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# Designing and implementing interdisciplinary undergraduate subjects

Final Report

The University of Melbourne

Dr Victoria Millar  
Dr Maurice Toscano  
Dr Chi Baik

[www.cshe.unimelb.edu.au](http://www.cshe.unimelb.edu.au)

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Requests and inquiries concerning these rights should be addressed to:  
Office for Learning and Teaching  
Department of Education

GPO Box 9880,  
Location code N255EL10  
Sydney NSW 2001

<[learningandteaching@education.gov.au](mailto:learningandteaching@education.gov.au)>

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## Executive summary

Universities are increasingly introducing interdisciplinary subjects into their curricula. Such subjects are seen to provide students with access to some of the big issues in society while also providing a solution to some of the more instrumental concerns with higher education, such as relevance and appropriate skill development for the workforce. However, interdisciplinary subjects are not well understood and their introduction is often accompanied by concerns about their quality and confusion around what precisely interdisciplinarity entails and how it is best supported and taught. This is in part due to the varying nature of interdisciplinarity and the many ways and stages that it can be included within curriculum. While there are common methodological and epistemological issues created in moving across disciplinary boundaries, practical advice on what type of interdisciplinarity best suits a particular purpose is difficult to find. Based on interviews with academics and students involved in three successful interdisciplinary subjects at The University of Melbourne, this project provides a critical analysis of how interdisciplinary subjects are designed and taught.

This project and the resultant report is primarily intended for university academics that are considering introducing interdisciplinary subjects or courses at their institution. The project does not offer an exhaustive answer to what best constitutes interdisciplinary teaching but rather provides a substantial starting point based on examples of best practice and the literature for thinking about some of the factors and influences that need to be taken into consideration when developing interdisciplinary subjects.

This report is presented over four complementary chapters that may be read in sequence or drawn on individually. The first chapter introduces the project and the scope of the research undertaken. The second chapter provides a review of the literature on interdisciplinary teaching at the university level. Chapter three covers case studies of the three interdisciplinary subjects that were investigated for the project and the main considerations around the design that were raised by the interview participants. The final chapter brings together the consistent themes that emerged from the case studies alongside the literature review.

It is clear from the literature review that while interdisciplinarity is often presented as an alternative to disciplinarity, the two are best viewed as complimentary in both the pursuit of new knowledge and in university teaching. Disciplinarity and interdisciplinarity in curriculum both have much to offer, a view shared amongst the academics interviewed for this project. That said there are a number of requirements that appear to be particular to the successful design and teaching of an interdisciplinary subject. Interdisciplinary teaching requires significant disciplinary depth and an ability and willingness to move across disciplinary boundaries. A strong academic team with a shared and consistent view of the purpose and aims of the subject was seen in all of the interdisciplinary subjects investigated. Communication amongst the academic team and with the students was ongoing and in general the face-to-face teaching and assessment reflected the commitment and aims of the subjects. This required considerable time, skill and resources amongst the teaching staff.

Support for staff developing interdisciplinary subjects through both workload models and professional development around the pedagogical and logistical considerations are two areas for further investigation that come out of this project. Alongside the need for a broader range of case studies from a variety of institutions to better understand the many manifestations and purposes of interdisciplinary subjects, an understanding of how such subjects can be well supported will make the place, implementation and teaching of interdisciplinary subjects more successful.

This report is also available on the Centre for the Study of Higher Education (CSHE) website. [www.cshe.unimelb.edu.au](http://www.cshe.unimelb.edu.au)

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# Chapter 1: Introduction

In recent years, there has been a growth in the number of “interdisciplinary” programs as universities showcase their capacity to prepare a new generation of thinkers and professionals (Lattuca, Voigt & Fath 2004; Millar forthcoming; Moore 2011). Universities are increasingly including subjects and courses that tackle highly complex problems, like global climate change and ageing, that are difficult to address adequately with the tools of any single discipline (Boix Mansilla & Gardner 1994; Davies, Devlin & Tight 2010; Gibbons *et al.* 1994; Lattuca, Holmwood 2010; Voigt & Fath 2004).

This Office for Learning and Teaching (OLT) seed project, which commenced in 2013, coincides with a major period of transformation of the Australian tertiary sector. As universities respond to changing regulations and student populations through a reinvigoration of their curricula, the place of the traditional disciplines and whether and how interdisciplinarity should be incorporated is being considered.

How best to maintain relevance while also providing students with the necessary knowledge and skills for the workplace, life and the ability to tackle society’s big problems inevitably results in questions about the balance between discipline-based and interdisciplinary components of curricula. The subtle restructuring of knowledge and increased borrowing across disciplinary boundaries has resulted in a movement against the traditional divisions of knowledge. It has also stimulated a steadily growing interest within the academic community in developing new knowledge through teaching and research that draws together the skills and perspectives of multiple disciplines (Klein 1990). Many supporters of interdisciplinarity see this as an opportunity for the transformation of the higher education sector through new modes of knowledge production and learning that seeks to bridge traditional disciplinary boundaries. Nonetheless it has also been argued that going too far down the interdisciplinary path might be detrimental to what is core to a university education.

Interdisciplinary courses are becoming a prevalent feature of university curricula. In 2002, nearly 40 per cent of university academics in the United States reported having taught an interdisciplinary course (Lindholm *et al.* 2002). This number is now expected to be higher and while the United States has a longer history of interdisciplinarity within higher education, Australia is equally seeing an increase in the number of universities incorporating interdisciplinary components within their curriculum, for example The University of Western Australia and The University of Melbourne.

The rapidly increasing number of these programs is often accompanied by concerns about the quality of programs and student learning, and confusion around what precisely interdisciplinarity entails. While there has been much written and researched in the areas of defining and investigating the emergence and manifestation of interdisciplinarity in its different forms (see for example Klein 1990; 1996; Jacobs and Frickel 2009; Mansilla *et al.* 2006; Van Leeuwen and Tijssen 2000), such discussions are spread across a broad range of literature resulting in a diffusion of the discourse. This is in part due to the varying nature of interdisciplinarity and the many ways and stages that it can be included within curriculum. Additionally, there is little acknowledgement within the practical advice available that interdisciplinarity manifests in a number of different forms.

