Integrating the disciplines: Successful interdisciplinary subjects

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Interdisciplinary teaching and learning is integral to the curriculum at the University of Melbourne. There has always been a range of interdisciplinary subjects offered in cross-disciplinary degrees, but the Melbourne Model has given further emphasis to interdisciplinary breadth of learning. For example, the University offers at least two types of subject which are explicitly interdisciplinary: University Breadth Subjects taught by cross-faculty teams and offered to undergraduate students from any faculty, and Interdisciplinary Foundation subjects which are compulsory first-year Arts subjects that integrate several Arts disciplines. As well as these subjects, the *Attributes of the Melbourne Graduate* (2009) stated that graduates of the University of Melbourne should be "knowledgeable across disciplines" with the ability to "examine critically, synthesise and evaluate knowledge across a broad range of disciplines." Finally, *Refining our Strategy* (2009) stressed interdisciplinary research as a key thrust for the future, and called for the development of greater interdisciplinary capacity.

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Introducing interdisciplinary subjects

There are various important but complex problems, phenomena and concepts that resist understanding or resolution when approached from single disciplines. Climate change and world poverty are clear examples, but equally, a full understanding of identity, public health, human rights, or knowledge can only be constructed by applying multiple perspectives and ways of thinking. For example, Carolan (2008) shows that the debate surrounding genetically modified organisms involves a tangle of factual, moral and epistemic issues that require multiple disciplines to unravel.

While disciplinary depth is essential for investigating these complex issues, they also require what Howard Gardner calls a 'synthesising mind' (2006, p.3). They require investigators who can engage in interdisciplinary translation and synthesis, as part of multidisciplinary teams or individually, in order to develop more complete pictures than would be possible from any one disciplinary perspective. As Lyon (1992) and Brew (2008) show, this is not a deviant exception, but a common path for the modern academic.

The implication is that we must educate for both disciplinary and interdisciplinary expertise. Interdisciplinary education must supplement disciplinary teaching and learning so students can learn how to respond to challenges that transcend disciplines, work in the confluence of multiple disciplines, and develop research trajectories that do not conform to standard disciplinary paths.

Interdisciplinary subjects are pivotal for this interdisciplinary education, teaching how to understand, navigate and employ multiple and often contrary ways of knowing. In these subjects students develop a meta-knowledge about different disciplines, methods and epistemologies, and learn how to purposefully and reflectively integrate and synthesise different perspectives in order to advance understanding and solve problems.

Yet because of the complexity of working across multiple ways of knowing, interdisciplinary subjects are challenging to teach. This guide provides materials and strategies to support the successful design, organisation, teaching, and evaluation of interdisciplinary subjects.

What are interdisciplinary subjects?

In an interdisciplinary subject, students explore and integrate multiple perspectives from different disciplines, sub-disciplines and areas of expertise. This is different from what might be called a multidisciplinary subject which juxtaposes multiple perspectives on the same topic without integration. Interdisciplinarity involves a synthesis or balance of multiple perspectives to produce such things as a deeper understanding or illumination, a balanced judgement, viable solution or a product that creatively accommodates the different perspectives. Boix Mansilla and Duraising call this developing an interdisciplinary understanding:

> We define *interdisciplinary understanding* as the capacity to integrate knowledge and modes of thinking in two or more disciplines or established areas of expertise to produce a cognitive advancement – such as explaining a phenomenon, solving a problem, or creating a product – in ways that would have been impossible or unlikely through single disciplinary means (2007, p.219).

The defining features of interdisciplinary subjects are first, some sort of interdisciplinary move or cognitive operation and second, what Nikitina (2002) calls an integrative structure, which is the intended result of the interdisciplinary operation. Although Boix Mansilla and Duraising stress integration as the key move or operation for interdisciplinary learning, other possibilities are translation, balancing, accommodation, synthesis, or making connections between multiple perspectives. There are numerous integrative structures that may result: an interdisciplinary interpretation or explanation, conceptualisation, theory or meta-theory, resolution or solution, deeper understanding or illumination, model, metaphor, product, policy, narrative, taxonomy, rule or application (Nikitina, 2002; Miller and Boix Mansilla, 2004; Gardner, 2008, p.47-50; Boix Mansilla & Duraising, 2007).

Students need to learn meta-disciplinary skills, attitudes, and understandings if they are to make these interdisciplinary moves and produce the integrative structures. Teaching these explicitly is essential because students are unlikely to have learned them previously, given the concentration on disciplinary teaching in much of the education system.

In particular, interdisciplinary students need to learn how to occupy different disciplinary perspectives, and to talk critically but reasonably across these perspectives. They need to be able to comprehend and translate disciplinary languages, ways of knowing and methods, and then balance, synthesise and integrate them. Gardner calls this learning an interdisciplinary pidgin (2008, p.72-73). Students need interdisciplinary collaboration skills if they are to work in a cross-disciplinary team, and disciplinary interpretation and synthesis skills if they are personally integrating information from multiple disciplines.

Also, interdisciplinary students must learn to interrogate multiple ways of knowing and the structure of knowledge itself. They must develop a reflective and explicit knowledge of how disciplines work, the issues and problems they can address, and "the strengths and limitations of each discipline as well as the possibilities of interaction between them" (Boix Mansilla, Gardner & Miller, 2000, p.36). They should develop meta-knowledge similar to that presented by Becher (1989) or Davies & Devlin (2007), including an understanding of the distinctive methods, content, epistemology, ways of thinking, and the legitimate and important questions from different disciplines.

