Developing and enhancing undergraduate final-year projects and dissertations

A National Teaching Fellowship Scheme project publication

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Foreword by Professor Stephanie Marshall

Universities should treat learning as not yet wholly solved problems and hence always in research mode. (Humboldt 1970, quoted by Elton 2005, 110)

This quote taken from Humboldt over 200 years ago at the University of Berlin’s founding emphasises his commitment to the inter-relatedness of teaching and research, and is still apposite today. What is higher education for, if it is not about assisting learners to make sense of the complexity of the world in which they live? It follows that a curriculum which integrates the knowledge and learning students glean from further studies, with engagement with local and global challenges and issues, better prepares students for lifelong learning. And, at a time when ‘skills for employability’ is of growing concern, a more integrative approach to the curriculum is being explored globally. This is where final-year projects, dissertations and capstone projects are so important in assisting the process of engaging students in knowledge creation.

This book, which is the result of a National Teaching Fellowship Scheme (NTFS) project undertaken by Mick Healey, Laura Lannin, Arran Stibbe and James Derounian from 2010 to 2012, explores how to engage students in the production of knowledge. It is unique in that it draws on global case studies, and presents a framework for assuring that students completing an undergraduate degree – irrespective of the diversity of programme, institution or mode of study – are better equipped to make sense of, and apply, their undergraduate learning through the teaching research nexus.

The book is rigorous, drawing upon the full range of recent literature. Through its case study approach, with over 70 exemplars drawn from across the world, it will be of exceptional value to the reader. I commend this excellent book to all higher education teachers grappling with the purpose, organisation, facilitation and possible modes of ‘evidencing’ best practice in the delivery of learning.

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We are indebted to colleagues from around the world who provided us with details of their final-year projects and dissertations, and members of our International Advisory Panel who helped us think through the issues. We are particularly grateful to Alan Jenkins (Oxford Brookes), who accompanied us on our journey from helping us formulate the initial idea for the project right through to providing a critical commentary on the text of this publication.

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**Executive summary**

*Over the last decade, the use of projects and dissertations in university curricula … has been seen as increasingly important* (Marshall 2009, 150).

*I cannot think of anything more unfair than … to treat all students as if they are the same, when they so manifestly are not* (Elton 2000, 1).

Final-year projects and dissertations (FYPD) undertaken by students at the end of their Bachelor degree courses are a topic of current interest in many countries. It is timely to reassert the importance of FYPD and to rethink their role in the curriculum as the context of higher education changes. For example, the number of students in higher education has expanded, students are coming from a wider range of backgrounds, and the challenges that humanity is facing in the 21st century are increasingly complex and inter-disciplinary. In addition, the development of MOOCs (massive open online courses) could lead to more of the content of degrees being delivered online, leaving universities to add value by focusing on student-centred activities where face-to-face tuition is needed, such as FYPD. Similarly, in discussions about providing more holistic learning experiences, the role of FYPD as the capstone of Bachelor degrees is likely to be of growing significance as a key way of delivering programme-learning outcomes and research-informed teaching.

Our argument is that all undergraduate students should undertake a FYPD, and while valuing the traditional Bachelor dissertation, which in the UK is typically an 8-12,000 word independent piece of disciplinary academic research, additional options should be available. These may differ in their conception, function, organisation, location, and nature of outputs. With increasing student numbers, widening diversity of motivations, and the growth of professional disciplines such as business, journalism, nursing, engineering and education, traditional dissertations do not necessarily provide for all students and employers’ requirements. Ways should be found for students in all disciplines, and from all backgrounds, to have the opportunity to fulfil their potential through undertaking FYPD more closely aligned to their needs and aspirations.

This book aims to identify innovative and creative ways of developing FYPD. It raises key issues about the defining characteristics of higher education and how the final-year curriculum should exemplify these through the design of FYPD. We illustrate our argument by drawing on over 70 case studies that we have collected from a wide range of disciplines in both research- and teaching-intensive institutions from the UK, Australia, Canada, Hong Kong, Japan, Netherlands, New Zealand, Switzerland and the United States. The book ends with a list of recommendations.

Although the project was carried out in the UK, this publication is relevant to rethinking the nature of FYPD internationally, with approximately half the case studies coming from outside the UK. The primary audience is academics responsible for designing FYPD, in particular dissertations and capstone projects; the book should also be of general interest to supervisors of FYPD and academic leaders/managers concerned with teaching and learning and curriculum development. It aims to help colleagues explore a variety of ways in which their FYPD could be designed, delivered and assessed.
We conclude that both students and staff/faculty should be given choices in the kind of FYPD they undertake/supervise and in the nature of the outputs assessed. This is, in our view, the best way to meet the varied needs of increased numbers of students in higher education and the pressure on staff resources to supervise them. This approach is likely to motivate a wider range of students than the one-size-fits-all mode, which characterises most FYPD, and hence increase the probability that more students will experience transformational learning.
1. The rationale for diversifying final-year projects and dissertations

*New models of curriculum … should all … incorporate research-based study for undergraduates* (Ramsden 2008, 10-11).

*Re-imagining capstone projects has implications for students, faculty, departments and institutions, but greater diversity could enhance its relevance to students and employers, better aligning the student experience with the academic interests and future career demands of the 21st-century graduate* (Hill et al. 2011, 331).

Final-year projects and dissertations (FYPD) are a topic of interest in many countries. In the US, The Boyer Commission (1998, 27) recommended that all undergraduate programmes should ‘culminate with a capstone experience. The final semester should focus on a major project and utilise to the full the research and communication skills learned in the previous years.’ In Australia, issues around capstone courses and standards are topical, for example, several recent reports have advocated the benefits of capstones (Bailey et al. 2012; Holdsworth et al. 2009). In Europe the reshaping of the Bachelor degree through the Bologna Process, which is designed to ensure comparability in the standards and quality of higher education qualifications across Europe, has stimulated a rethink about how and where to ensure a research emphasis in the curriculum. The latter is encouraged by the statement from the Conference of European Ministers Responsible for Higher Education (2009, 4) that ‘Higher education should be based at all levels on state of the art research thus fostering innovation and creativity in society’; and the follow-up conference in 2012 which stressed the ‘participation of students in research and development’ (Eurydice 2012, 52).


Projects and dissertations have always been viewed as an effective means of research training and of encouraging a discovery approach to learning … [they] are also seen as an effective means of:

- diversifying assessment;
- addressing concern to promote skills and employability;
- empowering the learner;
- motivating students;
- promoting links between teaching and research;
- ‘talent spotting’, ie identifying potential research students/assistants.

In the course of this project we came across a dissertation assessment brief from 2011 which included the instruction ‘**Do not** allow your typist or printer to impose their own ideas about presentation’. Presumably the brief had not been modified much from the time of typewriters, a time when printers had ideas rather than cartridges. We came across academics who felt that the dissertation, as the pinnacle of learning and achievement, did not need development or enhancement. But we also came across staff and faculty from a wide range of disciplines and countries who gave reasons why the role of final-year projects and dissertations (FYPD) should be considered carefully in the light of changes in the world around us. The following are some of the reasons:
more students go to university now, and only a small fraction go on to have academic careers, so universities need to help prepare students for the wide range of roles that they will play in society;

- students from a greater diversity of backgrounds are entering higher education, and a wider range of types of dissertation can help celebrate the range of talents, abilities and experiences that students have;

- the nature of ‘research’ is changing, with a wider range of activities, such as first person enquiry, action research in the workplace, knowledge transfer and production of artefacts now counting as research;

- there is an increasing inter-disciplinary and real-world focus in education in recognition of the complex nature of the issues facing humanity in the 21st century. For example, climate change has political, social, economic, technological and ecological aspects, and different kinds of FYPD could help prepare students for such issues (eg multidisciplinary, self-reflective FYPD teams actively engaged in community-based projects);

- in turbulent times the fundamental issue of what higher education is for is being increasingly questioned – is it to help graduates lead meaningful and satisfying lives, to transform society, to increase economic growth, to contribute to knowledge, or to satisfy students as consumers? As answers emerge, new forms of FYPD will be needed to help put a variety of visions into reality.

It is also timely to reassert the importance of FYPD and to rethink their role in the curriculum for two further reasons. Firstly, according to The New York Times, 2012 was ‘The year of the MOOC’ (massive open online courses) (Papano 2012). Ahmad (2013) predicts that the disruptive force of MOOCs will lead to more hybrid learning designs, with universities taking the best of the MOOCs to deliver the content of large introductory classes and some advanced courses, leaving the universities to add value by focusing on student-centred activities where face-to-face tuition is needed. Such a scenario could lead to a rapid growth of the ‘inverted’ or ‘flipped classroom’ in which content is delivered in the form of, for example, video and audio clips and electronic handouts, leaving the face-to-face contact time to focus on discussion, problem solving and other forms of active learning (Lage et al. 2000; Bergman and Sams 2012). FYPD give universities the opportunity to provide high quality student-centred learning involving supervision and advice which may not easily be delivered by MOOCs and hence they could become an even more significant feature in the curriculum.

Secondly, a number of universities are rethinking modularisation and the associated disaggregated assessment strategies which are its consequence. Accordingly these universities are re-aggregating the curriculum to provide a more holistic learning experience for students, the position of FYPD as a capstone for degree programmes is becoming more important (Hill 2013). This is part of the growing interest in assessing programme-level outcomes rather than just individual modules or courses (PASS 2012). Indeed, in a number of countries, such as Sweden, the quality of the FYPD is being used to assure the standard of degrees; hence well-designed FYPD may contribute to quality assurance and accreditation processes (Chapter 6). However, despite being regarded as an integral component of many undergraduate degree programmes FYPD have attracted a limited amount of research (Greenbank et al. 2008).

It is important to point out that we did not come across any staff who felt that FYPD were valueless and needed to be scrapped. Quite the contrary – the project has ended up as a celebration of not only
traditional forms of FYPD, but also a wide range of enhancements and innovations in practice that can help FYPD to adapt to changing times.

It is challenging to undertake an international review of FYPD, not least because there is considerable variability in the terminology used to describe final-year projects and dissertations (Table 1) and practices vary by discipline and country (Allan 2011; Bailey et al. 2012; Healey and Jenkins 2009; Kiley et al. 2012; Nicholson et al. 2010; Rowles et al. 2004). In this publication we use the term FYPD broadly to refer to all the various ways in which students undertake research and inquiry projects in the final year of their undergraduate or Bachelor degree courses. We make extensive use of case studies from a wide range of disciplines, institutions and countries. For ease of referencing the case studies are referred to in the text in the order they appear on the project website, where the sources on which they are based may also be found (Appendix 1).

The changing role and experience of final-year projects and dissertations

FYPD vary in the role they play in different countries. For example, in the UK the honours project or dissertation is undertaken by the majority of students and has, deservedly 'a privileged place within many degree programmes' (Hemmings 2001, 41). This distinguishes the UK from higher education systems in Australasia and Canada, where commonly only 10-20% of students undertake an honours project, as this often involves an additional year of study; though many more experience capstone projects as part of their undergraduate degrees. The traditional project or dissertation provides an excellent apprenticeship for students wishing to undertake research degrees, but with increasing student numbers, the widening range of motivations for studying higher education and the growth of professional disciplines, innovative approaches to designing a wider range of FYPD also need to be considered (see Table 3 in Chapter 3).

In the context of the UK the traditional honours project or dissertation is under pressure because of the resources required to support it, the lack of preparedness of some students to undertake it, and its lack of perceived relevance to some courses and future careers (Booth and Harrington 2003; Price and Feehily 2004). This has led some departments to stop offering the dissertation, but in our view this is a case of throwing the baby out with the bathwater; there are alternative forms the dissertation may take to make them relevant and other ways of addressing the resource (Chapter 7) and preparedness issues (Chapter 4).

The FYPD is commonly based on the three/four-year full-time model of higher education rather than the increasingly diverse provision, including part-time and work-based learning. Yet for many academics it remains the ‘acid test’ for students, towards the end of their degree, to demonstrate independent work on a major project, showing that they can think and work like a member of their discipline or profession. As Todd et al. (2004, 336) note:

The ability to work independently is an important outcome of undergraduate study and the dissertation is designed to allow learners to be more involved in decisions about the choice of subject matter, learning methods, control over which aspects may be focused upon, pace, sequence and content of their study - which are some of the key characteristics of independent learning.
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<th>Term</th>
<th>Meaning</th>
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<td>Dissertation</td>
<td>In the UK a ‘dissertation’ normally refers to an undergraduate honours project, while in North America it usually refers to a doctoral level project. Whereas the Americans use the term ‘project’ or ‘thesis’ to refer to research projects at undergraduate level, in the UK the word ‘thesis’ is usually reserved for Masters and doctoral level research projects. <em>In this publication the UK use of the term dissertation is used.</em></td>
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<tr>
<td>Honours project</td>
<td>The great majority of students in the UK undertake an honours project for their undergraduate or Bachelor degree, which usually counts for 20-40% of the final-year credits. It is variable in the rest of Europe; while in Australasia and Canada only a small proportion of students typically take an honours project. In the USA some HE institutions have a separate honors program, generally offered to the top percentile of students, that offers more challenging courses or more individually directed research projects or seminars instead of the standard curriculum. These students graduate ‘with honors’, but are awarded the same Bachelor degree as other students.</td>
</tr>
<tr>
<td>Traditional dissertation or honours project</td>
<td>The traditional honours dissertation in the UK, and some other European countries, is an independent piece of research, typically 8-12,000 words long, but those with lower credit ratings may be shorter (eg 5-6,000 words). In Australasia and Canada an honours project usually involves a larger piece of work undertaken as part of an additional year’s study. <em>This publication explores alternative forms of dissertation and final-year projects which might be offered alongside or instead of the traditional form.</em></td>
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<tr>
<td>Capstone project</td>
<td>The term ‘capstone project’ is commonly used in North America and Australasia for a project in the last year or semester of the degree programme which provides opportunities for students to synthesise and apply their knowledge and experiences from their whole programme. It helps them to negotiate successfully the transition to the next stage of their career, whether to the workplace or further study. <em>Our interest is in those capstone projects where undergraduate students undertake a significant amount of research and inquiry.</em></td>
</tr>
<tr>
<td>Final-year projects and dissertations (FYPD)</td>
<td><em>In this book FYPD refers to all of the above types of project which engage students in research and inquiry at the end of their undergraduate or bachelor programme. They include both traditional and alternative forms of the dissertation and honours project.</em> The key dimensions and characteristics of FYPD and some alternative possibilities are discussed in Chapters 2 and 3.</td>
</tr>
<tr>
<td>Module</td>
<td>Commonly five to eight modules or courses (according to their credit ratings) are taken by full-time students in their final-year in the UK.</td>
</tr>
<tr>
<td>Assessment</td>
<td><em>The term ‘assessment’ is used here in the UK sense of grading work or providing feedback</em> rather than the North American sense of evaluation of institutional and programme effectiveness.</td>
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<tr>
<td>Degree credits</td>
<td>Credit ratings for FYPD are cited in several of the case studies. Confusingly these vary between and within countries. In the UK a Bachelor Honours degree involves 360 credits; in Australia, parts of Canada and the US a Bachelor degree is commonly around 120 credits, while under the Bologna Accords in Europe a Bachelor degree requires 180-240 credits. In the UK 15 credits = 7.5 European credits = 4 credits in US. A clearer comparison is the proportion an FYPD constitutes of a full-time final-year programme.</td>
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In recent years the proportion of undergraduates going on to take postgraduate research degrees has fallen in many countries; hence other forms of FYPD may be more appropriate to meet their graduate aspirations. As Brew (2007, 7) notes:

For the students who are the professionals of the future, developing the ability to investigate problems, make judgments on the basis of sound evidence, take decisions on a rational basis, and understand what they are doing and why is vital. Research and inquiry is not just for those who choose to pursue an academic career. It is central to professional life in the 21st century.

While recognising the strengths of the traditional honours project, what are also needed are alternative types that provide students with a forward-looking experience and equip them to thrive in an uncertain, supercomplex world (Barnett 2000; 2004). Giving students a choice of alternative forms of FYPD is important to ensure that the needs of all final-year students are met regardless of background, discipline, institution or life goals.

The biosciences programme at Durham, a research-intensive university, represents a good example of providing alternative forms of FYPD. Students may choose between a laboratory-based project; developing a business plan for the formation of a biotechnology company to exploit an innovation generated by biological research; or a school-based biosciences project (Case study 5.8).

**Case study 5.8 Biosciences final-year project at Durham University, UK**

Students have a choice of three different types of final-year project:

1. **Laboratory-based project**
   The laboratory-based project provides an opportunity to participate in the research being carried out by staff in the school. Many students are able to work in the research laboratories, alongside postgraduate and postdoctoral researchers, and all students have access to the full array of research facilities in the school. The project currently entails over five weeks of full-time research, and students are given a piece of work that can lead to concrete results over this period. Many undergraduate projects have generated data that has subsequently been incorporated into scientific papers, with the student as a named author. The project is assessed through a report, written in the form of a mini-thesis, plus a short presentation.

2. **Biology enterprise**
   Biology enterprise (BE) is a project-orientated module, based on research in a commercial context, with self-selecting groups of five or six students working together. The learning context for BE follows the real-life scenario of the formation of a biotechnology spin-out company from an academic biosciences research group. BE aims to introduce students to: key processes of business start-up, specifically in the context of a spin-out of an innovation generated as a result of biological research; key factors and considerations that influence the decision-making process of the commercialisation of biotechnological innovation; the necessary skills, knowledge and resources required to take the concept through to credible commercial propositions; the purpose of a business plan and, using a self-generated idea, how to prepare and present a plan for a research-led biotechnology spin-off. A core component of BE is an in-depth desk study of a biological topic to collate, review, critically appraise and present the scientific research evidence that underpins the idea for the biotechnological product or process. The content of this module provides an introduction to key business processes such as ideas generation; market research; protection of
intellectual property; raising finance, in addition to developing individuals' team working, project planning, time management and transferrable skills.

3. **Biology into schools**

For students who see their future in science education, or other communication-based activities such as journalism, the Science into schools module provides an attractive option. As with the other research project options, it is research-led, but in this case the research takes the form of a systematic inquiry into the teaching and learning process. Students are required to prepare materials for teaching science in secondary schools, and to interact with teachers and pupils. After an initial training period, students spend at least four hours per week for 10 weeks in a local school. They are expected to graduate from classroom observation, to teaching assistance, to an opportunity to undertake whole class teaching. They will also devise a special biological sciences project for the school, which they implement and assess. The module is assessed through a journal of activities, reports, a presentation, and a review by the host teacher. This module focusses on developing communication skills, as well as team working and interpersonal skills. This module is only available to a limited number of students, determined by the number of participating schools.

Flexibility in the conception, function, organisation, location, and nature of outputs of FYPD is required not only to allow for diversity in student motivations, but also for discipline diversity. What counts as research and inquiry varies significantly by discipline (Healey and Jenkins 2009; Jenkins et al. 2007). Thus, for example, in art and design and media subjects there is much discussion about artistic practice as research (Till 2013) and a wide range of ways of portraying the outcomes of research and inquiry are acceptable, including practices such as photographs and photo-essays, videos, sound recordings, radio broadcasts, scripts and story treatments, illustrations, sketches, computer graphics, websites, animations, product designs and schematics, mixed-media project work, and group presentations. A range of forms of written work such as essays, stories, poems (eg 'creative writing') diaries and reflective logs may also be included. For example, in the Performing Arts degree at the University of Winchester students have a choice of assessments, including 100% performance, workshops and performance, and a traditional 10,000-word dissertation (Case study 1.17).

**Case study 1.17 Developing the reflective practitioner in performing arts at the University of Winchester, UK**

The BA (Hons) Performing Arts degree at the University concerns contemporary performance practice. We place the notion of the student as 'reflective practitioner' at the heart of the programme as a pedagogical and philosophical model. Performance-making and researching-through-performance are fundamental to the programme. Theory is explored through practice, while practice is evaluated and contextualised through theory. Inter-disciplinarity and cross-disciplinarity are also at the core of the programme. … The final year project module aims to develop a key transferable skill, which is promoted by the programme, namely fostering the students' ability to recognise their own learning needs in relation to their particular strengths and learning skills. Students develop an individually negotiated portfolio of work informed by current debates in performing arts, specifically focusing upon preparing them to continue work at postgraduate level or in a professional capacity. Various models are available to the students, including 100% performance, workshops and performance, and a traditional 10,000-word dissertation. In all cases the process must be underpinned by critical reflection.

*Source: Extracts from Hellier-Tinoco and Cuming (2010, 18, 21)*
Whether the institution is research-intensive or teaching-focused, choices as to the kind of FYPD they undertake are important as students have different motivations and career aspirations. Hence we believe that a more flexible but equally robust approach is required in the design and assessment of FYPD to meet the needs of students from diverse subject areas and types of institution.

The honours project or dissertation is seen as a key way of linking research and teaching (Jenkins et al. 2003, 2007; Rowe and Okell 2009) and many students testify to the transformational learning effect of their experience (Derouman 2011). Unfortunately this is not the experience of all students (Shadforth and Harvey 2004). Ways should be found for students in all disciplines, from all backgrounds, to have the opportunity to fulfil their potential through undertaking FYPD more closely aligned to their needs and aspirations. The initial impetus behind the Research Informed Teaching Initiative in the UK was to preserve the ‘gold-standard’ of honours projects and dissertations and to protect the international competitiveness of universities, though when enacted it went well beyond the dissertation (Childs et al. 2010; Healey and Jenkins 2009). Now is the time to diversify the nature of the FYPD to include both traditional research and a wider range of inquiry-based activities, with a strong emphasis on ensuring consistency of standards across different forms of assessment (Hand and Clewes 2000; Pathirage et al. 2007; Tariq et al. 1998; Webster et al. 2000; Chapter 6). Alignment of learning outcomes with project design and assessment is, of course, critical in the maintenance of quality and standards (Biggs and Tang 2011).

