problem	n (%)
Multiple problems	28 (27.2)
Multiple problems and case-based	24 (23.3)
Single complex problem	22 (21.4)
Case-based	10 (9.7)
Single complex problem and case-based	9 (8.7)
Single complex problem and multiple problems	5 (4.9)
All	5 (4.9)

Note: Only cases that utilised a project or problem-based curriculum were included in this analysis (n=171). A total of 103 participants selected one of the available nature of the problem or project choices.

Table 32: Types of WIL reported

Type of WIL	n (%)
Workplace experience only	27 (30.3)
Project for industry only	21 (23.6)
Simulated experience only	16 (18.0)
Workplace experience and project for industry	9 (10.1)
Project for industry and simulated experience	7 (7.9)
All	5 (5.6)
Workplace experience and simulated experience	4 (4.5)

Note: Only participants who indicated their capstone included an element of WIL were included in this analysis (n=93). Four participants did not answer this item.

Table 33: Engagement with an external client or partner

Type of external engagement including combinations	n (%)
Each student or team has a client	58 (57.4)
Single client for all students	25 (24.8)
Students collaborate across institutions	8 (7.9)
Single client and multiple clients	4 (4.0)
Single client and collaborate across institutions	3 (3.0)
Each student or team has a client and collaborates across	2 (2.0)
All	1 (1.0)

Note: Only participants who indicated their capstone includes an external client or partner were included in this analysis (n=105). Four of these participants did not indicate the type of external engagement.

Table 34: Multi-disciplinary - total and no. of disciplines

Single n (%)	Multi- n (%)	Type: similar n (%)	Type: different n (%)	
108 (56.0)	85 (44.0)	53 (63.9)	30 (36.1)	
Different 2-3 n (%)	Different 4-5 n (%)	Different 6 or more n (%)	Missing	Total
10 (33.3)	8 (26.7)	11 (36.7)	1 (3.3)	30

Note: 193 participants completed the initial item. 32 participants who selected highly differentiated disciplines provided details. Three of these participants referred to similar fields and were re-allocated, resulting a total of 29 items recording disciplines.

Table 35: Types of international experience

Type of international experience	n (%)
Study tour	8 (18.6)
Collaboration with overseas institutions	10 (23.3)
Exchange program	3 (7.0)
Other	22 (51.2)

Note: Table reflects total positive selections (n=43), with more than one item able to be selected. % reflects total selections. A total of 14 participants made a named selection. No participant made a named selection and also chose 'other'. Three participants selected study tour and collaboration, one selected study tour and exchange, one selected exchange and collaboration.

Table 36: Student cohort size

Cohort size	<i>n</i> (%)
< 10	19 (9.8)
10–30	51 (26.3)
31–60	34 (17.5)
> 60	90 (46.4)

Note: Twenty-two participants did not complete this item. Whether student cohort size varies across several factors was analysed. No significant relationships were found between cohort intake size and duration of the capstone ($\tau_b=.04$, $p=.56$, $n=194$), or age of the capstone ($\tau_b=-.05$, $p=.42$, $n=192$). Sub-samples were too low across most discipline groups to justify inferential testing, but were large enough in the social sciences, health, engineering/ICT and business. A chi-square test of independence indicated no significant differences in student numbers across these disciplines ($\chi^2(9, n=161)=12.50$, $p=.19$, $\Phi=.28$).

Table 37: Staff–student ratios

One staff member to:	<i>n</i> (%)
≤ 5 students	24 (12.4)
6–20 students	85 (43.8)
> 20 students	78 (40.2)
Don't know	7 (3.6)

Note: Twenty-two participants did not answer this item.

Table 38: Staff–student ratios across countries

Country	One staff member to:		
	≤ 5 students <i>n</i> (%)	6–20 students <i>n</i> (%)	> 20 students <i>n</i> (%)
Australia	21 (13.6)	64 (41.6)	69 (44.8)
Canada	0	0	1 (100)
Czech Republic	0	1 (100)	0
New Zealand	2 (14.3)	8 (57.1)	4 (28.6)
Singapore	0	1 (100)	0
UK	0	2 (100)	0
US	1 (7.1)	9 (64.3)	4 (28.6)

Note: Percentages reflect proportion within each country. Participants who selected “don't know” ($n=7$) were excluded. Cell counts were low outside of Australia, New Zealand and the US. No inferential test was undertaken.

Table 39: Staff–student ratios in PBL capstones

One staff member to:	PBL <i>n</i> (%)	Non-PBL <i>n</i> (%)
≤ 5 students	22 (12.9)	2 (9.5)
6–20 students	78 (45.6)	11 (52.4)
> 20 students	65 (38.0)	1 (4.8)

Note: Percentages reflect proportions within each type. As cell-counts were low in the smallest category in non-project or problem-based capstones, a chi-square test of independence was undertaken after ratios were collapsed into two categories. Participants who selected “don't know” ($n=7$) were excluded. $\chi^2(1, n=185)=1.79$, $p=0.18$, $\Phi=.09$.

Table 40: Staff–student ratios in WIL capstones

One staff member to:	WIL n (%)	Non-WIL n (%)
≤ 5 students	13 (14.0)	11 (11.1)
6–20 students	45 (48.4)	40 (40.4)
> 20 students	32 (34.4)	44 (44.4)

Note: Percentages reflect proportions within each type. Participants who selected “don’t know” (n=7) were excluded. As cell-counts were low in the smallest category in non-project or problem-based capstones, a chi-square test of independence was undertaken after ratios were collapsed into two categories. $\chi^2(1, n=185)=2.21, p=0.13, \Phi=.10$

Table 41: Staff–student ratios in multi-disciplinary capstones

One staff member to:	Multi-disciplinary n (%)	Non-multi-disciplinary n (%)
≤ 5 students	10 (12.0)	14 (13.7)
6–20 students	39 (47.0)	46 (45.1)
> 20 students	34 (41.0)	42 (41.2)

Note: Percentages reflect proportions within each type. Participants who selected “don’t know” (n=7) were excluded. As cell-counts were low in the smallest category in non-project or problem-based capstones, a chi-square test of independence was undertaken after ratios were collapsed into two categories. $\chi^2(1, n=185)=0.001, p=0.97, \Phi=.002$

Table 42: Who delivers

Who delivers	n (%)
Academic supervisors only	132 (68.0)
Academic supervisors and workplace supervisors	42 (21.6)
All	10 (5.2)
Academic supervisors and external supervisors	9 (4.6)
Workplace supervisors only	1 (0.5)

Note: Twenty-two participants did not answer this item.