To illustrate the integrative structure, and interdisciplinary moves, skills and understandings that are needed in an interdisciplinary subject, consider the following subject focussed on environmental decision-making. The integrative structure is to make reasonable decisions and judgments about environmental planning and design. The interdisciplinary moves needed are those of balancing, weighing and accommodating a variety of disciplinary perspectives. To accommodate the various perspectives and make a balanced judgement, students need to:

1. understand that there are several important disciplinary perspectives that are relevant to every environmental decision, such as from an engineer, zoologist, landscape sociologist and architect;

2. understand the perspective of each relevant discipline;

3. judge how important each perspective is for the issue at hand;

4. evaluate the evidence or reasons supporting each of the perspectives;

5. balance, weigh-up or accommodate the pressures from the different perspectives in order to reach a reasonable and creative decision or outcome;

6. make a case for why this decision or outcome is better than alternatives.

These skills and understandings are vitally important to support environmental decision-making. If they are not applied, the likely result is bad decisions that fail to take into account important perspectives, or that fail to properly balance or accommodate these perspectives. For example, someone might calculate the most efficient energy use for a new community centre without considering how people will interact with the centre and so they build an efficient centre that no one wants to use. Alternatively, someone might argue that, because of sociological factors, fire-destroyed communities should be rebuilt where they are, but because they ignore what planners and architects might say about mitigating fire risk, they rebuild communities that are in imminent danger. There are numerous other examples of such environmental blunders that could have been avoided with the right interdisciplinary skills and understandings, for instance the introduction of cane toads or dams that contributed to the destruction of local fish populations.

The main content for interdisciplinary subjects is often a topic or area of study that is best approached from multiple disciplines. While this is common, the content of interdisciplinary subjects can also be the skills that will be useful for interdisciplinary work. For example, an interdisciplinary logic or critical thinking subject would teach these interdisciplinary skills and then apply them in various disciplinary and interdisciplinary contexts.

What are the generic objectives of interdisciplinary subjects?

The previous description of interdisciplinary subjects can be summarised in a set of generic objectives for any interdisciplinary subject. On completion of an interdisciplinary subject, students should have interdisciplinary skills, understandings and attitudes. In particular, students should:

• be able to occupy and understand different disciplinary perspectives;

• be able to critically evaluate knowledge from a broad range of disciplines;

• be able to engage in interdisciplinary inquiry and problem-solving, employing multiple ways of knowing;

• have a meta-disciplinary understanding of the nature of knowledge and the disciplines;

• be able to integrate, synthesise, balance and accommodate knowledge from multiple disciplines in order to produce something greater than would be possible from any one disciplinary perspective.

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Do interdisciplinary subjects require disciplinary depth?

The hallmark of an interdisciplinarian is meta-disciplinary understandings and skills, and the development of these is the main objective of an interdisciplinary subject. Students in these subjects should learn how to access, understand, employ, and synthesise the expertise from various disciplines. They do not undertake these subjects to learn disciplinary expertise and knowledge.

Yet it is commonly thought that a necessary precondition of interdisciplinarity is disciplinary depth, and so it is thought that interdisciplinary subjects should teach both interdisciplinary skills as well as disciplinary expertise. However, this is a mistaken view. There are at least two different kinds of interdisciplinary researcher, and based on this, at least two different kinds of interdisciplinary subject. Both of these have as their primary aim the teaching of interdisciplinary skills and understandings, but only one requires disciplinary depth as a precondition.

1. Interdisciplinarity without disciplinary depth

Much interdisciplinary work does not require disciplinary depth. One example is the interdisciplinarity of a policy analyst, judge or political decision-maker who use special interdisciplinary skills to locate information from multiple disciplines, and then to understand, balance and synthesise this information so they can make a final decision. Another possible example is the researcher in an area of study such as education, who does not have a specific disciplinary background, but who has the ability to draw on multiple disciplines when they will be illuminating, and has general methodological skills for designing and carrying out research.

Expertise in a discipline may be useful for this kind of interdisciplinary work, making it easier to access and understand some disciplinary knowledge, but it is not necessary. Although most academics engaging in interdisciplinary research would have a strong disciplinary background, this is an accidental feature that occurs because the current institutional training has privileged disciplinary specialisation. The only thing necessary for this kind of interdisciplinarity is being able to identify when disciplinary expertise is needed and knowing how to access and use this.

An interdisciplinary subject based on this first kind of interdisciplinarity would teach interdisciplinary breadth rather than the more traditional disciplinary depth. Students would learn the interdisciplinary skills of comprehension, translation and synthesis of multiple disciplinary methods and perspectives. This is an appropriate and useful model of interdisciplinarity for first and second year subjects, when students have not yet developed disciplinary expertise. This can also be the model for groups or sequences of interdisciplinary subjects which would allow students to specialise in interdisciplinarity. They would hone interdisciplinary skills and knowledge just as disciplinarians hone the skills and knowledge from a particular discipline.

Of course, some basic disciplinary knowledge is needed to understand, translate and synthesise from multiple disciplines, and interdisciplinary students need some foundation in both the arts and sciences. At the very least they must be able to understand essays, artistic and conceptual work on one hand and quantitative, statistical and empirical work on the other. In some cases students will not have the requisite basic knowledge needed. For example, a pre-requisite for successful university level interdisciplinary work involving mathematics is at least some understanding of secondary mathematics. In such cases, some disciplinary teaching might be necessary before interdisciplinary teaching and learning can be effective. However, it is important to realise that interdisciplinarity of this sort requires only the general knowledge needed to access, translate and

use the insights from a discipline, and so interdisciplinary students do not need specific disciplinary knowledge, nor do they need to be able to research in the disciplines they integrate.

2. Interdisciplinarity founded on disciplinary depth

A second kind of interdisciplinary work does require disciplinary depth. For example, some disciplinary research requires collaboration with those from other disciplines, such as an architect working with an engineer, or an engineer working with a mathematician. A second example would be a cross-disciplinary or hybrid researcher who is trained in one discipline and draws on this background to do research in a different discipline, such as a philosopher of science or a historian of medicine. A third example is the interdisciplinary team, where each member has their own disciplinary expertise, but they also need interdisciplinary expertise to work together on a common problem. A final example is the disciplinary researcher who draws on insights from other disciplines to enrich their own disciplinary research, such as a sociologist drawing on art history and geography as part of their sociological research.