Diversifying final-year projects and dissertations
The focus of this book is on students undertaking research and inquiry projects in their final or senior year, but exploring a range of different kinds of FYPD also raises issues about the nature of research in different disciplinary and professional settings. This reflects discussions of what counts as research in different disciplines in the UK research assessment exercises and the 2013-14 Research Excellence Framework. Most performing arts, design and fashion FYPD have, over time, favoured the production of performances or artefacts displayed at end-of-degree shows. Consultancy and science communication projects are used, for example, in some biosciences courses (Luck 2008); while projects in professional subjects may be linked to work (Greenwood 2007; Millwood et al. 2007). There is a growing interest in the UK in the scholarship of engagement which draws on US experiences (Boyer 1996) and seeks to engage students directly as part of their curriculum with community groups (Chapter 5). Connected to this discipline variation is a debate about how the findings of FYPD can be more effectively disseminated (Chapter 8). Some of these issues parallel discussions about redefining the doctorate (Park 2007; Patton, 2013) and taught postgraduate projects (Brown et al. 2012).

There is evidence that FYPD may have a significant impact on student learning. Using data from the National Survey of Student Engagement in the US, half of the high impact activities that Kuh (2008) identifies could involve FYPD - collaborative projects, undergraduate research, community-based learning, internships, and capstone projects. This is supported by a study of two service learning capstone projects in New Zealand. Using the Australasian Survey of Student Engagement the researchers found that student engagement was enhanced by the course and the gain was highest among the previously least engaged (O’Steen et al., 2011; Case study 4.16 in Chapter 5).

In a similar vein we are especially interested in projects that result in what Kegan (2000) calls ‘transformational learning’. He argues that this results in new ways of knowing, or what Mezirow (1991) refers to as ‘new frames of reference’. Freire (1998) extends this and suggests that the prime purpose of
education is transformation of the individual and society. Undertaking FYPD facilitate students to move towards the self-authorship or contextual knowledge stage of intellectual development, which Baxter Magolda (2009) identified in a longitudinal study 25 years ago. She argues that:

Moving away from uncritical acceptance of knowledge to critically constructing one’s own perspective is more complex than learning a skill set. It is a transformation of how we think – a change in our assumptions about the certainty, source and limits of knowledge (Baxter Magolda 2006, 50).

This relates to the ‘student as producer’ and ‘student as scholar’ conceptual frameworks which are discussed in the next chapter.

This book aims to assist course teams in their search for innovative solutions for different disciplines and professions in designing and assessing FYPD. It builds on previous NTFS projects concerned with undergraduate research in new UK universities (Childs et al. 2010) and the experience of students in their final year (Webb 2011), as well as on the experiences of Centres for Excellence in Teaching and Learning focused on inquiry-based learning (LTEA nd). These previous projects only refer to FYPD in passing and none investigated the nature of innovative FYPD. Most of the ground-breaking forms of dissertation found in the NTFS Assimilate project at Masters level (Brown et al. 2012) are matched by those we have found at undergraduate level. Arguably the range and variety of innovative practices are even greater at the Bachelor level.

Making explicit the benefits of various forms of projects and recording the skills that students gain are important ways of linking FYPD to employability (Bolden et al. 2009, Gresty 2009). FYPD help develop skills in research and analysis, but students do not always make the link between what they have done for their project or dissertation and how they articulate this in letters of applications for jobs or their CV (Todd et al. nd). Competency-based interviews often ask applicants to describe a situation that demonstrates skills they have utilised; FYPD can provide appropriate examples. The experience of taking FYPD can, moreover, improve the development of graduate attributes, while at the same time encouraging research-mindedness (Gunn 2010; 2011).

Preparing students to move into the world beyond university is an underlying rationale for creating transformational experiences for final-year projects and capstone courses in many places (eg Lee 2006; Schermer and Gray 2012; Sill et al. 2009). In the US this is increasingly conceptualised as an occasion for integrative learning and as an opportunity for independent learning in one’s discipline or professional field. Integrative learning is about making connections within a programme or major, between fields, across curriculum and co-curriculum, and between academic knowledge and practice. Fostering students’ abilities to integrate learning is arguably, according to Huber et al. (2007) ‘one of the most important goals and challenges of higher education’. Within the curriculum the capstone course is an intentional place for integrative learning.

**Capstone projects**

Capstone projects are common in North America, where they are taken by two-thirds of Bachelor students (Berrett 2013) and in Australasia, where some universities, such as Macquarie and Swinburne University of Technology, require all students to take a capstone or are moving towards this (Lee 2013; Macquarie University nd). Capstone projects usually refer to integrative final-year ventures which are often focused on the transition into a profession or further study (Table 1; Nash and McArdle 2008) and
to the development of higher levels of intellectual development (Baxter Magolda 2009). Rowles et al. (2004, 14) suggest that:

Capstone experiences should be a culminating set of personal, academic, and professional experiences, and as such, the primary focus of capstone experiences should be on the synthesis, integration, or application of previously acquired knowledge rather than on the acquisition of new knowledge or skills.

However, the term capstone is used loosely and inconsistently (Bailey et al. 2012) and other terms, such as senior thesis or seminar, are sometimes used (Jones et al. 2012). Our interest is in those capstone courses in which students undertake research and inquiry projects, rather than those that are designed as taught courses. Some universities, such as Claflin University, South Carolina, have a compulsory capstone project. They encourage a wide range of formats depending on the major, including writing a comprehensive paper, producing a play, performing a major recital, giving a major exhibition, producing a television documentary, composing a musical, performing scientific research, or writing a novel (Case study 3.15).

Case study 3.15 The undergraduate capstone project guidelines at Claflin University, South Carolina, USA

Claflin University is a historically black university founded in 1869. In 2000-01, completion of either a senior thesis or capstone project became a requirement for graduation for all Claflin University undergraduate students. For honors students the required capstone is the honors senior thesis. For non-honors students, each school designs appropriate discipline-based capstone projects.

In 2003 a decision was made to incorporate a strategic goal of: ‘establishing a comprehensive undergraduate research program across the campus’ into the university’s five-year plan. Since that time, the university faculty agreed on the following definition of undergraduate research at the university: … faculty mentored student participation in inquiry to create intellectual contributions for the discipline of study. As their capstone project, honors students are required to produce a substantive and original thesis under the guidance of a selected faculty advisor. Topics must be in line with the student’s major. Intensive reading and utilisation of primary documents direct the initial preparation for the research. This process begins in the first semester of the junior year and continues through the senior year. The student may, for instance, write a comprehensive paper, or he or she may produce a play, perform a major recital, give a major exhibition, produce a television documentary, compose a musical, perform scientific research, or write a novel, etc. In cases where the student chooses to do a project instead of a comprehensive paper, a written component will be necessary to fulfil the thesis requirement.

The senior capstone project requirement for non-honors College students varies according to the student’s major degree program. These variations accommodate discipline-specific learning objectives in addition to the Claflin University institutional level learning objects associated with the senior capstone project requirement itself. Projects range from juried performances, to research proposals, to portfolios, but all carry with them a requirement for producing a technical writing paper appropriate to the student’s programme of study. Many schools or departments include an option for non-honors students to complete an undergraduate level thesis paper as the senior capstone.

Source: Based on Claflin University (2012, 2, 3, 6, 33)
Rowles et al. (2004) distinguish three models of capstone courses common in the US:

- ‘mountaintop’ capstones: these are inter-disciplinary courses that cross majors and bring together diverse groups of students (and potentially, staff/faculty);
- ‘magnet’ capstones: these are discipline (or major) specific; and
- ‘mandate’ capstones: courses mandated by an external constituency, such as a practitioner or registration body.

An audit of capstone courses in business schools in Australia found that over half were magnet capstones; and though the authors noted there were challenges introducing mountaintop capstones, they felt that these were often outweighed by the benefits (Bailey et al. 2012).

Capstone projects, as with other FYPD, may be transformative for the students as many are in a transitional phase from university to joining the ‘real’ world and have a need to deal with more complex and uncertain problems (Barnett 2004; Brew 2006).

In the capstone course students disengage (ie separate) from the undergraduate status and existential condition and reemerge (ie incorporate) as graduates prepared to assess critically and act responsibly in civil society. Thus, the capstone course provides the liminal threshold at which students change their status (Durel 1993, 223).

Recent research examining capstone courses at four American liberal arts colleges, where they are compulsory for all students, found a powerful effect on writing, oral-presentation, and critical-thinking skills. However, the students were weaker in integrating knowledge across courses and disciplines (Schermer and Gray, 2012).

**Book structure**
The next chapter explores the ‘student as producer’ conceptual framework which underpins this book and maps out how FYPD may vary. This leads us to emphasise the different dimensions of FYPD rather than attempt to come up with a single overarching definition. Having highlighted the variety of FYPD the following chapter explores the common characteristics and some of the alternative possibilities. This is followed by five chapters, each of which analyses a different theme about enhancing FYPD:

- preparation in earlier years of programme;
- engaging community groups and employers;
- assessment;
- supervising and advising; and
- celebrating and disseminating.

The final chapter discusses the conclusions and implications of this study. The chapters are illustrated by brief case studies covering a wide range of disciplines, institutional types and countries. Many may be adapted for use by different programmes, subjects, and cultures. Nearly all the 70+ case studies we collected are of FYPD at Bachelor level (Appendix 1). However, we include a few examples at Masters level and a few from earlier years of degree programmes, where we think the practice is potentially transferable with adjustment to the final year of the Bachelor degree.
The key challenge for each programme is to think creatively about the variety of ways in which FYPD may be designed to reflect the defining characteristics of higher education, but still be sensitive to the context of the nature of the subject and the culture of the department and institution in which it is taught. Importantly, as Gunn (2011) has noted below in relation to research-teaching linkage, introduction of innovations are more effective when embedded in the culture of disciplines and institutions than when imposed:

Ways of thinking, subject-appropriate learning activities, and the cultural context of discipline-specific knowledge generation and dissemination are variable enough to mean that notions of research-teaching linkages are most effective when they emerge from within the disciplines in institutions, whether these are configured research-intensive or not, rather than when introduced as part of a wide-scale, externally imposed, centralising educational agenda (Gunn 2011, 2; emphasis in original).

Her argument also applies to the design and development of effective FYPD.
Student as producer works on more than one level: as a curriculum development project, as a model of institutional change and as a social movement concerned with reinventing the ‘idea of the university’ (Neary 2012).

In undertaking this study we have drawn on literature from a wide range of sources covering interconnected issues, including linking research and teaching, undergraduate research and inquiry, community and work-based initiatives, capstone projects and integrative learning, independent, creative and transformational learning, equity and widening participation issues, graduate attributes and standards, assessment of individual and group projects, and disseminating and celebrating undergraduate work. The overarching framework that we have found particularly helpful in understanding final-year projects and dissertations (FYPD) is the wider national and international debate which concerns student as producer. This leads us to propose that it is important to highlight the variety of forms that FYPD may take and, rather than trying to come up with a single definition of the phenomena, we suggest that it is better to identify the various dimensions of FYPD and hence to celebrate this diverse range. Further references about FYPD may be found in Healey (2013).

Student as producer

The idea of students being active learners, in which they are the producers of their own knowledge rather than just consumers of other people’s knowledge, has been around for a long time. Confucius (c450 BC) is often quoted: ‘Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand.’ Gibbs (1998, 9) expressed this in a different way: ‘It is not enough just to do, and neither is it enough just to think. Nor is it enough simply to do and think. Learning from experience must involve linking the doing and the thinking.’

One of the most effective ways of linking the doing and the thinking is engaging students in inquiry-based learning (Healey et al. 2010; Lee 2012). According to the UK’s Centre for Active Learning (CeAL), active learning ‘focuses on inquiry in the field, studio, laboratory and classroom, using real sites, community-related and employer linked activities’ (Healey et al. 2005). More than simply ‘learning by doing’, this approach enables students to construct theoretical understanding through reflection on their activities. Healey (2005a, 183), moreover, suggests that ‘Undergraduate students are likely to gain most benefit from research in terms of depth of learning and understanding when they are involved actively, particularly through various forms of inquiry-based learning.’ This view is not a new one. Wilhelm von Humboldt recommended at the founding of the University of Berlin in 1810 (as quoted in the Foreword to this book) that ‘Universities should treat learning as not yet wholly solved problems and hence always in research mode’ (Humboldt 1970, quoted by Elton 2005, 110). These arguments led Healey and Jenkins (2009, 3) to propose that:

All undergraduate students in all higher education institutions should experience learning through, and about, research and inquiry. In undergraduate research, students learn and are assessed in ways that come as close as possible to the experience of academic staff carrying out their disciplinary research.
FYPD are perhaps the most common examples of engaging undergraduate students directly in research and inquiry within the curriculum, though they are but just one example of research-based learning (Healey 2005b). A summary of best practices which support and sustain effective undergraduate research has recently been produced by the Council on Undergraduate Research (Hensel 2012).

The term ‘student as producer’ has been popularised by Neary, first as the Director of the Reinvention Centre at the University of Warwick (2010) and subsequently as Dean of Teaching and Learning at the University of Lincoln (Neary and Hagyard 2010). He sees the student as producer as part of a needed rearrangement of higher education in which undergraduates working ‘in collaboration with academics to create work of social importance that is full of academic content and value’ (Neary with Winn 2009, 193). The University of Lincoln (nd) has identified eight key features of the student as producer concept:

- Discovery: Student as producer;
- Technology in teaching: Digital scholarship;
- Space and spatiality: Learning landscapes in higher education;
- Assessment: Active learners in communities of practice;
- Research and evaluation: Scholarship of teaching and learning;
- Student voice: Diversity, difference and dissensus;
- Support for research-based learning through expert engagement with information resources;
- Creating the future: Employability, enterprise, beyond employability, postgraduate.

A variant on student as producer is ‘student as scholar’, though it is more based on a liberal arts conception of higher education. It is a concept used at Miami University and recently taken up by the University of Prince Edward Island (Hodge et al. 2007, 2011; University of Prince Edward Island 2008). Hodge et al. (2007, 1) propose that:

Undergraduate research should, in fact, be at the centre of the undergraduate experience, that undergraduate education should adopt the ‘Student as Scholar’ Model throughout the curriculum, where scholar is conceived in terms of an attitude, an intellectual posture, and a frame of mind.

FYPD moreover provide opportunities for staff/faculty to link their research interests directly with their teaching. They extend the possibilities for collaborative research dissemination and reflect a nexus that makes research and teaching excellence inseparable (Ashrad 2013). There are many examples of FYPD leading to co-publication of the findings by students and their supervisors. Both the student as producer and student as scholar concepts clearly go beyond the FYPD and encourage change across the institution. Where such changes are first introduced to the form of the FYPD, the offer of alternative forms can stimulate change elsewhere, as there is a need to prepare students for the range of different types of FYPD on offer.

FYPD give students a significant opportunity to demonstrate their competencies as student producers or scholars. Another way of expressing these competencies is in terms of graduate attributes, which are a description of the generic qualities and skills that students are meant to possess on graduation (Barrie 2004). FYPD contribute to employability by helping deliver many of the graduate attributes emphasised by employers. Land (2013) suggests that the attributes associated with engaging undergraduate students in research and inquiry projects include:
• critical understanding;
• awareness of the provisional nature of knowledge;
• how knowledge is created, advanced and renewed;
• the effective communication and dissemination of findings;
• an ability to analyse problems and issues and to formulate, evaluate and apply evidence-based solutions and arguments;
• an ability to apply a systematic and critical assessment of complex problems and issues;
• an ability to deploy appropriate techniques of analysis and inquiry;
• familiarity with advanced techniques and skills;
• inventiveness and creativity in formulating, evaluating and applying evidence-based solutions and arguments;
• effective project management of time, resources, operations and information;
• an understanding of the need for a high level of ethical, social, cultural, environmental and wider professional conduct.

Some supporting evidence of the importance of skills development comes from a recent study by Malcolm (2012, 572) of staff and student perceptions of undertaking the honours dissertation in business and management. She found that both staff and students emphasised ‘the primacy of research process over outcome, and … the primarily personal value of learning and achievement within that process’.

Key dimensions of final-year projects and dissertations
The form that FYPD take may vary along five key dimensions - conception, function, organisation, location, and nature of outputs.

Conception
Traditional projects and dissertations are usually independently undertaken academic research projects with a degree of choice being exercised by the student as to the topic. In science, technology, engineering and mathematics these may be chosen from an approved list which staff/faculty are willing to supervise and can be supported by existing laboratory resources. An alternative is to engage students in consultancy projects. This is common in many business, engineering and ICT programmes. For example, in Interactive Media Studies at Miami University, Ohio, students work in groups of up to 20 on real client consultancy projects, such as redesigning their website (Case study 3.6 in Chapter 5). In other institutions projects may be closely linked to the research interests of staff/faculty. For example, in Criminal Justice at Australian National University, students participate in a research project based on current research being conducted by members of the Faculty of Law, the Australian Institute of Criminology and Research School of Social Science (Case study 2.3).

At Newcastle University, UK, students were involved in designing the Independent Study dissertation module for Combined Honours (Case study 3.11). Assessment in the module follows a path from formative to summative types of assessment. Both outputs and processes are assessed with the latter determined through a final reflective interview. An element of peer assessment is also used and peer collaboration is encouraged.

Function
Most dissertations emphasise the in-depth analysis of a problem or issue; whereas many capstone projects stress the synthesis of ideas and material covered earlier in the syllabus. For example, the
Exploring Contemporary Literature capstone module at Oxford Brookes University is compulsory for students studying English (Case study 1.13). The module encourages students in their final-year of study to reflect upon their accumulated reading experiences and to explore and implement their critical vocabularies by examining a number of contemporary writings. One of the principal aims is to get students to relate the material that is discussed in class back to other texts and cultural forms that they have encountered during their degree.

Other capstone projects, particularly in the professional disciplines, aim to prepare students for the transition into professional life, as do some of the consultancy projects mentioned above. For example, the Department of Engineering and Technology at Western Carolina University has implemented a core of five engineering project-based learning courses focused on the development of new products and processes culminating in a senior capstone (Case study 5.14). The department has partnered with The Centre for Rapid Product Realisation in delivering and administering the project-based learning and capstone courses. Both equipment and staff are shared in a collaborative effort to meet the needs of both industry and students. The capstone projects cover medical devices and testing equipment, manufacturing products and processes, military and tactical capability, solar collectors and control devices, and sports equipment redesign. The joint collaborative partnership has produced well over 100 industry related products/processes with several resulting in patent applications.

**Organisation**

In most traditional dissertations students work independently. However, in many projects group work is used, partly in response to increasing student numbers, but also to give them experience of team working which is common in many jobs and in some conceptions of research in science and engineering. For example, final-year student primary school trainee teachers at the University of Chichester have the opportunity to develop skills and confidence in creative problem-solving in their professional world (Case study 4.4 in Chapter 7). Students work in small self-selected teams of around three to five students. They address real-world problems over realistic timescales and, by the end of their projects, provide authentic resources for external clients, typically schools or non-governmental organisations (NGOs) such as museums or environmental education centres.

One benefit of working in teams is that where the group functions effectively, better quality work is often obtained than where students work individually. In Case study 4.12 (Chapter 6) it is related how the average mark for the Issues in Environmental Geography module based on group projects was consistently 3-5 percentage points higher than the average for other final-year modules in geography. The group mark was redistributed among the team members on the basis of self and peer assessment of the quality and effectiveness of their contribution to five project processes – ideas and suggestions; leadership, group organisation and support, minute taking; data collection/collation/analysis; report writing, production and editing; and preparing/giving verbal presentation (Healey and Addis 2004).

**Location**

Most FYPD are campus-based, though some supervision may take place through technology enhanced communication (Heinze and Heinze 2009). To make the experience more authentic a growing number of programmes are exploring ways of engaging their students in community and work-based projects. Work-based projects are relatively common in the professional disciplines, but we also came across innovative examples elsewhere. At Sheffield Hallam University, for example, they have adopted this model in a module in the humanities which runs across two semesters (Case study 1.9 in Chapter 5). Recent student projects include: writing a handbook for volunteers working with dementia sufferers in...
residential homes; operating as mentors in secondary schools; writing for an in-house film magazine; and managing external relationships with the Showroom Arts Cinema.

Community-based projects are growing in importance in the UK, but they have not yet reached the popularity they enjoy in North America, where they form part of the service learning initiatives found in most universities. At Portland State they have gone a stage further, during the final year each undergraduate is required to participate in a senior capstone community-based learning experience (Case study 3.1 in Chapter 5). Each student works with a team of students and faculty. Each senior capstone results in some form of summation, closing project, or final product that represents closure for the student’s higher education experience.

Nature of outputs
The traditional output of the dissertation in the UK in many disciplines is an independent project or thesis with the length dependent on the credit rating (Nicholson et al. 2010). For example, the guidelines for the School of History, Welsh History and Archaeology, Bangor University (2012) state:

A dissertation is a research project (10–12,000 words in length not including footnotes and bibliography) on an approved subject of the student’s own choice, organised and researched independently by the author, though under the general supervision of a member of staff. The dissertation should contain an element of originality (in the sources used and/or in their analysis) and should include primary material. … The dissertation is 40 credits and comprises one third of your marks in the final year.

Although other forms of output are common in FYPD in art, media and design subjects (eg Case study 1.17 in Chapter 1), they are rarer in most other disciplines. Several universities are investing in digital humanities centres and collaborative research programmes that can support students who want to work on non-traditional projects and dissertations. There is clear evidence of this at doctoral level in the States (Patton, 2013), but it is also apparent at undergraduate level. For example, at New York University’s archive and public history programme they have developed some creative alternatives to the traditional written thesis including oral histories, documentaries, and exhibitions (Case study 1.19). Nigel Thrift (2013) has recently argued that previously relatively distinct domains such as writing, drawing, painting, sculpture, music, or performance ‘are changing as a result of digital production and distribution. Over the last few years, each art form has begun to bleed into the others’. He goes on to predict that multimedia presentations of academic work will soon become the norm. If this happens the format of many FYPD may be very different in a few years’ time.