Table 43: Who delivers across countries

Country	Who delivers	
	Academic supervisors only n (%)	Combined with workplace or external n (%)
Australia	106 (66.7)	53 (33.3)
Canada	1	0
Czech Republic	1	0
New Zealand	10 (66.7)	5 (33.3)
Singapore	0	1
UK	1 (50.0)	1 (50.0)
US	13 (92.9)	1 (7.1)

Note: Due to the small cell counts in the categories of academic and external delivery (n=9), all three combined (n=10) and workplace only (n=1), breaking down delivery categories into sub-samples across countries was not meaningful. Even when using only two delivery categories, several countries had only one case in each category, and as such only delivery modes in Australia, New Zealand and the United States were inferentially tested. A chi-square test of independence indicated no significant relationship ($\chi^2(2, n=188)=4.13, p=.13, \Phi=.15$), although the US had one cell with fewer than five cases so this result should be interpreted with caution.

Table 44: Who delivers across disciplines

LTAS discipline grouping	Who delivers	
	Academic supervisors only <i>n</i> (%)	Combined with workplace or external <i>n</i> (%)
Architecture/building	3 (42.9)	4 (57.1)
Social sciences	38 (73.1)	14 (26.9)
Business	40 (83.3)	8 (16.7)
Creative arts	8 (80.0)	2 (20.0)
Engineering/ICT	15 (60.0)	10 (40.0)
Health	17 (48.6)	18 (29.5)
Law	1 (33.3)	2 (66.7)
Science	6 (66.7)	3 (33.3)
Non-discipline	4 (100)	0

Note: Cell-counts were too low outside of the social sciences, business, engineering/ICT and health to warrant analysis. A Chi-square test was used to compare the distribution across the two delivery categories in only these four disciplines, and indicated a significant difference ($\chi^2(3, n=160)=12.73, p=.005, \Phi=.27$).

Table 45: Who delivers in PBL capstones

Who delivers	PBL <i>n</i> (%)	Non-PBL <i>n</i> (%)
Sole academic staff	122 (71.3)	10 (47.6)
Combined academic and external	49 (28.7)	11 (52.4)

Note: Percentages reflect delivery categories within each type. Chi-Square ($\chi^2(1, n=192)=4.90, p=.027, \Phi=.16$)

Table 46: Who delivers in WIL capstones

Who delivers	WIL <i>n</i> (%)	Non-WIL <i>n</i> (%)
Sole academic staff	46 (49.5)	86 (86.9)
Combined academic and	47 (50.5)	13 (13.1)

Note: Percentages reflect delivery categories within each type. Chi-Square ($\chi^2(1, n=192)=31.23, p=.001, \Phi=-0.40$)

Table 47: Who delivers in multi-disciplinary capstones

Who delivers	Multi-disciplinary <i>n</i> (%)	Single discipline <i>n</i> (%)
Sole academic staff	58 (69.1)	74 (68.5)
Combined academic and external	26 (31.0)	34 (31.5)

Note: Percentages reflect delivery categories within each type. Chi-Square ($\chi^2(1, n=192)=0.006, p=.937, \Phi=-0.006$)

Table 48: Individual, group work or a combination

Individual only <i>n</i> (%)	Group work only <i>n</i> (%)	Combination <i>n</i> (%)
64 (33.3)	50 (26.0)	78 (40.6)

Table 49: Individual, group work or a combination in PBL capstones

Student individual or group work	PBL n (%)	Non-PBL n (%)
Individual work only	51 (29.8)	13 (61.9)
Group work only	48 (28.1)	2 (9.5)
Combination	72 (42.1)	6 (28.6)

Note: Percentages reflect delivery categories within each type. Chi-square ($\chi^2(2, n=192)=9.08, p=.01, \Phi=.21$)

Table 50: Individual, group work or a combination in WIL capstones

Student individual or group work	WIL n (%)	Non-WIL n (%)
Individual work only	30 (32.3)	34 (34.3)
Group work only	25 (26.9)	25 (25.3)
Combination	38 (40.9)	40 (40.4)

Note: Percentages reflect delivery categories within each type. Chi-square ($\chi^2(2, n=192)=0.11, p=.94, \Phi=.02$)

Table 51: Individual, group work or a combination in multi-disciplinary capstones

Student individual or group work	Multi-disciplinary n (%)	Non-multi-disciplinary
Individual work only	23 (27.4)	41 (38.0)
Group work only	21 (25.0)	29 (26.9)
Combination	40 (47.6)	38 (35.2)

Note: Percentages reflect delivery categories within each type. ($\chi^2(2, n=192)=3.44, p=.17, \Phi=.13$)

Table 52: Contact and independent hours

	n		M (SD)	Mdn
	Valid	Missing		
Contact hours: Classes/group seminars	174	42	24.48 (24.53)	16
Contact hours: Lectures	129	87	15.51 (17.28)	12
Contact hours: Individual supervision	131	85	11.40 (17.44)	6
Contact hours: Group supervision	110	106	14.84 (18.91)	10
Contact hours: Online	110	106	16.72 (24.88)	8
Independent work: In a workplace	79	137	38.11 (37.44)	25
Independent work: On campus	119	97	40.84 (33.58)	30
Independent work: Online	88	128	22.34 (25.06)	12
Independent work: Undetermined	81	135	39.32 (34.98)	30
Total contact hours	189	27	59.39 (55.25)	44
Total independent hours	177	39	73.57 (53.54)	70

Note: $n = 216$. As can be seen above, a large proportion of participants did not provide information on student hours, particularly, with regard to students' independent work. The high standard deviations in Table 52 – Table 56 are due to the participants answering the question in a highly variable way with a range of 100. Analysis of the data after removing outliers (33 cases with $z\text{scores} \pm 2.5$ were removed) yielded similar results to those presented here using the whole dataset.

Table 53: Contact and independent hours according to capstone duration

	8 weeks or less			8-15 weeks			16 weeks to one year			Kruskal Wallis		
	n	M (SD)	Mdn	n	M (SD)	Mdn	n	M (SD)	Mdn	Test Statistic	df	p
Contact hours: Classes/group seminars	14	20.64 (30.15)	10	123	23.65 (21.75)	16	36	26.69 (28.45)	19.5	5.33	3	0.15
Contact hours: Lectures	7	13.14 (10.30)	12	93	13.53 (12.62)	12	28	19.68 (23.49)	11.5	3.59	3	0.31
Contact hours: Individual supervision	6	6.5 (9.54)	3	92	9.67 (15.08)	5	32	14.53 (17.77)	11	6.89	3	0.08
Contact hours: Group supervision	8	13.38 (11.15)	9	75	12.48 (15.80)	9	26	18.81 (21.46)	11	5.50	3	0.14
Contact hours: Online	8	8 (9.07)	6	82	14.96 (22.72)	7.5	19	23.58 (30.18)	10	4.08	3	0.25
Independent work: In a workplace	5	61 (37.92)	80	54	35.80 (37.99)	21	19	35.42 (33.48)	20	3.93	3	0.27
Independent work: On campus	7	21.14 (10.49)	18	83	36.14 (29.94)	30	28	57.57 (39.90)	49	8.89	3	0.03
Independent work: Online	6	14 (9.57)	11	66	19.70 (22.20)	12	15	32.13 (31.40)	20	4.16	3	0.25
Independent work: Undetermined	5	26 (21.02)	12	63	33.83 (32.39)	28	13	71.08 (35.08)	100	10.81	2	0.01
Total contact hours	14	42.21 (32.17)	42	136	53.09 (43.45)	39	38	76.68 (59.46)	75	13.60	3	0.004
Total independent hours	12	55.58 (41.58)	40	128	65.34 (44.67)	60	36	102.53 (62.91)	100	13.31	3	0.004

Note: The category "Over a year" included only 1 case, and so was excluded from analysis. n=194. Differences meeting significance threshold ($p < .05$) are highlighted for emphasis.