While published work exists on the definitional and theoretical aspects of interdisciplinarity, there has been little work done, particularly in the Australian higher education context, on the practical aspects of designing interdisciplinary curriculum and teaching and assessing interdisciplinary learning. This seed project has undertaken an examination of the key features of interdisciplinary curricula in one institution with the aim of shedding some light on what is a difficult and complex area of teaching and curriculum design.

## Scope of project

Any consideration of interdisciplinarity must begin with a thorough understanding of what the concept means and how it changes students' outcomes and teaching approaches. This project provides a critical analysis of what interdisciplinarity is and some considerations around how best to implement interdisciplinarity within curricula dependent on the purpose. Chapter 2 presents a review of the current literature and discourse around interdisciplinarity. Chapter 3 presents the case studies investigated for the project and Chapter 4 provides some guidance around the design of interdisciplinary teaching and curricula.

The project is an empirically contained project that has focused on a single institution, The University of Melbourne. While limited in scale, The University of Melbourne nonetheless provides a rich source of interdisciplinary case studies as a result of the Melbourne Curriculum. In 2008, The University of Melbourne commenced a major curriculum restructure. As part of this restructure the university introduced a suite of interdisciplinary subjects to the curriculum. Undergraduate students are now required to take 20 per cent of their subject loading outside of the primary faculty in which they are enrolled. The project focuses on three different interdisciplinary subjects as case studies.

Importantly, the project recognises the diversity of interdisciplinary subjects that exist. There are a number of definitions and terms used to describe interdisciplinary work. Many try to capture the various degrees of integration of the disciplines. For the purposes of this project the following definition of interdisciplinarity will be used:

Interdisciplinarity 'integrates knowledge and modes of thinking from two or more disciplines or established fields of study to produce a cognitive or practical advancement for the benefit of the students that would have been unlikely through single disciplinary means' (Boix Mansilla *et al.* 2006, p. 70).

Rather than taking a more specific term or definition such as multidisciplinary or transdisciplinarity, this definition takes into account the broad spectrum of interdisciplinary activities allowing for the focus to be taken off typologies and instead be placed on the *practice* of interdisciplinarity. It also leaves open the degree of synthesis or integration required for interdisciplinary work. There is evidence to show that interdisciplinary teaching practices can vary in their levels of integration and that these levels can change over time (Klein 1990).

The majority of interdisciplinary subjects are organised around an overarching theme, topic or question, yet the logistics of how these subjects are taught varies greatly. There are two dominant models for teaching interdisciplinary subjects; neither would appear to be more or less common than the other. In the first model, interdisciplinary subjects are taught and run by individual academics. The one academic would be responsible for all of the planning and teaching for the course. In the second model, two or more academics are involved. The latter can introduce many variations where disciplinary collaboration can be involved in one, some or all of the planning, content design, teaching and assessment for the subject. For this project the team chose to look exclusively at the second model wherein disciplinary collaboration is occurring at some if not all stages of the interdisciplinary subject's development: from planning through to assessment.

Even within this model, subjects provide a number of different examples of how interdisciplinary subjects are organised. The degree to which disciplinary collaboration occurs varies depending on the subject. Some subjects have a very large planning committee with representatives from a wide variety of disciplines and experts from a range of areas, while others involve the main teaching staff being responsible for organising the

subject. The day-to-day teaching also varies. Team-teaching may involve academics presenting disciplinary perspectives one at a time, with other teaching members present or otherwise. Sometimes academics will present together and in some courses guest lecturers will provide information on a specific area of interest. These different models result in differing amounts of integration between the contributing disciplines. The connections between the different disciplines can vary from being made explicit by the academic teaching staff or being taught so students are implicitly required to make some of the connections themselves.

Three subjects were chosen as case studies for this project. *Science communication*, a second year subject aimed at extending Bachelor of Science students' communication skills. *The Poetics of the Body*, a large first year subject taken by students from across the disciplines that investigates the different ways the human body is used and explored from a range of disciplinary perspectives. *God and the natural sciences*, a second year History and Philosophy of Science subject that is taken by a mix of students and explores the intersection between religion and the natural sciences. These subjects were chosen as case studies for the project as they have a reputation for being well taught by both academics and students. Interviews were conducted with as many and in some cases all of the teaching staff in the subjects. Interviews were also undertaken with students of the subjects.

These case studies provide a small snap shot of how successful interdisciplinary subjects are run and begins to tease open some of the common issues faced and the common attributes of successful interdisciplinary subjects. Given the scale of this project, the project team recommends an expanded project to test and further examine the conclusions of this report through the exploration of a larger range of interdisciplinary subjects and supporting structures across a range of Australian universities.



## Chapter 2: What is interdisciplinarity?

Discussions of interdisciplinarity too often ignore the disciplines. Given that interdisciplinarity presupposes some conceptualisation of the disciplines it is important to consider the nature of disciplinarity and that a deeper understanding of interdisciplinarity will stem from this alongside an appreciation for why interdisciplinarity is so complex.

Much research has been undertaken to understand academic disciplines and the differences and similarities between them (eg Abbott 2001; Becher 1989; Bernstein 2000; Biglan 1973; Donald 1986; Dressel and Mayhew 1974; Hirst 1975; Scheffler 1965; Schwab, 1962, 1978; Stichweh 1992; Swoboda 1979; Trowler, Saunders & Bamber 2012). Disciplines are distinct in their content, methodologies, history and cultures. Recognition that disciplines differ not by one but many attributes has given rise to a number of multi-dimensional models and descriptions of the disciplines. Such typologies are not limited to disciplinary research and there is evidence that epistemologies and teaching styles are also discipline specific (Becher and Trowler 2001; Donald 2002; Jehng 1993; Paulsen and Wells 1998; Schommer and Walker 1995).

