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Capstone Designs at CUHK

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Capstone designs at CUHK

Executive summary

A principal consideration in recent cross-sector educational reforms in Hong Kong is ensuring that undergraduate programmes prepare students for the future workplace, an imperative that has made the capstone experience a fundamental in the new four-year curriculum. This paper discusses the results of a study that explored the experience of students in their final year of study in order to understand readiness for the workplace from a student perspective. Student feedback reveals some uncertainty and a lack of confidence over successful transition to the workplace, which is attributed to a reported academic focus in the current final-year study programme. Inviting comment from senior academics (academic voice) allows a fuller picture of the rationale, characteristics and associated challenges in running a capstone experience.

Project team

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Introduction

Hong Kong's cross-sector educational reforms, known locally as the 3+3+4 reform process, has initiated a new academic structure in secondary schools and a new four-year undergraduate (Ug) curriculum in the tertiary sector (Education Commission, 2000). Touted locally as 'once in a lifetime opportunity' for change, the changes involve several important goals in Ug education. These include the need to increase exposure to non-academic learning experiences; expand whole-person capacity; support a close linkage to workplace; increase students' adaptability given the rapid changes in society; and prepare students for a knowledge-based society (Education Commission, 2000). Collectively, the educational goals represent a dramatic change to an academic structure that in turn requires a careful look at the curriculum (University Grants Committee, 2010). One of the crucial areas is the final-year experience where, consistent with an outcomes-based approach to education, the task is not simply to produce good discipline-based or (vocationally skilled) graduates, but to develop multi-faceted graduates able of facing the challenges of a dynamic workplace and of wider society. Extending this point, as Yorke (2006) noted in relation to learning and employability, performance in discipline-related studies is not a crucial factor in the workplace. Rather, what most impresses employers is capacity in a range of soft skills, such as interpersonal skills, communication skills, and presentation skills. Another central workplace attribute is the capacity for continuing (or lifelong) learning.

Reflecting graduate-employability-related considerations, a major innovation in the new curriculum is the systematic inclusion of a capstone course for final-year students (The Chinese University of Hong Kong (CUHK), 2011) that are intended to be designed to suit the nature of each discipline. This report outlines a study of the final-year project (FYP), which nominally is the de-facto capstone-type course for programmes in CUHK. The aim, using students' (and academic) voice, is to first, understand the FYP or like activity (thesis) as it is implemented currently, and second, to review the FYP as a potential capstone activity in the new curriculum taking into account both student and academic viewpoints. The key question is to determine if the FYP as conceived is able to support the development of attributes linked to graduate employability. This is an important factor; as Rosenberry and Vicker (2006) reported when capstone activities address career issues, students appear to have a better understanding of the relevance of what they have learnt and how it can be applied, and thus student engagement and learning outcomes are benefitted.

Education reform in HK

The reform process, which commenced in 2009 at the upper secondary school level, will extend in 2012 into the tertiary sector with universities introducing a normative four-year Ug curriculum. With the shift to a normative four-year Ug curriculum in Hong Kong in 2012, local higher education faces some significant changes. Reflecting upon the reform proposals for the education system in Hong Kong and on learning and employability more generally, performance in disciplinary subjects is not a crucial factor for recruitment (Yorke, 2006). Rather, the interest is in soft skills – such things as interpersonal communications and teamwork. In effect, an academic-focused set of learning activities is not helpful for graduates looking to increase their employability. Instead, the challenge facing higher-education institutions in Hong Kong (HK) is to adapt their curriculum suitably in both the first and final years to help students transition from school to university. In CUHK, the curriculum structure is consistent with a long-established tradition of requiring students to pursue not only specialized studies in a professional discipline,

but also to gain an educational experience that serves to enhance their capacity for lifelong learning and competitiveness in working life (CUHK, 2011). The core skills comprise numeracy, critical-thinking skills and IT literacy, as well as a high level of proficiency in Chinese and English, developed through courses under the headings of Languages, Information Technology, General Education and Physical Education. The end goal of this overall experience is graduates with broad general knowledge and outstanding discipline-specific knowledge – what we described earlier as ‘a multi-faceted graduate able to meet the requirements of a dynamic and complex society’.

University context

The recent changes in HK education are somewhat ironic for CUHK, a highly regarded research-intensive tertiary institution in Asia, as until 1993–1994 the University had a four-year curriculum that was changed only because of the then government’s policy. As the University’s Strategic Plan (CUHK, 2006) subsequently noted, the University saw this change then as a welcome opportunity for the higher-education sector in Hong Kong to follow CUHK’s lead and tradition to promote all-round education and whole-person development. Broadly, CUHK’s educational philosophy in the four-year curriculum is to produce graduates who have a depth of knowledge within a specialty, an appreciation of the values of a broad range of intellectual disciplines, as well as general knowledge, bilingual proficiency in Chinese and English. Other desired attributes include a deep understanding of Chinese culture and an appreciation of other cultures, a basket of skills including IT and information literacy, and the ability to continue with lifelong learning and professional development. The Strategic Plan also explained the intention to provide opportunities to increase non-formal education and international exposure, while noting that the unique College system also had an important role to play in the promotion of non-formal education and whole-person development.

The curriculum is built on a credit-unit system, with flexibility and choices both in the selection of courses and in the sequence and pace of electives. With the exception of a few programmes (such as Medicine), the normative period of study is four years, and students have to complete 123 units, which is an increase from 104 under the three-year system. The increased credit requirement places the onus on programmes and on general education (GE) to provide interactive, and perhaps interdisciplinary, learning opportunities for all-round student development. As well, as appropriate to a curriculum informed and led by research, a capstone course or experience in the form of research, internship or other learning activity is stated as a required activity for all Ug programmes (CUHK, 2011). The systematic inclusion of a capstone course as the culmination of the Ug experience is described as a major innovation in the major programmes. Ug programmes are in this way being challenged to move from a discipline-specific focus to a wider, more general development of capabilities that include the soft skills necessary in the workplace, and the final-year experience, when the focus shifts towards helping student prepare for graduation and employment or research studies, is a key part of the overall educational experience.

Of the eight faculties in the university offering some 62 Ug programmes, 24 programmes currently have a compulsory FYP as a graduation requirement. Thirty-eight other programmes offer a FYP as an elective, with the common practice for the majority of FYP-type courses to focus on what can be described as academic research. It is also uncommon for student to have the option of choosing between academic research and participating instead in practical learning activities that may better align with their abilities and future interests.

The new Ug curriculum and the capstone course

As advocated by the UGC, an outcomes-based approach has been integrated into the design of the new curriculum. Another feature of the four-year curriculum is a common Faculty package for first-year students, with core components of the curriculum strengthened by the inclusion of general education, languages, information technology and physical education units. Yet another feature of the new curriculum is the inclusion of a capstone course as the culmination of the Ug experience (CUHK, 2011). While the specific capstone experience must naturally suit the nature of each discipline, the capstone course should target the synthesis of subject knowledge with independent enquiry (e.g. research) or execution (e.g. creative design in Fine Arts or Architecture, engineering design, fieldwork or internship), both involving reflection and evaluation (CUHK, 2011).