Table 54: Average student hours spent in contact and independent work in PBL capstones (8 -15 weeks duration)

	PBL			Non-PBL			Mann-Whitney <i>U</i>		
	n	M (SD)	Mdn	n	M (SD)	Mdn	U	Z	p
Contact hours: Classes/group seminars	107	23.86 (21.26)	18	16	22.25 (25.55)	13	751.50	-0.79	0.43
Contact hours: Lectures	83	12.94 (12.44)	10	10	18.40 (13.67)	14	297.50	-1.46	0.14
Contact hours: Individual supervision	84	9.18 (14.35)	5.5	8	14.88 (21.96)	3.5	328.50	-0.10	0.92
Contact hours: Group supervision	68	13.44 (16.25)	10	7	3.14 (4.41)	1	87.00	-2.76	0.01
Contact hours: Online	72	15.28 (23.67)	7.5	10	12.70 (14.83)	9	356.00	-0.06	0.955
Independent work: In a workplace	43	29.14 (33.66)	12	11	61.82 (44.23)	80	154.50	-1.78	0.076
Independent work: On campus	75	38.28 (30.49)	30	8	16.13 (12.79)	14	170.00	-2.01	0.04
Independent work: Online	59	19.42 (20.56)	12	7	22.00 (35.31)	14	182.50	-0.50	0.62
Independent work: Undetermined	56	34.11 (31.72)	30	7	31.57 (41.01)	16	176.50	-0.43	0.67
Total contact hours	119	53.88 (40.74)	39	17	47.53 (60.44)	28	742.00	-1.77	0.08
Total independent hours	112	64.11 (44.58)	60	16	74.00 (45.74)	90	768.50	-0.92	0.36

Note: n=137 Differences meeting significance threshold ($p < .05$) are highlighted for emphasis.

Table 55: Average student hours spent in contact and independent work in WIL capstones (8 – 15 weeks duration)

	WIL			Non-WIL			Mann-Whitney U		
	n	M (SD)	Mdn	n	M (SD)	Mdn	U	Z	p
Contact hours: Classes/group seminars	58	23.16 (18.76)	18	65	24.09 (24.25)	14	1784.00	-0.51	0.61
Contact hours: Lectures	46	12.46 (10.54)	12	47	14.57 (14.40)	12	1057.50	-0.18	0.86
Contact hours: Individual supervision	52	9.65 (14.76)	6	40	9.70 (15.67)	4.5	958.00	-0.65	0.52
Contact hours: Group supervision	42	9.14 (10.72)	7	33	16.73 (19.92)	11	519.50	-1.86	0.06
Contact hours: Online	45	14.60 (21.97)	8	37	15.41 (23.90)	7	819.50	-0.12	0.90
Independent work: In a workplace	42	40.52 (38.75)	27.5	12	19.25 (31.22)	1	148.00	-2.18	0.03
Independent work: On campus	43	29.37 (23.93)	24	40	43.43 (34.11)	37.5	668.00	-1.75	0.08
Independent work: Online	35	16.00 (18.67)	10	31	23.87 (25.28)	13	417.50	-1.61	0.11
Independent work: Undetermined	31	29.13 (28.24)	20	32	38.38 (36.01)	29	438.50	-0.79	0.43
Total contact hours	65	53.22 (45.95)	40	71	52.97 (41.36)	37	2285.00	-0.10	0.92
Total independent hours	61	72.59 (46.77)	70	67	58.75 (41.93)	60	1684.50	-1.72	0.09

Note: Note: n=137 Differences meeting significance threshold ($p < .05$) are highlighted for emphasis.

Table 56: Average student hours spent in contact and independent work in multi-disciplinary capstones (8 – 15 weeks duration)

	Multi-discipline			Single discipline			Mann-Whitney U		
	n	M (SD)	Mdn	n	M (SD)	Mdn	U	Z	p
Contact hours: Classes/group seminars	65	23.40 (23.06)	17	58	23.93 (20.40)	16	1786.50	-0.50	0.62
Contact hours: Lectures	52	12.10 (12.43)	8.5	41	15.34 (12.77)	12	855.00	-1.64	0.10
Contact hours: Individual supervision	50	8.16 (11.67)	4.5	42	11.48 (18.33)	6	912.00	-1.09	0.28
Contact hours: Group supervision	35	8.60 (6.45)	7	40	15.88 (20.31)	11	593.50	-1.13	0.26
Contact hours: Online	44	16.68 (26.65)	6.5	38	12.97 (17.24)	8	810.00	-0.24	0.81

Independent work: In a workplace	25	34.56 (36.72)	22	29	36.86 (39.67)	15	359.50	-0.05	0.96
Independent work: On campus	43	39.30 (29.10)	39	40	32.75 (30.82)	24	709.50	-1.37	0.17
Independent work: Online	34	24.12 (27.81)	13	32	15.00 (12.90)	12	464.50	-1.02	0.31
Independent work: Undetermined	33	32.24 (34.75)	20	30	35.57 (30.32)	30	444.50	-0.70	0.49
Total contact hours	74	48.55 (41.19)	37	62	58.50 (45.76)	43.5	1967.00	-1.43	0.15
Total independent hours	69	64.32 (46.93)	60	59	66.54 (64.32)	60	1973.50	-0.30	0.77

Note: n=137

Table 57: Graded assessment products/activities

Assessment activities	n (%)
Reports	135 (71.1)
Presentations	130 (68.4)
Evidence of behaviour (e.g. team	79 (41.6)
Reflective journals	76 (40.0)
Participation	75 (39.5)
Work in progress	64 (33.7)
Essays	56 (29.5)
Portfolio	55 (28.9)
Physical products	44 (23.2)
Examinations and tests	41 (21.6)