Of course on closer investigation of the disciplines it is clear that describing disciplines in this way only works at a broad level of analysis. On closer analysis it becomes clear that these kinds of models break down due to the dynamic nature of the disciplines and blurriness of the boundaries between disciplines. This means that there are some fields of practice that do not sit comfortably within a single discipline, for example economics and education, and that the disciplines are constantly changing and emerging with changes in technology, society, the economy, academia etc. In recent times the rise of biophysics and cultural studies are examples of this. These models, while they may not do justice to the complexity of the disciplines, do reveal the great variation between them. The content, the rules that guide them and the people that learn, teach or research within them all vary greatly.

It is commonly accepted that the role of the disciplines in the production of new knowledge is crucial in reducing complexity and shaping the formation of new knowledge (Sokal 1974; Woelert and Millar 2013) and provides the reason why the organisation of knowledge in universities has for so long revolved around the disciplines. To this day disciplines continue to be emphasised within the university structure (Clark 1983).

Interdisciplinarity functions as the other side of the coin of disciplinarity, reflecting the latter's dynamics of knowledge (Abbott 2001). So while there is a tendency in the literature to position interdisciplinarity as different from or an alternative to disciplinarity (see for pertinent discussions, e.g., Moore 2010; Jacobs and Frickel 2009; Abbott 2001; Klein 1996a; Gibbons et al. 1994), a more considered approach is that interdisciplinarity does not break with disciplinarity but presupposes disciplinarity in the process of developing novel methods and theories (Abbott 2001).

Research has shown that ideas, methods and theories successfully transit across disciplinary boundaries (e.g., Jacobs and Frickel 2009; Van Leeuwen and Tijssen 2000) and so rather than conceiving of interdisciplinarity as being opposed to disciplinarity it is rather coupled to it (Abbott 2001; Klein 2000; Woelert and Millar 2013).

As mentioned in Section 1, there are a number of definitions and terms used to describe interdisciplinary work. Many try to capture the various degrees of integration of the disciplines. It is worth reminding the reader that for the purposes of this project we adopt the following definition of interdisciplinarity:

Interdisciplinarity integrates knowledge and modes of thinking from two or more disciplines or established fields of study to produce a cognitive or practical advancement for the benefit of the students that would have been unlikely through single disciplinary means (Boix Mansilla *et al.* 2006, p. 70)

This definition takes into account the diversity of interdisciplinary activities yet allows for freedom in accounting for the degree of synthesis or integration required for interdisciplinary work.

Justification for interdisciplinarity generally comes in one of two forms, epistemological or instrumental with the latter form becoming increasingly dominant.

There are a variety of factors that influence the degree of integration. There is the issue that traditional university structures and funding bodies tend to reward strong disciplinary work but do not necessarily facilitate interdisciplinary collaboration for teaching (Braddock *et al.*, 1994; Petrie, 1976). Another issue is the epistemological barriers (or the differences in the disciplinary organisation of knowledge) and how these are overcome by disciplines that are trying to collaborate in interdisciplinary teaching. Part of this involves the need for induction into different academic discourses (Feyerabend, 1993). Conversation across the disciplinary boundaries requires a willingness to learn each other's languages, the techniques of data collection, analysis and everyday vocabulary (Gaff and Wilson, 1971). A good interdisciplinary conversation depends on a commitment to understanding one another's disciplines. This presents a significant epistemological barrier to all players in an interdisciplinary project.

Because there is so much variation between disciplines, it is difficult to predict how disciplines will interact. As disciplines change, many come into conflict or cooperation with other disciplines and it is not always the case that these interactions occur at the boundaries. Disciplines may collaborate because they complement each other or have overlapping knowledge; or interdisciplinarity can come about due to the development of more practical or applied commonalities. Whether interdisciplinary interactions occur for conceptual or instrumental purposes.

There are a number of variables and issues that need to be taken into account when examining interdisciplinarity. Coupling these with higher education teaching only adds to the difficulty. Designing interdisciplinary subjects requires an understanding of the value of discipline-based teaching and an openness and willingness to explore areas outside of the more traditional disciplines.

The following chapter offers insight into the curriculum design, structure and views of teaching academics and students in three successful interdisciplinary subjects at The University of Melbourne.

# Chapter 3: Case studies from The University of Melbourne

## Case 1: Science Communication

This second year undergraduate Science Communication subject aims to provide science students with a broader education than a traditional science degree. This subject was in part developed in response to some concern amongst university staff that students graduating from science degrees are seen to have limited communication skills. The subject was developed by a team that was keen to see communication skills more explicitly taught in the science curriculum.

Within the subject, students consider the range of purposes for communicating science and are then given the skills to be able to identify and communicate science effectively to a range of audiences.

... the main idea is to get people excited about how we communicate science and to give them skills to do it. (Subject lecturer)

The science communication subject provides an opportunity for students to develop these complementary skills alongside those that a typical science degree provides students. This is described by one student within the subject as follows:

The best thing I think was being creative within the scientific discipline itself. Because up until that stage, at school we were never taught to be creative doing anything scientific, and even now I'm at uni it's just straight up you learn the content. So having to think about these ideas a different way, in a way that we would need to tell people about it, was certainly very challenging. (Student)

The academics, tutor and the students all agreed on the main purposes and benefits of the subject as developing in science students that ability to communicate, across the different science disciplines, other disciplines and to a variety of public audiences and in a number of different forms. There were seen to be both vocational and non-vocational benefits from the subject. The students in particular saw a range of vocational benefits from the subject, including wanting to pursue a career related to the area of science communication through to being better able to demonstrate communication skills in the GAMSAT test. The subject teachers and students also made it clear that having a strong grounding in science, for both the students and teachers, was integral to the subject's success as that ensured everyone had a strong understanding of the scientific content that they were communicating. The subject is seen to be a step towards breaking down some of the inaccessibility of science, something that is seen of great importance in an age where debates around various aspects of science are discussed and important in the general community.