This sort of interdisciplinarity is less appropriate for first and second year undergraduate subjects, as students will be unlikely to have a sufficient disciplinary base. Third year undergraduate courses, after students have some disciplinary depth, might be the earliest time to offer such subjects. The aim of these subjects is to teach interdisciplinary skills, just as it is in the first kind of interdisciplinary subject. Yet the difference is that students are expected to draw on their own disciplinary expertise to do interdisciplinary work, and so they would need prerequisites in a relevant discipline.

How do you design and coordinate interdisciplinary subjects?

Interdisciplinary subjects bring together multiple perspectives (and often teachers) from diverse disciplines and so it is a complex task to design and coordinate these subjects. This section presents some key strategies that have proven useful for this task. It also presents a subject template that can be used to facilitate the coordination of multiple disciplinary perspectives into a coherent subject.

Choose a team of expert academic teachers and interdisciplinarians

Interdisciplinary subjects, like any other, benefit from having a high quality teaching team. Some interdisciplinary subjects develop organically out of the shared interest of several lecturers, others are deliberately created. In both cases, the careful choice of additional members of the teaching team is essential. Of particular concern for interdisciplinary subjects is that the teaching team include expert academic teachers and interdisciplinarian researchers.

Teaching an interdisciplinary subject, especially to a cohort of students from different disciplines, is more difficult than teaching one discipline. The teaching staff need to be able to communicate complex ideas from multiple disciplines at a level appropriate for students, while also helping them to synthesise multiple perspectives and develop interdisciplinary skills. To meet this challenge, the teaching staff need to be expert and flexible teachers.

At least some of the teaching team also need to have expertise in interdisciplinary research. Academic teachers need to be experts in the field they are teaching. In the case of interdisciplinary subjects it is not enough to have teachers who are experts in the various disciplines involved. Members of the team must also be expert at balancing, accommodating and integrating the insights from a variety of disciplines. Students need to learn the disciplinary insights from disciplinary experts and the interdisciplinary insights and skills from interdisciplinary experts. At the very least, members of the teaching team should be learning to engage in interdisciplinary research (perhaps in new interdisciplinary research projects with other members of the teaching team).

Networking has proven extremely important for finding the right teaching team for interdisciplinary subjects. Expert academic teachers and interdisciplinary researchers may be 'hidden' in any faculty, or even based outside a university. Cultivating a broad network of contacts will make it much easier to find and create an effective teaching team.

Coordinate perspectives and approaches

Interdisciplinary subjects present multiple, and often conflicting, perspectives and ways of knowing. These need to be coordinated in some way so the students have a coherent and rewarding teaching experience, and so the subjects do not become a confused muddle.

The first step in coordinating the multiple perspectives is to develop a shared interdisciplinary vision for the subject. This requires a great deal of ongoing dialogue amongst the teaching team. Allow more time than would be required in a subject where everyone involved in the teaching is from the same discipline and shares basic assumptions and a common language. At the very least, dialogue is essential so a common language can be developed and so everyone can understand the perspectives of every other member of the team (or as Petrie, 1976, puts it, each person can see what the others see). The subject template presented later is useful for facilitating this dialogue. The

shared vision created at the start of a subject will likely need to be revisited regularly in light of strengthening interdisciplinary practice and the uncovering of divergent interpretations of the vision.

The second step in coordinating the multiple perspectives is to present the subject in a way that allows students to integrate the perspectives into a new whole. This must go beyond presenting a collection of different disciplinary perspectives with no integration.

There is limited advantage to presenting one consistent narrative as this is likely to defeat the purpose of an interdisciplinary subject. If the perspectives are already woven together seamlessly, with the tensions and controversy smoothed over, students will never learn how to deal with the inherent complexity of interdisciplinary work. Rather than presenting a finished integration, it is better to model to weave together seemingly inconsistent perspectives, and to provide time and support for students to practise weaving for themselves (see Stein et. al., 2008 for more on this issue). A seamless narrative is also contrary to the nature of interdisciplinarity which tends to be dynamic and fluid. Limiting the integration of several disciplines to one 'official' line illegitimately prevents students from making unexpected but illuminating connections and syntheses.

The subject guide or description is sometimes used to present an interdisciplinary overview of the subject and show where each lecture topic, reading and disciplinary perspective fits into this whole. For this to be an effective means of integrating the subject, it should show how each disciplinary perspective adds something to an integrative structure such as a decision, product or explanation.

A third possibility for integrating the perspectives in an interdisciplinary subject is to have two different lecturers for every lecture: One to present disciplinary expertise and the second to model interdisciplinary synthesis and integration. For example there could be a different guest lecturer each week presenting a disciplinary perspective. To integrate these perspectives, there would also be another lecturer who, every week, introduces or sums up the guest lecture and explains how the disciplinary perspectives can be integrated. A variation is to organise lectures as an interview of disciplinary experts, where the interviewer shows how to bring out the salient insights from different perspectives and then how to weave them together.

In order to integrate diverse disciplinary perspectives, one interdisciplinary subject developed the concept of 'knowledge ownership'. All tutors and lecturers were asked to take ownership of the whole subject. Lecturers had to submit proposals before they were accepted as part of the teaching team. Their powerpoint slides were submitted in advance and given a consistent visual format, with the content integrated with the rest of the subject. To further integrate the perspectives, the subject coordinator introduces every lecture and explains how it will fit into the whole subject. The plan is to take this approach further and video podcast specialist lecturers on relevant topics so that the resident lecturer can play excerpts to students and discuss, critique, unpack and take questions about the content, just as a true interdisciplinarian takes expert disciplinary insights and interrogates and synthesises them. (As well as being an effective means of integrating the content, this is also a useful way to ensure that the relevant disciplinary expertise is available every year).