Table 58: Graded assessment products/activities in PBL capstones

Assessment activities		PBL n (%)	Non-PBL n (%)	Chi-square			
				χ	df	p	Φ
Physical products	Utilised	42 (24.9)	2 (9.5)	2.47	1	.12	-.11
	Not utilised	127 (75.1)	19 (90.5)				
Work in progress	Utilised	61 (36.1)	3 (14.3)	3.98	1	.05	-.15
	Not utilised	108 (63.9)	18 (85.7)				
Reports	Utilised	128 (75.7)	7 (33.3)	16.33	1	.00	-.29
	Not utilised	42 (24.3)	14 (66.7)				
Presentations	Utilised	121 (71.6)	9 (42.9)	7.14	1	.01	-.19
	Not utilised	48 (28.4)	12 (57.1)				
Essays	Utilised	50 (29.6)	6 (28.6)	0.01	1	.92	-.01
	Not utilised	119 (70.4)	15 (71.4)				
Participation	Utilised	70 (41.4)	5 (23.8)	2.43	1	.12	-.11
	Not utilised	99 (58.6)	16 (76.2)				
Evidence of behaviour	Utilised	73 (43.2)	6 (28.6)	1.64	1	.20	-.09
	Not utilised	96 (56.8)	15 (71.4)				
Portfolio	Utilised	45 (26.6)	10 (47.6)	4.00	1	.05	.15
	Not utilised	124 (73.4)	11 (52.4)				
Reflective Journals	Utilised	63 (37.3)	13 (61.9)	4.72	1	.03	.16
	Not utilised	106 (62.7)	8 (38.1)				
Examinations and tests	Utilised	33 (19.5)	8 (38.1)	3.81	1	.05	.14
	Not utilised	136 (80.5)	13 (61.9)				

Note: Physical products category had one cell that was below an expected count of 5 (4.8), as did examinations and tests (4.5), but as both were close to 5 the results should be interpreted with caution. Participants who selected 'other' were not included in this analysis.

Table 59: Graded assessment products/activities in WIL capstones

Assessment activities		WIL learning	Non-WIL	Chi-square			
		<i>n</i> (%)	<i>n</i> (%)	χ	<i>df</i>	<i>p</i>	Φ
Physical products	Utilised	26 (28.0)	18 (18.6)	2.36	1	.12	-.11
	Not utilised	67 (72.0)	79 (81.4)				
Work in progress	Utilised	36 (38.7)	28 (28.9)	2.06	1	.15	-.10
	Not utilised	57 (61.3)	69 (71.1)				
Reports	Utilised	66 (71.0)	69 (71.1)	.001	1	.98	.00
	Not utilised	27 (29.0)	28 (28.9)				
Presentations	Utilised	65 (69.9)	65 (67.0)	.18	1	.67	-.03
	Not utilised	28 (30.1)	32 (33.0)				
Essays	Utilised	23 (24.7)	33 (34.0)	1.97	1	.16	.10
	Not utilised	70 (75.3)	64 (66.0)				
Participation	Utilised	35 (37.6)	40 (41.2)	.26	1	.61	.04
	Not utilised	58 (62.4)	57 (58.8)				
Evidence of behaviour	Utilised	44 (47.3)	35 (36.1)	2.47	1	.12	-.11
	Not utilised	49 (52.7)	62 (63.9)				
Portfolio	Utilised	35 (37.6)	20 (20.6)	6.68	1	.01	-.19
	Not utilised	58 (62.4)	77 (79.4)				
Reflective Journals	Utilised	45 (48.4)	31 (32.0)	5.34	1	.02	-.17
	Not utilised	48 (51.6)	66 (68.0)				
Examinations and tests	Utilised	18 (19.4)	23 (23.7)	.53	1	.47	.05
	Not utilised	75 (80.6)	74 (76.3)				

Note: Participants who selected 'other' were not included in this analysis.

Table 60: Graded assessment products/activities in multi-disciplinary capstones

Assessment activities		Multi-disciplinary	Non multi-disciplinary	Chi-square			
		<i>n</i> (%)	<i>n</i> (%)	χ	<i>df</i>	<i>p</i>	Φ
Physical products/ prototypes	Utilised	23 (21.5)	21 (25.3)	.38	1	.54	-.05
	Not utilised	84 (78.5)	62 (74.7)				
Work in progress	Utilised	38 (35.5)	26 (31.3)	.37	1	.55	.04
	Not utilised	69 (64.5)	57 (68.7)				
Reports	Utilised	71 (66.4)	64 (77.1)	2.63	1	.11	-.12
	Not utilised	36 (33.6)	19 (22.9)				
Presentations	Utilised	65 (60.7)	65 (78.3)	6.68	1	.01	-.19
	Not utilised	42 (39.3)	18 (21.7)				
Essays	Utilised	29 (27.1)	27 (32.5)	.66	1	.42	-.06
	Not utilised	78 (72.9)	56 (67.5)				
Participation	Utilised	38 (35.5)	37 (44.6)	1.61	1	.21	-.09
	Not utilised	69 (64.5)	46 (55.4)				
Evidence of behaviour	Utilised	37 (34.6)	42 (50.6)	4.94	1	.03	-.16
	Not utilised	70 (65.4)	41 (49.4)				

Portfolio	Utilised	32 (29.9)	23 (27.7)	.11	1	.74	.02
	Not utilised	75 (70.1)	60 (72.3)				
Reflective Journals	Utilised	42 (39.3)	34 (41.0)	.06	1	.81	-.02
	Not utilised	65 (60.7)	49 (59.0)				
Examinations and tests	Utilised	25 (23.4)	16 (19.3)	.46	1	.50	.05
	Not utilised	82 (76.6)	67 (80.7)				

Table 61: Examination types utilised

Exam type	n (%)
Invigilated	23 (20.3)
Long-answer	21 (18.68)
Multiple-choice	21 (18.6)
Open-book	17 (15.0)
Closed-book	13 (11.5)
In-class	12 (10.6)
Take-home	6 (5.31)

Table 62: Examinations and tests in PBL capstones

Examination or test types		PBL n (%)	Non-PBL n (%)
Invigilated	Utilised	18 (54.5)	5 (62.5)
	Not utilised	15 (45.5)	3 (37.5)
Closed-book	Utilised	12 (36.4)	1 (12.5)
	Not utilised	21 (63.6)	7 (87.5)
Open-book	Utilised	14 (42.4)	3 (37.5)
	Not utilised	19 (57.6)	5 (62.5)
Take-home	Utilised	5 (15.2)	1 (12.5)
	Not utilised	28 (87.8)	7 (87.5)
In-class	Utilised	11 (33.3)	1 (12.5)
	Not utilised	22 (66.7)	7 (87.5)
Long-answer	Utilised	18 (54.5)	3 (37.5)
	Not utilised	15 (45.5)	5 (62.5)
Multiple-choice	Utilised	18 (48.5)	4 (50.0)
	Not utilised	16 (51.5)	4 (50.0)

Note: Non-PBL exams were infrequent, and as such inferential testing was not undertaken to determine if certain exam types were more prevalent in PBL or non-PBL capstones.