Case study 1.19 Engaging students in digital humanities in an archives and public history curriculum at New York University, US
‘Traditionally we required a written thesis, 35 pages in length. We modified the requirements to allow for digital projects, as well as other forms of archives and public history activities, such as exhibition designs, oral history projects, online documentary editions, and walking tours. Students have already begun to take advantage of the opportunities, and some have built extremely creative undertakings. An example is an historical blog, First Hundred Days (http://www.aphdigital.org/projects/firsthundreddays/), created by two students around the theme of the first hundred days of the Franklin Roosevelt administration. They invented several historical characters, embedded documents and media from the period into the site, and created lesson
plans that secondary school teachers might use to incorporate the site into the classroom’ (Wosh et al. 2012, 90-91).

At Sheffield Hallam they allow students on the MSc database professional dissertation to submit either a traditional report, or a portfolio of artefacts (Case study 5.15 in Chapter 6). In order to maintain clear fairness between the two approaches they share four equally weighted marking criteria - knowledge of the domain; justification of the approach; description of the research and discussion of the outcomes; and quality of the report and presentation of the argument. Typically the portfolio is delivered as a website, allowing the inclusion of hyperlinks to media of different types.

Undergraduate research conferences and journals are growing in popularity as means of disseminating the outputs from students’ projects (Healey and Jenkins 2009; Chapter 8). For example, final-year tourism students at the Universities of Lincoln and Wolverhampton participate together in a live virtual conference, as part of their final level assessment (Case study 2.2). Over a one-week period students from the two campuses can come together at times of their choosing to participate in a joint effort to disseminate research findings and engage in dialogue about their research. Students submit a full conference paper, but it is only a summary discussion paper that appears on the conference website. Each student is also required to post a comment on another conference paper, in true conference dialogue tradition.

Involving students in public engagement is another way in which FYPD outputs may be disseminated. Public engagement, as the UK National Co-ordinating Centre for Public Engagement (2012) comments:

> describes the myriad of ways in which the activity and benefits of higher education and research can be shared with the public. Engagement is by definition a two-way process, involving interaction and listening, with the goal of generating mutual benefit.

For example, Bath University has an optional module for third- and fourth-year mathematics students, in which they undertake a project designed to enhance and broaden public understanding of mathematics, with a particular emphasis on working with local schools (Case study 5.7). The project provides mathematics students with the opportunity to demonstrate competency with these skills and to evaluate their ability, while increasing student interest in teaching careers.

Drawing on these differences in conception, function, organisation, location, and the nature of the outputs, Table 2 summarises the dimensions of FYPD in a slightly different format. By mapping the key dimensions in this way, rather than trying to come up with a single definition of a FYPD, we celebrate the diversity of forms they may take. These dimensions can be viewed as continua. Table 2 was inspired by a related attempt to map the variety of forms that undergraduate research may take (Beckman and Hensel 2009).

One way to address a variety of dimensions is to provide students with a choice as to the form of dissertation they undertake, as we saw in the biosciences and performing arts case studies and at Claflin University in Chapter 1. A further example of offering a range of assessment options is provided by the Architecture, Design and the Built Environment degree at Nottingham Trent University. This approach empowers students and enables them to take ownership of their FYPD and the direction it takes (Case study 1.1). Further examples of alternative assessments and discussion of assuring quality standards are given in Chapter 6.
Table 2 Dimensions of final-year projects and dissertations: A summary

<table>
<thead>
<tr>
<th>Ranging from</th>
<th>To</th>
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<tbody>
<tr>
<td>Campus-based</td>
<td>Community or work-based</td>
</tr>
<tr>
<td>Undertaken at the university</td>
<td>Distance learning</td>
</tr>
<tr>
<td>Research career preparation</td>
<td>Preparation for a range of possible careers</td>
</tr>
<tr>
<td>Student learning centred</td>
<td>Outcome product centred</td>
</tr>
<tr>
<td>Discipline-based</td>
<td>Multi- or inter-disciplinary</td>
</tr>
<tr>
<td>Student initiated</td>
<td>Teacher/supervisor initiated</td>
</tr>
<tr>
<td>Individual work</td>
<td>Group work</td>
</tr>
<tr>
<td>Self-contained</td>
<td>Part of a larger project</td>
</tr>
<tr>
<td>Completed within the course</td>
<td>Builds on and revisits work of previous cohort</td>
</tr>
<tr>
<td>Original to the student</td>
<td>Original to the discipline</td>
</tr>
<tr>
<td>University audience</td>
<td>Professional/public audience</td>
</tr>
<tr>
<td>Emphasising in-depth analysis</td>
<td>Emphasising synthesis of knowledge/skills</td>
</tr>
<tr>
<td>Assessed by academics</td>
<td>Assessed by peers/professionals</td>
</tr>
<tr>
<td>Individual supervision</td>
<td>Group/peer supervisions</td>
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</table>

Case study 1.1 Giving students alternative assessment options for undertaking a product design project at Nottingham Trent University, UK

The course offers several possible routes. Assessment is based on a learning contract negotiated and agreed between the tutors and student. This contract stipulates the content of work, enabling students to complete one of the following options:

- Option 1: a 10,000-word dissertation and students produce a poster that summarises their work;
- Option 2: a 5,000-word conference paper with a supporting presentation delivered to peers and tutors;
- Option 3: a conceptual project with a 5,000-word critical justification. As well as a written outcome students are required to produce illustrations or simulations.

Prior to students undertaking their chosen assignment, there is a three week intensive period when students complete a learning contract. The contract identifies what option the student will complete, what they hope to learn and how that learning will be demonstrated. The module involves students using a wide range of primary and secondary research skills. Throughout the year, the direct contact students have with tutors is mainly limited to group or sometimes individual tutorials, where the tutor acts as a ‘consultant’, advising on their proposals, work in
progress, what knowledge or skills should be developed, how to tackle certain issues and who students should approach for further information. Occasionally there will be content common to all students and this will be delivered through lectures, for example, covering approaches to research. There are also opportunities for students to present their work in progress to a panel of tutors and peers, to obtain feedback.

Mapping the range of dimensions of FYPD emphasises the variety of forms that they may take, but there are also important common features that characterise FYPD and these are considered in the next chapter.
3. Characteristics of final-year projects and dissertations and alternative possibilities

All degree programmes will include a major research project, dissertation or equivalent (at undergraduate level typically 40 credits [ie one third of final year] where students are able to demonstrate the development of their own research and independent study skills, as well as their expertise in their chosen field of study. This major research project will provide a 'capstone' to their Durham education that allows students to demonstrate their ability as independent learners and researchers (Durham University nd).

The capstone group project is a mandatory two-term, four-credit course [ie 12% of final year in Quebec Province] required for graduation. ‘Everyone in their fourth and final year of an undergraduate engineering degree is required to work on a capstone design project in a team, bringing together all they have learned throughout their years of study,’ says Maureen Thuringer, administrator of the department (Concordia University 2012).

Final-year projects and dissertations (FYPD) represent an important opportunity for students to use their own initiative to select a topic, methodology, writing style, way of working and presentation format that aligns with their interests, personal and career goals, discipline and course requirements, and the changing world around them. To encourage students to use their initiative, course guides often give minimal direction about the range of possible forms a FYPD can take. For some students, however, this lack of prescription can actually reduce their choices since they automatically assume that what is required is a formal piece of writing that echoes the style and approach of their discipline’s textbooks and journal articles. To give students genuine choice in tailoring what they produce to their own specific abilities, interests and goals, one approach is to be explicit about which aspects of a FYPD are 'essential' and what possibilities and opportunities are available. The essential components, such as being an extended piece of work, research-based and underpinned by literature, are the features or characteristics that make it a FYPD. There are, however, many different forms that a FYPD can take while still exhibiting such core characteristics, as our project found in case studies demonstrating a wide range of innovative practice across higher education.

Our suggestion for FYPD guides is that they include both a list of essential features that need to be part of any dissertation, as well as an open-ended set of possible shapes and forms that their FYPD can take so long as the essential features are present and learning outcomes met. An example of a guide which follows this format is given in Case study 1.12 (Chapter 4). Clearly, what is considered essential and what range of possibilities are available to students will vary according to institution, subject area and course, but the list of key characteristics and alternative possibilities offers some ideas for consideration (Tables 3 and 4). The suggestions are intended to be expansive rather than restrictive – there are far more possibilities for dissertations than we can describe here.

The list in Table 3 is an attempt to characterise a FYPD; that is, to describe the essential features or core characteristics that distinguish FYPD from other types of work. As with all characterisations, not every FYPD can be expected to exhibit all of the characteristics; some are generally applicable, but others are more relevant to particular disciplines and some are aspirational rather than being a strict requirement. We have validated the ten characteristics through extensive consultation in 2011-12 with colleagues and students in the UK and abroad. The intention, though, is for educators to pick, choose, adapt and add to
this list according to their specific discipline, institution and educational goals. Whatever form a project or piece of work takes, and whether undertaken on campus, in the workplace or community, characteristics such as those in Table 3 make it a FYPD.

Table 3 Characteristics of final-year projects and dissertations

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td><strong>It should be an extended piece of work</strong></td>
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<tr>
<td></td>
<td>This means that the dissertation or project tackles a central question or issue in</td>
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<td></td>
<td>depth which the students take ownership of. All sections of the FYPD relate to the</td>
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<td></td>
<td>same issue rather than being a collection of unrelated essays. The size depends on</td>
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<td></td>
<td>the contribution it makes to the final-year marks eg 10%, 25%, 40% or, in the case</td>
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<td></td>
<td>of honours years in Australasia and Canada, 50% or more.</td>
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<td>2</td>
<td><strong>It should be research or inquiry-based</strong></td>
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<td></td>
<td>There are a great variety of approaches to research, but central to these is a desire</td>
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<td>to find out something significant about ourselves, our society, our culture, our</td>
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<td></td>
<td>environment or other aspects of our world. Research can be qualitative, quantitative,</td>
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<td></td>
<td>laboratory or design-based, artistic, ethnographic, participative, action research,</td>
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<td></td>
<td>research ‘on’, ‘for’ or ‘with’ people, first person inquiry, or one of many other</td>
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<tr>
<td></td>
<td>scholarly approaches.</td>
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<td>3</td>
<td><strong>It should be relevant to a discipline or take an inter-disciplinary approach</strong></td>
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<td></td>
<td>The dissertation needs to draw from the disciplinary and inter-disciplinary knowledge</td>
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<td></td>
<td>and literature that students have gained during their degree, regardless of where the</td>
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<td></td>
<td>research takes place, eg work or community-based research.</td>
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<td>4</td>
<td><strong>It should be underpinned by a range of relevant sources</strong></td>
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<td></td>
<td>Sources that inform dissertations and projects include textbooks, journal articles,</td>
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<td></td>
<td>surveys, interviews, experiments, secondary data, websites, blogs, tweets, wikis,</td>
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<tr>
<td></td>
<td>practice reports and direct personal experience. What is appropriate depends on the</td>
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<td></td>
<td>type of FYPD and the purposes that the source is being used for. It should be</td>
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<td></td>
<td>recognised that all sources have strengths and limitations, and reflection on the</td>
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<td></td>
<td>limitations and validity of the sources used is part of the process.</td>
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<tr>
<td>5</td>
<td>**It should be contextualised and show recognition of the provisional nature of</td>
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<td></td>
<td>knowledge**</td>
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<td></td>
<td>FYPD need to be contextualised through reference to the larger disciplinary and real-</td>
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<td></td>
<td>world contexts to which it is contributing. They should recognise that knowledge is</td>
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<td></td>
<td>uncertain, provisional, and may be contested.</td>
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<tr>
<td>6</td>
<td><strong>It should incorporate an element of critical thinking, challenge and evaluation</strong></td>
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<tr>
<td></td>
<td>The authors of FYPD should take a questioning attitude towards the sources used, the</td>
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<td></td>
<td>discipline, the data, and/or the social and cultural context, examining, problemat-</td>
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<td></td>
<td>ising and critiquing these as appropriate. The best FYPD challenge and stretch their</td>
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<td></td>
<td>authors and move them beyond their comfort zone helping them to discover new things</td>
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<tr>
<td></td>
<td>about themselves and their capacities.</td>
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</table>
7. **It should be clear what it is contributing**
A key part of a FYPD is its contribution to the field being investigated. For some disciplines, it is important that dissertations go beyond stringing facts together and demonstrate at least some elements of originality, innovation or creativity, though these are more likely to be the characteristics of a very good piece of work rather than a minimum threshold judgement. The originality could, for example, come from the application of a theoretical framework to new data, the critical evaluation of arguments surrounding a controversial issue, bringing together of information from multiple sources that have not been collated in that way before, or applying theory to real-life issues. It is also important that the experiences of undertaking FYPD contribute to the personal fulfillment of the students.

8. **It should have a clearly defined and justified methodology**
FYPD should be based on a systematic and rigorous methodology, with clear explanation of how application of the methodology can achieve the purposes and goals of the dissertation. It should give the opportunity for students to demonstrate the understanding and skills that they have developed during their degree programme. Furthermore it should show an awareness and understanding of appropriate ethical issues in undertaking the research.

9. **It should build up to its conclusions and where appropriate have an element of reflective commentary, including recommendations**
FYPD should reach a coherent set of conclusions which relate to both the particular topic and the research process. A variety of ideas should be considered, leading up to reasoned conclusions and recommendations, eg for future research or policy or practice. In some cases, critical evaluation can extend to reflection on the personal interests and goals of the researcher and how they influence the research process. Many disciplines emphasise the importance of the author presenting evidence-based and argued opinions.

10. **It should communicate the research outcomes appropriately and effectively**
FYPD should be presented in ways which most clearly and effectively communicate the ideas to the intended audience. For some dissertations and projects, there may be multiple intended audiences, for example, a research section which is aimed at an academic audience and a report based on the research aimed at policymakers. Most FYPD will incorporate an extended piece of academic writing while some may also include other forms of writing or other media, such as a report, conference presentation, website, or digital story.

So long as FYPD demonstrate a set of ‘essential’ features, such as those described in the previous section, there are a wide range of possibilities for the shape and form that they can take. The examples in Table 4 are based on the cases studies of innovative practice in FYPD, listed in Appendix 1, and give an idea of the range of possibilities available. In some cases they may be offered in addition to the traditional dissertation or project.
<table>
<thead>
<tr>
<th>Common features</th>
<th>Alternative possibilities</th>
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<tbody>
<tr>
<td>Individual work</td>
<td>Teamwork and group-work at some stage in the process; from workshops, mini-conferences and peer evaluation to entirely collaborative projects. Case study 1.4 is an example of a teamwork project (Chapter 5).</td>
</tr>
<tr>
<td>The output is a research report</td>
<td>The output consists of a research report as well as a product or artefact that has been created through practical application of the research findings. Students in Music at Oxford Brookes can include a CD, tape or video of music which accompanies their written dissertation (Case study 1.14).</td>
</tr>
<tr>
<td>Disciplinary focus</td>
<td>Inter-disciplinary and/or practice focused, where the dissertation can link to career and/or citizenship agendas. Case study 3.5 is an example of an inter-disciplinary approach (Chapter 8).</td>
</tr>
<tr>
<td>Detached observation</td>
<td>Engagement and intervention in the real world and ‘live’ issues; personal reflection. In Case study 3.1 students undertake a compulsory community-based capstone project (Chapter 5).</td>
</tr>
<tr>
<td>Use of scholarly literature</td>
<td>Using scholarly literature, but also drawing on a wider range of practice and other sources; eg high quality new media sources or oral testimony. Case study 1.3 demonstrates using a scholarly approach to develop a visual artefact (Chapter 6).</td>
</tr>
<tr>
<td>Consideration of the ethics of the research process in terms of not harming subjects</td>
<td>Deeper consideration of the ethics of the research in terms of the potential benefits or detriments to society arising from the type of research conducted. Case study 1.9 includes reflection on ethical issues (Chapter 5).</td>
</tr>
<tr>
<td>Emphasising in-depth analysis</td>
<td>Emphasising the integration of analytical skills with other capabilities. In Case study 5.6 students develop applied research skills in a real-world context (Chapter 5).</td>
</tr>
<tr>
<td>Writing style derived from subject textbooks and journal articles</td>
<td>Appreciation of the wide range of scholarly writing that takes place in a subject area, including creative approaches. Using a mixture of writing styles; for example, a research section written in an academic style and an artefact produced in a business or public-facing style for a target audience. Case study 1.12 describes a range of creative scholarly writing styles in which dissertations could be written (Chapter 4).</td>
</tr>
<tr>
<td>A written and bound thesis (c.8-12,000 words dependent on credit rating)</td>
<td>A written thesis for the main part of the dissertation, together with one or more artefacts derived from the research such as: project reports, reflective writing, conference presentations, business plans, software packages or visual artefacts such as DVD documentaries, sculptures or websites. In Case study 4.7 students write for a undergraduate research journal (Chapter 8).</td>
</tr>
<tr>
<td>Self-contained and completed</td>
<td>Part of a larger project. Case study 5.18 inherits and builds on work from a previous cohort of students (Chapter 4).</td>
</tr>
<tr>
<td>Campus-based</td>
<td>Work-based or community-based research and consultancy projects (Chapter 5).</td>
</tr>
<tr>
<td>Primarily designed as a preparation for postgraduate study</td>
<td>Aimed at students’ preferred career, whether as an academic researcher or a wide range of other possible careers, agendas and priorities. Case study 5.1 prepares students for a career in ICT (Chapter 5).</td>
</tr>
<tr>
<td>Reproduction of the traditions of the discipline</td>
<td>Creative extension of the discipline, or combining coverage into an inter-disciplinary project. Case study 3.7 shows how an inter-disciplinary approach can achieve a tangible useful output (Chapter 6).</td>
</tr>
<tr>
<td>Individual supervision</td>
<td>Group and/or peer advice and support. Case study 4.4 is a group-based project, where only one member of the team is required to be at the weekly meeting, giving responsibility to students to divide up tasks and communicate information effectively to other group members (Chapter 7).</td>
</tr>
<tr>
<td>Assessed by academics</td>
<td>Assessed by peers or practitioners in addition to academics. In Case study 2.4, 35% of the assessment is marked by the client (Chapter 5).</td>
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</table>
Whatever form the FYPD take their effectiveness depends on the quality of the design and the process of implementation. It is important here to take account of the various stakeholders. An analysis of the perceptions of what students, staff and academic institutions, employers, society and community groups want from FYPD is included in the final project report (Healey et al. 2012). The importance of taking account of the views of range of stakeholders is well expressed by Todd and Magleby (2005, 203) in the case of engineering education:

One of the principal objectives of engineering education is to prepare graduates for the practice of engineering in industry. Industry involvement in the educational process can be very helpful in devising programmes to meet this objective. Yet, engineering education has a number of other stakeholders including students, faculty, academic administrators, and others. Identifying and meeting the needs and wants of these various stakeholders is essential in developing educational programs and learning activities that are effective and sustainable.
4. Preparation in earlier years of programme

In earlier times, when examinations were a dominant mode of assessment in most undergraduate courses, the dissertation was a relatively novel opportunity to experience a different type of assessment. Now, with course work much more widely used to assess both knowledge and skills, the dissertation should build on writing, referencing and other information skills that the student has developed earlier in their studies (Rowley and Slack 2004, 178).

An understanding of the research process (asking the right questions in the right way: conducting experiments; and collating and evaluating information) must be a key part of any undergraduate curriculum (Ramell 2006).

A common comment of examiners about final-year projects and dissertations (FYPD) is that students do not appear to have been adequately prepared. This is confirmed by research into the student experience of dissertations (Todd et al. 2004). The transition to an independent piece of work can be problematic for many students. Hence preparation for the FYPD should begin from the day students start in higher education and in designing degree programmes it is useful to map back from the FYPD the skills and ways of thinking which need to be developed in earlier courses.

There are hopeful signs that this is happening in a number of places. For example, Rowley and Slack (2004) argue that while in the past the FYPD was often the first chance for students to gain skills in independent learning and research, now research skills are integral to many degrees right from the start. Healey and Jenkins (2009) describe the pedagogical shift that is beginning to occur through examples of degree programmes which introduce students to research from the start of their degree. In one case, students begin their research training even earlier, since at the University of Gloucestershire the induction process includes a research project that students complete during induction week before beginning their formal studies (Centre for Active Learning 2010). At Roskilde University in Denmark, half of the assessed marks in each year of the Bachelor and Masters programmes are based on project work, with inter-disciplinary group work dominating in the early years and gradually moving to independent, discipline-based projects (Legge 1997). Over 80% of students at the Massachusetts Institute of Technology (MIT) undertake at least one undergraduate research opportunity programme often in their junior year, mostly in addition to their studies (Huggins et al. 2007). These instances of engaging students in research and inquiry throughout their degree further illustrate the concept of student as producer (Chapter 2).

Willison and O’Reagan (2007) have devised a research skill development framework for undergraduate students to guide them from the moment they start at university to the completion of their dissertation. In a series of levels, students move from reproducing existing knowledge, communicating in lay language and evaluating information according to prescribed criteria, to the other end of the spectrum where they use disciplinary language, extend knowledge, and self-generated criteria. Willison (2012, 917-918) in a recent Australian study found an unanticipated result: ‘Explicit research skill development in regular courses has the capacity to be more effective than mentored undergraduate research in helping students develop question framing skills and in encouraging students to progress to research degrees.’
Nottingham Trent University has a series of ‘critical practices modules’ in art and design which help prepare students for final-year projects and dissertations by introducing them to the research process early on (Case study 1.6).