I think our idea of the subject was breaking down all the barriers that come between us and the general population, and to make the general population a lot less scared of what science is and to make them more accepting of it. (Student)

## Organisation of subject

The subject is taught by a group of three core academics (one of whom coordinates the subject), a range of guest speakers and a tutor. The subject is run with a two-hour weekly lecture and a one-hour weekly tutorial over the semester. The academics have a range of complimentary knowledge and skills. The academics that currently teach into the subject all have strong science backgrounds however they have since all gone onto to specialise in different aspects of science across research: IT, science education and philosophy of science. This means that they bring a range of experience and views of science in both the academic and public sphere but with a strong science base. These academics teach the majority of the lectures, each speaking to the area that they are strongest. This is then rounded out with guest lecturers that come to speak about specific areas of communication, for example speakers from commercial radio and newspapers.

In previous iterations of the subject, an academic that specialised in communication also taught into the subject however this is no longer the case and the coordinating academic now teaches this content. This was not seen to be an issue. Previous research shows that when interdisciplinary subjects such as this are co-taught often the ability for lecturers to move outside their initial knowledge base increases as they are exposed to and learn other disciplinary approaches to the subject material (Miller & Mansilla 2004).

In coordinating and designing the subject the subject coordinator emphasised the necessity that the design and teaching within interdisciplinary subjects be a collaborative process.

... otherwise it's just one person's vision, that then just has a little tiny bit of input from others here and there, then say 'oh look it's interdisciplinary, look someone teaches one lecture', whereas from the very beginning we were very clear on this is our core passion, but we are coming at it from different angles, this is how we want to set it up... I don't know if you could retrofit a subject to become interdisciplinary, I think it has to be that way from the beginning.  
(Subject coordinator)

The subject was designed by a group of academics together. This included both the teaching academics and other interested and invited individuals. This allowed for discussion around what the aims of the subject were and ensuring that these were common amongst the teaching staff. The core teaching academics together came up with a common list of five "essentials of excellent science communication". This is a list that the teaching staff all related to and refer to in their teaching, providing a common thread throughout the subject. The assessment is largely based on the five essentials. The subject coordinator also provides some continuity and integration across the semester by attending all of the lectures, her reasons for doing this are explained below:

It was challenging to work out how to give an overview to something so broad in one semester... So on the one hand, I wanted to have all the different voices, that was a very important part of it, but I didn't want the students to have no idea what had just hit them ... Which is why I decided early on that I would attend every class, even though it wasn't technically part of my teaching load so I heard exactly what they heard, and I was there to chat in the break in the middle of the two hour lecture, and I'd be there to chat before and after and during to make more of a community feel. (Subject coordinator.)

So in addition to having a common thread throughout the curriculum for the subject with the 'essentials of science communication', the subject coordinator provides a continual point of contact for students. This provides greater support for students in drawing links between the various aspects and teaching staff in the subject. This was also echoed in the interviews with students that felt that the disciplines were all brought together coherently and that there were no obvious distinctions between the contributing teaching staff and their expertise.

The subject teachers were all chosen as they are known to be engaging and enthusiastic teachers. This was seen to be particularly important given the nature of the subject material. Students were highly appreciative of the effort that the teaching staff put into the subject:

you had to go to all the lectures because they'd put in so much effort and they were so enthusiastic to teach you. (Student)

It made you more involved, I found anyway. (Student)

The tutorials for the subject were seen to be vital for discussing the concepts covered in the lectures and developing in students the skills that are required to develop within the subject. The tutor actively mixed students across the science disciplines to foster from the outset their ability to communicate to people from outside of their own disciplinary area. Students were enthusiastic about this approach saying that it stretched them and forced them to engage from early on in the subject.

## Subject Assessment

The assessment for this subject follows the course structure closely. There are three assessment pieces for the subject.

- 1) Written assignment: Writing for different audiences; 30%
- 2) Online science blog; 30%
- 3) Group project (made up of three parts); 40%
  - a) Press release
  - b) Visual material for primary school audience
  - c) Group oral presentation.

The first assignment requires students to write two, 500-word stories on an area of science for two different audiences. One story is to be written for an international science magazine and the other for a tabloid newspaper. The second assignment, the online science blog, requires students to contribute three times to a blog over the semester. The aim of the blog is to 'reflect on the role of science and technology in society' in an online publicly available blog and to comment once per week on peers' blog posts. The final assignment, the group project, forms the major assessment task for the subject and involves three students interviewing a Masters of Science student about their research. The group is then required to produce a press release, visual material for primary school audience and a group oral presentation on the research.

These three pieces are all assessed by criteria that emphasise the accuracy of science content and the development of communication skills. The assessment tasks are about 'testing particular skills' and the tutorials are particularly used to develop those skills. It is clear through the feedback from students and the teaching academics that the assignments are tightly aligned with the main aims of the subject and successfully develops and display students' science communication skills.

## Case 2: The Poetics of the Body

*The Poetics of the Body* (hereafter *Poetics*) is an interdisciplinary undergraduate subject offered by the *Centre for Ideas* (CFI) in the *Faculty of the Victorian College of the Melbourne Conservatorium of Music* (VCAM). It is primarily directed to students in their first year of undergraduate studies and is open to all students at the university. The lectures in *Poetics*

come from disciplinary specialists from faculties outside the VCAM, as well as organisations outside the university. The subject centers on the recognition that the human body informs, and is informed by, multiple disciplinary perspectives. More importantly *Poetics* begins with the premise that an interdisciplinary understanding of these perspectives is highly relevant in the 21<sup>st</sup> Century.