Ensure tutors and tutorials are of the highest standard

Tutorials (or workshops, or whatever you call the small group teaching component of a subject) are crucial for coordinating the diverse perspectives involved in interdisciplinary subjects, and so tutors (or workshop facilitators) are an essential part of the teaching team.

Integrating multiple disciplinary perspectives and ways of knowing requires active thinking that is difficult for students to engage in during a lecture. So, in many interdisciplinary subjects it is in the small group discussions and interactions in tutorials (or workshop) where students integrate the multiple disciplinary perspectives and ways of knowing. Tutoring an interdisciplinary subject, therefore, requires the ability to present a wide range of disciplinary perspectives and to model how to synthesise, balance and accommodate these, while also helping students to do the same.

To be able to facilitate student integration of multiple perspectives and help students learn to do this for themselves, the tutors need to be excellent teachers and excellent interdisciplinarians who are comfortable travelling well outside their disciplinary comfort zones. Established academics with teaching and interdisciplinary research experience can often be the best choice for tutors, while disciplinary focussed graduate students who have little teaching experience are often poor choices.

Given the importance of tutorials for the success of interdisciplinary subjects, and the level of expertise needed to facilitate a tutorial, allocating time for tutor training and support is essential. Tutors will need extra training so they all start with the same understanding of the disciplinary content, interdisciplinary skills, and integrative structures. This is especially important as tutors will likely have to deliver tutorials where they present and synthesise content from disciplines outside their primary area of expertise. They also need extra support and training from an experienced teacher so they can manage the complex interdisciplinary conversation in a tutorial.

Because tutorials are crucial for interdisciplinary learning, several subjects employ a tutor coordinator who administers the tutorial programme, designs tutorial materials and activities, and provides weekly training and support to the team of tutors.

Good channels of communication between lecturers and tutors is also crucial to the success of interdisciplinary subjects. Tutors need to know what lecturers have in mind, and the tutors are an essential conduit of information about how students respond.

Coordinate administrative details

The administration of an interdisciplinary subject tends to be more problematic than other subjects. When disciplines from multiple faculties are involved, just coordinating timetables for meetings and scheduled classes can be difficult. Then there are the different policies on such things as presentation and grading of student work and hiring and payment practices for sessional staff. These issues need coordinating as much as the disciplinary perspectives and approaches.

Address and manage expectations

A further important consideration when designing and coordinating an interdisciplinary subject is how to manage the conflicting expectations of students, academic teachers, and of the subject itself. This is especially important for interdisciplinary subjects which are often very different from what students or lecturers have encountered before and expect.

First year students already have a variety of expectations (often tacit) about university teaching and learning, and if a subject does not meet these expectations, they will resist learning in it. They may already have expectations about: normal work-load, the best way to learn, appropriate type and frequency of assessment tasks, criteria for high quality work, how subject content should be explained, how small group teaching works (whether it should be a tutorial discussion, teacher led

workshop to practise skills, or a lab where students conduct an experiment), how much participation is required in small group teaching, and whether asking questions is appropriate, and if so, which kinds of questions. Catering to the diversity of possible expectations is difficult for any subject, but it is especially challenging for interdisciplinary subjects which are different to the expected single-disciplinary subjects. Students in interdisciplinary subjects tend to expect their subjects to present one consistent perspective and they will be surprised when they are confronted by several, potentially conflicting perspectives, with the potential result that they end up confused and resentful.

As well as general expectations about teaching and learning, students will also have expectations based on their disciplinary leanings. Just as C.P. Snow (1964) describes, there seems to be two cultures of students, Science and Arts. Students will be disheartened if an interdisciplinary subject is too 'sciency' or too 'artsy', and they will resist (or be phobic about) working with numbers if they see themselves as Arts students, or writing essays if they see themselves as Science students. Janet McCalman (2008, p.17) calls this "resistance to learning outside their comfort zones."

To complicate matters, the teaching staff are also likely to have divergent expectations about every aspect of teaching and learning. Staff have their own expectations about lecture and tutorial structure, high quality performance, the ideal responses to a question, the best questions to ask, the best order in which to present content, how the material is best learned, and how to access and read academic literature, etc. To complicate matters further, they may not even be aware of these expectations, treating them as merely the way teaching and learning is, based on how things are normally done in their disciplines. This is also a problem for the content of interdisciplinary subjects as the meaning of key terms often differs across disciplines. For example, 'sustainable', 'energy' and 'valid' are each used in very different ways in different disciplines.

If these diverse and conflicting expectations are not addressed and managed, students will not know what is expected of them, and interdisciplinary subjects are likely to appear incoherent and poorly taught. How do you manage the diverse expectations to create a coherent interdisciplinary subject?

1. make explicit your expectations about teaching and learning (and those of every member of the teaching team);

2. create a consistent approach to teaching and learning in the subject (which will likely involve some compromises);

3. explain any disciplinary jargon or skills, especially those that would be taken for granted in a standard disciplinary subject;

4. be explicit about your expectations (and the justification) to students. Do not take anything for granted, as at least some of your students will not share the assumptions you make. Be especially clear about assessment expectations and marking criteria. Students need to know what integrative structure they are expected to produce, what interdisciplinary skills they will need and how they should apply them, and what counts as high quality interdisciplinary work. The subject template described later is a useful tool for clarifying these expectations.

One subject manages student expectations by showing students that they will not be at a disadvantage regardless of whether they are from Arts or Science. At the beginning of the subject students are shown the anonymous grades received by previous students, with the degree of the students indicated, so that current students can see that BA and BSc students do equally well.

Plan the subject in explicit detail

It is important to plan interdisciplinary subjects in explicit detail, especially to address and manage conflicting expectations. The following subject template highlights some of the key features of an interdisciplinary subject. Addressing each of these features with the teaching team helps to uncover assumptions and tacit expectations, and then to create a shared vision for the subject where the various perspectives can be coordinated, and one consistent set of expectations presented. The completed template can also be used to design interdisciplinary assessment tasks and criteria. (The template would need to be modified slightly for interdisciplinary subjects whose main content is interdisciplinary skills. In this case, 'interdisciplinary operation' would be the main focus).