In general a capstone course is described as being intended to integrate a body of relatively fragmented knowledge into a unified whole (Atchison, 1993; Durel, 1993). This integrating activity allows students the opportunity to: a) *look back* or reflect over their Ug curriculum in an effort to make sense of that experience; and b) encourage students to *look forward* in order to transition into working life by building on that experience (Durel, 1993; Henscheid, 2008). The particular design feature of looking forward is crucial; it reflects a realisation by tertiary institutions in the 1970s and 1980s (Atchison, 1993; Schroetter & Wendler, 2008) of a gap between academic study and the real world (the workplace). As a result, many universities moved to develop a course that could bridge this gap (Schroetter & Wendler, 2008). The resultant course(s) evolved into what is today referred to as a capstone course that some describe as the “crowning achievement” in an Ug programme (Atchison, 1993, cited in Schroetter & Wendler, 2008).

The National Survey of Senior Seminars and Capstone, a study in the United States (US), recorded the importance, even critical nature of this course (Chickering & Schlossberg, 1998; Henscheid & Barnicoat, 2001). As the study also noted, it is often difficult for student to leave their comfort zone (the academic environment) and move into the workplace. Consequently, the obligation was on educators to help student transition after graduation. Research by Chickering and Schlossberg (1998) reported three issues with successful transition. These were: first, to make a career connection; second, to help identify new roles after university; and third, to foster a lifelong learning practice upon graduation. Overall, educators were encouraged to treat this facilitative role in successful transition for final-year students as equally important as helping student transition into university as freshmen.

There are three specific features in a transition-focused Ug curriculum. The first is a foundation component that provides students the basic set of knowledge and skills (Bailey, Oliver & Townsend, 2007; Jervis & Hartley, 2005). This foundational component is typically represented by the formative courses students are expected to complete in the first three years of Ug studies. A second component of a transition-focused curriculum is a pre-capstone component, usually completed towards the end of year 3 and the beginning of year 4, the nominal capstone year. The purpose of the pre-capstone component is to help student develop advanced research techniques and related skills in preparation for their final-year study. The third and final component of a transition-focused Ug curriculum is the actual capstone course or activity, that some in literature also describe as an ‘experience’ in recognition that the capstone objectives are likely to be satisfied better by a composite range of activities (Hauhart & Grahe, 2010). Reflecting the diverse needs of the student body and their specific transition needs, one US-

based institution, the University of California, Los Angeles (UCLA), has identified a range of capstone type activities within the final-year of the curriculum (UCLA, 2007). The implicit design idea in this example is that student activities should be based on their needs and abilities.

Capstone design characteristics

Literature identifies two broad types of capstone activities, a developmental capstone and an assessment type of capstone, although an activity can focus on both aspects at the one time. In this paper, the focus is on a developmental approach to a capstone, as this form of capstone tends to be the common design approach in Ug education. Assuming a developmental focus to the capstone activity, four broad design characteristics are identified in literature. These are:

- To encourage *integration* and synthesis of previously acquired knowledge and skills (Bailey et al., 2007; Cuseo, 1998; Jervis & Hartley, 2005). Others describe the integrative focus as giving students a chance to make connections between course content, acquired skills and application in a wider context (Holdsworth, Watty & Davies, 2009; Huber & Hutchings, 2004; Rowles, Koch, Hundley, & Hamilton, 2004).
- To facilitate some form of transition, such as from university to professional/ working life (Bailey et al., 2007; Cuseo, 1998; Henscheid, 2000; Schroetter & Wendler, 2008; Wood, 2007). This characteristic includes the encouragement of useful connections between study majors and work experience acquired via internships and exchanges; an awareness of personal development necessary to transition from undergraduate to post-university life; and preparation for career or postgraduate education through professional development (Henscheid, 2000; Jervis & Hartley, 2005). Crucially from a learning-outcomes perspective, as Rosenberry & Vicker (2006) noted, capstone activities that address career issues help students develop a better understanding of the relevance of what they have learnt and how it can be applied. This is also the last opportunity to ensure students graduate with the knowledge, skills and attitudes they need to meet the growing demands of professional practice (Rowles et al., 2004).
- To assist students to reflect on and demonstrate on what they have learnt over their Ug studies (Holdsworth et al., 2009; Kerka, 2001). Reflective practice is a fundamental skill of lifelong learners and being able to reflect on one's performance can help achieve higher goals. Hence, reflection is a vital component of capstone experience (Kift, Field & Wells, 2008) that involves both course content in their academic major and more generally across courses, as well as an inner, personal reflection by students on their aims, personal strengths and future plans (Brooks, Benton-Kupper & Slayton, 2004; Henscheid, 2008).
- Finally, as a culminating experience (Holdsworth et al., 2009) a capstone offers students a chance for closure (Rowles et al., 2004; Schrotter & Wendler, 2008; Schubert, 2009). The process of closure, which includes recognition of accomplishments, pulls together all the ideas presented in different units and helps construct some sorts of integrated, meaningful whole experience (Heinemann, 1997).

Figure 1 is a conceptual illustration of a developmental capstone designed to support the development of discipline-specific knowledge, as well as generic skills and high-level thinking required in the workplace.

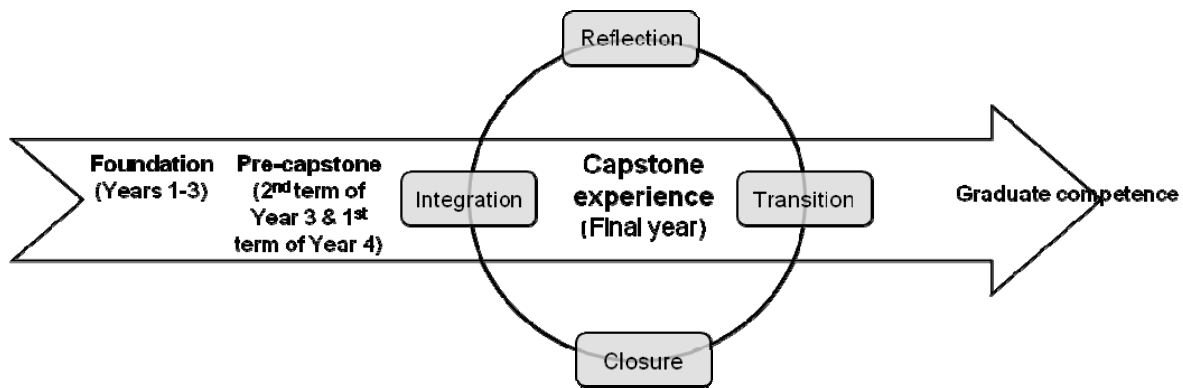


Figure 1. A conceptual illustration of a developmental capstone

The central focus in such a capstone is not on acquiring new knowledge but on integrating, reflecting and extending knowledge already acquired (Bailey et al., 2007; Cuseo, 1998), with learning outcomes encapsulated by the term graduate competence. Conceptually, competence includes an adequate grasp of specific graduate capabilities, as well as a sound grasp of both declarative (theory-based) and procedural (how to apply) discipline knowledge. It is possible that for certain courses accreditation is an important factor in determining satisfactory course completion; under such circumstances an assessment type of capstone may be necessary. An assessment capstone is illustrated in Figure 2. As suggested by the illustration, course design features remain the same, less the assessment component where a pass/fail component determines whether a student graduates into the profession or whether s/he is deemed to have failed. The purpose of this latter capstone activity is to act as a gateway test that assesses professional knowledge and skills at the completion of Ug studies. As will also be evident, it is also reasonable to combine a developmental and assessment focus in the one capstone activity.