**Case study 1.6 Developing authentic undergraduate research in art and design at Nottingham Trent University, UK**

The critical practices modules occur throughout the students’ undergraduate degree in Years 1, 2 and 3. The process of teaching in Years 1 and 2 develops the focus on research, and also on collaborative learning. The modules concentrate on critical and contextual thought and practice in the context of an undergraduate design programme. The teaching starts from the premise that the research process as an inquiry should have primacy, and that the modes of development and exposition should be ‘authentic’ to the research context. Authenticity in relation to a creative art and design programme is understood to include creative art and design practice. Student research is as likely to be situated in the context of developing creativity in the context of a primary school as it might be focused on analysing the visual language of Jacobean play texts.

The University of Sunderland has explicitly stated that their focus for the whole undergraduate degree has changed to become more research-focused, with a strong build-up to dissertations or final-year projects (Case study 2.7).

**Case study 2.7 Implementing a research active curriculum at the University of Sunderland, UK**

The University revised its institutional teaching and quality assurance processes in 2010 to deliver an undergraduate curriculum that promotes progressive development of graduate research attributes fostered through increased student engagement in enquiry. In the final year all programmes ensure that students experience a suitable synoptic activity which helps them bring together understanding of their discipline and professional area and prepares them for employment and citizenship.

As well as specific research skills, students need to develop and practice the generic capabilities that they will also require to make a success of their FYPD. These include report writing, verbal and visual presentation, creativity, criticality, and independent decision making. Lee (2013), in an Australian context, refers to this as the ‘trickle-down effect’ of implementing capstone projects on the entire undergraduate curriculum. One particular skill which is becoming increasingly emphasised as student numbers increase is that of teamwork.

**Obtaining experience through group projects**

One of the most significant ways that the case studies examined in this project have helped prepare students for the dissertation is through practical projects that include teamwork. This enables students to tackle a research project that can be larger and more significant than if they were on their own, helping them obtain insight into the research process. It also gives students an opportunity to engage practically in real-life situations and gain insights that would be unavailable sitting in a library. The University of Utrecht has a particularly useful way of helping students to gain authentic team research experience in the third year without needing to be involved in actual laboratory work, which comes later. The students investigate a topic and methodology and write a PhD proposal together (Case study 5.10).
Case study 5.10 Bridging the gap between textbooks and scientific research: Cell biology at the University of Utrecht

A third year course for cell biology majors focuses on writing and defending a research proposal as an open ended authentic assignment; ie modelling much of the authentic research experience of cell biologists, but not the actual laboratory tasks: and includes student teams writing a PhD proposal. It builds on the more textbook-orientated knowledge and controlled laboratory experiences in years one and two.

The 15-week course, with some 24 students, has three components:
1. A general research topic is defined by staff, and students read selected research papers with a focus on research methodology and research questions.
2. Students are divided into four groups of six and out of class formulate a research question and methodologies. They also visit relevant research laboratories, contact experts and discuss their proposals in class with fellow students and staff.
3. Student teams present their final proposals to a jury of four staff (two cell biology specialists, one biologist, and one non-biologist). The broad composition of the jury means that the proposal should be clearly formulated for both specialists and non-specialists.

Students then take an extended senior research thesis (usually in the summer semester and often extending into the summer vacation). Some students will work in the lab of jury members, as they were invited to do their research project with them. Six years of course evaluations and a survey of alumni have shown the initial difficulties students face in moving beyond textbook knowledge; the value of the various components; and the course’s success in helping them to think as scientists and better appreciate how research is conducted.

Another example of teamwork in preparation for the dissertation operates at the University of Tasmania, where students design an experiment together and discuss the advantages and disadvantages of different approaches (Case study 5.17).

Case study 5.17 Reorganisation of labs to develop research independence in agricultural science at the University of Tasmania, Australia

The department radically revised laboratory teaching to address problems students and staff encountered in a required final-year research project. Students frequently had difficulties in understanding what was required and staff spent much time resolving such issues through individual supervision. Lower level (laboratory) courses were revised to integrate laboratory teaching with lecture-based and statistical methods courses. Laboratory-based activities were developed which required students to work in teams with increasing levels of independence. For example, the final ‘lab’ four-week activity had a paper by the lecturer in preparation for publication, and a discussion of some future research options. Students were provided with all information prior to the lab and divided into subgroups. Then as a whole class they designed the experiment and discussed the relative advantages and disadvantages of the various approaches. The students then ran the labs with support shifting from help to guidance with the final labs being class (group) discussions around the (1) statistical analyses, then (2) the presentation and (3) the meaning of each of the experiments.
A further example of teamwork comes from Olin College. Each year students participate in group-based entrepreneurial engineering design projects, which build up to the senior capstone where they work in multi-disciplinary teams of five to seven students on company sponsored projects (Case study 5.20).

**Case study 5.20 Students work in multi-disciplinary teams on both year-long engineering capstone projects for corporate sponsors and two- to three-year-long entrepreneurial sustainable projects at Olin College, US**

Olin College (US) is an innovative engineering institution with a curriculum from Year 1 built around group-based entrepreneurial engineering design projects. Early projects are shaped by faculty but later ones are student designed with faculty support. Each year every student presents a project they have been working on at the Fall Project Expo. In the final-year capstone, seniors work in multi-disciplinary teams of five to seven students on full-year engineering projects for partnering corporate sponsors. Olin works with companies and technology clients to develop SCOPE projects that are important to the sponsor while providing a useful educational experience for the student. The corporate partner commits financial and organisational support. Olin provides a faculty advisor and dedicated work space and technical support and equipment. The teams deliver formal mid-year and final reports to sponsors.

Partly drawing on the SCOPE experience, Olin with neighbouring Babson College (an entrepreneurial business college) has recently developed a linked course that starts in the junior year but can also serve as an alternative or additional capstone on 'Affordable Design and Entrepreneurship'. Student teams from Olin and Babson work on entrepreneurial but sustainable projects around the world, including the US, in areas such as energy, water, health, agriculture, transportation and communication. An ideal student path would be to complete an internship with an initiative partner, take the course for two semesters, work for a mission-driven company or NGO as an intern, and be part of launching a new social venture. The plan is for projects to last two to three years, with dozens of students ‘getting on and off the (project) bus’ as one course or one year is not enough time for the necessary technology and business model development.

**Extending projects over more than one year**

A further way of training students to engage effectively in research and inquiry during their degree course is to develop projects which occur over more than one year and hence give the students a progressive learning experience. At Olin College they have affordable design and entrepreneurship projects which last over two or three years with dozens of students ‘getting on and off the (project) bus’ (Case study 5.20). More ambitiously students in the College of Engineering in Maryland are encouraged to live in the same hall of residence for the first two years of a three-year project to encourage team bonding. The research projects are student-initiated and tackle social issues, usually involving a significant technology focus (Case study 5.19).

**Case study 5.19 Across department undergraduate research programme in the College of Engineering, Maryland, US**

Gemstone is a highly innovative programme for selected ‘honors’ students in engineering and other disciplines. The programme is now in its 17th year. Student teams, formed in the freshman year, undertake three-year, student-initiated research projects in which they analyse and propose solutions to societal problems, which generally involve a significant technology focus. Team members work as a co-ordinated group, investigating their project from the perspective of
individual majors, under the guidance of a faculty mentor. In their first two years students are encouraged to live together in a hall of residence floor reserved for Gemstone participants. The research projects, eg ‘a comparative study of erosion control measures in the Chesapeake Bay area and homeowner response to such interventions’, are developed in consultation with outside experts and agencies. In their final year student teams present their research to experts or outside agencies and write a team thesis. The learning process mirrors the team-based consultancy style research that students are likely to carry out after graduating. The students present and defend their team research at the Team Thesis Conference. The presentations are 30-minutes long followed by 30 minutes of questions from the discussants and the audience. Following this the team has one hour in a private discussion room with their discussants and mentor for feedback on the presentation and thesis.

A variant on this is to develop projects which need several years to complete and to arrange for each cohort of students to pass on where they have reached to the next cohort. This system of ‘inheritance’ has worked successfully in the history of science course at University College London (UCL) (Case study 5.18).

**Case study 5.18 Science undergraduates build on research of previous students at University College London, UK**

The chief innovation in the history of science course at UCL is the mechanism of inheritance: each year students receive a body of work produced by the previous group of students and make improvements and additions to it; this process can be repeated until publishable materials are produced. This is part of a system of learning that enables students to function as a real and evolving community of researchers. First developed in a final third year course, it was then opened up to second years to enable interested students to continue their work as part of their dissertation, and to strengthen the diachronic community by having the previous year’s students present when the next cohort take the course (Chang 2005, 2007). One outcome was a monograph on the history of chlorine, which contained selected articles by undergraduates on their research (Chang and Jackson 2007). Chang has now moved to Cambridge. However, since 2007-08, Ambrosio has developed a related course ‘Topics in the History of the Physical Sciences’. Selected students investigate an aspect of the history of electricity from a variety of angles: philosophical, sociological. Students produce an extended essay and their research materials in a form that subsequent students can use. Open Resource digital technology is central to the course including an online journal for student articles: with digital support making ‘the editing work considerably more 'manageable', thus allowing our methodology to become 'more transferable’ (Ambrosio and Jackson 2011).

**Developing project proposals**

Another approach to preparing students for their dissertation or final-year project is to have students produce an outline or proposal for the dissertation in the year before they actually start. As Greenbank and Penketh (2009) point out, critical reflection on how undergraduate students plan to undertake the dissertation is an essential part of preparation. In the year before they begin their dissertation, St Mary’s University College asks students in psychology to prepare a poster presentation which outlines their dissertation proposal (Case study 4.14), and at Southampton Solent students taking their second year coaching and development unit prepare a research plan (Case study 2.6). Aligning the research proposal to the research methods course helps ensure embedded practice.
Case study 4.14 Student poster conference linked to dissertation in Psychology at St Mary’s University College, UK

The psychology department at St Mary’s University College has integrated a required poster session into the dissertation requirements. The research project – some 5,000 words – is handed in the April of their final year. This counts for 80% of the final mark on that course. As with many other UK institutions work on this project is meant to start in the second year. At St Mary’s there is a required poster session in May of their second year at which students present and discuss an initial outline of their work. This counts for 20% of the final grade on the project and is assessed on visual content and presentation and student answers to questions about their project. The poster session is run in the form of an academic conference, with all academic staff attending as well as first-year and third-year students. Involving first-year students both increases the numbers of questions that second year students have to answer, and perhaps most significantly orientates first-year students as to how to carry out their research.

Case study 2.6 Coaching and community development at Southampton Solent University, UK

The final-year unit Coaching and Community Development builds on a second year unit entitled Coaching and Development. Students begin the third year with a clear idea and project plan as they have been required to engage with industry partners, employers, and businesses during their second year. The main function of the third year unit is to encourage students in groups to deliver their own coaching and development initiative in the local community. Involvement of practitioners has been an important factor in developing both the second and third year units and there is now a ‘Dragons Den’ element where students have to present their work to a mix of academic staff and industry professionals. Students are assessed via a poster presentation in front of partners from industry and are required to submit an individual reflective portfolio.

Preparing to communicate in different genres

In some universities and disciplines it is almost a given that students are considered researchers right from the moment they arrive at university, and that most of the activities they carry out encourage independent learning and help prepare them for the dissertation. However, this is usually still within the world of a particular discipline, preparing students narrowly as apprentice academics rather than more broadly as graduates who will need a complex range of skills and abilities in their future lives whether in an academic job or not.

The English Language degree at the University of Gloucestershire has attempted to broaden the possible shape that a dissertation can take, allowing students to include as part of their dissertation an artefact based on their research, which could be an article, a play, a poem, a guide, or a website (Case study 1.12). One finding from this process is that students were enthusiastic to create artefacts such as guides for teachers, blog entries or children’s workbooks, but struggled with writing anything beyond a straight academic essay because they were not used to it. The question is how to prepare students to be able to write skilfully in more than one genre – something that could give them new insights into their research topic as well as being useful later in life. It would be impossible to include explicit instructions in how to write a good teacher’s guide, a vision statement, a polemic, a personal reflection and all the other possible genres students might want to write in, of course. The approach that is being tried is to help students develop flexibility in their writing by giving them skills in recognising the conventions of a genre and then using these conventions to shape their own writing and speaking. Four genres that students do this for are: a) academic writing, b) internet forums, c) written ethical argumentation, and d)
political/social speeches. However the idea could be applied to many other genres since the skills in recognising genre conventions and reproducing them are transferable. The results of this training are still being evaluated, but the aim is to help prepare students not only to do well in their dissertation but to have many paths and possibilities for the future that they are skilful and confident enough to take.

Case study 1.12 Letting the apple fall further from the tree: The creation of a guide to inform students of the diversity of possible forms that an English Language dissertation can take at the University of Gloucestershire, UK

This case study discusses the initial findings from introducing a guide to inform students about the diversity of possible forms an English Language dissertation can take (Stibbe 2011). Further research will examine the impact of the dissertation guide on the kind of dissertation that students actually select and the quality of the final product. One of the defining characteristics of a dissertation is that it is an independent piece of work where the student has the freedom to choose their own research topic, methodology and, to some extent, format and writing style. Assignment briefs often prescribe the word limit, hand in date, learning outcomes and assessment criteria, but are careful not to specify further details about the topic or approach since these are up to the student. Ironically though, the lack of specificity can lead to a reduction in choice, since in their desire to produce ‘what is expected’ students often default to the standard textbooks of their course, the journals of their discipline, or previous dissertations, but not beyond. This project has produced a more detailed and specific assessment brief and process for dissertations. The brief outlines the essential characteristics of a dissertation and describes a wide range of possibilities for the shape and form that the dissertation can take. The process is designed to provide students with a strong support structure to give them confidence in the direction they choose for their dissertation. Initial feedback suggests that students are delighted both to be offered a range of possibilities to consider and to have a clear structure in which to undertake their project.

David Lynch (1992) says: ‘We think we understand the rules when we become adults but what we really experienced is a narrowing of the imagination.’ Ideally, as students go through university and ‘learn the rules’ they will simultaneously experience a widening of the imagination as new possibilities open up in front of them and they gain a broad range of skills.

At the University of Leeds, an innovative internship programme engages bioscience students in a project where they develop educational resources. This is a particularly useful exercise in terms of gaining skills in multiple genres, since the educational resources will be in a different style from the straight academic discourse of the dissertation (Case study 5.13).

Case study 5.13 Students undertake paid internships as agents of change or educational researchers in biosciences at the University of Leeds, UK

The Faculty of Biological Sciences, University of Leeds has started to run two programmes of non-laboratory internships for first and second year students. These provide good training for undergraduates who opt for the educational development dissertation. The first, badged as Students as agents of change is where students work in groups to develop a resource to enhance the curriculum; it can be something they have identified themselves as being needed within their programme or a project initiated by a member of staff. The second scheme is where the intern contributes (individually) to an educational research project. Examples of continuing projects
Jacques et al. (1981, 102) model the dissertation process as ‘Getting Going; Sorting Out; Keeping Going; and Ending Up’. This chapter has attempted to show that the stage ‘Getting Going’ starts not at the beginning of a dissertation module, but when a student first sets foot in the university. Transforming students into researchers who can confidently conduct and write up a project within the discourse of a discipline is a challenge, but one that is being met across a wide range of universities. Opening up students’ imaginations and equipping them with skills to choose from an expanded range is another challenge, one that may be just as important in preparing students for life beyond university.
5. Engagement with community groups and employers

The academy must become a more vigorous partner in the search for answers to our most pressing social, civic, economic and moral problems, and must affirm its historic commitment to what I call the scholarship of engagement (Boyer 1996, 13).

Employers tell us they want clear communicators who are strong critical thinkers and who can solve real-world problems in an ethical way (AAC&U 2009). To achieve these outcomes, we believe that colleges and universities must create an educational culture that promotes engaged student learning. Faculty, staff and administrators must work together to help students take responsibility for their own learning and their own lives and see themselves as constructors of knowledge rather than passive recipients of information (Hodge et al., 2011, 29).

Benefits

There is considerable evidence that student engagement with community groups and employers benefits their learning while making a practical contribution to communities and companies. Mason O’Connor et al. (2011), for example, note that the literature on community engagement through the curriculum suggests it enhances the quality of academic work, employability and lifelong learning. Furthermore they comment that: ‘There is strong evidence to suggest that placements involving community-based learning can provide a range of graduate attributes (knowledge, skills and value systems) that support employability and enhance the quality of student’s academic work.’ (p.38). Hill et al. (2011, 332) moreover, argue:

A traditional research project prepares the minority of very able students for further academic study. However, for the majority of students of all abilities seeking employment outside higher education, it may not instil the core personal and transferable skills required by many employers.

External engagement with real issues has been shown to increase students’ confidence through placing them in positions of responsibility (Clouder 2009), and exposing them to a greater diversity of learning experiences (Lee et al. 2010). It can be ‘highly developmental, particularly when it is linked to a personally-valued purpose and engaged with critically and reflectively’ (Lester and Costley 2010, 563). The quality and effectiveness of the student experience of external research may have a lasting impact on their future careers (Ryser et al. 2013). Projects and dissertations - where part or all of the research is conducted externally - therefore have considerable value, not just for professional subjects but also across the curriculum. The work-based project in humanities at Sheffield Hallam is an innovative and successful example of providing external engagement for students studying English Language and other humanities subjects (Case study 1.9). In Australia four universities collaborate in finding students work placement projects. They have found that participating students are more readily employed (Case study 5.6).

Case study 1.9 Final-year work-based projects in the humanities at Sheffield Hallam University, UK
The University has been running work-based projects in the humanities for 17 years. Undergraduate students in English Language take a single work-based learning module as a compulsory part of their degree in the second year, and it is open as an option for all other...
humanities students, including final years, to take. The module itself is spread over one year, and includes six taught sessions and a series of tutorials. Examples of recent projects include:

- writing a handbook for volunteers working with dementia sufferers in residential homes;
- writing for the in-house film magazine and managing external relationships with the Showroom Arts Cinema;
- publicity for a local city farm tapping into local magazine culture for wider publicity;
- project work for FURD: Football Unites, Racism Divides;
- youth group leadership;
- Student Union Volunteering committee chair and publicity responsibilities;
- 'Homestart' work supporting new mothers in their own homes (mature student project).

Students produce a portfolio which includes a skills audit, learning log and diary, supporting materials, and SWOT analysis. The module guide places a strong emphasis on reflection, with the 3000-word ‘Reflective Learning Diary’ being central to the assessment. Importantly, the guide encourages not just reflection but critical reflection. The guide requires students to reflect on academic aspects of their work, on the skills involved, their own and others' behaviour, and, importantly, ‘the ethical, social, cultural and institutional contexts of the work’ including ‘constantly monitoring the 'rightness' of what we do, are asked to do, and ask others to do’ as well as ‘questioning institutional or individual practice when necessary’.

Case study 5.6 Linking students with industry through co-operative education for enterprise development (CEED) in four Australian Universities

The CEED projects are open to final-year undergraduates or Masters level students studying Engineering, Information Technology, Business, Science, Sustainable Management, and Food Technology or Food Studies in four Australian universities. Industry-based training is integrated with the student’s university degree. Approximately 90 students a year work during term time on-site with a local industry host. They work for course credits, normally for a minimum of three days a week for a semester. Most projects are ‘practical’ or R&D focused giving students the opportunity to develop applied research skills in a real-world context. CEED has reviewed hundreds of projects and found that the students who participate are more readily employed on graduation.

Developing links with community groups builds on Boyer’s (1996) work on the scholarship of engagement or scholarship of application (Braxton et al. 2003) and what others in the US and Australia have called ‘public scholarship’ (Colbeck and Michael 2006; Krause 2007). Boyer (1996, 13) argues strongly that ‘the academy must become a more vigorous partner in the search for answers to our most pressing social, civic, economic and moral problems’, such as issues around austerity, poverty and addressing climate change. But equally there is a need to harness the reciprocal application of community experience to the development of knowledge (Eyler and Giles 1999). This can mean adopting a radically different approach to teaching and learning, as Rice (2003) argues:

Teaching that takes students into the community and involves genuinely engaged learning such as service-learning and learning communities extending beyond the campus are intrinsically contextual and social. Faculty members will have to rethink both their relationship to students and the ways they interact with community partners. Honoring what can be learned from practice and building it into the scholarly process will be a major challenge.
Many of the examples of community-based learning follow DeLind and Link’s (2004, 127) dictum that: ‘Before losing themselves in the virtual or plunging headlong into the international, students need to carefully and critically examine what exists … outside their front (and back) doors.’ A good example of engaging students in community-based research comes from Bates College in the US. It was one of the first schools in the States to receive the Carnegie Foundation’s Community Engagement Classification for both its curriculum and its outreach and partnership programmes (Case study 3.16).

Case study 3.16 Community-based research at Bates College, Maine, US
Bates has a strong social service, citizenship ethos (it was founded by abolitionists in 1865 and gave early support for black and female enrolment at the College) and more recently has developed a strong focus on ‘service learning and supporting students as active informed citizens’. Recently this public service mission has been greatly strengthened in scale and given a central academic focus through the establishment in 2005 of the Harward Center for Community Partnerships. The three main goals of the Centre are:

1. Based on previous service learning, student and staff volunteering, the Centre aims to build a strong scholarly research-based approach that both supports community development but also transforms teaching and research in the disciplines. Several departments have now integrated research-based service learning into their courses and senior capstones. Some departments now offer research methods courses that focus specifically on collaborating with the community for research.

2. An important priority is working with faculty and community partners as a ‘Collaboratory’ to transform in-term and out-of-term research learning opportunities and the mainstream curricula in the disciplines at Bates.

3. The Harward Centre seeks to build long-term projects founded in community needs and student and faculty research interests that enable students and faculty to work with community partners on issues of common concern. The projects are co-generated by community partners and faculty. Thus one project had local museum staff working with humanities students who were learning and using oral history research methodologies to interview former mill workers to develop a travelling exhibit about Lewiston’s mills and mill workers in the 20th century.

Portland State University has taken this engagement of students in community-based learning further than most by requiring all their students to participate in a community-based capstone course (Case study 3.1).