The following is an example of a completed subject template from a subject that takes an interdisciplinary approach to homosexuality. On the next page is a blank subject template.

Main issue	Homosexuality: In particular, the different perspectives and views of homosexuality
Reason for the interdisciplinary approach	The different perceptions of homosexuality cannot be understood without an understanding of the various disciplinary perspectives on homosexuality. In particular, different disciplines illuminate the reasons behind the perceptions and their history and social consequences
Integrative structure	Holistic and complete understanding of homosexuality Taking a reasonable, well-rounded position that takes into account the variety of perspectives about homosexuality
Interdisciplinary operation	Forming a balanced point of view or reasonable position Taking into account multiple perspectives and reasons Making a case for the reasonable position
Disciplines to be integrated	**Discipline 1: Biology** Understand and take a position on the extent to which homosexuality is acquired or innate
	Discipline 2: Laws, rights and politics Understand and evaluate the current policy, laws and rights about homosexuality and their social effects
	Discipline 4: Theology Understand and evaluate the reasoning behind the positions taken by various religious groups
	Discipline 5: Psychology and sociology Understand the psychological and sociological implications of particular views about homosexuality

Interdisciplinary subject template

Main issue What is the significant topic, issue or content to be approached in an interdisciplinary fashion? For example, climate change, seeing, the body …	
Reason for the interdisciplinary approach Why is an interdisciplinary approach valuable or necessary for this topic? What difference will an interdisciplinary understanding make?	
Integrative structure What is the aim of taking this interdisciplinary approach? What are students expected to produce? For example, deeper understanding, balanced judgement, solution, tangible product	
Interdisciplinary operation What sort of interdisciplinary moves will students need to make to produce this integrating structure? For example, translation, balancing, synthesis or accommodation	
Disciplines to be integrated Which disciplines will be integrated in the subject? For each discipline: Why is it important for interdisciplinary work on this issue? What substantial contribution does it make? How is it centrally relevant to and illuminating of the issue? How does it present a clearly distinct perspective, representing a different way of knowing? What would be missing if this discipline were not represented?	**Discipline 1** **Discipline 2** **Discipline 3** **Discipline 4**

How do you assess interdisciplinary learning?

Assessment is another important issue for interdisciplinary subjects, and in particular, what to assess and how to measure this. (There are also general issues about how to assess, but these are dealt with in many resources on teaching in higher education and will not be addressed here). This section examines criteria that could be used to assess interdisciplinary learning, and which are also essential for setting clear and explicit expectations, and for designing teaching and learning activities for an interdisciplinary subject.

The core of assessing interdisciplinary learning is assessing how well students are able to engage in interdisciplinary work. Yet often the criteria used for making such assessments are inadequate. Criteria for high-quality interdisciplinary work often employ fuzzy metaphors or are highly abstract such as: it pushes the boundaries of the disciplines, it all comes together, the whole understanding is more than the sum of its disciplinary parts, or it balances, accommodates and synthesises different perspectives and ways of knowing. However, these are too vague for lecturers to assess and too abstract to provide concrete advice to students about how to complete interdisciplinary tasks.

Use specific interdisciplinary criteria

The challenge in assessing interdisciplinary work is to turn the vague criteria into something specific, concrete, observable, and thus assessable. Here are two frameworks that assemble what is known about high quality interdisciplinary work into more specific assessment criteria:

Assessment of levels of interdisciplinary understanding and engagement[1]

1. *Unidisciplinary:* Disciplines are seen as separate and isolated. Students at this level tend to be uninterested in other disciplines (and potentially xenophobic of them), while dogmatic about their own discipline or unreflective beliefs.

2. *Awareness of other disciplines:* Students at this level are aware of different disciplines and their different methods and purposes. However they tend to have stereotyped, superficial beliefs about other disciplines as well as misconceptions and inaccuracies. They also tend to see each discipline as offering its own separate and incommensurable perspective.

3. *Pluralism and multidisciplinary:* Students at this level have an accurate understanding of the methods and findings of different disciplines. They use the different disciplines to provide multiple ways of approaching a common problem or issue, but do not integrate the perspectives. They see the various perspectives in terms of a smorgasbord of possible choices, rather than attempting interdisciplinary integration.

4. *Interdisciplinary:* Students at this level are truly interdisciplinary and attempt to develop one reasoned perspective from the various disciplinary perspectives and methods, which they support by evidence from multiple disciplines. They engage in sophisticated integration, and have a clear sense of purpose for why the disciplines needed to be integrated.

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[1] This framework can also be used to assess the extent to which a subject is interdisciplinary, if it is suitably modified to refer to what is presented in the subject rather than the qualities of the students.

Three criteria for interdisciplinary assessment[2]

1. *Disciplinary grounding:* The degree to which student work is *grounded* in carefully selected and adequately employed disciplinary insights - that is, disciplinary theories, findings, examples, methods, validation criteria, genres, and forms of communication.

   - Are the selected disciplines appropriate to inform the issue at hand? Are any key perspectives or disciplinary insights missing?

   - Are the considered disciplinary theories, examples, findings, methods, and forms of communication accurately employed, or does the work exhibit misconceptions?

2. *Advancement through integration:* The degree to which disciplinary insights are clearly *integrated* so as to advance student understanding - that is, using integrative structures such as conceptual frameworks, graphic representations, models, metaphors, complex explanations, or solutions, that result in more complex, effective, empirically grounded, or comprehensive accounts or products than would have been possible under a single disciplinary framework.

   - Where is there evidence of disciplinary integration (e.g., integrative structures such as a conceptual framework, graphic representation or reinterpretation, model, metaphor, explanation, or solution)?

