Overview

Final year students, when making the transition from university to the workplace or to further study, need to make sense of the learning they've gained throughout their whole program of study. Many universities have introduced "capstone" projects or courses, which have the dual benefit of:

- helping students synthesise their learning across the program, demonstrate holistically their development of graduate capabilities and successfully negotiate the transition to their next career stage, and
- enabling the institution to assess final graduate capabilities for a program.

A capstone project involves an authentic, project-based activity that closely relates to professional work in the field. In completing it, students must apply the discipline knowledge and capabilities they have learned, as well as generic skills. A capstone project could incorporate, for example:

- work-integrated learning placements
- other immersive learning experiences such as study tours, service learning, volunteering, virtual simulations
- case analysis
- interdisciplinary project work.

For a capstone project, the course developer often negotiates with the student to determine the form and process of the task and its assessment. Students often compile portfolios for the purposes of assessment.

When to use

Capstone projects are usually completed as a formal unit of study in the final year or semester. They are most appropriate for students who need to integrate all that they have learned throughout an entire program of study, for use at work or in further study.

Benefits

Student learning in higher education is all too often fragmented into discrete topics. When they graduate, students may have good disciplinary knowledge, but they might still find it hard to integrate their learning for use in the real world. Even when project-based learning is used in individual courses, students may never have had the opportunity
to incorporate relevant skills from other courses in those projects.

Capstone projects can effectively consolidate and further develop generic skills in a disciplinary and interdisciplinary context. Other benefits include:

- helping students integrate and synthesise prior knowledge and learning from multiple and diverse topic areas, including between course strands and majors, thus helping them to go "beyond the tacit message of curricular fragmentation in order to connect their learning" (Huber & Hutchings, 2004)
- enabling students to apply synthesised knowledge and skills to an initially unstructured authentic problem
- further developing and consolidating students' communication skills and other graduate capabilities
- supporting graduate career plans and enhancing student career preparation, by promoting meaningful connections between general education, the academic major and career experiences
- meeting graduates' university-to-work transition needs (or undergraduate-to-higher-degree needs), helping them to produce explicit evidence of complex and sophisticated graduate capabilities
- enabling reflection on key personal adjustments by final year students as they consolidate their learning and progress to their next career stage
- encouraging a sense of unity and community among the senior class, which can serve as a foundation for later alumni networking and future alumni support for the Faculty and university
- providing an educational site for evaluation, enabling Faculty staff to consider the effectiveness of a whole program of study in an integrated and coherent way.

Challenges

Capstone projects are rarely a one-size-fits-all proposition. The most benefit is gained if the project focuses on:

- enabling individual students
- taking their aspirations into account and
- supporting students as they become more independent and responsible in their learning.

However, too much flexibility and "open-endedness" can be problematic for some students, and capstone projects typically demand a great deal of student time and commitment.

You may need to negotiate specific assessment tasks and criteria individually, and develop strategies for appropriate and equitable assessment. Assessment criteria need to be responsive to the negotiated assessment tasks or project, but you should define them sufficiently well that they set achievable standards or levels of performance.

If possible, give students the opportunity to diagnose gaps in their own learning, and to have input into the assessment design to address these gaps. Teachers can find this kind of involvement a challenge to manage, so employ a mix of assessment styles to:

- encompass the range of the students' past experiences, and
- ensure that not only cognitive but also affective and psychomotor learning are assessed.
Capstone projects, because they serve an integrative function at program level, usually involve many staff across multiple disciplines in their development and implementation. The course coordinator will need to:

- secure other staff's cooperation and collaborative involvement, and
- recognise and embrace diverse perspectives across the disciplines in the design of assessment.

**Strategies**

**Determine the role of a capstone project**

In planning a capstone project, consider the following:

- Can the program setting accommodate a capstone project/course? Will its integration into the program be supported?
- Will the capstone course unit include, or consist of, a practicum or internship in a professional or industry setting?
- Are there examples of successful capstone project courses (both local and from further afield) from which you can learn in designing the course?
- What sources of information can be used to identify the types of work graduates seek and obtain, so that you can base capstone project work on real-life examples?
- Can you draw on existing industry links and partnerships to enhance the design of the capstone project course?
- How can you establish and extend collaborative relationships with major employer organisations in creating settings for capstone units?
- How ready are students for the demands of a capstone project? For example, have they developed a capacity for self-management and independence as learners? Are they experienced in teamwork and reciprocal peer reviewing processes?
- Will you organise appropriate support to help students develop realistic and feasible topics and the capacity to complete them?
- Are administrative processes in place to minimise and manage risks associated with students' participation in authentic professional and industry settings? These might include occupational health and safety, insurance and intellectual property concerns.