Case study 3.1 Compulsory community-based learning capstone project at Portland State University, US
During the final year each undergraduate student is required to participate in a senior capstone project, which constitutes the culmination of their university studies programme. The senior capstone is a community-based learning experience that provides an opportunity for students to apply the expertise they have learned in their major to real issues and problems in the community; and enhances students’ ability to work in teams, necessitating collaboration with people from different fields of specialisation. Each student works with a team of students and faculty. And every senior capstone must result in some form of summation, closing project, or product that represents completion of the students’ programme experience.
There is a weight of evidence that community and employer-based learning generates mutual gains for higher education students, staff, communities and community groups and businesses (Table 5).

Table 5 Benefits of engaging in community and work-based learning

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<th>Benefits to students</th>
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<tr>
<td>• Development of critical thinking, gaining insight into the complex nature of knowledge, showing enthusiasm for a subject and understanding related to it (Burack et al. 2010; Contis et al. 2010; Deeley, 2010).</td>
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<td>• ‘Provides a foundation for civic and social growth facilitating deeper inter-cultural and inter-ethnic understanding, and fosters a lifelong commitment to giving (Eyler and Giles 1999; Brewis et al. 2010)’” (Mason O’Connor et al. 2012, 16).</td>
</tr>
<tr>
<td>• Potential to address issues and opportunities affecting the public; and build on the knowledge, contacts and skills of community organisations (Hardwick and Coffey 2010; Stoeker and Tyron 2009; Brewis et al. 2010).</td>
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<td>• Kuh (2009) argues that internships, community service, and senior capstone courses provide opportunities to integrate and apply knowledge.</td>
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<th>Benefits to staff/faculty</th>
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<td>• COBALT (1999) argues that staff gain through networking, keeping up to date and the pleasure of seeing their students’ attainments.</td>
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<td>• Derouinian (2007) notes the value of drawing on graduate practitioners to feed back into undergraduate teaching and learning. Staff and students gain from the input of up-to-date case studies and practical examples to complement and, in some cases, challenge theory.</td>
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<th>Benefits for communities, community groups and businesses</th>
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<tr>
<td>• Engaging students can extend organisational capacity.</td>
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<tr>
<td>• The connection may help to foster longer-term collaborations between higher education institutions, community groups and businesses.</td>
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<tr>
<td>• Student engagement can assist organisational stability and continuity.</td>
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<tr>
<td>• Access to hands-on support and university expertise, students’ energy, enthusiasm and ideas, ‘low-cost help (main cost is time spent working with students) and opportunities to tackle tasks that could not otherwise be funded’; the chance to influence university courses and develop programmes more appropriate to local needs; identify potential employees and staff development links; also to gain a clearer idea of how the university operates and what it can provide (University of Brighton 2012).</td>
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<tr>
<td>• Increase public awareness of key issues (University of Minnesota 2012).</td>
</tr>
<tr>
<td>• Increase public support in the community as young people become ambassadors for their universities, homes, and other networks (National Service-Learning Clearinghouse 2012).</td>
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Source: Based in part on Mason O’Connor et al. (2011, 16-18)
Engaging with community organisations and employers

For several decades in professional subjects, such as nursing, marketing and engineering, students have completed dissertations that involved engagement beyond the walls of the university with community groups, public institutions or commercial businesses. For example, agribusiness students at the University of Queensland undertake a compulsory capstone course in which they complete overseas projects for Australian agribusiness companies (Case study 2.4).

Case study 2.4 International on-course market research experience for final semester Bachelor of Agribusiness students at the University of Queensland, Australia

The last and most important piece of work undertaken is the final semester international market research project for fee-paying Australian agribusinesses. Overseas research experience is regarded as critical in the professional development of these students, as the future of agribusiness in Australia lies in its global competitiveness. This compulsory capstone involves groups of four to five students, guided by an experienced academic mentor, working on their client’s project for the whole of the second semester (August to early November). In late September each group travels overseas for two weeks to do the in-market research and they are required to have the whole project finished and a full report back to the company, orally and in writing, during the first week of November.

When a project involves working with a community organisation or employer it adds an additional stakeholder to the project. To minimise the tensions that can result, it is good practice to draw up learning contracts between students, the university and the organisation involved which specify the responsibilities of each of the partners (Matthews et al. 1995).

Problem or inquiry-based learning in community and workplace settings has proven to be ‘an effective approach to teaching as real-life, problem-based learning provides opportunities for students to find academic activities meaningful and worthwhile’ (Lee et al. 2010, 563). For example, the geography department at the University of Canterbury, New Zealand, has been running an inquiry-based course in service learning for several years in which students undertake projects for community organisations and the format has proved easily modifiable for earthquake response and recovery research, following the Christchurch earthquakes of 2010-12 (Case study 4.16).

Case study 4.16 Capstone service-learning project in geography at the University of Canterbury, New Zealand

This final-year course is for between 40 and 60 students working in groups of five or six. It was set up more than a decade ago as an inquiry-based learning course, with students responsible for undertaking research selected from a suite of topics assembled by academic staff (Spronken-Smith 2005). Six years ago, this format was subsumed within a service-learning framework, with the topics formulated in conjunction with community groups. The key to its successful operation is the negotiation of roles and responsibilities between students, community partners and academic staff (the latter acting as advisors, not supervisors). The course runs for a semester (12 weeks) with minimal formal contact time, although it begins with a residential weekend away from campus so all parties can meet each other and for students to engage in research methods workshops. It ends with a public presentation of class findings. Assessment is 60% group-based and 40% individually-based. The individual items are a short essay at the start of the course assessing previous published work relevant to the topic, and a reflective essay at the mid-point.
Marks for group work (a 5,000-word written report and the conference presentation) are moderated with input from each group member, including the staff advisor.

An assessment of the impact of this learning method on student engagement showed that students with high, moderate or low levels of engagement in their university careers, according to measures derived from the Australasian Survey of Student Engagement, all experienced enhanced engagement in the course. Those previously deemed to be least engaged reported the biggest gains (O’Steen et al. 2011). Since 2011, the format has proved readily adaptable for undertaking earthquake response and recovery research, following the Christchurch earthquake disaster of 2010-12.

The case studies examined in this chapter can be described along a spectrum from students engaging in small scale projects for local community groups to taking a work placement with a large multi-national corporation. Typically the smaller and more community-focused the organisation, the more independence and scope there is for self-initiated projects, while larger corporations offer a more structured and directed experience. There is also a spectrum of involvement of the host organisation, from just providing a workplace for students, to offering supervision, sponsoring projects and even marking student work. In the international market research project at the University of Queensland, the employer provides sponsorship and is responsible for 35% of the assessment (Case study 2.4), while the following systems engineering project at the University of Macquarie allows employers to award 10% of the marks (Case study 5.1).

**Case study 5.1 Collaborative and student-driven learning approaches to capstone units in ICT at Macquarie University, Australia**

The Systems Engineering Project was designed in 2001 as a programme to create alliances between top computing students, academics and industry to their mutual benefit. From the student’s viewpoint, the objective of this programme is to assist them in taking responsibility and initiative for their own learning and prepare them for a career in ICT, which will primarily involve working in project teams to deliver ICT solutions. To meet this objective, the students manage their own projects and present a lecture series to peers. From the project sponsor’s standpoint, the objective is to gain students who have a firm foundation in the fundamentals of computer science and an ability to apply and adapt that knowledge to solve real business concerns. Benefits to the university are the provision of an industry-relevant experience for students and the creation of a bridge between academics and industry partners.

In some cases students may gain from work-based learning through role play. For example, in the broadcast journalism course at the University of Gloucestershire they put aside a whole week for students to run their own news organisation (Case study 1.4).

**Case study 1.4 Advanced Newsweek: Work-based learning and employability skills for student journalists at the University of Gloucestershire, UK**

This third year double module aims to consolidate journalism theory and practice into one intensive ‘Newsweek’ where students operate their own news organisation across the three media platforms of television, radio and online news. Using a purpose-built production office alongside television and radio studios, the students elect their newsroom roles and formulate working rotas to research and produce news bulletins, programmes and a news website for one 40-hour intensive week.
The module aims to enhance relevant employability skills. Students run their own newsroom and utilise vocational skills that are less explicit in other modules such as strategic thinking and problem-solving, as well as understanding group and individual motivation. They are required to act (and dress) in a professional manner and to maintain a high level of respect while making often difficult and instant decisions to tight deadlines. Teaching and learning is blended with 12 weeks of tutor-led lectures, seminars and workshops, followed by a student-led ‘practise Newsweek’ before the assessed Newsweek begins. During the assessed period, students carry out their own primary research to gather and produce daily news to industry standard. They brand and present programmes from inception to completion. At the end of each news programme they hold an editorial meeting in which they reflect on the experience and finished ‘product’. This encourages individual and peer-to-peer reflection which is used to enhance the next programme, and the student’s cycle of progression becomes noticeable after the first day of operating a ‘rolling newsroom’. The module integrates the development of research and vocational skills in an intensive real-world setting.

Then there are courses which are entirely work-based. For example, at the University of Bolton they have an inter-disciplinary action research course based around inquiry which is entirely work-based.

**Case study 3.3 Inter-disciplinary inquiry-based learning (IDIBL) focused on action research in the workplace at the University of Bolton, UK**

The IDIBL framework project has developed an undergraduate and postgraduate module for inquiry-based learning, which includes final-year honours projects. The student is an action-researcher who must identify an opportunity for improvement in their work-context. Learners support each other in an online community to combine study with work. The modules contained within the framework focus on process, and generic concepts and outcomes, rather than subject content. Through a process of negotiation between individual learners and course staff, a personalised inquiry is developed to include learning activities and assessment products that meet the module requirements, and are informed by the learners’ professional practice. The student then plans what they will do, undertakes it in their own work context, evaluates the action, and revises the plan.

Students may also gain experiences of working on authentic projects by undertaking consultancies for external clients. At Miami University they work in inter-disciplinary teams to provide innovative digital solutions for paying clients (Case study 3.6), while at the University of Central Lancashire students taking community sports development courses complete consultancy projects for community organisations (Case study 2.1) and at the University of Otago undergraduate oral health students in the Faculty of Dentistry are required to produce a patient education resource for a target group in their local community (Case study 4.17).

**Case study 3.6 Involving students in inter-disciplinary interactive media consultancy projects at Miami University, Ohio, US**

Interactive Media Studies at Miami University is an inter-disciplinary programme (including Computer Science, Engineering, Management Information Sciences, English, Marketing, Graphic Design, and Education) that brings together students and faculty to investigate how interactive media informs and transforms their disciplinary perspective. The programme has been running since 1996 and uses problem-based learning and team-oriented projects to help students learn
how to apply their theoretical knowledge to innovative digital solutions for a paying client. About 100 students a year take the programme. Students work in groups of up to 20. The students decide how to divide up tasks; typically there are groups undertaking development, design and marketing. The programmes are team taught with the last two weeks spent on de-briefing and talking about what they’ve learnt. The students are typically in class four hours a week, but spend many more hours visiting clients, undertaking research or doing user testing. They make a presentation to their client at the end of the project. Commercial companies are charged $20,000 (c£13,250) per project paid on delivery; non-profit organisations and charities are typically charged $5,000 (c£3,300). They found that the client did not take it as seriously when no charge was made. From the client’s perspective, they get out-of-the-box thinking that they would never obtain from consultants. The clients typically end up with something that far exceeds their expectations. The students find it surprising and challenging to manage the changes which commonly occur during the development stage of a project.

Case study 2.1 Engaging students in applied research through a community sports development consultancy project at the University of Central Lancashire, UK

The final-year Community Sports Development module acts as a capstone for Sports Coaching students. It is taken in addition to the honours dissertation. Students work as a project team on a consultancy brief with a partner agency and recommend strategies that can be used to support community development through sports and coaching initiatives. There are normally eight to 12 consultancy briefs divided up among 40–50 students, with students creating their own consultancy teams. Examples include: a ‘health check’ of football refereeing in Blackburn; a community sport and crime reduction project; and a consultancy on community sport.

Case study 4.17 Promoting oral health in a local community at the University of Otago, New Zealand

The Bachelor of Oral Health programme has a particular focus on health promotion and a strong awareness of socio-cultural influences on health. Graduates of the programme are registered health professionals who are part of the oral health care team. Undergraduate students are required to produce a patient education resource for a target group in their local community. Each year a different target group is identified and a context for use of the resource is provided. Students are required to research a topic and produce a five to seven minute video (on DVD) that includes appropriate scientific information. Students work in groups of three or four, and engage in a variety of learning activities that develop a range of skills including critical thinking, evaluation of the literature, communication, time management, problem solving and collaboration. Each project extends over approximately 13 weeks and has 50 timetable hours. Assessment is based on a presentation to class and colleagues, supporting documents, self and peer assessment of each member’s contribution to their group, and an individual written report.

Ethical, mutuality and resource issues

When students engage with external organisations a degree of caution is necessary, since there may be tensions between the corporate ethics of the organisation and the student’s own belief system (Moore 2007). Bakan (2009), for instance, provides a stark critique of corporations where the overriding pursuit of profit may lead to harm for customers, the wider society and the environment. The work-based project at Sheffield Hallam (Case study 1.9, above) attempts to avoid this problem by encouraging students to find unpaid work with schools, charities or the students’ union. Similarly, the extended
sociology project at Birmingham City University asks students to work with a local group that supports others, such as an activist organisation fostering refugee rights (Case study 4.9).

**Case study 4.9 Encouraging students’ critical engagement with community-based publics and issues at Birmingham City University, UK**

This final-year extended project provides students with an opportunity to undertake an applied venture, or a library-based piece of research in an area that is of particular interest and relevance to them, and that is informed by the tenets of public sociology. Students are responsible for either coming up with a topic themselves, or working with a local group that supports others and adopts a public sociology perspective. Prescriptive details for extended projects are not given; the expectation is that students will negotiate these with supervisors. Once they decide on a topic, they dedicate one day a week to this for the rest of the two terms of the third year of their degree. They also keep a reflexive learning log (as they did during the second term of their second year when they undertook a project or placement) focusing on the significance of their work, and informed by both academic and practice literature.

Another approach to dealing with ethical issues is to allow students to work in a wide range of organisations, including for-profit corporations, but with the explicit instruction to be critical and reflective. Valentin (1999) argues that it is essential that external learning ‘as well as focusing on the development of individual competence for work, allows space to challenge dominant organisational ideological assumptions and practices’. The mechanical engineering final-year project at the University of Adelaide is industry sponsored, but deals with ethical issues by requiring an understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development (Case study 5.5).

**Case Study 5.5 The mechanical engineering final-year project at the University of Adelaide, Australia**

The final-year project in the School of Mechanical Engineering aims to provide solutions to engineering problems related to industry or to scientific research, with emphasis on project management and effective communication. It is considered to be an important part of the engineering education process and projects sponsored by local industry are strongly encouraged. Industry supported projects enhance student skills through relevant real-world projects in research and development, and benefit industry through expertise transfer, innovation and development. Unlike traditional engineering honours projects - where individual students work on research-based questions - this one actively encourages projects involving teams. In addition, recognising the diverse range of careers that graduates enter, any type of venture is allowed so long as it meets minimum criteria. Students are encouraged to suggest projects themselves as these often lead to outstanding results.

The module guide for the work-based project at Sheffield Hallam similarly asks students to critically reflect on ‘the ethical, social, cultural and institutional contexts of the work’ including ‘constantly monitoring the ‘rightness’ of what we do, are asked to do, and ask others to do’ and ‘questioning institutional or individual practice when necessary’ (module guide quoted by Stibbe 2012, 10).

Where projects are community-based, another key issue to be aware of is mutuality. Students may be paying high fees to the university, but part of the actual training and learning experience is being provided for free by a community group or business. In such cases it is important that benefits to the community
exceed the resources it expends in hosting the student. The University of Brighton (2012) reinforces and extends the point in working ‘to develop sustainable partnerships between the university and its local community that are of mutual benefit and that address issues of marginalisation and disadvantage’.

A final issue concerns the resource implications of externally engaged FYPD. A number of the case studies examined describe the high costs of finding opportunities for students, vetting employers, and supporting students as they adapt to a working environment, solving issues between employers and students, and training students in the critical and reflective skills required for this kind of project. On the other hand, in addition to the benefits gained by students there are also benefits for the university in establishing relationships with local businesses and community groups for outreach and knowledge transfer.

Overall, engaged projects and dissertations - where students complete part or all of their research in external bodies - offer great potential benefits to students, staff and the community organisations and employers they work with. Many problems can be avoided through careful design, but they can be resource-intensive. As COBALT (1999) notes, community-based learning creates an:

extra workload ... for supervisors. However most felt that they were compensated by the benefits of student attainment, the chance to build and maintain their own networks and the opportunity to keep up with practical developments in their field.
6. Assessment

Assessment is the single most powerful influence on learning in formal courses and, if not designed well, can easily undermine ... [innovative] teaching and learning approaches (Boud et al. 1999, 413).

The assessment of final-year projects and dissertations (FYPD) is critical not only because they form a major piece of work for the students, but also because students are, in most cases, expected to demonstrate achievement of many of the key programme learning outcomes as a ‘capstone’ to their studies. Comparability of standards between different forms of FYPD is an important issue. As accountability pressures grow, the FYPD are increasingly seen as an important way to assess the learning experience of students in their major or degree programme (Jones et al. 2012). This has been recognised in Sweden where the only piece of student work that is examined by the external quality panel of experts charged to evaluate standards is the independent degree project (Swedish National Agency for Higher Education 2011). Moreover it is recognised that capstone projects in Australia can ‘provide a robust vehicle for assessing the professional capabilities of individual students who are about to graduate, as well as provide evidence of the effectiveness and standards of a programme of study for accreditation’ (Rasul et al. 2009, 209). The case for the importance of FYPD in evaluating programme outcomes in Australia has been strengthened with the development of discipline-based standards.

Diversifying the form of assessment

Diversifying FYPD means considering a wider range of assessment tasks (Biggs and Tang, 2011). Adopting a mixture of assignments enables students to develop their own interests and engage more fully with the learning process. As Bloxham and Boyd (2007, 34) argue: ‘We need an assessment process which more closely judges the students’ capacity to act as well as to express their factual and conceptual knowledge of the topic.’ Assessment should be integral and not separate from learning. In providing students with a choice as to how they undertake their FYPD and a degree of flexibility in how it is assessed, students should gain greater ownership of the process. This can be enhanced by allowing students to showcase their work in a variety of ways including undergraduate conferences, end-of-year degree shows, presentations to colleagues, academics and professionals, production of documentaries and preparing consultancy reports, as well as, or in some cases instead of, a written thesis.

It is important that students experience a variety of different learning approaches through their degree programmes because this helps them gain what they will require in future roles in society. It is crucial therefore, when designing FYPD, to consider the wealth of possibilities. This also applies to assessment. Considering new, different or varied forms of assessment can enhance the student learning experience. It can, for example, ‘be useful to consider the balance between generic educationally-focused learning and work-based/professionally-focused learning’ (Macquarie University 2009, 4). Furthermore it may be beneficial to students to offer a range of options, which provide them with an opportunity to develop knowledge and key skills in their area of interest, rather than trying to go for a one-size-fits-all.

Students in biosciences at the University of Plymouth are offered a choice of undertaking either a traditional dissertation or a group project including individual analysis and write up supplemented by an individual research proposal (Case study 5.4).
Case study 5.4 Research into practice: an alternative format for final-year biosciences honours project at the University of Plymouth, UK

Research into Practice includes a research proposal as an assessed element, instead of having the bulk of marks awarded for the writing of a dissertation. The new format encourages more external employer engagement. The module assists students looking for a more directed approach and requires them to sign up to a single project where the protocol for data collection is largely written by the project advisor. Data collection is then carried out by the group and the results are pooled, before being analysed and written up on an individual basis. The new format is similar to an extended laboratory investigation and, consequently, the project advisor is largely responsible for the planning and any risk or ethical assessments. As students taking projects in the new format have not designed their own research study they have to carry out a separate research proposal assessment to meet this learning outcome; albeit after students have carried out the data collection and analysis. The research proposal is communicated via a template and although the student does not have to carry out the proposed study, it does need to be realistic, affordable and capable of completion by an undergraduate.

Assessment, in the sense of the grade the work obtains, is a focal point for students (Biggs and Tang 2011). Hence if we want students to engage with the holistic process of learning then the way the curriculum is designed, including assessment, is central. This requires curriculum developers to consider the purpose of FYPD and how they can be designed to suit a variety of student requirements.

To accommodate varying student needs some degree programmes, such as Plymouth’s biosciences degree (see also Case study 5.12 later in this chapter), provide a choice for students as to what is assessed in their FYPD. Other courses, such as the University of Greenwich’s Design dissertation, are more specific in their FYPD assessment outputs, but the choice remains with the student regarding what to research and produce. Students generate a written piece alongside a physical artefact which supports their work, but this artefact and the topic are flexible and chosen by the individual (Case study 1.3).

Case study 1.3 Design dissertation: from practice to theory and back again at the University of Greenwich, UK

In 2007 the dissertation experience of students in graphic and 3D digital design was reviewed. Due to students reporting a lack of engagement with a solely text-based piece of research the emphasis of the dissertation changed. It has become a ‘practice with theory’ model of learning. This model of the ‘studio’ and the theory elements of a design course being more closely linked has been tested in many undergraduate art and design courses with great success. The emphasis now is on the quality of the research for the dissertation; so the experience becomes about how to gather information and then communicate it in an appropriate manner. There is a strong visual element to each project, which helps construct and define the students’ arguments. The ‘physical’ format of the final piece is highly flexible and links to the content of the written report. The main evidence for success comes from students showing the dissertation as part of their final exhibition and it featuring prominently in their portfolios. There is also anecdotal evidence that employers have been surprised and impressed by the quality of the revised dissertation both in terms of form and content.