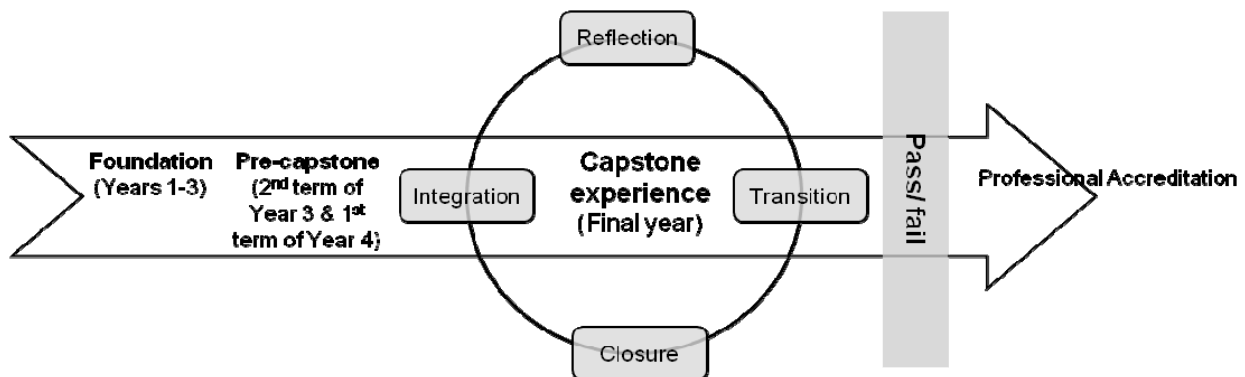


Figure 2. A conceptual illustration of an assessment capstone

Figure 3 integrates these design features (foundational years, pre-capstone and capstone experience designed in terms of the four characteristics) in terms of a normative four-year curriculum. As this illustration shows, the key activity selected by a student can vary; that is, the approach to a capstone activity is not a one-size-that-fits-all approach. Rather, as illustrated in the UCLA capstone activity, a range of capstone type activities is offered in the final year of the curriculum. As this example shows, it is thus possible to tailor a capstone activity to reflect the

diverse interests and abilities of individual students. As the UCLA model also suggests, perhaps no more than 10–25 percent of students might attempt a thesis or individual project, while the majority would be expected to either attempt a group project or complete an internship. However, what is common to all activities is the focus, which is intent on providing a culminating study experience to students' Ug studies.

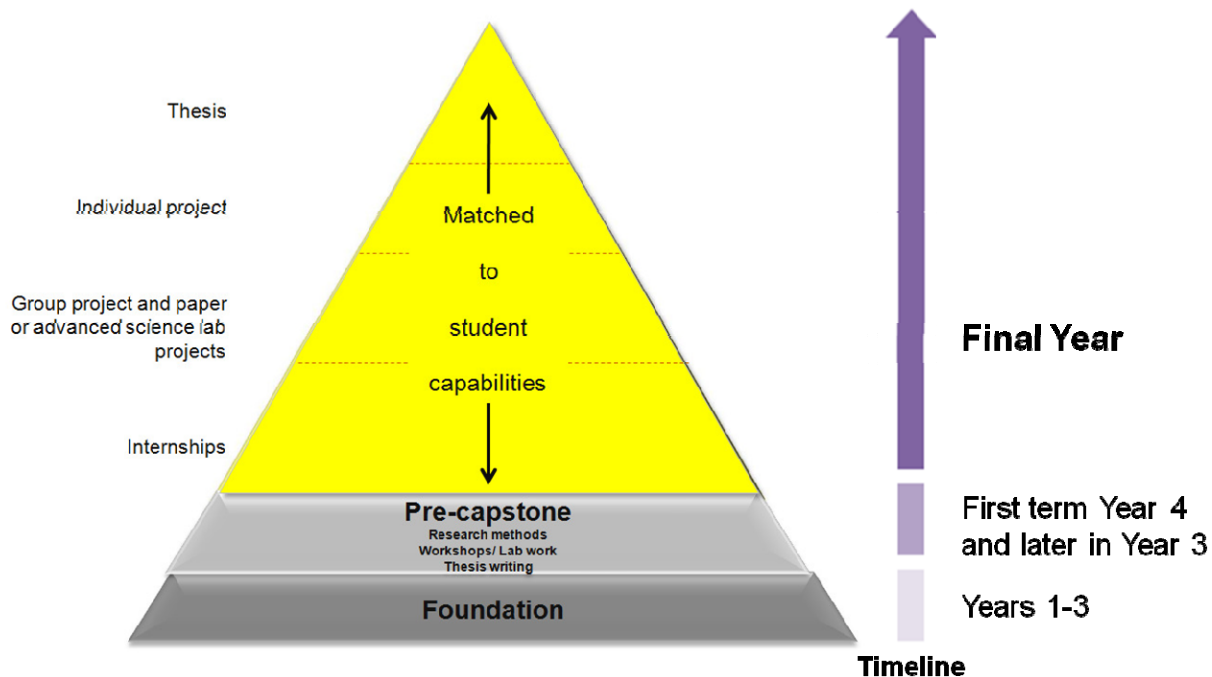


Figure 3. An illustration of a capstone implementation in a normative four-year curriculum (After UCLA, 2007)

As suggested in Figure 3, effective implementation of a capstone involves offering students a variety of options suited to their capabilities. Thus, for example, academically capable and interested students would be able to complete an academic thesis, while less academically gifted students might elect a choice between less challenging tasks such as a group project or senior seminar or an internship. Whatever option chosen, each capstone experience would need to incorporate the four design features. We turn next to a study of the FYP, which is the current de-facto capstone course in the current final-year curriculum and answer two questions: 1) what do students and academics think about the FYP and the concept of capstones; and 2) what are their respective concerns over the proposed capstone experience?

Study methodology

This study collected data from three parties, alumni, final-year students and academics. Focus groups with alumni were considered in order to report on: first, how and how well the capstone equivalent, the FYP, achieved their respective programme learning outcomes and supported desired careers; and second, what were the aspects that were good and/or needed to be improved. However, as the uptake by alumni was very limited, an alternative data-collection (survey) method based on the regular Graduate Capability Questionnaire (GCQ) was used. This survey is distributed using an online system to fresh graduates one year after graduation. Three

hundred and three students completed the GCQ in 2010. The graduates who participated were asked to rate on a five-point scale the final-year learning experience in CUHK in terms of the four capstone characteristics – integration, reflection, transition and closure. A series of case studies with final-year students followed-up on GCQ findings. These student case studies involved sets of students who were interviewed every three months in order to track their respective learning activities and experience, including specific feedback on workload and assessment. Eighteen final-year students from thirteen programmes volunteered to participate in the case studies. In addition to commenting on their experience in relation to the capstone characteristics, students were also encouraged to articulate their expectations and opinions on a final-year experience. Besides students' and graduates' feedback, this study also interviewed academics in order to evaluate their perspective on implementing and administering the capstone. Thirteen programme coordinators from six disciplinary areas participated in the interviews, again on a voluntary basis. Academics were asked about the aims, objectives and rationale behind the current curriculum design for final-year students, and any administrative constraints that hindered the better administration of a capstone activity. A specific project conceptual map is provided in the Appendix.