   - Is there evidence that understanding has been enriched by the integration of different disciplinary insights (rather than an association or connection that does not offer any illumination)?

   - Would something be lost if a particular disciplinary insight was missing from the work or if the balance of disciplinary insights were different?

3. *Critical awareness:* The degree to which the work exhibits a clear sense of purpose, reflectiveness, and self-critique - that is, framing problems in ways that invite interdisciplinary approaches and exhibiting awareness of distinct disciplinary contributions, how the disciplines are integrated and the limitations of the integration.

   - Does the work show a clear sense of purpose, framing the issue in ways that invite an interdisciplinary approach?

   - Is there evidence of reflectiveness about the choices, opportunities and compromises involved in interdisciplinary work and about the limitations of the work as a whole, such as what an account fails to explain or what a solution could not address?

   - Does the work present a considered judgement?

   - Does the work show awareness of the tensions and conflicts between the different perspectives without falling back on a simplistic relativism or dogmatism?

Make the criteria concrete

Even though these frameworks give clear and precise criteria, they are still abstract. As such the criteria cannot be easily assessed, and they give little concrete advice to students about what they are expected to do. For example, knowing that high quality interdisciplinary work integrates

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[2] This framework is taken directly from Boix Mansilla & Duraising, 2007, especially, p.222, 227 & 233.

perspectives is not the same as having concrete criteria that can be used to discern whether a piece of work integrates or not.

An abstract criterion such as 'Is there evidence that understanding has been enriched by the integration of different disciplinary insights?' can be made more concrete by specifying the sorts of things that would be written in a student essay that enriched understanding by integration:

- This interdisciplinary understanding is better than our previous understanding because …

- It solves x, y and z problems because …

- It explains … because …

- This interdisciplinary understanding has transformed how I approach the issue in the following ways …

An alternative example is with the criterion 'Work exhibits a clear sense of purpose, reflectiveness, and self-critique.' If student work addresses and finishes the following sorts of statement there are concrete indicators that this criterion has been met:

- The problem being addressed is …

- My reasons for integrating the disciplines to address this problem are …

- a, b and c discipline need to be involved because …

- A limitation of my interdisciplinary approach is …

In both of these examples, the concrete criteria provide both assessment tools and advice for students. By making these criteria explicit and concrete, students know what they are expected to do when engaging in interdisciplinary integration, and the teaching team know what to look for when assessing student ability to integrate.

The following example of concrete criteria for assessing interdisciplinary learning comes from an interdisciplinary global health subject. In this subject, students learn how to grapple with and solve global health problems that involve complex and intertwined medical, social, political, religious, economic and educational factors. High quality interdisciplinary work in this subject would meet the three following criteria and students' work can be assessed against these criteria by observing whether they ask and answer the listed questions, whether they give multiple possible answers, and whether they elaborate on these answers:

1. *Shows an understanding of the situation:* What are the dominant factors shaping the current situation? What are the different interests involved? What factors and interests are amenable to change? Who are the possible change agents involved? What problems are there? What further information or analyses are needed in order to address and resolve the problems?

2. *Identifies relevant 'toolkit' of resources, expertise, people and organisations:* What 'tools' can best address the problems? What disciplines can provide these tools? Which ones can be mobilised, how and by whom?

3. *Solves the problem:* What are the alternatives? Given the nature of the problem, and all available information and analyses, which is the best solution? Why is this the best solution? Is it feasible and sustainable? What is required to implement it? What would be an effective strategy for implementation? What are its key elements, priorities, timelines? Who can implement this and how might they best do this?

A further example of assessment criteria for interdisciplinary subjects comes from an interdisciplinary history subject. The main integrating structure in this subject is to create an 'ecological' understanding and explanation of complex human phenomenon. The aim is to create an understanding of everyday life by explaining it in terms of a system of macro-forces involving multiple causes and contexts. High quality ecological explanations would meet the following two criteria:

1. *Analyses the complexity of the issue:* What is the complexity underlying and providing a context for this issue? How are economics, institutions, cultures, values, the environment, social structures, medicine, biology, etc., relevant? How do these factors interact? How do humans interact with these factors? What effect does this reciprocal interaction have on the issue? What argument can be made that supports your interpretation of the interactions and effects?

2. *Imaginatively recreates the issue:* How can the context and the interrelationships be presented as a 'fleshed out' dramatisation rather than a bloodless, abstract list of 'the facts of the case'? What would it be like to be involved in this issue? What would the participants feel, think or believe? What narrative can dramatise the technical argument?

These are the sorts of questions students are expected to ask and engage with when they do 'ecological' interdisciplinary work, and so they provide concrete criteria that can be used to assess their interdisciplinary learning. Do students ask and address these sorts of questions? How often? In how much detail?

To design concrete criteria for interdisciplinary assessment, the best place to start is how you personally engage in interdisciplinary work: How do you integrate different disciplines in your research? How do you apply your skills to different disciplinary content? What questions do you ask yourself? What thinking do you employ? What do you do or say when working in an interdisciplinary context? Your answers to these questions will specify the sorts of things students should ask, or do, when engaging in high quality interdisciplinary work.

Use a range of assessment tasks

As well as explicit concrete criteria for assessing interdisciplinary work, interdisciplinary subjects need a range of assessment tasks where students can demonstrate they have met the criteria. Because the interdisciplinary work students will need to do is complex and often novel to them, it is useful to offer smaller assessment tasks that target particular interdisciplinary skills. The following are possible examples of such assessment tasks:

- Present students with a situation and have them describe it from several perspectives or disciplines (targets their ability to take multiple disciplinary perspectives)

- Present students with an argued case for an interdisciplinary decision, and ask them to evaluate the case and identify what gaps would need to be filled to make it a balanced case (targets their ability to evaluate interdisciplinary judgements)

- Present students with three disciplinary perspectives about a case, and have them make a balanced judgement that incorporates all three (targets their ability to make balanced, interdisciplinary judgements)

- Present students with a case and have them report several relevant disciplinary perspectives (targets their ability to find, translate and paraphrase multiple disciplinary perspectives)

- Teach a general skill that is useful for interdisciplinary work, such as critical thinking, and have students apply it across disciplines. For example, have students complete a critical thinking task about a) a quantitative issue, b) a legal issue, and c) a social issue (targets their ability to apply skills across disciplinary contexts)

Once students have developed some interdisciplinary skills in smaller assessment tasks, they can complete a larger, final assessment. The final assessment should probably ask students to produce the integrative structure that the subject is built on. For example, students can be asked to make a balanced judgement or product, or provide an illuminating explanation. Completing this task will require them to apply all the interdisciplinary skills they have learned.