Self and peer assessment are other ways of diversifying the assessment of FYPD. Self assessment is often used to encourage students to reflect on their work. This may involve keeping a reflective diary or blog as part of the process of undertaking the project. It may or may not be assessed by the tutor and form
part of the final mark. For example, media students at Swinburne University of Technology write a 1,000 word reflective self assessment (Case study 1.5 in Chapter 5). Peer assessment, in contrast, is most commonly used where projects are undertaken in groups. There is pressure from students, particularly in the final year, for summative marks to represent the work of individuals. Sometimes this may mean asking for individual write-ups of projects. Alternatively there are well developed ways of using peer assessment to redistribute group marks between team members. Arguably only the members of the group can reasonably make judgements about the quality of the contribution of other team members to various group activities. For example, as mentioned in Chapter 2, both peer and self assessment were used in an environmental issues capstone project to redistribute the mark given to the group project among team members (Healey and Addis 2004) (Case study 4.12).

Case study 4.12 Final-year students undertake team research projects on local environmental issues at the University of Gloucestershire, UK

Issues in Environmental Geography ran for about a decade at the University as a final-year capstone module; and an earlier version ran at Coventry University for several years. In its final form students worked in groups of four to six on local environmental issues. The module was concerned with analysing competing environmental philosophies, applying them to understanding a particular local or regional environmental issue and coming up with policy recommendations. The students developed their own projects, starting with a proposal. They were supported through two key lectures on environmental philosophies, a workshop on effective teamwork and individual group tutorials on their chosen topics. The semester-long course was assessed through a group report (60%); oral presentation of project (30%) and an individual learning journal and reflective essay (together counting for 10%). The marks given for the group project were redistributed among group members using peer and self assessment of the quality and effectiveness of their contributions on a five point scale to five group processes (ideas and suggestions; leadership, group organisation and support, minute taking; data collection/collation/analysis; report writing, production and editing; and preparing/giving verbal presentation). The average mark for the module was consistently c3-5% points higher than for other modules, reflecting the benefits of working in teams. The difference in marks was confirmed by external examiners.

Assuring standards
Designing different approaches to assessing FYPD may help meet a range of students’ needs, but it may also raise concerns about maintaining academic standards. In developing FYPD it is essential to ensure that academic standards are maintained through the assessment process and there is comparability between different forms of FYPD. Despite many disliking the process, academics in the UK are familiar with working with generic assessment criteria for judging the quality of their own varied disciplinary research outputs in past research assessment exercises and the current research excellence framework, so this should not be a challenge for them (Research Excellence Framework 2012). Assurance of standards of FYPD can be achieved in the design of the programme and learning outcomes and the design of assessment criteria. Assurance of standards in the UK is overseen by a system of external examiners and validation and periodic review of programmes with external involvement. Some FYPD programmes provide options for students, so that students can choose the type of project which best suits their requirements, interests and aspirations. Significantly the UK Quality Code chapter on assessment states that: ‘Institutions can encourage staff to make use of different assessment methods by ensuring they have access to expertise, internal and external, to support the development of assessment that focuses on student achievement’ (QAA 2011, 5).
Where options are offered the case studies we have collected demonstrate that the clarity of the learning outcomes, assessment criteria and detailed module guides are key in ensuring standards. Although the outputs and nature of the projects can vary, if the expectations, in terms of student input and the nature of the research and inquiry, are equivalent then academic standards should be assured.

The University of Leeds' bioscience programme demonstrates how a range of different projects can be offered while maintaining academic standards (Case study 5.12). Seven different types of project are currently offered and this is shortly rising to nine.

**Case study 5.12 Alternative final-year projects in the biosciences at the University of Leeds, UK**

Final-year students within the biomedical sciences group of programmes have the opportunity to undertake one of the seven types of research project. Each project is of eight weeks duration, with students expected to commit 3.5 days per week to their project. Students are provided with a list of projects (with project descriptors) in March of the year preceding their final year and invited to choose, in rank order, ten projects they would like to be considered for. Projects are then allocated based on student choice and ranking within the year group; with projects starting in the January of their final year. The assessments for all project types are similar. Students are required to write a 25-30-page dissertation and deliver an oral presentation. Students undertaking critical review projects also have to submit a 5-page grant proposal linked to their review. In addition there is a supervisor allocated ‘productivity’ mark.

- **Individual laboratory projects**
  Students undertake an individual programme of research in the laboratory of their project supervisor, often contributing to current research.

- **Group laboratory projects**
  Students work collaboratively, as a team of three to four, to undertake a programme of research; based either in their supervisor’s laboratory or in the teaching laboratories.

- **Computer simulation projects**
  Students investigate the function of biological systems using established computer models (e.g. human cardiac myocytes).

- **Critical review projects (with linked grant proposal)**
  Students undertake a hypothesis-driven critical review of the literature in a specific area/topic within the biosciences.

- **Survey projects**
  Students undertake a public health survey under the general theme of ‘Healthy Lifestyles’.

- **Science and society projects**
  Students undertaking science and society projects create, deliver and evaluate interactive, curricula enhancing teaching in local primary (students aged 7-11) and secondary (students aged 13-18) schools.

- **Educational development projects**
  Students undertaking educational development projects develop and evaluate learning resources for use in undergraduate teaching. Working either individually or in small teams, students develop learning resources or new teaching methods (e.g. using social media) to support current teaching.

Where a choice of projects is allowed, assessing them using identical assessment criteria is a common way to ensure comparability of standards. This is the approach in the Database Professional MSc at Sheffield Hallam University (Case study 5.15). Although this example is at Masters level the ideas are transferable to Bachelor level dissertations.
Case study 5.15 Dissertation in database professional MSc by portfolio at Sheffield Hallam University, UK

For the Database Professional MSc students may submit either a traditional report, or a portfolio of artefacts. In order to maintain equity and transparency between the two approaches the marking criteria are identical. In both cases they are:

- knowledge of the domain (25%);
- justification of the approach (25%);
- description of the research and discussion of the outcomes (25%);
- quality of the report and presentation of the argument (25%).

Students work one-to-one with a supervisor. They undertake some of the ‘usual’ tasks, such as literature review and methodology, but also include other items such as design outputs, sample working programmes (if that was one of their target outcomes), screencasts with demonstrations, videos of users’ feedback and anything else they think might be useful to paint the picture. Often they undertake a learning blog at the same time, which is included as an artefact so long as they provide some reflective commentary on it. The real art is the way that they piece together the artefacts. Typically this portfolio will be delivered as a website, allowing the inclusion of hyperlinks to media of different types.

In contrast there are circumstances where using different forms of assessment for different types of project are appropriate. A good example comes from the University of Central Lancashire where an inter-disciplinary project, shared by several different programmes, is assessed differently by each programme. Students from different disciplines are brought together to work on a common project with a tangible, real output. In this case it was a book, ebook, film and exhibition, but this could be changed to suit the needs of different disciplines and institutions. Although at Masters level, we believe the idea to be transferable to undergraduate programmes (Case study 3.7).

Case study 3.7 Working in an inter-disciplinary way with communities in the UK, Kenya and Zambia to design, produce and sell a children’s book at the University of Central Lancashire, UK

The Letters to Africa and Pipeline Projects are an innovative way of bringing students from different disciplines together in a practical, applied way to devise, produce and sell real products for children, usually books, photographs and ebooks, under the banner of UCLan Publishing. Students work with communities, including local schools, in Lancashire, Zambia and Kenya to gather content for the output. Sales from the products partly fund the following year’s projects and partly go towards financing a secondary school education for children in the African community of Kimana in Kenya. The project is entirely integrated into all the participating programmes. However, the way in which it is assessed is up to the individual programme/module tutors. For example, MA Publishing students co-ordinated the project and prepared the briefs for all students from various disciplines. They were doing this work as part of a practical module and were assessed through group project books and individual reflective statements. The emphasis was put on assessing the process rather than the output. In contrast many MA Linguistic students adopted the project as part of their dissertation work. They researched the Maasai language (Maa) and contributed a piece about the language to the book, interviewed local African people about the language and put together the very first Maa language glossary in print.
Another way to build in consistency of standards and to enhance the quality of work produced is to formalise both formative and summative feedback. At Queens University Belfast they developed a scheme whereby students submitted three interim progress reports for their dissertations, on each of which staff gave written and oral feedback (Heylings and Tariq 2001). Podcasts have also been used to provide feedback on projects (Hill 2008). Supervisors of third year Psychology student research projects at Liverpool Hope University used the commentary on their supervisees' second year projects to give guidance to the student on how to develop their new project (O'Siochru 2008).

Assessment criteria
Whether undertaking a traditional dissertation or a more innovative or creative kind of FYPD the assessment criteria are similar, though the weightings are likely to vary. In some disciplines, particularly in media and art and design subjects a distinction is made between the criteria used to assess the outcome and the process of producing it. In these subjects students are often asked to reflect on their own creative work in relation to assessment criteria and their adopted approach and form. Here the concern is with assessing knowledge, understanding and ability to contextualise their work. Table 6 presents a composite of criteria used in dissertations in geography and business.

Variation in marking is often higher for FYPD than for other pieces of work which is why double marking is essential (Webster et al. 2001). Greater consistency can be encouraged by careful design of assessment criteria and marking procedures that are regularly discussed within teaching teams so as to gain a shared understanding of meanings and application, while allowing flexibility in their implementation to prevent the criteria stifling creativity (Pathirage et al. 2007). The development and discussion of generic assessment criteria is important here, as the earlier analogy with the Research Excellence Framework (2012) showed. Identifying expected achievements against the assessment criteria should allow for the differences in the degree of autonomy students have in independent, group and co-researching models of FYPD (Hill et al. 2011). It is just as important for students to understand the assessment criteria as it is for markers. Asking students to assess example projects or parts of projects and then discuss what they see as the strengths and weaknesses is an effective way for them to develop an understanding of the criteria (Rust et al. 2003).

Assessing the development of project skills
Developing project skills and gaining applied experiences are important aspects of undertaking a FYPD. The research skills framework developed at the University of Adelaide provides a useful tool for designing the skills expectations of FYPD (Willison and O'Regan 2007). There is evidence that its use ‘developed a variety of discipline-specific research skills and that these skills were useful for subsequent studies and especially for employment’ (Willison 2012, 905). Evidence that well designed FYPD help develop research skills and graduate capabilities, such as speaking, writing, group work, creative problem solving, and inquiry comes from a study of the development of two capstone subjects in physiology at La Trobe University in 2011 (Julien et al. 2012). Their findings are based on an analysis of student performance and feedback scores in conjunction with staff perceptions. They found that final grades were significantly higher in 2011 compared with final grades in the previous two years. However, they also reported higher staff workloads from implementing the student-centred approach. Another way to encourage students to reflect on their skills development is to build in a requirement that students keep a project log and undertake a skills self-evaluation (Heylings and Tariq 2001).
**Table 6 Assessment criteria for honours dissertations in the UK**

**Fundamentals of the dissertation**
- Evidence of originality and perceptiveness.
- Clarity of aims and topic identification.
- Evidence of reading and awareness of literature.
- Quality of research design and methodology.
- Awareness of any shortcomings of design and methodology.
- Quality of data.
- Presentation, analysis, evaluation, synthesis and interpretation of data.
- Conceptual awareness and theoretical understanding.
- Sustained argument.
- Logical organisation.
- Findings and conclusions justified and contextualised in the literature.
- Where appropriate, improvements or further developments of study.
- Recommendations for the topic and research process.

**Presentation**
- Standard of presentation, use of English language and structure.
- Use of complex academic terminology.
- Correct use of referencing conventions.
- Coherent integration of illustrative materials.
- Clarity of communication and ideas.

**Administrative**
- Conduct including engagement with administrative processes.
- Assessment of risks and ethical considerations.
- Fulfilling requirements.

**Independence**
- Ability to work independently.
- Demonstration of personal initiative and responsibility.
- Conduct and competence during practical work.
- Cognitive, intellectual, practical and personal skills.
- Appropriate and correct use of ICT applications.
- Reflective, critically evaluating own performance and personal development.

**The ‘X Factor’**
- Demonstrable critical ability.
- Creative thinking.
- Flair and innovation.

*Source: Based on Hill et al. (2011, 340); Hand and Clewes (2000); and Nicholson et al. (2010)*
Practical assessment can occur by showcasing it in the work place or laboratory. The project ‘Nurturing biochemical research skills’ at Queensland University of Technology (QUT), for example, combines group-work, laboratory skills and practical assessment. It demonstrates that FYPD can take different approaches to assessment (Case study 5.2). In diversifying assignments, greater opportunities are provided which suit different student needs.

**Case study 5.2 Nurturing biochemical research skills in a group laboratory-based capstone unit at Queensland University of Technology, Australia**

This final-year unit of the ordinary degree provides students with an authentic learning experience which integrates a number of specialist biochemical procedures. Students work in teams of six to complete a 13-week laboratory-based project to attempt to purify an enzyme. There are no lectures or examinations. In addition to the major lab project, workshop sessions foster critical analysis of scientific procedures and provide insights into particular aspects of successful group work. Students improve oral and written communication through individual presentations, group submissions and as contributors to online discussions. The unit is very well received by students and their performance is a key indicator of potential to undertake the fourth year honours course.

A further example from QUT, which illustrates the assessment of project skills as well as outcomes, is a virtual law placement in which students are assessed through their submission of an application for their preferred placement, their contribution to an online discussion, the project and an ePortfolio reflection (Case study 2.9 in Chapter 7).

Another way to incorporate practical experience in FYPD is to engage with community organisations and industry professionals (Chapter 5). An interesting example of how this can be assessed comes from the Liverpool Institute for the Performing Arts where 80% of marks go to a student conference involving industry experts and the criteria for the remaining 20% is determined by the students themselves (Case study 1.10).

**Case study 1.10 Learning from industry professionals and a student-led conference on contemporary issues in arts management at the Liverpool Institute for the Performing Arts, UK**

*Contemporary Issues in Arts Management* is a final-year module where students are required to engage with industry professionals. Students research areas of interest and present their findings at a student conference. Throughout the module ten speakers at the top of performing arts management talk at one session about the future of the industry. Students are required to engage and network with the speaker and host the sessions, which includes providing research packs to peers. Most of the assessment (80%) is via a presentation at the end of the module at an annual Contemporary Issues in Arts Management Conference. Emphasis is placed on coherence and strength of argument and supporting evidence, over presentation. This unique event is attended by industry professionals and members of the public as well as our other two years of management students. Conference reaction is tweeted by the audience, generating wide dissemination. The external examiner commented (2008-09) that: ‘The student conference ... is excellent professional preparation as well as a sound testing of the students’ understanding of the industry.’ The remaining 20% of the marks are available for criteria decided by students, for example, their interaction with guest speakers’ subject matter and enhancements to the course.
A further example of a final-year project, this time involving business students at Bradford, illustrates how the development of employability skills may be assessed. The project engaged students in teams in raising money for charities. Assessment was through a formal presentation, involving employers as well as tutors, and documentation of the team project processes (Case study 2.12).

**Case study 2.12 Charity fund raising final-year project in business and management to enhance employability at the University of Bradford, UK**

This module was designed with two broad outcomes in mind: to give students the knowledge and expertise they needed to perform well in the graduate selection process; and to add to their CV activities which would give them something to talk about at interview and that would stretch them in the development of their skills. The former was delivered via classroom teaching while the latter was the product of planning and delivering fund-raising initiatives for one of a small number of charities. Students undertook football matches, disco nights, cake stalls, fashion shows, and so on; and on a number of occasions, obtained corporate sponsorship to cover certain expenses. The emphasis of the module is on the practical demonstration of skills and students are asked to present an analysis of what they had done and why in an ‘Apprentice Boardroom’ at the end of the module. Assessment criteria included presentation skills, their performance as a team and performance on the task. While teams who raised larger sums of money typically did better than those who did not, the amount of money raised was not part of the assessment. Assessment was through a formal presentation undertaken in front of three employers as well as tutors and team documentation (minutes of meetings, accounts, receipt from the charity involved, evidence of communication with the charity, risk assessment of health and safety for the activities proposed, feedback from the mentor and a two-side reflective account) submitted one week before the presentation.

A current study based in Australia is investigating the generic and specific skills developed through undergraduates experiencing research (Wilson 2012). The teaching research: evaluation and assessment strategies for undergraduate research experiences (TREASURE) project seeks to improve the ability of academic staff to design, implement and assess undergraduate research projects that extend student understanding of the nature and processes of research, and to foster students' abilities to take part in those processes. The key questions underpinning the research objectives of the project are: ‘can curriculum design grounded in the nature and processes of research in the undergraduate experience of research contribute to transformational student learning?’; and ‘does reflective writing promote this form of learning?’. The initial stages of the project are shedding light on the development of ways of thinking and practising in the sciences, particularly the development of critical thinking in scientific research contexts.

In designing creative FYPD it is important to align the learning outcomes, the experience and the assessment. A FYPD should be viewed as the pinnacle of the degree and as such it should ensure that students have the opportunity to build on the knowledge which they have acquired in an area which interests them. The Leeds Biosciences FYPD programme is an excellent example of good practice. It demonstrates how students can be given a range of options, which enables them to consider what they want to accomplish by completing a FYPD.
7. Supervising and advising

The supervisors has been described in the literature as subject expert; gatekeeper of academic standards; advisor on the research literature and methodologies; the ‘midwife’ of the dissertation; director; project manager; shape; scaffold; supporter; editor; and promoter of student self-efficacy (based on MacKeogh 2006, 20).

research supervision, even at undergraduate level, needs to be a learning process for both the supervisor and the student (Rowley and Slack 2004, 180).

The function of the supervisor or advisor is complex and diverse because of the wide and varied role the academic has in final-year projects and dissertations (FYPD). Traditionally the role of the supervisor is to ‘provide guidance, advice, instruction, encouragement, support - but the work should reflect that of the student and not the supervisor’ (MacKeogh 2006, 20). Positive supervisory relationships can enhance students’ potential by building their confidence and encouraging independence (Light and Cox 2001). In addition to providing support, advice and guidance for the student, the supervisor is required to be aware of ethical and safety concerns in relation to the research (BERA 2011; Healey, R. et al. 2013). It is vital that they are aware of best practices and support the student through the process of gaining consent for the research, where this is applicable. It is the supervisor’s role to assist students, through advice and guidance, in their management of conflicts and risk. Finally, the supervisor acts as the student’s examiner - providing formative and summative feedback throughout the learning process (MacKeogh 2006). This traditional role can place huge pressures on academics when they are supporting a large number of students, which is one of the reasons for rethinking the approach to FYPD. By changing the design of FYPD, support for students can be delivered in a variety of ways, which may ease time pressures on academic staff. It should also be recognised that academics supervising students undertaking FYPD need support and advice for undertaking a role which is significantly different from other forms of teaching (Marshall, 2009). As Day et al. (1998: 51) note ‘avoiding the twin traps of over or under supervising is never easy’. Where undergraduate research takes place outside the curriculum recognition of the time that supervision takes may be an issue (Hensel and Paul 2012).

Some authors make a distinction between supervision and advising, but the terms appear to be used loosely and interchangeably. Where a distinction is made, the former is sometimes used to describe the situation at postgraduate level and the latter at undergraduate level as, for example at University of Plymouth (Gresty 2013). While in a work-based context the term supervision is sometimes seen as less appropriate as it describes a hierarchical relationship, whereas advising is seen as describing a more facilitative relationship. Hence in this situation Boud and Costley (2007, 119) argue that: ‘The conception of the role of academics in project work needs to change from one focused on project supervision to one of learning adviser.’ This reflects the fact that in work-based learning situations students are more likely to receive support from their work settings and have a more learner-managed role in project work (Boud and Costley 2007, 122-123).
Guides and resources
As student numbers have increased and greater emphasis has been placed on quality assurance and enhancement, many departments have produced guides explaining what is expected from FYPD in their programmes. Many books and guides have also been published on undertaking undergraduate research, dissertations and capstone projects both in general (Wisker 2009) and in particular subject areas (eg Bailey et al. 2012; Knight and Parsons 2005; Todd et al. nd). However, most of these resources take a conventional view of what counts as a FYPD. If alternative forms of FYPD are to become widely acceptable then the possibility to undertake them should be included in these guides and books. If the range of alternatives is not publicised then students will default to the traditional forms of FYPD. A good example has been written for the English Language dissertation in Case study 1.12 (Chapter 4).

A novel way of developing a user-friendly guide is to get undergraduate students to write it. This is the approach used at the University of Newcastle where four students researched good dissertation and research module advice practices across a large faculty (Case study 3.12).

Case study 3.12 Engaging students in investigating research support and developing web resources at the University of Newcastle, UK
A group of students identified good practice across a large faculty in undergraduate dissertation and research modules, and then shared the models of student support identified through a web resource on which all students may draw. All second year students were offered the opportunity to be part of the Research Project. Four students were selected and paid £200 for this. A member of staff supervised the project and interns but ensured that the students were the ones who informed the shape of the project. Students worked in pairs to identify all the relevant modules, make initial email contact and then arrange face-to-face interviews with those staff who were willing. This was a major task for most of them as they had never been involved in this type of social research before. They also spoke with student representatives in each subject to gather more student views. An emergent component from the student intern contribution was their desire to create a set of quality standards for research module student support with both ‘essential’ elements and ‘good practice’ aspects. This will be progressed through quality enhancement mechanisms. As intended too, development of resources for a website to assist students in dealing with dissertation issues has identified a wide variety of engaging practices – from playing a funny flash game to ways of finding a research topic.

Providing written guides to what is expected and examples of good practice are essential, but experience suggests that to be effective they need to be reinforced by other means. At Brunel University they complement the subject specific guidance by organising a Dissertation Question Time at which a panel of undergraduate students, academic staff and an academic skills advisor answers student questions (Danvers 2012) (Case study 3.10).