Table 63: Examinations and tests in WIL capstones

Examination or test types		WIL learning	Non-WIL	Chi-square			
		<i>n</i> (%)	<i>n</i> (%)	χ	<i>df</i>	<i>p</i>	Φ
Invigilated	Utilised	10 (55.6)	13 (56.5)	.00	1	.95	.01
	Not utilised	8 (44.4)	10 (43.5)				
Closed-book	Utilised	5 (27.8)	8 (34.8)	.23	1	.63	.08
	Not utilised	13 (72.2)	15 (65.2)				
Open-book	Utilised	7 (38.9)	10 (43.5)	.09	1	.77	.05
	Not utilised	11 (61.1)	13 (56.5)				
Take-home	Utilised	1 (5.6)	5 (21.7)	n/a			
	Not utilised	17 (94.4)	18 (78.3)				
In-class	Utilised	7 (38.9)	5 (21.7)	1.44	1	.23	-.19
	Not utilised	11 (61.1)	18 (78.3)				
Long-answer	Utilised	9 (50.0)	12 (57.1)	.02	1	.90	.02
	Not utilised	9 (50.0)	11 (47.8)				
Multiple-choice	Utilised	7 (38.9)	14 (60.9)	1.95	1	.16	.22
	Not utilised	11 (61.1)	9 (39.1)				

Note: As expected cell counts were too low in take-home exams to calculate a reliable chi-square result, and as such no inferential test was undertaken. Eighteen WIL capstones included some form of exam, and 23 non-WIL capstones included some form of exam.

Table 64: Examinations and tests in multi-disciplinary capstones

Examination types		Multi-disciplinary	Non- multi-disciplinary	Chi-square			
		<i>n</i> (%)	<i>n</i> (%)	χ	<i>df</i>	<i>p</i>	Φ
Invigilated	Utilised	16 (64.0)	7 (43.8)	1.62	1	.20	.19
	Not utilised	9 (36.0)	9 (56.3)				
Closed-book	Utilised	10 (40.0)	3 (18.8)	2.04	1	.15	.22
	Not utilised	15 (60.0)	13 (81.3)				
Open-book	Utilised	7 (28.0)	10 (62.5)	4.78	1	.03	-.34
	Not utilised	18 (72.0)	6 (37.5)				
Take-home	Utilised	2 (8.0)	4 (25.0)	n/a			
	Not utilised	23 (92.0)	12 (75.0)				
In-class	Utilised	4 (16.0)	8 (50.0)	5.45	1	.02	-.37
	Not utilised	21 (84.0)	8 (50.0)				
Long-	Utilised	13 (52.0)	8 (50.0)	.02	1	.90	.02
	Not utilised	12 (48.0)	8 (50.0)				
Multiple-choice	Utilised	10 (40.0)	11 (68.8)	3.23	1	.07	-.28
	Not utilised	15 (60.0)	5 (31.2)				

Note: Statistically significant differences ($p < .05$), are highlighted for emphasis. As expected cell counts were too small in take-home exams, the chi-square test was not undertaken. For in-class exams, one cell had expected count of under 5 but was calculated regardless as the expected count was very close (4.7) and proportions were markedly different.

Table 65: Assessment of group work

Group work assessed	n (%)	Entirely group outcome n (%)	Individual component n (%)	Not indicated n (%)
Yes	102 (53.4)	28 (27.5)	52 (51.0)	22 (21.6)
No	88 (46.6)			

Note: Percentage for component assessment is calculated within relevant subsample. 27 participants did not respond.

Table 66: Group work assessment in PBL capstones

Group work assessed	PBL n (%)	Non-PBL n (%)
Yes	97	4 (19.0)
No	71	17 (81.0)

Note: PBL capstones were far more likely to include assessment of group work ($\chi^2 (1, 189) = 11.23, p < .001, \Phi = .24$).

Table 67: Group work assessment in WIL capstones

Group work assessed	WIL n (%)	Non-WIL n (%)
Yes	47 (50.5)	54 (56.3)
No	46 (49.5)	42 (43.8)






Note: Assessment of group work was roughly equally prevalent in work integrated and non-work integrated capstones ($\chi^2 (1, 189) = .62, p = .43, \Phi = -.06$).

Table 68: Group work assessment in multi-disciplinary capstones

Group work assessed	Multi- n (%)	Non-multi- n (%)
Yes	50 (47.2)	51 (61.4)
No	56 (52.8)	32 (38.6)

Note: Percentages reflect the proportion within single and multi-disciplinary capstones. ($\chi^2 (1, 189) = 3.81, p = .05, \Phi = .14$).

Table 69: Assessors and their weightings

Assessor	n (%)	M (SD) %	Mdn %	Weighting	
				0-----50-----100	Histograms
Teacher-assessment	179 (94.7)	79.28 (24.48)	90		
Peer-assessment	88 (46.6)	16.59 (18.88)	10		
Self-assessment	72 (38.1)	18.49 (20.15)	10		
External-assessment	67 (35.4)	33.25 (27.78)	22.5		
Other	11 (5.8)	60.11 (42.35)	61		

Note: Histograms represent the number of cases falling into ten equal categories of the total proportion range (0–100), for example the first bar represents the number of cases falling between 0 and 10, the second bar the number of cases falling between 11 and 20, and so on. Before analysis, cases were checked to ensure that no weighting was provided next to types of assessors that were not present in the capstone. Eight cases that had selected a “0” weighting next to a type of assessor that was not present in their capstone. The weighting figure in these cases was removed. However, cases that listed a “0” weighting were retained when participants indicated those types of assessment were actually present in their capstone. A small number of cases also indicated the presence of a particular assessor (e.g. peer, self, etc.) but did not complete the weighting. These included 12 cases for peer assessment, 14 for self assessment, two for teacher assessment and five for external assessment. Six cases also selected that at least one assessor was present, but left all assessor weightings blank. All of these cases indicated earlier their capstone included assessment. It is uncertain why these cases left the weightings blank, as such they were excluded from all assessor weightings analyses.

Table 70: Assessors in PBL capstones

Assessor		PBL	Non-PBL	Chi-square			
		n (%)	n (%)	χ	df	p	Φ
Peer	Utilised	83 (49.1)	5 (23.8)	4.810	1	0.028	-0.159
	Not utilised	86 (50.9)	16 (76.2)				
Self	Utilised	63 (37.3)	9 (42.9)	0.247	1	0.619	-0.036
	Not utilised	106 (62.7)	12 (57.1)				
Teacher	Utilised	159 (94.1)	20 (95.2)	0.046	1	0.831	0.016
	Not utilised	10 (5.9)	1 (4.8)				
External	Utilised	57 (33.7)	11(52.4)	1.579	1	0.209	0.091
	Not utilised	112(66.3)	10(47.6)				

Note: n=190. The chi-square result for Teacher Assessment, 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.22. The result has been included as the cell below 5 is close to the expected count.