A detailed illustration of the study method is listed in the Appendix. Both quantitative and qualitative analyses were used to interpret the data. Quantitative analysis was used to examine the survey results by comparing students who had or did not have capstone experience in their final year of study. The results showed the relative realisation of capstone characteristics and the development of selected CUHK graduate capabilities, while semi-structured interviews with final-year students and academics provided a rich qualitative pathway for collecting insights and practices through interviews and personal conversations (Brewerton & Millward, 2006; Heppner & Heppner, 2004).

Key findings

In general, GCQ results showed that students who attempted the FYP versus those who did other electives reported better achievement across the four capstone design characteristics. Of the four, transition was noted as the weakest in achievement. However, there was a relatively weak relationship noted between doing FYP and being more capable. That is, students who did not attempt a capstone course (FYP) seemed to report minimal difference in the development of graduate capabilities. Both these findings were generally supported in the follow-up student voice case studies, which also suggested that students attempting the FYP found it too academic and particularly lacking in terms of the transition design component. Broadly, students also indicated they would like to have more workplace-related learning opportunities in future FYP (capstone) type studies. While generally not being aware of a capstone design requirement, most academics appeared to view the main purpose of the FYP as enabling the students' capacity to conduct an individual research project. They expected that students should be able to transform their knowledge and skills into the future employment.

We turn next to consider specific study findings related to final-year students' voice and the GCQ survey. Following this, we look at collected qualitative findings based on academic voice.

Graduate Capabilities Questionnaire

Figure 4 shows the graduate responses in terms of the four design characteristics. The responses collected allowed a comparison of relative experience across the design characteristics between students who have done a FYP and students who had not attempted an FYP but instead completed individually selected electives. Based on these responses, it is clear that an FYP is somewhat more successful in addressing the four design characteristics identified for a capstone experience. The results confirm the general value of a capstone activity as a culminating study activity in a curriculum; it also highlights that integration and transition are the least well-satisfied attributes for both groups under the current design.

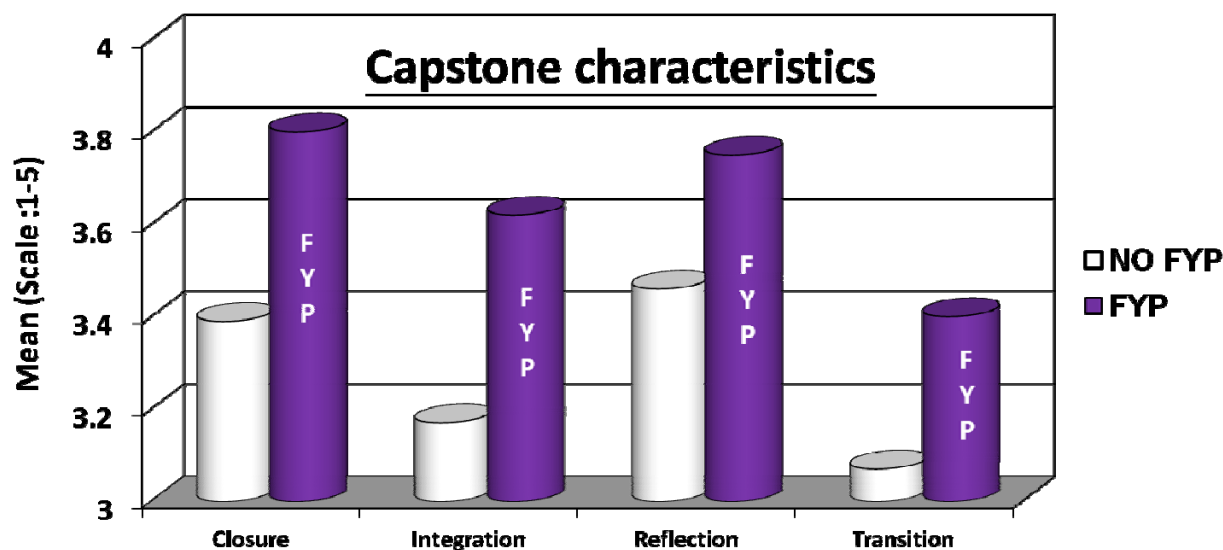


Figure 4. Student feedback on capstone characteristics

The reported development of graduate capabilities for the two student groups is shown in Figure 5. What is interesting is that despite appearing to broadly meet the design characteristics (see Figure 4), the reported effect on capability development between students who did and those that did not attempt the FYP is minimal. Rather, based on the data it is possible to suggest that there is, at present, a weak relationship between doing the FYP and being more capable across all graduate capabilities. The logical question arising from these findings is what might cause the FYP to be ineffective in enhancing graduate capabilities, and subsequently what might be done to improve the final-year curriculum, including exploring better alternatives to the FYP as a capstone?

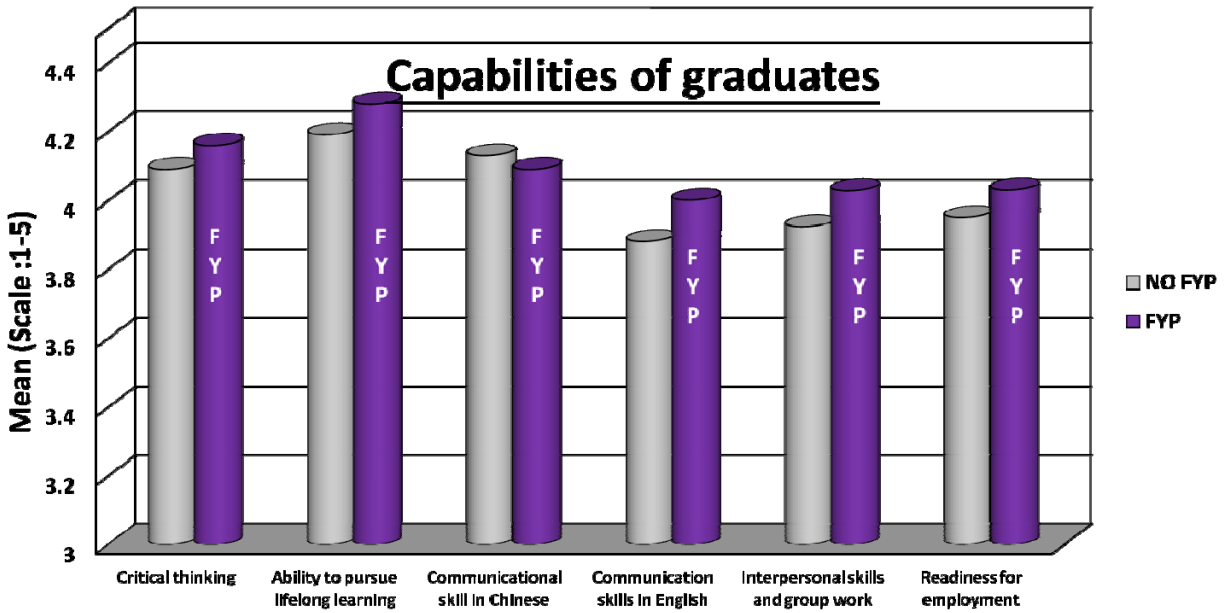


Figure 5. Student feedback on graduate capabilities

In order to seek possible answer to these questions, we turn next to examine both student and academic voice.