Case study 3.10 Dissertation Question Time: Supporting the dissertation project through panel discussion at Brunel University, UK
Dissertation Question Time attempts to create an informal arena for discussion, while allowing the input of voices from a range of subjects and perspectives. The workshop consists of a panel of undergraduate students, academic staff and an academic skills advisor discussing questions from students on any aspect of the dissertation process. During the workshop the student attendees address their question to any member of the panel. The aim is to prompt open discussion and students on the panel are particularly encouraged to lead the discussion. To encourage
participation students are invited to submit questions beforehand and these are distributed among
the audience. The main themes that arose from students attending the sessions involved issues
over the relationship with the supervisor, confusion over structure or format and time
management. The dissertation is seen by many as a highly individual project; meaning it can be
difficult to provide advice that students deem specific enough for their learning needs.
Consequently students can find it hard to relate the answers to their topic. However, students
can find the discussion of general research approaches from the panel reassuring and interesting.
Therefore the advice generated through the discussion is valuable in that it complements subject
specific provision but makes no attempt to replace it.

Group and peer supervision
The supervisor may take on many roles, acting as a guide, confidant, consultant and examiner (MacKeogh
2006). The advice and guidance which can be offered to students through feedback on their work and in
discussions can be pivotal in enhancing students understanding about the direction of their project.
Bloxham and Boyd (2007, 20) argue that:

The most important aspect of the assessment process in raising achievement is the provision of
feedback. Research indicates that students value feedback despite anecdotal staff views and
contrary research evidence regarding how students fail to engage with it.

There are numerous ways in which feedback can be given to students, from written feedback, to
podcasting and seminars. Students can also support each other through peer learning, sharing
experiences and offering advice. At Oxford Brookes University, for example, students who participate in
the Geoverse project receive feedback on their ideas in the form of peer learning. Those in an optional
final-year course are required to write a paper on research they have undertaken during the second year,
which is then evaluated and commented on by postgraduate students, in the manner of an academic peer-
reviewed paper (Case study 4.7 in Chapter 8).

Traditionally supervision occurs through one-to-one sessions, but these can be adapted, in particular to
cater for the growth in student numbers and introduction of new technologies. In designing and
developing FYPD to have a wider spectrum of possibilities, differing supervisory relationships can be built
into the course. For example, Robson (2006) used action research with a group of eight geography
dissertation students at Keele University to empower them as independent learners and peer supporters
(Case study 4.13).

Case study 4.13 Helping students to engage more effectively with the research
process in undertaking their undergraduate dissertations at Keele University, UK
Undertaking an independent research project in the form of a dissertation can be the most
challenging and rewarding part of an undergraduate student’s university experience. However,
students often suffer from lack of motivation, hesitancy and avoidance when faced with the
daunting enormity of the task and the high demands placed on them as independent learners and
problem solvers. Robson (2006) undertook a case study of her efforts as a supervisor, using
action research, to help students engage more effectively with the research process. The aim of
the study was to make effective changes to improve students’ motivation, commitment and
achievement with regard to completing a geography dissertation. It is argued that listening to
students and responding to their perceived needs is an effective way to improve supervision.
Initial findings showed students to be lonely and insecure about their dissertations and the
supervisor pressured by a considerable supervisory burden. Four cycles of action research were subsequently conducted with a group of eight dissertation students during one academic year. The research evaluated four interventions whereby the supervisor-researcher invited the students to:

- evaluate their progress;
- learn from examples of completed dissertations;
- share and support each other;
- engage in peer assessment.

Qualitative evidence demonstrates a shift from a status quo of individual supervisory meetings between poorly motivated students and a frustrated supervisor, to highly motivated students effectively empowered as independent self-learners and peer supporters. It is concluded that given the right circumstances students can be facilitated to ‘do it better themselves’.

The benefits of group and peer supervision were also found by Akister et al. (2006, 1) among social work students:

Results indicate that supervision of undergraduate students using small, supervisor-led peer groups is an effective paradigm for dissertation supervision. Advantages of the peer-group approach include: a much higher rate for completion on time; greater interest in their studies maintained during the process and less ‘failure-driven’ learning. The students’ gradings suggest that there is no detrimental effect on performance.

Rowley and Slack (2004, 180) argue that: ‘Undergraduate supervision is a highly demanding task, in which the supervisor plays a pivotal role in supporting students towards realising their potential.’ Supervision is traditionally viewed as the role of the academic. However, support mechanisms and structures can take on many different forms; from one-to-one supervision, group tutorials, peer support, lectures, workshops and employer supervision. Guidance and advice, which is the role of the supervisor, can be obtained from peers and through work-based supervision in the guise of employers and community workers.

**Online supervision**

One method, which can be utilised to great effect, is online supervision. This can support campus-based and distance learners, peer learning and hectic student lifestyles. Students use a virtual learning environment (VLE) to share experiences and post questions which other students may answer, leaving the supervisor to intervene only occasionally. As students can be demanding of supervisors (Harrison and Whalley 2006; 2008) using a VLE, such as Moodle or WebCT, as a supervisory tool can empower students to take ownership of the learning process, though experience suggests that to persuade students to engage the purpose and benefits for them need to be clearly articulated. At Reading University electronic feedback has been used effectively to provide feedback and assessment for learning in built environment dissertations (Tang 2012). VLEs may also be used to encourage students to undertake reflection. At Queensland University of Technology law students engage online with their workplace supervisor for a virtual research and inquiry placement (Case study 2.9).
Case study 2.9 Virtual law placement: Experiencing work integrated learning in diverse law graduate employment workplaces virtually at Queensland University of Technology, Australia

Virtual law placement provides law students with an opportunity for research and inquiry into a diverse range of working environments that are now available to law graduates, including international placements. Students are assessed through their submission of an application for their preferred placement, their contribution to an online discussion forum, the project and an ePortfolio reflection. They work as part of a team on a real-world law workplace project, for example, an internet-based intellectual property dispute; or listing a public company; or engaging in research about access to justice for juvenile offenders in regions of Thailand. Students apply legal knowledge and skills to complete a real-world workplace project in a team, using online communication technologies to enable students to be virtually, rather than physically, present at the workplace and to engage with the other participants, including the workplace supervisor of the virtual placement.

Supervisory relationships
Supervision is a central element of FYPD. It is vital in order to ensure that students are on the right path and adhering to professional and ethical guidelines. However, the supervisory relationship requires a careful balance between providing advice and guidance and allowing the student to experience their own learning journey – including making mistakes. At the University of Chichester students are guided in group contact sessions. The course leaders recognise that the supervision experience is a learning process for both students and professional supervisors as a result of their FYPD programme (Case study 4.4).

Case study 4.4 Trainee teachers making change happen in their professional world at the University of Chichester, UK

The Creativity 3 project has a simple goal: to challenge student teachers to make change happen so they develop the skills and confidence to do the same in their first jobs. It is a 15-credit module that gives final-year student primary teachers the chance to develop skills and confidence in creative problem solving in their professional world. Students work in small self-selected teams of around three to five students, addressing real-world problems over realistic timescales and, by the end of their projects, provide genuine products for external clients. Apart from a one-hour launch to the whole cohort, the only scheduled contact time for the module is an hour a week. These sessions are called Muffins & Mindmaps and free coffee, tea and hot chocolate are provided, along with muffins. Just one member of each group is required to be there, but the onus is on the participants to communicate the content to the rest of the group. These interactive and relaxed sessions provide chances to share news and tips with other projects, but also to focus on themes that will help projects succeed. All groups contribute to a newsletter to share ideas and show that the module itself is a creative, professional initiative. While tutors deliberately keep their distance, it is still easy for them to get very excited about the changes that students bring about. For example, one project created an adventurous and interactive curriculum and changed the practitioner with whom the students were working beyond recognition. The students now have a different professional philosophy, greater confidence, deeper awareness of learning and teaching issues, and a new positive relationship with peers.

Undertaking FYPD is likely to be the largest research-based project undertaken by an undergraduate student and that can be daunting. Light and Cox (2001, 139) comment that: ‘At undergraduate level,
projects are perhaps the only area where students may consciously feel they are taking risks.’ It is helpful for both the supervisor and students to keep an agreed record of the outcome of supervisory meetings and the targets set to be completed before the next one. Such records, as well as being good practice, can help protect supervisors and students if any complaints are later made about the quality of the supervision. In one study Sports Education students completed a proforma to comment on the feedback they received from their tutor while completing the dissertation. The findings identified key issues for practice within the dissertation supervisory relationship.

Furthermore, it was suggested by the students that this was an exercise with inherent merits for them: encouraging reflection on the learning process and helping them identify their responsibilities as independent learners. As a result, some students engaged more with the tutorial system and gained more from the experience (Mills and Matthews 2009, 108).

In providing positive supervisory support throughout students should also be supported in developing their graduate attributes including gaining skills in research and inquiry, reflection, and personal and intellectual autonomy (Barrie 2004; Moon 2004). One of the broader roles of supervision, which is often neglected, is to make explicit the longer-term benefits students may gain from the skills, attitudes and abilities learnt while undertaking their FYPD.

A useful framework based on expectations for guiding supervisory relationships is presented in Figure 1. If both the student and the supervisor complete it, then mismatches in expectations can be discussed openly. It was originally developed to assist the supervision of postgraduate theses, but is easily modifiable for FYPD. It is most appropriate for independent projects, but some of the questions may be useful for group projects (see also Marshall 2009).

A different framework has recently been designed by Luck (2012) (Figure 2). It sets out the key questions which students should ask about the project (plans, inputs, supervision, outcomes, and assessment) and the key responsibilities of the supervisors (validity, risks, support, objectivity, and equality). By getting the student(s) and supervisor to map these against each other in a matrix, or ‘wireframe’ as Luck calls it, helps identify which of the intersections are critical for their particular project. Figure 3 illustrates that even within a single discipline the intersections where the wireframe bulges may vary significantly for different kinds of project. The main value of the framework is that it facilitates a structured conversation between students and their supervisors around key issues which may not always be brought out explicitly and should help reduce the differences in conceptions of undergraduate research projects between students and staff (Stefani et al. 1997). Although developed in the context of dissertations in biosciences, the framework could easily be modified to reflect different questions and responsibilities relevant to other discipline contexts.

‘Providing a balance between student autonomy and staff support is challenging but essential’ (Hill et al. 2011, 337). In projects where students are working alongside academics and postgraduates, for example in a research group, supervisory relationships are rather different from undertaking a conventional dissertation. Students are then acting as co-researchers, in the form of apprentices. In such negotiated pedagogies there are ethical issues which should be worked through because of the unequal power relationships (Le Heron et al. 2006).
In this chapter we have reviewed some of the many ways in which the supervision of FYPD can be undertaken. As with the design of the projects themselves and how they are to be assessed, designing the supervisory process, in whatever form, should be considered before the project starts.

**Figure 1 Supervision expectations**

Read each pair of statements below and then estimate your position on each. For example, with the first statement if you believe very strongly that it is the supervisor's responsibility to select a good topic you would put a ring round '1'. If you think that both the supervisor and student should equally be involved you put a ring round '3' and if you think it is definitely the student's responsibility to select a topic, put a ring round '5'.

|   |   |   |   |   |   |
|---|---|---|---|---|
| 1. It is the supervisor’s responsibility to select a project topic | 1 | 2 | 3 | 4 | 5 | The student is responsible for selecting her/his own topic |
| 2. It is the supervisor who decides which theoretical framework or methodology is most appropriate | 1 | 2 | 3 | 4 | 5 | Students should decide which theoretical framework or methodology they wish to use |
| 3. The supervisor should develop an appropriate programme and timetable of research and study for the student | 1 | 2 | 3 | 4 | 5 | The supervisor should leave the development of the programme of study to the student |
| 4. The supervisor is responsible for ensuring that the student is introduced to the appropriate services and facilities of the department and university | 1 | 2 | 3 | 4 | 5 | It is the student's responsibility to ensure that she/he has located and accessed all relevant services and facilities to undertake the project |
| 5. Supervisors should only accept students when they have specific knowledge of the student's chosen topic | 1 | 2 | 3 | 4 | 5 | Supervisors should feel free to accept students, even if they do not have specific knowledge of the student's topic |
| 6. A warm, supportive relationship between supervisor and student is important for successful candidature | 1 | 2 | 3 | 4 | 5 | A personal, supportive relationship is inadvisable because it may obstruct objectivity for both student and supervisor during candidature |
| 7. The supervisor should insist on regular meetings with the student | 1 | 2 | 3 | 4 | 5 | The student should decide when she/he wants to meet with the supervisor |
| 8. The supervisor should check regularly that the student is working consistently and on task | 1 | 2 | 3 | 4 | 5 | The student should work independently and not have to account for how and where time is spent |
| 9. The supervisor should insist on seeing drafts of work to ensure that the student is on the right track | 1 | 2 | 3 | 4 | 5 | Students should submit drafts of work only when they want constructive criticism from the supervisor |
| 10. The supervisor is responsible for decisions regarding the standard of the project | 1 | 2 | 3 | 4 | 5 | The student is responsible for decisions concerning the standard of the project |

Adapted from a framework presented by Kiley and Cadman (1997)
Figure 2 A framework for supervisory relationships

The basic wireframe

Questions for the student to ask

**PLAN:** What is the project about? What strategy will we use? How will progress be monitored? Where are the milestones?

**INPUTS:** What will be expected of me? What hours of work are expected? What resources are needed? Will I be working with others? Can I contribute ideas?

**SUPERVISION:** Who will direct the research? Who do I turn to for advice? How often will we meet? Will meetings be recorded?

**OUTCOME:** What will the result look like? What format will it take? How should I write it up? What regulations should I follow?

**ASSESSMENT:** Which aspects of the work will be assessed? What are the criteria? Who will contribute to the assessment?

Supervisor’s responsibilities

**VALIDITY:** Does the project have subject validity? Is there a real research question? Is it educationally valid? Is it a route to learning? Can the student develop and flourish?

**RISKS:** What will success depend on? Are there threats to progress? Is educational outcome independent of process and result? Do I have full academic responsibility?

**SUPPORT:** Are adequate resources available? Are any uncertain? What training is needed? What backup is available? Can colleagues give support?

**OBJECTIVITY:** Is the assessment context clear? Will assessors be objective? Will ability be recognised? What happens if things go wrong?

**EQUALITY:** Does the project fit with departmental norms? Do all students have equivalent opportunities? Is project allocation fair? Will the project offer a balance of intellectual, generic and specific skills?

*Source:* Luck (2012)
Figure 3 Examples of application of the wireframe

Example 1: Expression of genes in fetal sheep kidney when mother is on low protein diet

Example 2: Critical review of literature on effectiveness of *Echinacea* as a cold remedy

Source: Luck (2012)
Celebrating and disseminating the end of a final-year project and dissertation (FYPD) is an important aspect to the overall process and provides public recognition of the student as producer role. When students are given a chance to celebrate their achievements it is appreciated. Additionally, it can be an opportunity for all of those who have supported the students to come together and can inspire students in earlier years. Where potential employers are invited it provides opportunities for networking (eg Case study 1.10 in Chapter 6). Hence it is worthwhile when designing FYPD to consider how to build in a celebration where students can be congratulated and demonstrate their efforts and achievements. There are aspects of the end of year degree shows, common in art and design schools, which other disciplines might consider adapting to celebrate and disseminate the work of their students and in particular FYPD. For example, undergraduate research conferences and publications may be appropriate ways for other disciplines to disseminate and celebrate student work (Healey and Jenkins 2009; Walkington and Jenkins 2008).

Celebrations at the end of the project can include the class or larger audiences through showcase events and presentations. Showcasing students’ work can challenge them to engage with multiple audiences. It also requires students to draw on a range of skills in order to disseminate key information from their project and provides students with the chance to ‘feel that they have been given the best opportunity to express their ability in their discipline, but also convey something of themselves [and] what the subject means to them’ (Light and Cox, 2001, 169). The showcase may not necessarily be assessed and can act solely as a form of celebration at the end of a project, though unless there is the incentive of marks being awarded some students may not participate.

The Boyer Commission (1998, 24) emphasises the importance of communication and dissemination:

Every university graduate should understand that no idea is fully formed until it can be communicated, and that the organization required for writing and speaking is part of the thought process that enables one to understand material fully. Dissemination of results is an essential and integral part of the research process, which means that training in research cannot be considered complete without training in effective communication.

Going public with the students’ work is one of the simplest ways to raise the standard of the work produced, because when they know their peers, friends, relations, academics, professionals and community members may see their work they are more likely to put in the effort to produce their best work. Oral as well as written communication is critical. In the Gemstone project at Maryland student teams have 30 minutes to present findings to an audience including a group of discussants at a thesis
conference before answering questions for 30 minutes (Case study 5.19 in Chapter 4). They have a rehearsal six to eight weeks before the conference. At some institutions the celebration of undergraduate research is such a part of the culture of the institution that they invite students who are applying to the university to come along with their parents to meet the presenters and see what kind of work they might be engaged in, should they come to the institution (Case study 3.13).

### Case study 3.13 Undergraduate research celebration days in the US

Several US institutions have a special day, days or even a whole week in which students from across the institution present their research – generally by posters but also through talks, exhibitions or performances. These are often accompanied by talks from leading researchers in that institution or nationally. Audiences for such events are faculty, fellow students; and in some cases, eg Boston University and Bates College, the dates for such events are carefully selected to ensure parents, potential students, alumni and potential sponsors can attend (Huggins et al. 2007).

In 2012 the University of New Hampshire celebrated its 13th undergraduate research conference; over 1100 students participated over ten days.

A variant on the research conference could be to adapt for FYPD students the Three Minute Thesis competition which was originally devised by the University of Queensland for research students and is now a Trans-Tasman competition; it has also been adopted by a number of institutions around the world (University of Queensland 2012). In the original version graduate students had three minutes to tell a general audience about their research and how it’s going to change the world. They are allowed only one PowerPoint slide. A similar structure could be used within departments and across faculties and institutions for FYPD. Another way of disseminating the findings of FYPD more broadly is to ask students to submit a 30-60 second video explaining their FYPD to a general audience (Flaherty 2013).

FYPD are about enhancing students’ understanding, knowledge and skills. Too often the potential to celebrate the outcomes of the students’ hard work and dedication to their FYPD and to disseminate their findings to a wider audience are missed. Spronken-Smith et al. (2013) have developed a useful research dissemination framework, which complements Willison and O’Reegan’s (2007) research skills development framework. They map a range of examples of undergraduate research and inquiry dissemination against a matrix of exposure of the work (from module to international level) and level of autonomy (from teacher directed to student directed).

Some students have the opportunity to disseminate their findings at national undergraduate research conferences. The National Conference on Undergraduate Research in the US regularly hosts 2,000 students and their faculty mentors, while recently founded conferences in Britain (British Conference of Undergraduate Research) and Australia (Australian Conference of Undergraduate Research) are attracting over 200 delegates each (Brew 2012; Hampton-Reeves 2012). Their activities are beginning to be noticed by higher education policy makers. There is a regular ‘Posters on the Hill’ event in Washington DC. The first ‘Posters in Parliament’ celebration took place in London in January 2013 and a similar event is planned in Canberra, Australia.

### Celebration and dissemination case studies

The following four case studies explore how opportunities for celebration and dissemination can be incorporated into FYPD; thereby providing a platform for students to enhance their communication skills or simply rejoice at completing the project. The first case study, ‘Geoverse’, gives students an
opportunity to publish their own work in an academic journal and demonstrates how students may collaborate to gain publishing experience (Case study 4.7).

Case study 4.7 Geoverse: A national journal for undergraduate research in geography at Oxford Brookes and three other universities, UK

Geoverse is a national undergraduate research journal for Geography which has been piloted in four institutions. The geography departments at Oxford Brookes University (the lead institution), Queen Mary, University of London, the University of Gloucestershire, and University of Reading comprise the editorial board of the journal. Geoverse publishes student-led original research based on theoretically considered and empirically-based investigations undertaken at undergraduate level. The aim is to motivate and reward students for innovative research practice, and give them support through the review process before disseminating their work by publishing it. Papers are reviewed by a panel of postgraduate students.

Students at Oxford Brookes undertake a compulsory second year module called Geography in the Field where they go on a field trip and work in groups to collect data. An optional third-year honours module enables students to write up their research as a paper with supervisory support from a tutor. This resulted in many students becoming authors of research papers but in a supervised manner. This helps fill a gap in the research cycle for undergraduate students because they did not get the same kind of constructive, meaningful and useful feedback that an academic would get from going to conferences, putting papers in, and getting feedback from peer reviewers. In this module students get dialogic feed-forward on their work and they are provided with an opportunity to disseminate their research through organising undergraduate conferences as well as the opportunity to publish in Geoverse.

The work has also impacted on the work of colleagues in other institutions and transformed their curricula. Colleagues at the University of Reading have replaced an examination with writing a journal article for Geoverse. The University of Gloucestershire has developed an assignment for which students write a collaborative journal article. At Queen Mary, University of London they have an expedition to Iceland. Students are given the opportunity to produce a research paper for Geoverse on their return.

The second case study, at the College of Wooster, involves an Independent Study (IS) programme and demonstrates how the whole institution can come together to celebrate. There is an academic element, with students showcasing and presenting their work to peers, academics, family and community members, but also a sense of fun in their celebrations on ‘IS Monday’, the hand-in deadline for all projects (Case study 3.9).

Case Study 3.9 Independent Study programme at the College of Wooster, US

Independent Study (IS) is a year-long project conducted by all senior students and is an integral part of the Wooster degree. Students are given opportunities to develop their skills, to support them in the completion of their IS, from their first year, and are offered an opportunity to participate in Wooster's Summer Research Program, which acts as an apprenticeship. The IS programme allows students to demonstrate skills and abilities that employers value. It is an individually-designed study completed in collaboration with a mentor. IS can culminate in a major research paper, an art exhibit or a performance. Students are required to conduct a literature review and plan and carry out research in an appropriate environment (ie lab, theatre, or studio).
At the end of their project students make an oral presentation to defend their research. There are also opportunities for celebration. There is the hand-in deadline, IS Monday, which ends with an IS parade. The Senior Research Symposium, a celebration of IS, enables students, staff, peers, parents and community members to celebrate the accomplishments of students in their senior year. It is a day where student classes are cancelled and they stage presentations and art exhibitions to demonstrate their knowledge and achievements.