Table 71: Assessor weightings in PBL capstones

Assessor	PBL			Non-PBL			Mann-Whitney U		
	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>U</i>	<i>Z</i>	<i>p</i>
Peer	71	10.0	17.01 (19.30)	5	9.0	10.6 (11.06)	129.50	-1.02	0.31
Self	52	10.0	16.94 (19.85)	7	20.0	30 (20.00)	91.00	-2.19	0.03
Teacher	159	90.0	80.62 (22.89)	19	73.0	68.05 (33.90)	1272.00	-1.16	0.24
External	55	20.0	33 (29.12)	9	38.0	34.78 (18.65)	200.00	-0.92	0.36

Note: Sample sizes in non-PBL capstones were small. A small number of participants indicated the presence of an assessor type but indicated that assessor was given a 0 weighting, specifically one in self-assessors and one in teacher assessors. Only nine cases in the entire sample indicated a weighting for the category 'other' so it was not included in this analysis.

Table 72: Assessors in WIL capstones

Assessor		WIL	Non-WIL	Chi-square			
		<i>n</i> (%)	<i>n</i> (%)	χ	<i>df</i>	<i>p</i>	Φ
Peer	Utilised	45 (48.4)	43 (44.3)	.31	1	.57	-.04
	Not utilised	48 (51.6)	54 (55.7)				
Self	Utilised	38 (40.9)	34 (35.1)	.68	1	.41	-.06
	Not utilised	55 (59.1)	63 (64.9)				
Teacher	Utilised	85 (91.4)	94 (96.9)	2.64	1	.10	.12
	Not utilised	8 (8.6)	3 (3.1)				
External	Utilised	43 (46.2)	24 (24.7)	10.52	1	.001	-.24
	Not utilised	50 (53.8)	73 (75.3)				

Table 73: Assessor weightings in WIL capstones

Assessor	WIL			Non-WIL			Mann-Whitney U		
	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>U</i>	<i>Z</i>	<i>p</i>
Peer	38	10.0	15.97 (18.32)	38	10.0	17.21 (19.66)	709.00	0.14	0.89
Self	32	19.5	23.09 (20.45)	27	10.0	13.04 (18.72)	244.50	2.93	0.01
Teacher	88	80.0	74.13 (26.23)	90	97.5	84.31 (21.64)	2992.50	2.92	0.01
External	45	20.0	30.64 (27.13)	19	30.0	39.42 (29.06)	335.00	1.37	0.17

Note: A number of cases indicated an allocation of zero to a particular assessor. Specifically, within WIL capstones, five cases reported 0 weighting for peer assessment, one for self assessment, two for teacher assessment and two for external assessment. Within cases not classified as WIL, one case indicated self assessment was utilised but allocated 0 weighting, and one case indicated other assessment was utilised but was given a 0 weighting. Only nine cases in the entire sample indicated a weighting for the category 'other' so it was not included in this analysis.

Regarding the higher weightings allocated to external assessors in non-WIL capstones, distributions were closely examined. Of the 19 cases, two indicated 100% external assessment, one indicated 70% and a further case indicated 75%. The remainder were evenly spread between 50% and 10%. Due to this lower sample size, the measures of central tendency were influenced by the few cases falling towards the higher end of external assessor weighting, although all were below a common univariate outlier marker ($z=3.29$, or $p<.001$). A similar number of cases within

the work integrated group utilised high external assessor weightings, but the majority did not and central tendency parameters were lower.

Table 74: Assessors in multi-disciplinary capstones

Assessor		Multi-	Non-multi-	Chi-square			
		<i>n</i> (%)	<i>n</i> (%)	χ	<i>df</i>	<i>p</i>	Φ
Peer	Utilised	44 (41.1)	44 (53.0)	2.66	1	.10	-.12
	Not utilised	63 (58.9)	39 (47.0)				
Self	Utilised	42 (39.3)	30 (36.1)	.19	1	.66	.03
	Not utilised	65 (60.7)	53 (63.9)				
Teacher	Utilised	102 (95.3)	77 (92.8)	.56	1	.45	.05
	Not utilised	5 (4.7)	6 (7.2)				
External	Utilised	41 (38.3)	26 (31.3)	1.00	1	.32	.07
	Not utilised	66 (61.7)	57 (68.7)				

Note: Expected counts in one cell in teacher assessors and other assessors were under 5 (both were 4.8), as such results should be interpreted with caution. One multi-disciplinary capstone did not include assessment, and was not included in this analysis; all single discipline capstones included assessment.

Table 75: Assessor weightings in multi-disciplinary capstones

Assessor	Multi-disciplinary			Non-Multi-disciplinary			Mann-Whitney- <i>U</i>		
	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>U</i>	<i>Z</i>	<i>p</i>
Peer	39	10.0	18.9 (24.75)	37	10.0	14.16 (9.20)	654.000	-.709	.478
Self	34	10.0	18.68 (23.75)	25	15.0	18.24 (14.34)	355.500	-1.093	.274
Teacher	99	90.0	79.47 (24.19)	79	85.0	79.04 (25.01)	3874.000	-.111	.912
External	39	25.0	30.90 (25.61)	25	20.0	36.92 (31.05)	437.500	-.693	.489

Note: A number of cases indicated an allocation of zero to a particular assessor. Specifically, within multi-disciplinary capstones, five cases reported 0 weighting for self assessment and three for teacher assessment. Within the non multi-disciplinary capstones, four cases selected a 0 weighting for peer assessment, two for self assessment and one for teacher assessment. Only nine cases in the entire sample indicated a weighting for the category 'other' so it was not included in this analysis.

Table 76: Capstone purposes across discipline groups

Domain	Item	Social sciences		Business		Health		Engineering/ ICT		Kruskal-Wallis analysis of variance			Dunn-Bonferonni post-hoc tests	
		M (SD)	Mdn	M (SD)	Mdn	M (SD)	Mdn	M (SD)	Mdn	Test statistic	df	p	Pairwise comparisons	p
Preparatory	Future postgraduate study	3.54 (.97)	4	2.47 (1.06)	3	3.40 (1.10)	3.5	2.46 (1.02)	2.5	32.65	3	.001	Eng<health** Eng<arts*** Bus<health** Bus<arts***	.005 .001 .002 .001
Preparatory	Training for research careers	3.44 (1.01)	3	2.18 (1.09)	2	3.13 (1.17)	3	2.38 (1.01)	2.5	28.49	3	.001	Bus<health* Bus<arts*** Eng<arts***	.022 .001 .001
Quality Assurance	Benchmarking with other institutions	3.44 (.94)	3	2.40 (1.16)	3	3.33 (.88)	3	2.79 (1.21)	3	22.59	3	.001	Bus<arts*** Bus<health***	.001 .001
Knowledge	Synthesis of prior learning	4.69 (.59)	5	4.73 (.45)	5	4.43 (.57)	4	4.21 (.72)	4	13.49	3	.004	Eng<arts* Eng<bus*	.014 .015
Quality Assurance	Demonstrating course standards	4.40 (.68)	4.5	3.64 (1.17)	4	4.17 (.91)	4	4.00 (.98)	4	12.54	3	.01	Bus<arts**	.004
External	Meeting industry/professional accreditation requirements	2.88 (1.49)	3	2.82 (1.39)	3	3.47 (1.59)	4	3.96 (1.30)	4	10.94	4	.01	Bus<eng*	.034
Preparatory	Preparation for industry/employability	4.19 (.96)	4	4.62 (.53)	5	4.63 (.56)	5	4.33 (.76)		10.41	3	.02	Arts<health*	.034