Student voice

Relative importance of the design characteristics

Based on accumulated responses, all student participants agreed that the four characteristics were valuable in the final year of study. Of the four characteristics, however, students were broadly unanimous that transition required the most attention. Reflecting this concern, students, for example, said it is important that the curriculum design attempted to help them understand the workplace environment, have the chance to put theory into practice, and to get assistance to better determine a career path. At this final stage of Ug life, students suggested that knowing specific workplace requirements and being prepared to face unexpected real-life challenges should be the primary features of the 'transition' component. Students acknowledged understanding real-world (or workplace) practice as being very necessary in order for a smooth transition. For example, a science student, who spends 16 hours a day in the library to study, expected he would face many problems in effective communication when he applied for jobs. According to him, if he had been given a chance to know the workplace environment and the relationship between science and the outside world, then this would have been most helpful to his future employment.

Another feature highlighted as supporting better transition, was the chance to execute and apply what they have learnt in class in their final year of study. Stated in terms of literature, application of integrated knowledge serves as an experience for students to evaluate their performance and abilities to manage hands-on tasks. As several students mentioned:

'[the opportunity to] use acquired theories to apply into the real world, after such practical use of theories, I will never forget these theories, because they transformed into my experience.' (Humanities)

'Something you may only have come across in one course, then forget, but by doing FYP you refresh your memory and [learn to] apply it.' *'Because you can apply what you have learnt and after graduation, you can perform better transition to the real world – you won't get lost after graduation.'* (Science)

It is clear that application of knowledge is important to students. For this reason, both authentic tasks and authentic assessments are crucial elements of the study experience. Authentic learning tasks are 'whole-task' experiences based on workplace assignments that require an integration of skills, knowledge attitude and social context. These tasks match what a student might expect to encounter in professional practice (real-world-related), not classroom-based tasks. Other characteristics of an authentic task include being ill-defined, open to more than one solution and requiring collaboration. Authentic assessment involves worthy intellectual challenges, presented as an array of tasks that are likely to be encountered in the workplace – so it is not usual to separate assessment from the nature of the task. Typically, an authentic task would involve the following steps: problem identification, research, analysis, problem resolution and presentation that together require full application of acquired knowledge in realistic settings. To illustrate further, a written test is not a useful basis to infer a person's driving ability. Rather, an authentic test would include some demonstration of ability, as well as offer an opportunity to improve their observed performance through feedback.

In all, students endorsed the importance of a final-year learning experience based on the four design characteristics, with a particular emphasis on transition. However, it is problematic whether students found their FYP experience actually satisfied these characteristics.

Evaluating the FYP

Of the four design characteristics identified in literature, two characteristics, reflection and closure, were reported as being commonly evident in the FYP, while integration and transition were not as commonly reported. Examining student feedback, themes related to *integration* are categorized under curriculum design, while comments related to *transition* aspects are categorized in terms of the focus of capstone. Comments linked to *reflection* and *closure* are grouped within the broad theme of graduate capabilities. Table 1 (pp. 16–17) is a summary of key points noted by participants.

1. Curriculum design

Curriculum design is crucial to a successful implementation of a capstone experience. The learning activities before the final year, i.e. the foundation and pre-capstone components, are reported by students as crucial to preparing them to reflect and integrate concepts during their final-year study. According to the students, there are both positive and negative aspects to the FYP. Positive feedback was mostly linked to closure and reflection. Student reported that they were able to reflect on their performance in soft-skills and personal goals through FYP.

'I know how to conduct a study effectively and efficiently.' (Humanities)

A science student noted because her FYP was to create a new product, she needed to use her previous knowledge to serve as the base of reference:

'I have to use previous knowledge in my FYP, in order to produce something new [a new flavor candy]. I can also apply what I have learnt in my minor [marketing studies], as I have to conduct marketing research for my new product.' (Science)

Similarly, an engineering student reveals revision and application (integration) aspects in the FYP experience:

'FYP reminds me of what I have learnt in Year 1, for example some formula, and I manage to apply them in the project.' (Engineering)

However, this experience was not a common one among students. More commonly, students reported that only a limited amount of knowledge was useful to their FYP. These students, as a result, thought that the FYP did not help them to integrate what they have learnt in their University life.

'This topic is from a Year 3 course [final-year course], not quite related to Year 1 & 2 courses.' (Science)

'I don't think FYP can integrate previous knowledge, in these 3 years, only one course talks about cultural conservation. [There were] many necessary materials not been mentioned in previous years; they are new to me and I have to find them by myself.' (Humanities)

'Many of them are new theories; it seems like taking an extra course rather than consolidating previous knowledge.' (Engineering)

Notwithstanding the fact that students in the FYP could not consolidate what was otherwise informative knowledge, students found that research skills learned in previous years were essential to their FYP. As one humanities student noted: *'My discipline emphasizes fieldwork a lot in course-based projects, so in my FYP, I can integrate the skills of fieldwork methodology.'* Based on this feedback, it is reasonable to infer that curriculum design and choice of learning activity are important when implementing a capstone, and that without adequate foundations, a capstone experience could be less meaningful.

2. Focus of the FYP

The focus of the FYP (research or transition) affects the value of the experience and the achievement of learning outcomes. Based on student feedback, students going into the workplace found the FYP experience not linked to their needs and abilities. Conversely, students who were interested in postgraduate studies reported the FYP as most beneficial to transition. As one student noted:

'I have learnt different theories, more algorithms and more capable of doing [computer] programming.' (Science)

In contrast, as another Science student headed into the workplace remarks:

‘[The] FYP cannot prepare me for [the] workplace, but it prepares me for postgraduate study. For example, I know how to do research and [have] discover[ed] that being a MPhil student is to do research consistently, then write a thesis.’ (Science)

These students highlight the use of a FYP in process of academic study – the FYP roughly equates to doing research. In such cases, the FYP gave final-year students a sense of closure and offered them a chance to reflect what they have learned over the period of their university life. When asked about whether the FYP helped them integrate previous knowledge and skills, most students mentioned integration in terms of research skills, but not the consolidation of knowledge and skills. One issue with integration is that students noted the courses offered in the previous years were too diverse. Another issue, given the focus is on academic research and so narrowed down to a specific topic, is that the format allowed very limited inference from previous studies.

The sum conclusion is the research focused FYP offers little opportunity for the much desired development on soft skills, such as independent problem solving, self-management, communication and teamwork. These and other workplace capabilities, including technological awareness and initiative and enterprise are important graduate capabilities. Some representative comments on the (lack of) utility of the FYP in terms of student’s expectation in the final-year study include:

‘After doing this FYP, I realize I don’t want to stay in the academic field’ (Humanities).

‘I wonder how an academic thesis is considered to be helpful in a business world.’ (Humanities)

‘FYP is not useful to me, because I am not staying in the academic world’ (Humanities).