What conceptions do students need for successful interdisciplinary teaching and learning?

For successful interdisciplinary teaching and learning, students must have, or develop, conceptions about the nature of interdisciplinarity. They will need sophisticated conceptions of knowledge and truth to make sense of the multiple and often contrary disciplinary perspectives that they will be confronted with in an interdisciplinary subject. Without these conceptions students will misunderstand the whole endeavour of interdisciplinary teaching and learning, and they will end up frustrated and frustrating.

Conceptions about knowledge and truth can be called 'epistemic positions', following the empirical and theoretical work of Perry (1970, 1981) and also Paul and Elder (1994, 1995, 2002). Students take different epistemic positions in response to what Perry terms 'multiplicity', which is an experience of multiple plausible, contradictory answers and alternatives (as distinct from an experience of simple, clear-cut, unambiguous answers). Such multiplicity is a key feature of interdisciplinary teaching and learning, and so the epistemic positions students take have important implications for interdisciplinary subjects.

If students take simple epistemic positions they will be unable to deal with the complex pluralism of multiple disciplinary perspectives, and will misunderstand the aims and expectations of interdisciplinary teaching and learning. In the face of a range of plausible views from multiple disciplinary frameworks, where none seem to be simply 'right' or 'wrong', some of the students will end up confused and unable to figure out what is going on. Others will resort to a dogmatic position and assert their opinion come what may, while others will retreat to an equally problematic relativist position and think that it is all a matter of opinion and so engaging with the issues is pointless. Some will not understand why there is so much disagreement when they should just be able to get the right answer and move on. Others see no value in continuing the interdisciplinary dialogue once they have stated their opinion.

On the other hand, if students take a sophisticated epistemic position, they would see the multiple perspectives they are confronted with as an opportunity to engage in what Dewey refers to as dialogical reflective thinking (1916, 1933) in order to make reasonable judgements (Paul, 1994, p.347-348) or warranted assertions (Dewey, 1938).

There are three main epistemic positions that Perry has shown that university students tend to take. The first two are inadequate to support interdisciplinary learning, and so interdisciplinary students need to take the third epistemic position.

1. *Dualism:* From the dualist position, knowledge is objective, certain and absolute. The dualist classifies multiplicity in dualist categories such as right-wrong, true-false, correct-incorrect or good-bad. They tend to see the world in terms of matters of fact.

2. *Relativism:* From the relativist position, there is no objective knowledge, as beliefs, theories and values are inherently and wholly relative, contingent and contextual. The relativist classifies all mulitiplicity as subjective or culturally relative opinions. They tend to see the world in terms of matters of preference and taste.

3. *Critical Pluralism:* The critical pluralist takes knowledge to be objective, as does a dualist, while rejecting the certainty and absolutism associated with that position. They also retain the pluralism of relativism without drawing the relativist conclusion that 'anything goes'. The critical pluralist classifies multiplicity as more or less warranted or unwarranted and sees the world in terms of more or less well-reasoned judgements. When presented with a range of alternative conceptions, the critical pluralist applies reflective, critical and inter-subjective thinking to judge them as better and worse.

The implication is that critical pluralism is a necessary foundation for interdisciplinary work. Because the multiple perspectives involved in interdisciplinary subjects cannot simply be categorised as true, false or mere opinion, the classification methods of dualist and relativist epistemic positions cannot support learning in these subjects. Dualist and relativist students have a conception of 'right answers', 'wrong answers' and 'mere opinion', but they do not have a conception of 'reasoned judgement' where ideas are judged better or worse depending on the quality of reasoning supporting them (Paul, 1994, p.347-348). Without this understanding that only comes with critical pluralism, they cannot make sense of the complex judgements needed to balance, accommodate and synthesise the findings and perspectives from multiple disciplines.

How do you educate for critical pluralism?

Perry argues that critical pluralism can develop spontaneously in response to multiplicity. This would imply that merely confronting students with pluralism and disagreement in an interdisciplinary subject could spur them to move to the position of critical pluralism without the need for explicit guidance.

However, Perry also argues that confrontation with multiplicity does not automatically result in a movement to critical pluralism. Some students get 'stuck' or 'entrenched' in a dogmatic position or 'escape' to a relativist position and never reach the critical pluralism needed for interdisciplinary learning. Epistemic positions tend to be extremely robust and difficult to abandon (Gardner, 1989, p.5-6). This is because everything a person experiences and learns is 'coloured' by the position they take (not to mention the impact of social forces which may also reinforce epistemic positions). As a consequence, students are likely to interpret the multiple perspectives presented in interdisciplinary subjects from within their existing dualist or relativist position. Rather than transforming their epistemic positions to something more sophisticated and useful for interdisciplinary learning, it is far easier for them to reject alternative perspectives, to compartmentalise them or to assimilate them under their current position.

Rejection

Students can disregard the experience of multiplicity as illegitimate or unreal in some way. For example, dogmatist students will reject as false, mistaken or confused any challenging views. They reject the divergent disciplinary perspectives raised in interdisciplinary subjects as being 'wrong' while their own perspective is 'right'. Alternatively, from a relativist position, the disagreement between disciplinary perspectives might be rejected as illusory because it is really only people stating their personal preferences and tastes.