**Align assessment with learning outcomes**

The learning outcomes in a capstone project reflect its aim to:
• consolidate learning in an integrative way
• develop a coherent overview of achievements, and
• prepare the student to make the transition out of the program.

Clarify to students what you expect of them, being particularly explicit about the values that underpin the learning design. For example, the project might have been conceived as an opportunity to:

• explore diverse and competing perspectives across disciplines
• investigate ambiguities and discrepancies between theory and practice
• conduct critical self-reflexive evaluation,

or engage in some other specific activity. Make it very clear what you want students to achieve.

The assessment design should articulate the range of knowledge, skills, capabilities and dispositions that students are expected to demonstrate having achieved.

Some typical learning outcomes that can shape the design of capstone projects are:

• extension of analytical and strategic thinking, and problem-solving skills
• application of theory in practice
• development of career networking capabilities
• consolidation of higher-level applied communication skills (written, oral, interpersonal, professional presentation)
• application of employment-related teamwork skills
• demonstration of early professional dispositions and ethical stance
• appreciation of complexity and ambiguity
• cross-cultural sensitivity
• global awareness
• self-reflexivity as a learner and commitment to further learning and development
• innovativeness and creativity
• leadership capabilities.

Define the assessment focus of a capstone project

When designing for assessment in capstone projects, consider the balance between

• generic, educationally-focused learning and
• work-based or professionally-focused learning,
The goal of integrative learning is to address both these perspectives at once.

Here are some examples of the diverse assessable outputs generated in a capstone project:

- a case study based on a "real-world" situation (the "living case method"), for example giving an overview of an organisation, its mission, goals, long-term prospects and how it interacts with various actors and forces in its environment
- a research grant proposal or plan based on an authentic professional or industry need
- a feasibility study report on a proposed initiative addressing an issue relevant to a particular professional or industry need
- a project management plan for a team-based product design project
- a research report on the project conducted through the capstone unit
- a plan for the development and implementation of a program of activities for an authentic professional or industry setting
- a series of communiqués addressed to those working in the authentic professional or industry setting of the capstone project work
- an integrative portfolio of a student's key learning outcomes from the course.

Further examples from several disciplines can be found in Holdsworth, Watty & Davies (2009).

You can assess the capstone unit by requiring students to submit several smaller pieces throughout the semester. This gives them the chance to receive formative feedback on each stage to ensure that they are on the right track. It can also help facilitate their team's collaboration and the engagement of their fellow students in providing peer feedback.

Develop assessment criteria

Base the project's assessment criteria on the aims and specific learning outcomes of the capstone course. Include program-level graduate attributes and industry accreditation requirements. Additionally, tailor the criteria to individual learners working towards specific goals, and allow the learner to have some ownership of the assessment process.

You can use an assessment rubric to:

- articulate standards at different levels of performance according to particular criteria
- provide a basis for discussion with students about expectations, and
- frame the grading process and provision of feedback to students.

Support your students

Because capstone assessment is comparatively more individualised, requirements for student support will also vary.
Generally speaking, though, as a capstone project is a stepping stone to professional practice, assessment should promote learner independence, intrinsic motivation and responsibility.

Ideally, students will have had previous experience in self and peer assessment, teamwork, reflection and independent research. Assessment in a capstone project should build on and benefit from that, or compensate if students have not engaged in one or more of these practices.

Use technology
Technology tools (e.g. to support peer review, group work, collaboration, reflection and research) are widely available. Some of these are integrated into Learning Management Systems such as Moodle. Further details are available via the links on the Selecting Assessment Methods page of the Assessment Toolkit.

Ensure fairness
The assessment plan for a capstone project must offer an equal chance of success for all students. The more responsive the assessment can be to individual student interests and goals, the more readily students' diverse backgrounds and special needs can be accommodated. Expecting all students to complete the same assessment tasks reduces the effectiveness of a capstone project as a summation and synthesis of an individual's learning experience, and a response to their interests.

Pay careful attention to the practicalities of organising tasks and contexts for assessment activities. You may need to negotiate with both students and host supervisors, particularly in the case of

- work-integrated learning, and
- situations where special accommodations are needed for some students.

Additional information

External resources

Integrative Learning: Opportunities to Connect. Carnegie Foundation for the Advancement of Teaching, USA.

Further readings


**Acknowledgments**

The contributions of staff who engaged with the preparation of this topic are gratefully acknowledged.

This topic was inspired by a resource developed for the Macquarie University Assessment Toolkit.