‘My FYP cannot support my transition to workplace, it is too concentrated and I cannot learn anything from other fields.’ (Science)

‘FYP is unhelpful in my transition, because I think I probably won’t stay in the same field anymore.’ (Engineering)

Adding nuance to the limited practical utility of their FYP, as a Humanities student pragmatically noted:

‘You won’t write on your job application form claiming that you have completed a FYP, unless the organization you are applying for is also concerned about your FYP topic, if not FYP is just a 6-credit course without further implication.’ (Humanities)

Nonetheless, although the majority of students viewed their FYP as unsuitable in terms of fulfilling the transition component of a capstone experience, some students acknowledged the value of parts to their FYP because it involved something that was not purely academic research work.

‘The compulsory placement at a primary school [allowed me the opportunity to] demonstrate my competence as a social worker.’ (Humanities)

The above comments by students reveal a tendency for a rigid (research-focused) approach to the FYP. This issue calls for better curriculum design where the final-year experience is designed expressly to support students’ acquire workplace-based competence,

particularly in the soft skills. The student feedback also provide strong support for the design approach adopted by UCLA that allows for varied study options, based on capabilities and interests – a student-oriented capstone activity in design.

3. Developing graduate capabilities

According to the Hong Kong Education Commission (2000), the core objective of a capstone activity is in essence to equip students with graduate capabilities suitable for their future development. Graduate capability is as several commentators note, closely related to their employability (Cranmer 2006; Washer, 2007; Zinser, 2003). Consequently, it is essential for educators to ensure students leave the university with relevant skills. These include problem-solving skills, organizational skills, and presentation skills in both written and oral forms, and being a good team member. By obtaining these crucial employability skills, as Washer (2007) stressed, students can promote themselves to prospective employers when they go looking for suitable jobs.

Reflecting on the broad impact of the four design characteristics, students commonly reported presentation skills as having improved because presentation is a compulsory aspects of most FYPs.

‘I think my presentation skills [have] become better because there are some chances to practice throughout the FYP.’ (Engineering)

While students reported positively on the link between the FYP and presentation skills because of the compulsory assessment requirement, in general, students doubted the significance of completing the FYP as a way to develop these wider capabilities and so to improve their prospects in the eyes of prospective employers. However, one aspect that appears less appreciated is the development of written communication. This capability does not get reported as relevant, but it is still a key graduate capability (Cranmer, 2006; Tomlinson, 2007; Yorke, 2006).

Summary of developmental themes by student voice

Table 1 is a summary of developmental themes identified by student voice. As the table shows, integration and transition are reported variably depending on the focus of the FYP – graduate studies or workplace transition. In contrast, there is a general appreciation of the value of the FYP in developing certain graduate capabilities, most notably presentation skills and the capacity to conduct an investigative study.

Table 1. Summary of student voice by development theme

1. Curriculum design	
Integration (+ve)	<ul style="list-style-type: none"> • <i>My discipline emphasizes fieldwork a lot in any course-based projects; as a result, my study helps integrate the skills of fieldwork methodology.</i> • <i>Have to use previous knowledge in order to produce something new; as a result, my study also allows me to apply what I have learnt in my minor.</i> • <i>FYP reminds me of what I have learnt in year 1; I can apply this knowledge in the project.</i>
Integration (-ve)	<ul style="list-style-type: none"> • <i>FYP cannot integrate previous knowledge.</i> • <i>Many necessary materials are new.</i>

	<ul style="list-style-type: none"> • <i>FYP topic is not related to year 1 & 2 courses.</i> • <i>New theories result in me feeling like I am taking an extra course rather than consolidating previous knowledge.</i>
2. Focus of the FYP	
Transition (+ve)	<ul style="list-style-type: none"> • <i>Cannot prepare me for workplace, but postgraduate study.</i> • <i>Compulsory placement demonstrates my competence.</i>
Transition (-ve)	<ul style="list-style-type: none"> • <i>Not useful as I am not planning to stay in the academic world.</i> • <i>Wonder how an academic thesis is considered helpful in a business world.</i> • <i>FYP no use for job application; it is just a 6-credit course.</i> • <i>Research type FYP cannot help job application.</i> • <i>Cannot support my transition to workplace, it is too concentrated and I cannot learn anything from other fields.</i> • <i>Won't stay in the same field; hence the FYP is unhelpful.</i>
3. Graduate capabilities	
Reflection and Closure (+ve)	<ul style="list-style-type: none"> • <i>Know how to conduct a study effectively and efficiently.</i> • <i>Learnt different theories and became more capable.</i> • <i>Presentation skills become better because of there are [many] chances to practice throughout the FYP.</i>

Academic voice

When considering the execution and implementation of a new curriculum, it is, of course, important to take into account the view and experience of academics. They will, after all, enact the proposed curriculum. The noticeable trend in the four-year curriculum, however, is for no substantive change in the content of the FYP – that is, the FYP is largely the de-facto capstone. In effect, academics appear not to have considered the effect of current practice and are seemingly unaware of the capstone design requirement and the emphasis on desired workplace knowledge and skills. Among the 13 participants interviewed, only four could be said to have some idea of the importance of a capstone-like final-year experience to support student transition to workplace. For most programmes, the common academic response had less to do with realising the significance of the proposed changes under the new curriculum and more about managing workload and projects.

1. Purpose of the FYP

Most programme coordinators tended to think that what they were doing currently in the form of a FYP as equivalent to a capstone experience. However, careful study on their responses shows that most of them are only able to accomplish one capstone design feature, integration. Exploring the purpose of the FYP, as some academics explained the FYP as:

'Intending them [students in our programme], try to use all they have learnt in the first few years, not only in our major courses but also other marketing, accounting, all the knowledge, business knowledge without a boundary of courses, they apply either theoretically or practically in terms of aspect.' (Business)

'To help our students to be able to integrate whatever they learnt from the previous two to three years, everything they done and to apply their knowledge and skills, the

quantitative as well as analytical skills. Apply their knowledge and skills to an actual project within a company. This is the major objective of this project,' (Business)

'[Design] studio would be like experience or location where other courses and other knowledge being sort of tested, implemented and realized within the design studio.' (Humanities)

'I think the course should just be a wrap up course because our entire programme is [after all] interdisciplinary in nature. As well, I did have feedback saying they are relatively fragmented and they didn't have a chance to unify or at least they try to do a project that will make them thinking about what they have learnt.' (Business)

A common response by academics with regard to the final-year curriculum is that students should be given a chance to utilize what they have gained in the previous years in order to demonstrate they have successfully understood [expressed in terms of disciplinary knowledge] what they are required to know. Besides integration of knowledge, academics also identified an important aim of the FYP was to advance students' research skills – the way to approach an issue, explore possible solutions and select significant literature. Furthermore, solid analytical skills for data interpretation, and professional presentation skills for both written and oral work were regarded as areas that students needed to develop for what they considered as a good research achievement:

'One of the reasons is to always improve students' research ability in terms of studying literature, making good oral presentation.' (Science)

'[Students are] to be able to use [the] Japanese language in context ... to be able to put together a long-term project that they are responsible for initiating and designing.' (Humanities)

'[the] programme uses this final-year project as their capstone course in order to make students familiar with the kind of research that they can do after graduation, experience how to handle a project on their own and how to focus on a particular project in physiology, environmental science or molecular biology, hoping that we can raise students' interests in life sciences, so one of the purposes is to always improve students' research ability in terms of studying literature, [such as] making good oral presentation.' (Science)

Such observations display by default skills perceived as important for final-year students from an academics' perspective. In simple terms, most academics perceive the capstone final-year experience as a way to prepare their students to be prospective researchers in a related field. Consistent with the earlier students' remarks, the stance reinforces an academic focus to the FYP. However, this seems to ignore the percentage of students who do not go on to become postgraduate students. In reality, most students (>80 percent) enter the workforce rather than postgraduate studies immediately after graduation. Therefore, it is questionable that whether the current focus and rationale of the FYP can really support student transition and development.