*Poetics* already had a precedent within the *Victorian College of the Arts (VCA)* (which later merged with the Faculty of Music to form the VCAM). As a collection of schools, the VCA faced many of the challenges and opportunities that came with the division of teaching and academic work into fairly well demarcated fields of artistic practice and training. In an effort to facilitate greater collaboration between the schools, in 2001 the CFI introduced a 'common curriculum' for the VCA with the aim of 'providing a course of study that advances both specialist arts practice and offers a broad educational program. The common curriculum is designed to enable students to consider the arts within a larger social, political and cultural contexts' (University Handbook). So, by the time *Poetics* was launched, the VCA already had experience in addressing the tensions inherent in promoting an interdisciplinary approach within a discipline-oriented organisational structure.

The subject aims to place multiple approaches on 'an equal footing'. *Poetics* examines the mechanistic and reductionist construction of the human body that has flourished in Western Modernity.

And to call attention to that is not difficult, to say that there's a belief system behind it, there's a system of the body, of the physical body, the body of belief, the body of law, the body of mythology, but let's look at it poetically. Let's use the creativity of what artists do, and crazy artists who improvise do, and put that on an equal level with specialists, with academics, with people that believe that this is the one way and this is what I know. (Subject coordinator)

Within the subject the human body itself serves the role of leveling disciplinary perspectives. As the subject tutor says: '...the human body: everything crosses through it, we all have one'. This is exemplified by the way the human body is presented through different lectures by specialists. The lectures in the subject are designed to give students access to specialist, disciplinary and expert knowledge about a particular rendering of the human body, but under certain conditions. There is an expectation that the guest lecturer have a solid knowledge of their field. More importantly, it is expected that the lecturers are able to communicate to a general audience while still doing justice to the complexity of the material being dealt with. Whilst it is important that lecturers are able to speak to a general audience, they need not address specifically the disciplinary backgrounds represented amongst the students in the subject, as these change with each cohort. The responsibility for bringing the disciplinary perspectives offered by the lecturers down to a single level rests with the subject coordinators and the tutorials play a particular role in this. This was described as thus:

But in the tutorials, somewhere between the tutorial and the guest speaker is where it all happens. Because I can bring, you know if I bring in someone like Stellarc who is doing really crazy technological things to the body, I can then talk about the Renaissance and talk about the view of the body and allopathic medicine and how the body is used in modern dance related to Stellarc's work. And so the tutorial becomes kind of like a context builder or something that the guest speaker doesn't have to do. And that seems to work incredibly well. (Subject tutor)

Much of the success of *Poetics* stems from the core subject teacher's capacity to consider, and get students to consider, the implications of what specialists have come to know about the world. But more importantly, these academics need to be able to examine the specialist literature and identify what is of significance. So, for example:

... with Epigenetics, the notion is that there are certain kinds of choices, or perceptions or chemical environments that switch genes on and switch them off. And one theory is that our actions and our choices can silence a gene or activate a gene. So if perception is changing the way our genes act, we better take perception pretty seriously. Now the mechanism of packing Histones and RNA messenger proteins and how they replicate and all of that, that's science class. So I need to be familiar with that, but I don't need to have a science degree to say here are the implications of this. (Subject tutor).

The subject is not about 'proving things' but rather showing that they can be investigated from 'lots of different angles' and that these different approaches supplement students' own specialist studies. These different approaches also affect students' relationship with the material, and this has the reciprocal effect of altering from cohort to cohort how the material is being explored.

Students also need to make sense of the connections and multiple perspectives by applying them in the context of their own disciplinary thinking and practice. This is an ability that the subject coordinator and tutor sees as important in his work as a composer. Just as his artistic work relies on conversations with knowledgeable others outside of his discipline so is his teaching. The teaching in the tutorials must 'be very carefully organised and carefully organised in conversation with other people'.

To this end, the tutorials are structured so that they utilise a plurality of teaching and learning approaches.

... you know a conversational, sitting in a circle throwing out ideas and throwing out opinions, is one type of tutorial. Going to a collection of art by Schizophrenics, and really tearing through that and not talking at all, that's another. One where I'm presenting and it's really sitting at the whiteboard, and it's like this, it's like this, that's another. So what I do is, I don't try to synthesise or hybridise them, but to have different cosmologies of tutorials.

What is most important is that there is a reason for each and every approach taken – that it can be justified in terms of being the most appropriate approach for the matter under discussion, and what it connects to. So, in *Poetics* there is no balance between 'structure' and 'freedom', but rather the implementation of structure when structure is needed, and freedom when freedom is called for.

## Assessment

The three tasks that together form the assessment in *Poetics* likewise reflect this commitment to having multiple approaches that are justifiably well suited to students' different educational needs.

The first assessment task is an 'Intellectual Journal' in which students record the ongoing development and engagement with the ideas encountered in the subject. It is expected that the journal demonstrate their efforts to draw connections between material within the subject and also with their main discipline. While "Diversity of writing, graphic notation and imaging [is] encouraged" (University Handbook), there is still an expectation that the creative work of the journal is appropriate to the material covered in the subject. So, while these journals are presented in a variety of ways, 'a good journal is one where I can see critical thinking and passion all the way through it'.

In the Project component of assessment, students undertake a weekend seminar with a specialist. For example, they may undertake a life drawing or martial arts seminar. The challenge for students here is to translate these experiential encounters with the body into a solid piece of writing. This may favour those that really enjoy writing

essays, it nevertheless calls upon a level of creativity and imagination that goes beyond the conventional undergraduate essay.

The final assessment piece is a group presentation where students form small groups to inquire more deeply into an idea of the subject that is of interest to them.

And someone says: “I’m really interested in Psychology and how it’s related to Mythology” and someone else says “Wow, that’s cool. I’ve been looking at lucid dreaming, why don’t we work on a project together?” And the groups form pretty easily when you get late into the semester. And then they present. But the way that they present is obviously as important as what they present.... All I mean is, is there’s an appropriate means to get to the thing you are trying to articulate. And if it needs creativity, or needs more theatricality, then you should use it. And if it doesn’t, then give a straight interesting presentation that says this is about transfer of information.