Quality Assurance	Confirmation of knowledge gained in course	4.38 (.76)	4.5	4.04 (.85)	4	4.30 (.84)	4.5	3.88 (.90)	4	9.86	3	.02	Eng<arts*	.054
External	Supporting staff research activities	2.69 (1.09)	3	2.02 (.92)	2	2.43 (1.01)	3	2.21 (.83)	2	9.10	3	.03	Bus<arts*	.028
Personal	Independence	4.48 (.71)	5	4.18 (.75)	4	4.23 (.68)	4	3.96 (.86)	4	8.26	3	.04	Eng<arts*	.05
Knowledge	Application to practice	4.42 (.79)	5	4.71 (.46)	5	4.80 (.48)	5	4.58 (.50)	5	7.83	3	.05	Arts<health*	.05

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. Purposes were compared across social sciences ($n=49$), business ($n=49$), health ($n=43$) and engineering/ICT ($n=28$). Other discipline groups had fewer than 13 cases and were deemed to be not representative enough for analysis. Inspection of the distributions for the purpose rankings in the sample, and across the discipline groups, indicated they were highly negatively skewed and non-normal. Formal tests of normality confirmed this in each discipline grouping (Kolmogorov-Smirnov $p < .01$ and Shapiro-Wilk $p < .01$ for all items in each discipline group). As such, the median-based Kruskal-Wallis test was undertaken to identify the purpose items that were ranked significantly differently by the four discipline groups, followed by Dunn-Bonferroni pairwise comparisons to identify which specific groups differed from others.

Table 77: Purposes across ≤ 15 week and ≥ 16 week capstones

	Duration of delivery						Mann-Whitney <i>U</i>		
	15 weeks or less			16 weeks or more					
Capstone Purpose	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>n</i>	<i>Mdn</i>	<i>M</i> (SD)	<i>U</i>	<i>Z</i>	<i>p</i>
Meeting industry/professional accreditation requirements	148	3	3.01 (1.46)	39	4	3.64 (1.56)	2186.00	-2.38	0.02
Enabling academic/industry linkages	148	3	3.37 (1.11)	40	4	3.80 (1.02)	2335.50	-2.12	0.03
Ensuring quality of graduates	149	5	4.48 (0.69)	40	5	4.75 (0.49)	2371.00	-2.32	0.02
Refinement of technical skills	148	4	3.84 (0.96)	40	4	4.28 (0.75)	2209.00	-2.59	0.01

Note: Items for which differences were not significant ($p < .05$) are not reported here. One hundred and forty-six capstones were 15 weeks or less, and 39 capstones were 16 weeks or more and completed all purpose items.

Table 78: Forms of support available

	Support from institutions	Support from professional bodies	Support from elsewhere
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Documents	52 (78.79%)	14 (21.2)	18 (27.27)
Group professional development activities	43 (65.15)	13 (19.70)	16 (24.24)
Individual support	42 (63.64)	9 (13.64)	10 (15.15)
Community of practice/network	34 (51.52)	4 (6.06)	8 (12.12)
Other	2 (3.03)	0 (0)	2 (3.03)

Appendix 2: Survey questions

The complete survey participants undertook is included here. Survey features, such as drag and drop boxes, are not shown.

.....

In which country do you currently work the most?

What is the name of your institution? Please note institutions will not be named in the results, this question is for the purpose of describing the sample.

Is your institution:

- ☐ A higher education only university
- ☐ A dual sector university (applies to Australia)
- ☐ A private higher education provider
- ☐ Other _____

To your knowledge, in your institution, are capstones:

- ☐ Required
- ☐ The norm
- ☐ Dependent on discipline or course

Does your institution have a policy on capstone implementation or design?

- ☐ Yes
- ☐ No
- ☐ Don't know

Could you provide a link to the policy or indicate what it covers?

What is the primary discipline in which you currently work?

To the best of your knowledge, in your discipline (nationally or internationally) are capstones:

- ☐ Required
- ☐ The norm
- ☐ Unusual
- ☐ Other _____

Is there a professional body governing your discipline courses/programs?

- ☐ Yes
- ☐ No
- ☐ Don't know

What is the name of the professional body?

Does the professional body provide a definition of capstones?

- ☐ Yes
- ☐ No
- ☐ Don't know

This section asks you more about the background of your capstone:

So that we can identify where more than one person has answered on a single capstone, please provide the name of the capstone below. This information will not be included in the findings.

In what way are you most involved in this capstone? Please drag each activity in which you are involved into the box, in the order in which you are most involved.

Activities you are in involved in:
_____ Managing/coordinating
_____ Developing curriculum
_____ Teaching/supervising
_____ Providing curriculum advice

Thinking about the capstone in which you are currently most involved, approximately how long have you been involved with this capstone?

- ☐ Less than 2 years
- ☐ 2–5 years
- ☐ 5–10 years
- ☐ More than 10 years

Approximately how many years has the capstone been running?

- ☐ Less than 2 years
- ☐ 2–5 years
- ☐ 5–10 years
- ☐ more than 10 years

To the best of your knowledge, for what reason(s) was it introduced?

To the best of your knowledge, has the capstone been significantly revised since it was first delivered?

- ☐ Yes
- ☐ No
- ☐ Don't know

How many years ago were the most recent changes made?

To the best of your knowledge, for what reason(s) were changes made?

The following questions ask about general characteristics of your capstone:

Which of the following describe your capstone model:

- ☐ A non-credit bearing activity or unit/course that is assessed
- ☐ A non-credit bearing activity or unit/course that is not assessed
- ☐ A single unit/course in which students are assessed for their capstone work
- ☐ Related to multiple units of study but assessed in one
- ☐ Delivered as one unit/course/activity but assessed in multiple units
- ☐ Other reason not listed here (please explain) _____

Approximate length of capstone study experience/delivery time: This is the length of time the capstone takes each time it is delivered.

- ☐ 8 weeks or less
- ☐ 8–15 weeks
- ☐ 16 weeks to one year
- ☐ More than one year

Approximate fraction of full-time studies in the year taken up by the capstone (FTE): For example, 1 unit of study in one semester will be one eighth of FTE.