In the third case study, at a small private university in Alaska, all students give an oral presentation of the findings of their senior project to the university community (Case study 3.14). In larger universities this might be more appropriately done at programme or departmental levels and spoken presentations might be replaced by posters.

**Case study 3.14 Final-year project presentation at Alaska Pacific University, US**
All students across the disciplines undertake a senior project and present it to the campus community on designated days at the end of each semester. Thus students experience both the process of researching and also communicating findings in spoken presentations. The institution has a strong commitment to active and research-based learning and they now market themselves as ‘The University of Active Learning’. They have a strong year one orientation to active learning and a range of required courses in all years involving research techniques and projects which lead into the required final-year senior project. There is a strong applied focus. As well as a formal research paper, students in discipline groups (mainly Environmental Sciences, Human Services, and Business) present their research as a professional public presentation. The presentations are advertised to faculty, staff and students, as well as interested members of the public. Other classes are cancelled so that the student body can attend. Often those researched attend. The final assessment is a 40-60 page research paper, the quality of the presentation including handling of questions. While numbers of graduating students are small (c70 per year) the idea of a public presentation as part of the final-year project could be adapted by larger departments and institutions.

In the final illustrative case study, resources selected students at Ball State University work on an immersive inter disciplinary project with a member of faculty; this requires them to create a product, such as a DVD, which will engage the public in conversation. One project, on the State of Sexual Assault, won an Emmy Award (Case study 3.5).

**Case Study 3.5 Changing institutional and undergraduate perspectives and approaches to education: The state of sexual assault undergraduate project at Ball State University, US**
Ball State University promotes immersive learning: an inter-disciplinary concept which combines content, skills, societal need, and students’ interests into a transformative learning experience. Each year, four Ball State University faculty members are chosen to lead teams of 15 students in inter-disciplinary, immersive seminars. The students are chosen by application or audition. Working together with a community sponsor, each group of faculty and students creates a product to engage the community in public dialogue. To demonstrate how the Virginia B. Ball Centre for Creative Inquiry supports academics, students and community groups, the State of Sexual Assault project is presented as an illustrative example.
Students immersed themselves in a project which took a victim-centred perspective of the sexual assault casework process. The seminar then produced a short documentary, State of Assault, addressing current issues around DNA processing, laboratory technologies and evidence collection protocols. The project linked directly with Madison County Sexual Assault Treatment Centre, Indianapolis-Marion County Forensic Services Agency, and other regional support bodies to address the needs and rights of sexual assault victims. The inter-disciplinary seminar culminated in a marketable DVD documentary with interviews and hands-on activities outlining the evolving needs and trends in sexual assault case management. State of Assault won an Emmy Award in 2009 in the editing/story category. It has been shown in several local, regional, and national venues.
9. Conclusions and recommendations

Academic disciplines should be free to choose what is appropriate to measure independent, advanced learning for their students … having a uniform approach to demonstration of honours-level achievement is arbitrary (Huggins et al. 2005).

Final-year projects and dissertations (FYPD) are a topic of international interest, whether we are discussing the honours dissertation in the UK, capstone projects in North America and Australasia, or undergraduate projects to conclude Bachelor degree courses in Europe to meet the needs of the Bologna Accords. However, there is increasing pressure to rethink the form of the traditional FYPD in response to the growth in student numbers and diversity of motivations to study, the expansion of professional degrees, lack of relevance to some courses and future careers, and the reduction in the numbers of staff/faculty to supervise projects. This book has sought to identify innovative and creative solutions for developing FYPD to meet the requirements of students from different backgrounds, aspirations, disciplines and kinds of institution in the context of diminishing resources in many countries in the 21st century. As Hill et al. (2011, 344) conclude: ‘Ideally a final-year research project should inspire and challenge a student to think in new ways, to apply their expertise to explore and solve problems, and to share that thinking and new experience with peers.’ Moreover our argument is that the key challenge for each programme is to think creatively about the variety of ways in which FYPD may reflect the defining characteristics of higher education and give some choices, but still be sensitive to the nature of individual subjects and the culture of the department and institution in which the programme is taught.

Conclusions
We can summarise the key conclusions derived from earlier chapters in this publication in the following 12 points:

1. Final-year projects and dissertations (FYPD) are an example of a wider set of activities in which students are producers of knowledge and not just consumers. A wide range of different kinds of FYPD exist; these are reflected in the 70+ case studies listed in Appendix 1 and are summarised in the dimensions of FYPD (Table 2 in Chapter 2) and alternative possibilities for dissertations (Table 4 in Chapter 3).

2. The traditional dissertation is rightly valued in terms of the range of beneficial impacts it has for student learning; it can result in transformative learning experiences for many students. However, not all students and staff find it a suitable or beneficial experience. Diversifying the range of forms of FYPD and the way they are assessed can meet the needs and aspirations of a wider range of students, particularly those completing professional degrees and those seeking employment outside academia.

3. Although we have emphasised FYPD which are relatively innovative in their context it is important to note that they share a common set of features. The key characteristics of FYPD are given in Chapter 3.

4. The wide range of skills acquired through the many forms of FYPD that we encountered suggests significant benefits can be made regarding student employability. These skills support
students’ development by encouraging them to become empowered, confident and capable learners.

5. Although we found a wide range of different approaches in terms of the design of the projects, the way they are undertaken and assessed, and the form of the outputs, it is somewhat surprising to find, the relatively limited choice that students appear to be given. In less than 20% of the case studies we collected is there an explicit element of choice. Despite all the innovative ideas we encountered, it appears that most programmes continue to operate a one-size-fits-all policy to those taking their FYPD. However, as we have seen in the case studies which include an element of choice about the type of project or the form of assessment, it is relatively easy to include this in the design, while recognising that different kinds of choices are appropriate in different disciplines, institutions and countries.

6. For students to produce high quality FYPD it is essential that preparation starts early in the programme, ideally from the first year onwards (Chapter 4).

7. Students in several disciplines have benefited from FYPD which have involved links with community groups or employers; these real-world learning experiences provide an excellent way for students to develop graduate attributes which prepare them for life after university (Chapter 5).

8. Diversifying the form of assessment of FYPD can increase the interest and ownership of students in the process. This can be encouraging students to showcase their work in a variety of ways, including undergraduate conferences, end-of-year shows, presentations to colleagues, academics and professionals, the production of documentaries and consultancy reports, as well as, or in some cases instead of, writing theses. Integrating self and peer assessment into the design of FYPD and explicitly assessing the development of project skills may also be beneficial to student learning (Chapter 6).

9. Where choices in the nature of the project and the way it is assessed are introduced it is essential that standards are comparable. The most straightforward way to ensure this is to use similar, or in some cases identical, assessment criteria and to provide clear marking guidance so that a common understanding of their meaning and application is shared among the markers (Chapter 6).

10. Supervising FYPD can consume considerable staff/faculty time and energy. Providing information in the form of guides and question and answer sessions, using group supervisions, and facilitating ways for students to support each other can reduce the staff time required. Focused discussions between supervisors and students and greater consistency can be encouraged through the use of tools, such as the student expectations framework (Figure 1 in Chapter 7).

11. Although some of the best dissertations may be placed in the library, in most disciplines few people see FYPD other than the students who undertake them and the academics who assess them. Yet making work public is one of the simplest ways of raising the quality of work and acknowledging the amount of effort put into it. We have something to learn from the end-of-degree shows common in art and design schools. At some universities the celebration of
undergraduate research is such a part of the culture of the institution that they invite applicants to the institution to come along with parents and supporters to meet the student presenters and see the kind of work they might be engaged in, should they come to the university (Chapter 8).

12. Much attention in this project has been given to collecting case studies of FYPD from a wide range of disciplines, differing institutions and countries. The experience of the events, workshops and conferences at which we have presented has shown how effective these are to challenging academics to think beyond the current ways that they undertake FYPD.

What next?
This book has focused on developing a conceptual understanding of the nature of FYPD and analysing and celebrating, through the collection of a large number of case studies from around the world, the diverse forms they may take. This has led to practical guidance on how to design FYPDs and to develop supportive policies to ensure that innovative ideas are put into practice. There are important research and development agendas, which can build on this enhanced understanding and interest. On the research side, there are wide gaps in our knowledge and understanding of both the experience of staff/faculty who redesign or offer alternative FYPD and their students’ experiences in undertaking them. Such studies would complement those undertaken of staff and student perceptions of the traditional honours dissertation (eg Malcolm 2012; Stefani et al. 1997). On the development side, the growing interest in the sector in students as change agents provides opportunities for staff and students to co-design FYPD and co-research into their impacts (Healey 2012).

Recommendations
The following recommendations arise from this book:

- **Encouragement and support of academic staff and institutions to create distinctive FYPD opportunities is more likely to be successful than prescription.** In the conferences and workshops where we have discussed the findings of this project we have repeatedly found that adapting practices to local conditions was more important than adopting off-the-shelf practice. Institutional context is vital for the success of new FYPD initiatives. Progress towards greater opportunity for active learning and self-direction within FYPD can only be achieved through knowledge and guidance, which this project has sought to address, and by investment in the future of the higher education student experience.

- **Giving students a choice in the form and assessment of FYPD will help to meet the varied needs of the student body studying in higher education.** This is likely to motivate a wider range of students than the one-size-fits-all approach, which characterises most FYPD, and hence increases the probability that more students will experience transformational learning. For many students the FYPD is a capstone experience, but for others it is the fulcrum on which their degree rests and an entry into postgraduate study or transition into professional life. Designing FYPD which allow for varied purposes and motivations is a major challenge for higher education.

- **Institutional quality assurance and ethical procedures need to be appropriate to allow a range of FYPD to flourish.** To minimise additional validation requirements the easiest way to allow choice is to have several different versions of FYPD under the same module code. The examples we have uncovered during the project all meet the same learning outcomes and are
assessed similarly, though the weightings given to different components may vary. By having the choice within a module means that it is easier to modify the details of existing modules than having to validate a new one. As for ethical clearance, clearly approval is required where, for example, FYPD involve human subjects. However, some institutions appear to be taking the risk-averse culture to extremes and operate a blanket ban of undergraduates contacting people and organisations outside the university. This prevents their students undertaking many relevant topics and gaining skills, such as undertaking interviews and questionnaires, and puts their students at a disadvantage both in what they learn and in applying for graduate school or employment, compared with students studying at other universities who have less draconian policies.

- A variety of strategies is desirable to address the issue of reduced staff/faculty resources to supervise FYPD. The key approach is better preparation in earlier years of the programme so that the students develop the skills of designing and executing research and inquiry projects and hence require less staff supervision when it comes to FYPD (Chapter 4). Thus the FYPD is integrated holistically into the degree programme. Greater use of group supervision and peer support (Chapter 7) should also take pressure off staff. In some cases group rather than individual projects may be an alternative. In such cases designing effective ways of redistributing marks to recognise differences in the quality of contributions from individual team members may be necessary to persuade students that their efforts are rewarded and that they are not carrying passengers (Chapter 6).

- FYPD guides should include both a list of essential features that need to be part of any project or dissertation, as well as an open-ended list of possible shapes and forms they can take so long as the essential features are present. This should encourage students to be more creative and to experiment with new forms of FYPD if they would like to go beyond the 'standard' 8-12,000 word written thesis.

- For future research there is a fruitful area to explore in terms of the experience of staff in rethinking their FYPD and introducing them into the curriculum and the experience of their students in taking them. This project has identified many positive comments from staff about usefulness of the case studies. Now what are required are more systematic studies to explore further the desirability of involving students both as co-designers of FYPD and co-researchers into their impacts.


Ahmad, A. (2013) Personal communication.


Appendix 1 - List of case studies by discipline

Space only allowed selected brief case studies to be included in the text. The full case studies of these and other examples collected during the project and the sources on which they are based may be found on the project website (http://insight.glos.ac.uk/tli/activities/ntf/creativehops/pages/default.aspx) in the order given below. Recently added brief case studies are included in the FYPD handout available from: http://www.mickhealey.co.uk/resources.

**Arts, design, media and humanities examples**

1.1 Giving students alternative assessment options for undertaking a product design project at **Nottingham Trent University, UK**
1.2 History students contribute research findings to a website at **Victoria University, Canada**
1.3 Design dissertation: From practice to theory and back again at the **University of Greenwich, UK**
1.4 Advanced Newsweek: Work-based learning and employability skills for student journalists at the **University of Gloucestershire, UK**
1.5 Community sector work placements as capstone projects at **Swinburne University of Technology, Australia**
1.6 Developing authentic undergraduate research in art and design at **Nottingham Trent University, UK**
1.7 An extended essay as an alternative to a dissertation in a radio production degree course at the **University of Gloucestershire, UK**
1.8 Producing artefacts through collaboration in media production at the **University of Gloucestershire, UK**
1.9 Final-year work-based projects in the humanities at **Sheffield Hallam University, UK**
1.10 Learning from industry professionals and a student-led conference on contemporary issues in arts management at the **Liverpool Institute for the Performing Arts, UK**
1.11 Entertainment technology dissertation at **Staffordshire University, UK**
1.12 Letting the apple fall further from the tree: The creation of a guide to inform students of the diversity of possible forms that an English language dissertation can take at the **University of Gloucestershire, UK**
1.13 Exploring contemporary literature at **Oxford Brookes University, UK**
1.14 Music and the dissertation at **Oxford Brookes University, UK**
1.15 Creative exchange: Multidisciplinary media arts practice in an industry context at **James Cook University, Australia**
1.16 BA (Hons) Popular Music: An alternative approach to assessment design of a research project module at **Colchester Institute, UK**
1.17 Developing the reflective practitioner in performing arts at the **University of Winchester, UK**
1.18 Style in performance in music degree at the **Royal Scottish Academy of Music and Drama, UK**
1.19 Engaging students in digital humanities in an archives and public history curriculum at **New York University, US**
### Business, hospitality, law, sport and tourism examples

2.1 Engaging students in applied research through a community sports development consultancy project at the **University of Central Lancashire, UK**

2.2 Modelling the research experience: Tourism students’ virtual conference at the **Universities of Lincoln and Wolverhampton, UK**

2.3 Students participate in a research project on criminal justice linked to staff interests at **Australian National University, Australia**

2.4 International on-course market research experience for final semester Bachelor of Agribusiness students at the **University of Queensland, Australia**

2.5 Events management live consultancy project, at the **University of Gloucestershire, UK**

2.6 Coaching and community development at **Southampton Solent University, UK**

2.7 Implementing a research active curriculum at the **University of Sunderland, UK**

2.8 Researching contemporary management issues: An alternative to the final-year project at the **University of Winchester, UK**

2.9 Virtual law placement: Experiencing work integrated learning in diverse law graduate employment workplaces virtually at **Queensland University of Technology, Australia**

2.10 Broadening final-year projects through use of major and minor thesis requirements at the **Japan Advanced Institute of Science and Technology, Japan**

2.11 Students solving real-life projects in computer science and software engineering at the **University of Sheffield, UK**

2.12 Charity fund raising final-year project in business and management to enhance employability at the **University of Bradford, UK**

2.13 Management practice in real-world projects at Hong Kong Polytechnic University, **Hong Kong**

2.14 Final-year work placement: An alternative to the dissertation in events management at the **University of Winchester, UK**

2.15 Language students work in teams on international market research projects at **Leeds Metropolitan University, UK**

### Inter-disciplinary and cross-institutional examples

3.1 Compulsory community-based learning capstone project at **Portland State University, US**

3.2 Unravelling complexity at **Australian National University, Australia**

3.3 Inter-disciplinary inquiry-based learning (IDIBL) focused on action research in the workplace at the **University of Bolton, UK**

3.4 Academic credit for employability skills at the **University of Gloucestershire, UK**

3.5 Changing institutional and undergraduate perspectives and approaches to education: The state of sexual assault undergraduate project at **Ball State University, US**

3.6 Involving students in inter-disciplinary interactive media consultancy projects at **Miami University, Ohio, US**

3.7 Working inter-disciplinary with communities in the UK, Kenya and Zambia to design, produce and sell a children’s book at the **University of Central Lancashire, UK**

3.8 Work-based alternative to the dissertation at Masters level: Staff engaged in action research at the **University Centre Yeovil, UK**

3.9 Independent study programme at the **College of Wooster, US**

3.10 Dissertation Question Time: Supporting the dissertation project through panel discussion at **Brunel University, UK**

3.11 Engaging students through empowering them to co-create the curriculum at the **University of Newcastle, UK**
3.12 Engaging students in investigating research support and developing web resources at the University of Newcastle, UK
3.13 Undergraduate research celebration days in the US
3.14 Final-year project presentation at Alaska Pacific University, US
3.15 The undergraduate capstone project guidelines at Claflin University, South Carolina, US
3.16 Community-based research at Bates College, Maine, US

Education, social, environmental, and health sciences examples
4.1 Service-learning programme in Faculty of Education at Queensland University of Technology, Australia
4.2 Giving students first-hand experience of research-based consultancy in environmental management at the University of Queensland, Australia
4.3 Preparing and defending a consultancy report in environmental geology at Kingston University, UK
4.4 Trainee teachers making change happen in their professional world at the University of Chichester, UK
4.5 Students act as research consultants in joint degree in education, sport and leisure at Nottingham Trent University, UK
4.6 Empowering communities through asset mapping and GIS, a series of senior capstone courses at Portland State University, US
4.7 Geoverse: A national journal for undergraduate research in geography at Oxford Brookes and three other universities, UK
4.8 Research and inquiry-based practice dissertation for undergraduate qualified nurses at the University of Southampton, UK
4.9 Encouraging students’ critical engagement with community-based publics and issues at Birmingham City University, UK
4.10 Geography workplace project at Staffordshire University, UK
4.11 Bachelor thesis in international co-operation and development for pre-primary and primary school teachers at Scuola Universitaria Professionale della Svizzera Italiana, Switzerland
4.12 Final-year students undertake team research projects on local environmental issues at the University of Gloucestershire, UK
4.13 Helping students to engage more effectively with the research process in undertaking their undergraduate dissertations at Keele University, UK
4.14 Student poster conference linked to dissertation in psychology at St Mary’s University College, UK
4.15 Designing a research capstone experience for pharmacy students at Southern Illinois University Edwardsville, US
4.16 Capstone service-learning project in geography at the University of Canterbury, New Zealand
4.17 Promoting oral health in a local community at the University of Otago, NZ

Science, technology, engineering and mathematics examples
5.1 Collaborative and student-driven learning approaches to capstone units in ICT at Macquarie University, Australia
5.2 Nurturing biochemical research skills in a group laboratory-based capstone unit at the Queensland University of Technology, Australia
5.3 Chemistry ‘concentrated study’ project at the University of St Andrews, UK
5.4 Research into practice: An alternative format for final-year biosciences honours project at the University of Plymouth, UK
5.5 The mechanical engineering final-year project at the University of Adelaide, Australia
5.6 Linking students with industry through Co-operative Education for Enterprise Development (CEED) in four Australian Universities
5.7 Communicating maths at the University of Bath, UK
5.8 Biosciences final-year project at Durham University, UK
5.9 GIS management in industry at Curtin University, Australia
5.10 Bridging the gap between textbooks and scientific research in cell biology at University of Utrecht, Netherlands
5.11 Integrating professional and technical competencies in a final-year capstone design course at the University of New South Wales, Australia
5.12 Alternative final-year projects in the biosciences at the University of Leeds, UK
5.13 Students undertake paid internships as agents of change or educational researchers in biosciences at the University of Leeds, UK
5.14 Facilitating student professional readiness through industry sponsored senior capstone projects at Western Carolina University, US
5.15 Dissertation in database professional MSc by portfolio at Sheffield Hallam University, UK
5.16 Developing and professionally managing video-games at Utah game forge, at the University of Utah, US
5.17 Reorganisation of labs to develop research independence in agricultural science at the University of Tasmania, Australia
5.18 Science undergraduates build on research of previous students at University College London, UK
5.19 Across department undergraduate research programme in the College of Engineering, Maryland, US
5.20 Students work in multi-disciplinary teams on both year-long engineering capstone projects for corporate sponsors and two- to three-year-long entrepreneurial sustainable projects at Olin College, US
5.21 Bioscience Horizons is an undergraduate research journal published by a mainstream publisher, UK
Comments by readers

Oozing with great examples; it will be a terrific resource (Rachel Spronken-Smith, Otago, New Zealand).

I found it extremely interesting and enjoyable to read, comprehensive and full of good ideas. The style of writing is clear, accessible and readable. It will be a valuable and reliable resource for colleagues (Martin Luck, Nottingham, UK).

It provides a wealth of information and ideas about the development of final year projects. … The wide range of case studies - both across disciplines and from different countries - helps to demonstrate that these are not just isolated examples of good/innovative practice, but can be a fundamental element of undergraduate education. I particularly liked the focus on graduate attributes and the development of applied learning. I also liked the emphasis on student involvement in the design and assessment of projects (Stephen Jackson, QAA, UK).

An excellent and timely resource (Bettie Higgs, University College Cork, Ireland).

It is a very clearly written and accessible overview of final year projects which brings together a rich variety of examples of good practice. I’ve no doubt it will be an important book which will help to drive innovation across the sector (Stuart Hampton-Reeves, University of Central Lancashire, UK).

I really like FYPD - it's grounded and sensible. Full of pragmatic examples (Stephen Hill, University of Gloucestershire, UK).

FYPDs are Persian carpets which should be in the reach of all higher education programmes. I see FYPDs as the academy's signature of what is meant when research marries teaching (Arshad Ahmad, Concordia University and President of the Society for Teaching and Learning in Higher Education, Canada).

A treasure trove of conceptual thinking, reviews of the scholarly and research evidence, and shining through the publication a wide ranging set of international case studies to enhance the practice of course teams, departments and institutions (Alan Jenkins, Oxford Brookes University, UK).
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