Although a number of academic staff who were interviewed indicated that their final-year curriculum was intended to enhance students' research skills, other academics acknowledged that

the connection with future workplace abilities was also essential. Employability skills, such as problem-solving skills, communication skills, interpersonal skill, analytical skills, self-management and teamwork are important indicators of one's abilities for most employers (Cranmer, 2007; Tomlinson, 2007; Yorke, 2006). Academics views on employability skills and FYP are as follows:

'One of the possible type of capstone is a research type, the second one is more a applied one, so students learn all their knowledge, they may like to apply in the real world, so the capstone can be a kind of internship...' (Business)

'When I introduced the capstone/ final-year project to students in the syllabus, I have a section where I point out these are the ways that the capstone project is directly relevant to your future career, because I think it is relevant to their career ...; it's about being able to communicate with other people, to be able to look at a great deal of information and then to analyze it, organize it, and present it. These are basic skills that they will need in the workplace, and these are the basic skills we are teaching for the final-year project, so I outlined these things to them, so that they can see that it is directly relevant to everything that they gonna be doing later on in their work.' (Humanities)

'The ability of students to work as an engineer, to actually be able to find information that they may not learn in courses, so they have to read literature and doing some research on the literature, actually apply some practical engineering skills in addressing that [role].' (Science)

Summarizing, academics describe integration as the common purpose of the FYP, as most projects or internship require students to apply their discipline knowledge and skills to accomplish research papers or assigned workplace tasks. Some programme managers also reported supporting students' transition to the workplace as an important part of the FYP. This latter purpose is enabled by offering internship and workplace opportunities that enhance workplace competence. However, a large proportion of the programme managers appear to be focused on assisting students into graduate school and to eventually becoming potential researchers. Closure and reflection as components of the FYP are not evidently primary considerations. A summary table below shows an evaluation of FYP approaches based on the four design characteristics (Table 2), where a double tick (✓✓) indicates strong agreement.

Table 2. Summary table of evaluation of FYP approaches

	Integration	Transition	Reflection	Closure
Humanities	✓✓	✓	✓	-
Business	✓✓	✓	✓	-
Science	✓✓	✓	-	-

2. Administrative considerations

Balancing administrative workload is an issue for most programmes. For example, as one programme noted, *'there is an imbalance in workload in our department because the teachers who teach in Cantonese may have 100 of students, whereas those of us who teach in English may have 15 and 10 in a class, so how to address that imbalance.'* However, with the introduction of

a capstone requirement, there is a second more serious issue facing academics. As programme managers highlighted, there are considerable administrative and supervisory considerations with the FYP. Labour and workload are the two most commonly reported concerns in administrating the FYP. Being a supervisor is not easy, as academic staff have to work closely with the students and provide them with constructive and inspiring comments. To be a good supervisor, academics often have to give up some of their research time to monitor students' progress. With the onset of a compulsory capstone, in addition to supervising postgraduate students, academics will now need to devote their limited supervisory resources also to final-year students who attempt an academic thesis. With no alternatives to dealing with the issue of staff availability, quite clearly the workload for academics is at a critical knife edge. Many academics are already busy with supervisory related work on a considerable number of research projects. As a result, one concern under the current capstone arrangements using a de-facto FYP is that Ug students are unlikely to receive adequate academic support because of a lack of time and labour resources. Another concern is that research topics are usually bound by academics expertise, the likely effect is that some (many) students may be unable to pursue studies in their area of interest, which in turn may affect students' motivation to complete their FYP. The sum effect is a budding, albeit underappreciated, crisis.

'The general feeling is ... a few [students] is okay, a labour of love, but when everybody has 10 [or more students], there is no more love ... it is too difficult, too much labour. So we have to deal with this one, to see how the department, or maybe ... most other faculty and department will think about this final-year project and you need a supervisor for the project right, so the manpower become an important ... so you have one or two interesting topics, you do not mind to share, to give guidance to the students, but it takes time, and students need to talk to you often before they off track, you have to do this. I think most of our staff do not mind [one or two], but if we're talking about 5 then I think we need to see how to deal with this kind of manpower problem.' (Business)

'We foresee there will be some difficulties in experimental science department because there will be difficulties in how to assign students to a project or to a supervisor. Will there be enough lab space in the research lab of the supervisor, maintenance course for expensive equipment and then consumable cost and the assessment because new for every final-year project? Every semester beside the supervisor, there is an additional examiner within the department to listen to the oral presentation or to read the final report ... and now if we have say 50–60 students, in assessment, we need to double this number.' (Science)

Another administrative challenge highlighted by academics concerns the number of internship opportunities available for students. Aside from available places for all students wanting to access an internship, there is concern that, under the current economic atmosphere, many companies may be reluctant to offer even a short-term internship to students. Reflecting some of these concerns, one programme has devised a practical, albeit partial, solution.

'The reason we have two capstone courses for students to choose from is basically we like the banking and finance practicum a lot, but it's very difficult to guarantee sufficient practicum project for all the students; therefore we have another course, which is the research course on banking and finance.' (Business)

Finally, financial concern has always been the ultimate challenge to implementing a well-organized curriculum. Academics claimed that, although there is a budget increase for the administration of new 3+3+4 curriculum, they in fact have had difficulty in getting financial support from administrators. Academics from ‘hard’ science programmes, which include experimental science and engineering programmes, indicated that they needed increased budgetary allocations in terms of experimental space and equipment for students to conduct their FYP. Currently, some programmes report an inability to accommodate the increasing number of students, as well as the numbers of research topics. The effect is that it is hard to offer students the desired diverse learning experience because of a lack of resources:

‘I need to rely heavily on research grants to help funding on some of the final-year project (some kind of seed funding for FYP).’ (Engineering)

‘Many of the difficulties have to do with resources. Research lab are already very crowded and then if you have three undergrads coming, that may cause more problems, and some of them even express safety problems’. (Science)

Summary of academic voice

Table 3 is a summary of FYP-related comments based on academic voice. Integration and transition-related objectives are reported as the primary rationale in designing the FYP. However, there is a strong academic (research) orientation to transition. There are some serious administrative issues facing academics. These are principally resource-based: availability of hardware and financial support, but staff availability and workload issues are concerns that will become chronic without suitable design strategies and complementary administrative adjustments. Both humanities and sciences programmes share common staff-related concerns, but there are less easily solved issues, such as additional laboratory spaces facing the sciences.