In this task too, the theme of choosing a mode of communication and representation from a multitude of available modes that is most appropriate to the subject matter at hand is evident. This process of selection is something that is very characteristic of the artistic process. So, no single assessment task or a monolithic approach to assessment is considered capable of capturing the complexity and diversity of perspectives that students in the subject are encountering and making meaning from.

### Case 3: God and the Natural Sciences

History and Philosophy of Science (HPS) is often cited as an area that has always been interdisciplinary. This discipline takes science, technology and medicine as the object of study and looks at these areas with a humanities approach. HPS groups in universities will often have academics with a range of backgrounds including, scientists, historians, philosophers and anthropologists. For this reason including one case study from this area was seen to be important. ‘God and the Natural Sciences’ in particular is a subject that moves across philosophy, history and science. This second year undergraduate subject ‘studies the complex relationship between religion, theology and the natural science’ from the medieval period until the present day. The first half of the semester takes a historical view and the second half a philosophical approach. A number of examples are explored in detail in the subject, for example the trial of Galileo and Darwinian Evolution.

The subject arose from a perceived interest amongst HPS students around issues that involved science and religion. The subject was then put together to fulfill this interest. The subject is taught by two academics. One completed a major in physics before doing a PhD in HPS, the other academic has a PhD in both physics and HPS and is a practicing Anglican priest. The majority of students undertaking the subject tend to be from either the science or the arts faculties however a smaller number of students from outside these two areas also take the subject.

The subject involves two, one-hour lectures and one weekly tutorial throughout the semester. The two academics are present at all of the lectures, which are either co-taught or taught by the academic who is stronger in the particular area being covered. The two academics both described the importance of them both being present and contributing to the subject. The level of collaboration between them appears to be incredibly high with one academic describing the subject as ‘labour intensive’ but that it was important to take ‘real responsibility for continuity’ particularly if you are trying to ‘weave together some kind of account’.

One of the main aims of the subject is to explore through a number of historical examples,



the space where science and religion come together either beneficially or not. An important part of the subject that both students and academics agreed upon is the deliberate discussion of tensions around some of the issues raised by having one of the teaching academics provide the perspective of an atheist and the other that of a priest. The academics talked about deliberately playing this up and challenging each other.

... we challenge each other to the point where we have to think very hard about it. And the students really like this. (Subject lecturer)

This aspect was spoken about by the students positively in the interviews and in the formal feedback the subject has received.

I really appreciated the way that they interacted in the lectures and often had a mini debate about some topics. I haven't been in many subjects where the lecturers have argued over particular points. It made the subject interesting and engaging. (Student)

The subject is about teaching students to appreciate the 'contingencies and complexities of history' and providing them with an increased capacity to appreciate the 'thinking of people or cultures that are very remote or foreign to them' and 'interrogate their own positions'. The ability to debate the issues and content that is covered is one of the core skills that the academics are trying to develop in their students so in engaging in this kind of debate and discussion openly in lectures the academics are providing a model of what they want from students. The academics talked about getting students to see that there are 'no easy answers' with some of the topics they cover and that students need to be able to work out where they stand on some issues and to be able to construct an argument to back up their position.

This ability is a skill that is highly important in the humanities. In terms of how the subject interacts with the science some historically important events that highlight the interaction between the church and science are introduced to students. The two major events considered are the trial of Galileo and the introduction of Darwin's theory of evolution. As the two teaching academics have a science background they feel both capable and comfortable in teaching the science associated with these events. The students interviewed also mentioned that the lecturers' backgrounds gave their teaching 'legitimacy'. In past iterations of the subject guest lecturers from the science and archaeology faculty had been brought in to teach some components of the subject. However, as the subject progressed the current teaching staff felt happy to take this over for two reasons. The first being that they developed their understanding of the area and secondly it was felt that in teaching these lectures themselves consistency was maintained and that the main themes and questions were more successfully brought out.

The balance of how much of the science was required to successfully complete the subject was another consideration for the teaching academics.

... we try to find the balance where we can discuss it. It's sometimes hard work but that's the aim. There's a certain amount of scientific literacy that gets worked through the course, but it would by no means measure the standards of a science course. (Subject lecturer)

The aim was to have enough understanding of the science to be able to have 'an informed discussion about it', so that when they are discussing a particular event, students know 'what the claims are' and can subject those 'claims to scrutiny'. This balance was also reflected in the assessment.

## Assessment

1. Mid-semester 1000-word essay; 25%
2. End of semester 2000-word essay; 50%
3. Participation in two tutorial discussions of set readings, followed by a 500-word summary; 2 x 12.5%.

For the mid and end-of-semester essay, students are given a range of topics to choose from, for example: 'Genesis is outdated for anyone with a scientific view of the world: assess' or 'Assess the following claim: The Galileo affair was an example of the suppression of scientific truth by a dogmatic religious authority, which lends credence to what we have called the conflict thesis, the idea that science and religion are kind of at war'.

The participation in the tutorial discussion requires that students prepare three questions that were raised for them from a set reading for discussion in a tutorial. They also need to provide an answer to one of these questions. Following the tutorial students needed to submit a 500-word summary of the questions and the discussion. They are required to do this twice in the semester.

## Chapter 4: Conditions for interdisciplinarity and conclusions

Interdisciplinary subjects can cover a diverse range of topics and content, involve a range of disciplines and teaching staff and can be structured in a multitude of ways. The case studies examined for this project provide insight into some of the commonalities seen in successful interdisciplinary subjects.

While the number of subjects investigated for this project is small, there were definitely some common themes that came out of the interviews conducted. These are discussed below.

### Getting the ‘right’ people

The subjects investigated for this project were all taught by academics who see it worth their while to deepen their disciplinary depth and also move outside of their home discipline. They are willing to learn and move across these boundaries themselves. Many have come from diverse backgrounds or have experience that reflects a long interest in interdisciplinarity.