- ☐ One eighth of FTE or less
- ☐ Quarter of FTE or less
- ☐ Half of FTE or less
- ☐ More than half FTE
- ☐ Integrated (whole of year is considered capstone)
- ☐ Varies
- ☐ Not applicable

Timing:

- ☐ Final year of undergraduate degree
- ☐ Honours
- ☐ Masters
- ☐ Other _____

Is the capstone a:

- ☐ Required course
- ☐ Elective course
- ☐ Both (i.e. required for some streams, elective for others)

Is the capstone delivered by (tick all that apply):

- ☐ Academic supervisors
- ☐ Workplace supervisor
- ☐ External Provider
- ☐ Other _____

Estimated number of students undertaking the capstone in the most recent delivery

- ☐ 10 or less
- ☐ 30 or less
- ☐ 60 or less
- ☐ More than 60
- ☐ Don't know

Estimated staff/student ratio:

- ☐ 1/5 or less
- ☐ 1/6 to 1/20
- ☐ More than 1/20
- ☐ Don't know

Do students primarily work as:

- ☐ Individuals
- ☐ Teams
- ☐ Both individuals and teams (please explain) _____

Please estimate the total number of student hours across the entire duration of the capstone, in each of the following activities.

Contact (supervised) hours:

- _____ Classes/group seminars
- _____ Lectures
- _____ Individual supervision meetings
- _____ Group supervision meetings
- _____ Online

Independent work:

- _____ In a workplace
- _____ In a campus environment (e.g. Lab)
- _____ In an online environment (e.g. discussion forums)
- _____ Undetermined

Is there anything you would like us to take note of regarding the number of hours students work on their capstones?

The following questions ask about other aspects of your capstone. Would you characterise your capstone as being:

Project or problem-based?

- ☐ Yes
- ☐ No

Select all that apply:

- ☐ A project generated by staff
- ☐ A project generated by students
- ☐ A project generated by an external partner
- ☐ Single complex problem
- ☐ Multiple problem tasks
- ☐ Case-based
- ☐ Other _____

Work integrated:

- ☐ Yes
- ☐ No

Select all that apply:

- ☐ Workplace experience/internship
- ☐ A project for industry
- ☐ A simulated experience
- ☐ Other _____

Including clients/external partners?

- ☐ Yes
- ☐ No

Select all that apply:

- ☐ Single client provides context for all students
- ☐ Each student/team has their own client
- ☐ Students collaborate across institutions
- ☐ Other _____

Having an international component?

- ☐ Yes
- ☐ No

Select all that apply:

- ☐ Study tour
- ☐ Collaboration with overseas institutions
- ☐ Exchange program
- ☐ Other _____
- ☐ None of the above

Does the capstone involve:

- ☐ A single discipline (e.g. physics)
- ☐ Multiple disciplines

Please specify the type:

- ☐ Multiple similar field (e.g. business disciplines)
- ☐ Multiple differentiated disciplines (please indicate which disciplines)

In your view, what are the primary purposes of this capstone? Please tick all that apply and rate their importance

Knowledge:

	Not at all Important	Very Unimportant	Somewhat important	Very Important	Extremely Important
Synthesis of prior learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analysis of an in-depth topic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquisition of new knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Application to practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Skills:

	Not at all Important	Very Unimportant	Somewhat important	Very Important	Extremely Important
Refinement of technical skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organization/work management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication (verbal, written)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creative (e.g. problem-solving)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thinking (e.g. critical decision making)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Personal:

	Not at all Important	Very Unimportant	Somewhat important	Very Important	Extremely Important
Independence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resilience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional identity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-efficacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quality assurance:

	Not at all Important	Very Unimportant	Somewhat important	Very Important	Extremely Important
Benchmarking with other institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrating course standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Confirmation of knowledge gained in course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring quality of graduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Preparatory:

	Not at all Important	Very Unimportant	Somewhat important	Very Important	Extremely Important
Training for research careers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preparation for industry/employability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Broadening student experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adding to student CVs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Future postgraduate study	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

External:

	Not at all Important	Very Unimportant	Somewhat important	Very Important	Extremely Important
Enabling academic/industry linkages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supporting staff research activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meeting industry/professional accreditation requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meeting institutional requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have we left out a key purpose of your capstone? If so, please describe below

Is there anything else you would like to tell us about the purpose of capstones? If so, please describe below

Does your capstone include assessment?

☐ Yes

☐ No

Which of the following are used for graded assessment?

- ☐ Physical products/prototypes
- ☐ Work in progress
- ☐ Reports
- ☐ Presentations
- ☐ Essays
- ☐ Participation
- ☐ Evidence of behavior (e.g. teamwork)
- ☐ Portfolio
- ☐ Reflective Journals
- ☐ Examinations and tests
- ☐ Other _____

Which types of examinations and tests are included in your capstone:

- ☐ Invigilated
- ☐ Closed-book
- ☐ Open-book
- ☐ Take-home
- ☐ In-class
- ☐ Long answer
- ☐ Multiple choice

Please indicate which of the following assessment mechanisms are present and whether they contribute to final grades or not.

	Assessment mechanisms present	
	Present	Not present
Peer-assessment	<input type="radio"/>	<input type="radio"/>
Self-assessment	<input type="radio"/>	<input type="radio"/>
Teacher assessment	<input type="radio"/>	<input type="radio"/>
External assessment	<input type="radio"/>	<input type="radio"/>
Other (please describe the type of assessment)	<input type="radio"/>	<input type="radio"/>

Of these assessment mechanisms, please indicate how much, as a percentage, they each reflect of a student's grades for this capstone:

- _____ Peer-assessment
- _____ Self-assessment
- _____ Teacher assessment
- _____ External assessment
- _____ Other (please describe the type of assessment)

Is group work assessed?

- ☐ Yes
☐ No

Please briefly explain how the group work grades are calculated.

If your assessment could not be captured by the methods above, can you briefly describe how assessment is carried out?

What is the best thing about delivering a capstone unit?

What are the key challenges/barriers you have faced in designing/delivering this capstone?

If you had the opportunity and unlimited resources, what, if anything, would you change about this capstone?

To the best of your knowledge, are there support mechanisms for developing capstones available through your institution, professional body or elsewhere?

- ☐ Yes
☐ No
☐ Don't know

What kind of professional learning resources or support mechanisms have been made available to you, or have you accessed for information about capstone design/delivery, and from which source:

	Available from your institution	Available from professional body	Available from elsewhere
	Yes	Yes	Yes
Document resources, such as guides and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Group professional development activities or events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Community of practice/networks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Individual support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please explain)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What, if any, information resources or professional development do you think would be most helpful to designers of capstone curriculum?

Is there anything we have forgotten to ask about that you think is an important factor in the design and delivery of capstone curriculum?

In your view, are there any particular benefits or challenges in utilising capstones to assess overall program/course quality?

This research project has other components aside from this survey. Would you be interested in taking part in any of the following:

- ☐ Receiving a summary of the results at the end of the project
- ☐ Joining the Capstone Network. You will receive regular updates on the progress of the project and the development of capstones in higher education
- ☐ Undertaking an individual interview, discussing your capstone and the challenges and benefits of capstones
- ☐ Providing a detailed case study of a capstone you work with
- ☐ None of the above

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