Table 3. Summary of academic voice by FYP rationale and administrative problems

Rationale of FYP	
Integration	<ul style="list-style-type: none"> • <i>Students in our programme, they try to use all they have learnt in the first few years.</i> • <i>To help our students to be able to integrate whatever they learnt from the previous two to three years.</i>
Transition	<ul style="list-style-type: none"> • <i>One of the reasons is to always improve students’ research ability in terms of studying literature, making good oral presentation.</i> • <i>This final-year project as their capstone course in order to make student familiar with the kind of research that they can do after graduation.</i>
Administrative problems	
Hardware resource	<ul style="list-style-type: none"> • <i>Research labs are already very crowded.</i> • <i>Will there be enough lab space in the research lab of the supervisor?</i>
Labour & workload	<ul style="list-style-type: none"> • <i>You need a supervisor for the project right, so manpower becomes an important issue.</i> • <i>We foresee there will be some difficulties in experimental science department because there will be difficulties in how to assign students to a project or to a supervisor.</i>

Summary findings

Capstone activities or experiences typically provide the culmination of studies in a senior or final year of an Ug degree. The objective is to help facilitate the move of soon-to-graduate students, either to graduate studies or to gainful employment. In an uncertain workplace and an increasingly competitive and globalised workplace, this is perhaps an underappreciated but most necessary responsibility for higher-education institutions. In CUHK, the intention is to include a capstone course as part of the new four-year curriculum. Described as a major innovation, Ug programmes are essentially being challenged by educational policy to move from a discipline-specific focus to a wider, more general development of capabilities that include the soft skills necessary in the workplace.

Consistent with educational policy, relevant literature suggests that the focus of a capstone activity is towards helping student prepare for graduation and employment or research studies. The question is what is actual practice? The FYP experience in CUHK provided a useful basis to answer this question, as the FYP is for most programmes the de-facto capstone activity. This critique is assisted by the fact that the FYP is not compulsory, so that it is possible to compare the relative experience of students as they go through the final-year experience. In effect, both academic and students share a common view on the aim and objectives of the current FYP. Both groups acknowledged that the common purpose of the FYP is a research product and the FYP objectives emphasize academic components that focus solely on enhancing students' research competencies. Table 4 summarizes responses for both groups of participants according to the four capstone characteristics and focus of transition. As both student and academic feedback reveals, the design characteristics are partially satisfied by the current FYP, while there is a clear academic focus to the FYP. In sum, it could be suggested that the current orientation of the FYP and final-year curriculum is not consistent with an outcomes-based approach that seeks to support the development of generic and specific workplace skills or graduate capabilities.

Table 4. Summary on student and academic voice

	Integration	Transition	Reflection	Closure	Transition Focus
Student voice	✓	✓	✓✓	✓✓	academic studies
Academic voice	✓✓	✓	--	-	academic studies

Given that the majority of graduates enter the workplace after completing their Ug studies, there is a seeming over concentration on academic-oriented knowledge and limited skills development in the current FYP design. The approach is compounded by a general lack of awareness of capstone design principles, particularly transition, and the failure by many academics to grasp the need to foster generic workplace competence. We turn next in the following section to an illustrative design framework proposed for a better final-year curriculum.

Suggested final-year curriculum framework

The comments from students and academics offer a number of valuable insights for the design of a capstone experience. Assuming suitable foundational and pre-capstone components, Table 5 illustrates a possible approach to designing a final-year capstone experience comprising a range of learning activities and assessment strategies that suit a developmental capstone. Each graduate capability, learning activity and assessment is mapped against the four design characteristics, giving a rich two-dimensional capability development approach to the capstone experience. Ideally, the objective is to get as rich an experience as possible, employing some, but not all, of the desired capability development outcomes.

Table 5. Design framework to support a (developmental) capstone activity

Integration** (I)	Reflection (R)	Closure (C)	Transition (T)			
Integrate knowledge and skills	Reflect on development – academically, socially and personally.	Close Ug student life	Transition from Ug studies to being self-autonomous learners.			
Choose the activities and assessment						
What are we developing/ assessing (Indicative)	How (authentic learning activities) (Indicative)	Authentic assessment methods (Indicative)	Design Characteristics			
			(I)	(R)	(C)	(T)
University community	Project work, service	Group project, self reflection	✓	✓	✓	✓
Discipline knowledge	Project work, group presentation, simulation, thesis	Presentation, peer assessment, group project, reflection	✓	✓	✓	✓
Academic skills, self-directed learning e.g. research, collaboration	Group presentation/ case analysis/ simulation/ lab. experiment report	Presentation, participation, peer assessment	✓	✓		✓
Self-awareness	Reflection journal/ blog	Reflection; Pass/Fail	✓	✓		
Leadership skills/ teamwork/ interpersonal skills	Group project, team-based activities, career planning	Group project, peer assessment, reflection, presentation	✓	✓	✓	✓
Problem-solving skills	Case analysis/ group/ research project/ simulation	Group project, peer assessment, reflection	✓	✓		✓
Citizenship	Service learning	Not assessed			✓	✓

Based on student voice, the most welcomed learning activities are group work, presentations and fieldwork. These are all authentic learning tasks that help in the development of interpersonal skills, communication skills, presentation skills and the practical skills that nearly all employers were looking for. For the majority aiming to start a career on graduation, an internship working experience is most valued, especially as they can be associated with possible

job offers. In contrast, students who planned to go to graduate school wanted more seminars and more teaching assistants available to offer them support and study assistance during their final year. Academics highlighted concerns over labour and workload, while generally displaying a low level of awareness of the design features associated with a capstone experience.

Conclusion

This paper reports on a study that evaluated aspects of the current final-year curriculum and the FYP in CUHK in terms of whether it could support the development of graduate employability. Using comparative studies from literature and practical examples from world-class universities, four design characteristics were identified: integration, transition, reflection and closure. As also suggested in literature, the emphasis is more on a capstone experience than an activity or course. Understanding the capstone activity as an experience, a series of activities and assessment tasks were highlighted that might help integrate student disciplinary knowledge, as well develop essential workplace problem-solving skills, while Figure 3 illustrated an economical approach to capstone design that also focuses on activities that match students' capabilities and interests. Students with strong academic capabilities and an interest in graduate studies might thus complete a demanding research thesis, while students looking to move into the workplace may elect an individual or group project or simply complete an internship that is best suited to their transition needs.

Findings suggest that if the education reform is seeking to develop multifaceted professionals who are confident and highly competent in workplace, then a capstone experience based on the current FYP is not aligned with the desired outcomes. The FYP is shown to be a research-focused study experience and, if it is the only option for final-year students, it fails to satisfy the employment transition objectives for a majority of students. What is needed is a design framework that matches student capabilities and learning experience, and is aligned to support better transition. Such a design approach will also serve to address administrative and related workload concerns reported by academics. Simply, if the current research focus is maintained in the new curriculum, programmes that are currently under pressure to support a mere 20 students will be severely challenged when confronted with 80 students needing to complete a FYP thesis. The reality is that a lack of awareness and de-facto practice can fail both students' transition needs and cause a tremendous increase in workload for academics that can contribute to the incorrect view that the capstone is a waste of time and resource, rather than a valuable learning activity.

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Appendix

Project conceptual map