Interdisciplinary subjects can be created for a range of purposes and reasons and tend to attract a broad student cohort. The academics that teach these subjects need to be willing and able to think and teach outside of their direct disciplinary area. Students also appreciate teachers that demonstrate this ability most probably because it provides a model for how this can be done. Student respondents also spoke of how academics’ background and ability to move across boundaries gave interdisciplinary subjects legitimacy. Academics need to be able to demonstrate both expertise and flexibility in their interdisciplinary teaching, a skill that could be said to be different to strictly discipline based teaching.

It is clear that the subjects investigated were fairly labor intensive for the teaching staff and require a higher level of coordination in comparison to more discipline based subjects. However, this was seen as a necessity and not a negative as teaching staff members were happy to invest the time required to make interdisciplinary subjects successful. This highlights the importance of having teaching staff that have an interest in the subject area and believe in the importance of what the subject is trying to achieve. It is likely that the time investment required in at least the first few iterations of a new interdisciplinary subject are going to be significant.

The success of these subjects is evidenced by the enthusiasm of the staff and students, the effort and reputation of the teaching staff as being excellent in offering students engaging subjects.

### Coherence through a collaborative teaching team

As in many co-taught subjects, the importance of having a team of academic teaching staff that communicate well and have a common understanding of what the goals of the subject are is highly important. In an interdisciplinary environment, this means the teaching team talking explicitly about some of the more logistical aspects and broad aims of the subject. This is required as academics from different disciplinary backgrounds often have differing

teaching styles, expectations and norms; and these are better discussed up front. While there is not an issue with teaching staff having their own teaching style and perspectives on a particular subject these need to be weaved together to the extent that there is consistency across a subject in terms of the main purpose of the subject, expectations of students and assessment.

While collaborative discussion around the design of a subject prior to it commencing is important, as is ongoing dialogue between all teaching staff. This should be inclusive of both academic staff and other teaching staff, for example, tutors and guest lecturers. Ongoing discussion between teaching staff will increase the coherence across the subject allowing some of the weaving together of interdisciplinary material to be done by the teaching staff and painting a clearer picture of the subject for the students.

Students in the subjects investigated appreciated the cohesive picture that the different teaching staff brought together. This is something that was achieved by the teaching staff through sustained discussion of the subject throughout the design, teaching and evaluation processes.

Strong subject coordination can also play the role of providing coherence across a subject particularly when there are a large number of teaching staff involved. Equally a visible subject coordinator provides an obvious person for students to contact throughout a subject.

## The special role of tutorials and tutors in interdisciplinary subjects

The tutorials in the subjects studied were vital in bringing together the different strands of the interdisciplinary subject and providing a space to focus on some of the core understandings and skills required. The ability to undertake such a role is no small task. Given the greater complexity and range of disciplines that tutors need to be able to deal with and teach, tutors in interdisciplinary subjects need to have the time and ability to successfully perform this role. This means consideration of the background of interdisciplinary tutors and their willingness to move across and understand a number of disciplinary areas.

Interdisciplinary tutors require appropriate support through workload models and acknowledgement of the specialised role they are playing. The time commitment of interdisciplinary teachers may be high due to the necessity that they attend lectures where required so that they are fully aware of what is covered in the subject and to prepare and deliver high quality interdisciplinary tutorials. The pedagogical understanding that is required of interdisciplinary tutors is specialised and this could be beneficially supported through professional development or mentoring. The kind of support that interdisciplinary subjects require both at a structural and professional development level is something that needs further exploration.

## Assessment

The assessment in an interdisciplinary subject needs to reflect the interdisciplinary aims of the subject. In this regard there was great variation in the assessment used in the subjects investigated in this project. These varied from more traditional forms of assessment such as essays to journals and performances.

While interdisciplinary subjects often give considerable thought to how the subject is taught, like in university teaching more generally, the assessment does not always receive the same level of consideration. Due to the complex nature and interactions in an interdisciplinary subject the assessment can be difficult to design and assess. Ideally the

assessment should require that students develop and demonstrate the ability to integrate disciplinary perspectives to the extent that the subject aimed.

However, this is an area that could use more investigation. This project, while it looked at the assessment, was not scoped to properly ascertain the criteria on which students' work was judged and how and if this reflected the interdisciplinary intent of the subject.

## Summary

Interdisciplinary subjects can take a variety of forms and cover a huge range of topics. Yet this project has found that there are some common design considerations for successful interdisciplinary subjects. In putting together an interdisciplinary subject and in evaluating existing interdisciplinary subjects these considerations will provide the basis for an open and critical discussion amongst teaching staff.

Points for consideration when designing an interdisciplinary subject

- What is the subject about?
- What are the main aims of the subject?
- Who will be teaching the subject and from what disciplines are they?
- Do the academics involved feel comfortable moving outside their disciplinary area?
- Do the tutors involved feel comfortable moving outside their disciplinary area?
- Would any of the teaching staff benefit from professional development or mentoring in the area of interdisciplinary teaching and learning?
- How will the subject be coordinated?
- Will the subject be designed and taught collaboratively? What roles will different staff play?
- How will cohesion be maintained throughout the subject?
- Which teaching staff will attend the lectures/ seminars/tutorials?
- Will the assessment reflect the interdisciplinary nature of the subject?

While pointing to some key design considerations for interdisciplinary subjects, this project does not necessarily map out a comprehensive list of strategies or solutions to these questions. The three case studies highlight the complexity of interdisciplinary subjects and that this area of teaching is still not well understood or supported within universities. The project points to a number of areas that could use further investigation:

- A study of a broader range of interdisciplinary subjects in a range of institutions would allow some of the design considerations to be more broadly compared.
- Given the complexities around teaching interdisciplinary subjects, is there any way that these subjects can be better supported in workload models and through professional development. How is this done at other universities?
- Assessment is commonly agreed to be one of the key components in curriculum. How are interdisciplinary subjects best assessed and by what criteria?

## References

- Abbott, A. (2001). *Chaos of disciplines*. Chicago: University of Chicago Press.
- Becher, T. (1989). *Academic tribes and territories: intellectual enquiry and the cultures of disciplines*. Milton Keynes, England: Open University Press.
- Bernstein, B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique* (No. 4). Maryland: Rowman & Littlefield.
- Biglan, A. (1973). Relationships between subject matter characteristics and the structure and output of university departments. *Journal of Applied Psychology*, 57(3), 204–213.
- Boix Mansilla, V. & Gardner, H. (1994) Teaching for understanding in the disciplines—and beyond. *Teachers College Record*, 96(2), 198-218.
- Boix Mansilla, V., Feller, I., & Gardner, H. (2006). Quality assessment in interdisciplinary research and education. *Research Evaluation*, 15(1), 69-74.
- Braddock, R. D., Fien, J., & Rickson, R. (1994). Environmental studies: Managing the disciplinary divide. *The Environmentalist*, 14(1), 35–46.
- Clark, B. R. (1986). *The higher education system: Academic organization in cross-national perspective*. Berkeley and Los Angeles: University of California Press.
- Davies, M., Devlin, M., & Tight, M. (Eds.). (2010). *Interdisciplinary Higher Education: Perspectives and Practicalities*. Bingley UK, Emerald Group Publishing Limited.
- Donald, J. G. (1986). Knowledge and the university curriculum. *Higher Education*, 15(3), 267 - 282.
- Donald, J. G. (2002). *Learning to think: Disciplinary perspectives*. San Francisco, Jossey-Bass.
- Dressel, P. L. & Mayhew, L. B. (1974). *Higher education as a field of study: The emergence of a profession*. San Francisco: Jossey-Bass.
- Jacobs, J. A., & Frickel, S. (2009). Interdisciplinarity: A critical assessment. *Annual Review of Sociology*, 35, 43-65.
- Feyerabend, P. (1993). *Against method*. London: Verso Books.
- Gaff, J. G. & Wilson, R. C. (1971). Faculty cultures and interdisciplinary studies. *The Journal of Higher Education*, 186–201.
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. & Trow, M.

- (1994). *The new production of knowledge. The dynamics of science and research in contemporary societies*. London: Sage.
- Hirst, P. H. (1975). *Knowledge and the curriculum: a collection of philosophical papers*. London: Routledge.
- Holmwood, J. (2010). Sociology's misfortune: disciplines, interdisciplinarity and the impact of audit culture. *The British Journal of Sociology*, 61(4), 639–658.
- Jacobs, J. A., & Frickel, S. (2009). Interdisciplinarity: A critical assessment. *Annual Review of Sociology*, 35, 43–65.
- Klein, Julie. (1990) *Interdisciplinarity*. Wayne State University Press
- Klein, J. T. (1996). *Crossing boundaries: Knowledge, disciplinarity, and interdisciplinarity*. Charlottesville: University Press of Virginia.
- Lattuca, L.R., Voigt, L.J. & Fath, K.Q. (2004). Does interdisciplinarity promote learning? Theoretical support and researchable questions. *The Review of Higher Education*, 28(1), 23-48.
- Klein, J. T. (1996). *Crossing Boundaries: Knowledge, Disciplinarity, and Interdisciplinarity. Knowledge, disciplinarity and beyond*. Charlottesville, Va:University Press of Virginia.
- Lindholm, J. A., Astin, A. W., Sax, L. J., & Korn, W. S. (2002). *The American college teacher: National norms for the 2001-2002 HERI faculty survey*. Technical report, UCLA Graduate School of Education & Information Studies, Los Angeles, CA.
- Millar, V. (forthcoming). Comparing discipline based and interdisciplinary knowledge in university education. In Philippe Vitale and Beryl Exley (Eds.), *Pedagogic Rights and Democratic Education: Bernsteinian explorations of curriculum, pedagogy and assessment*. Routledge.
- Miller, M. & Boix Mansilla, V. (2004). Thinking across perspectives and disciplines. *Goodwork project report series*, 27, 1–13.
- Moore, R. (2011). Making the break: disciplines and interdisciplinarity. In F. Christie and K. Maton (Eds.), *The anthropology of writing: understanding textually mediated worlds* (pp. 87–105). London: Continuum.
- Paulsen, M. B. & Wells, C. T. (1998). Domain differences in the epistemological beliefs of college students. *Research in higher education*, 39(4), 365–384.
- Petrie, H. G. (1976). Do you see what i see? the epistemology of interdisciplinary inquiry. *Educational Researcher*, 5(2), 9–15.
- Scheffler, I. (1965). Philosophical models of teaching. *Harvard Educational Review*, 35(2), 131–143.
- Schommer, M. and Walker, K. (1995). Are epistemological beliefs similar across domains? *Journal of Educational Psychology*, 87(3), 424.

Schwab, J. J. (1962). The concept of the structure of a discipline. *Educational Record*, 43, 197—205.

Schwab, J. J. (1978). *Education and the structure of the disciplines*. Chicago: University of Chicago Press.

Sokal, R. R. (1974). Classification: Purposes, principles, progress, prospects. *Science*, 185(4157), 1115-1123.

Swoboda, W.W. (1979). Disciplines and interdisciplinarity: A historical perspective. *Interdisciplinarity and higher education*, 49–92.

Trowler, P., Saunders, M., & Bamber, V. (Eds.). (2012). *Tribes and Territories in the 21st Century: Rethinking the Significance of Disciplines in Higher Education*. International Studies in Higher Education. Florence KY, Routledge, Taylor & Francis Group.

van Leeuwen, T., & Tijssen, R. (2000). Interdisciplinary dynamics of modern science: analysis of cross-disciplinary citation flows. *Research Evaluation*, 9(3), 183-187.

Woelert, P., & Millar, V. (2013). The 'paradox of interdisciplinarity' in Australian research governance. *Higher Education*, 66(6), 755-767.