Compartmentalisation

Students can also keep incompatible perspectives and conceptions compartmentalised from each other. They might have one explicit view they articulate in exams or when asked by the lecturer, and a different incompatible but implicit view that they act on outside educational contexts. For example,

see Gardner's (1989, p.5) account of how students tend to give the accurate answer to theoretical physics questions in exams, but then they rely on their very different, highly inaccurate and superficial, physical theories and conceptions they developed when young – their unschooled mind – for day-to-day problem solving. In many cases, the challenging disciplinary perspectives students are confronted with in an interdisciplinary subject are merely "superimposed" against their pre-existing beliefs, and so they remain "inert" with no real impact on their decisions outside the lecture hall or exam room (Paul, 1994, p.340; Gardner, 1989, p.120).

Assimilation

Alternatively, students can incorporate multiple disciplinary perspectives within the structures of their current positions. A dualist could interpret the emphasis on multiple perspectives in interdisciplinary subjects as indicating that the lecturer and tutors are inept or confused and cannot clearly articulate the truth, or that they are ignorant and do not know the truth. Because dualist students just want the right answers, from their point of view the multiplicity and lack of final answers in interdisciplinary teaching will seem like a cover-up for bad teaching. A relativist student will likely interpret the emphasis on multiple perspectives as being an elaborate way to say that everyone can have their own opinion. From this perspective the lecturer's refusal to identify the 'right' disciplinary answer is taken to mean that answers are unimportant, and any answer is as good as another.

Accommodation

In order to move to critical pluralism, students must circumvent the rejection, compartmentalisation or assimilation of multiplicity and must instead accommodate it. Rather than fitting the multiplicity into their existing structures, they must transform their current inadequate epistemic positions and create new structures. They transform their epistemic position so they can now make sense of otherwise discrepant multiple defensible perspectives.

If students are to accommodate the multiplicity they will be confronted with in an interdisciplinary subject, and move from a dualist or relativist position to critical pluralism, they will need explicit teaching and guidance. The following five teaching and learning strategies will be useful:

1. Be explicit about your own critical pluralist position and your rejection of unsophisticated dualist or relativist positions. Be explicit that you expect students to take a similar position of critical pluralism.

2. Avoid simplistic ways of talking about multiple perspectives that may encourage unsophisticated dualism or relativism. Avoid presenting what you teach as either the correct view of the matter or merely one opinion among many as these will lead your students to unsophisticated dualist or relativist positions, or strengthen their commitment to them. Too much emphasis on "there are no right and wrong answers about this issue" will move students towards relativism. However, too much emphasis on "but of course some views are proven true" will move students towards dogmatism. Instead, create a culture of critical pluralism in your lectures and tutorials. Stress that there are better and worse answers, make explicit the process of weighing up the complex evidence and reasoning to support different perspectives, describe how you develop a reasonable judgement that balances the relevant considerations, and ask students to do the same.

3. Students have to be confronted by the complex reality of interdisciplinarity. Confront them with multiple views, the evidence and reasons for these, and how the views differ and disagree. Avoid what Stein et. al., (2008, p.409) call a synthetic model where content is presented as a simplified syntheses with the disagreements between perspectives smoothed over. Also avoid presenting an uncritical pluralism where each view is presented in isolation from the others (which Stein et. al., 2008 calls a survey course). The tensions and contradictions between disciplinary perspectives are essential elements to interdisciplinary knowledge, and the challenge they pose is an essential spur for students to become critical pluralists. Critical pluralism requires being aware of the tensions and conflicts as essential elements in knowledge, without falling back on relativism or dogmatism.

4. Aim to create cognitive conflict for students where their current epistemic positions do not do justice to what they experience. In particular, conflict is created for dualists by highlighting the disagreement amongst legitimate epistemic authorities such as expert researchers, and conflict is created for relativists by highlighting how experts can judge that one view is better than another in the face of disagreement and pluralism.

5. If students are to move to critical pluralism, they need to follow up the problematising of their relativist and dualist positions with further investigation of these positions. As well as investigating the interdisciplinary content and skills, students need a chance to assess and reconstruct their epistemic positions. Give them the opportunity to engage in explicit reflection and meta-discussion about the nature of truth and knowledge and how to conceptualise these.

How do you evaluate the success of interdisciplinary subjects?

The general success of interdisciplinary subjects can be evaluated using standard student survey questions (such as 'this subject was well-taught' and 'overall satisfied with the quality of learning in this subject') and with informal evaluation during the subject (such as 'What did you like about this subject?' and 'What could be improved?'). However, to target the success of the interdisciplinary aspects of a subject, there needs to be more specific evaluations, in particular, an evaluation of the extent to which a subject enables students to develop a meta-disciplinary understanding, and interdisciplinary skills. Two ways to evaluate the success of interdisciplinary subjects is through formative and summative evaluations.

Formative evaluation (How do I know the students comprehend the subject?)

Formative evaluation occurs during the learning process in order to improve future learning. By evaluating their own learning, students deepen and strengthen their understanding, and the teaching team can use the evaluations to design teaching activities that will further deepen student learning.

Formative evaluation for interdisciplinary subjects involve students evaluating the extent to which they understand interdisciplinary teaching and learning, see the need for interdisciplinarity, and have a meta-disciplinary awareness. Formative evaluation of this sort should happen in conjunction with teaching and learning activities that explicitly focus on developing a meta-disciplinary awareness and interdisciplinary abilities. For example, lecturers should explain how they decide which discipline to access when problem-solving, or how they synthesise information from multiple disciplines.

A valuable formative evaluation method is to have students write answers to questions that address interdisciplinary teaching and learning. The teaching team can use the answers to diagnose misconceptions that block learning in an interdisciplinary subject, and then address these in their teaching. For further learning, the students can also revisit these questions at the end of the subject and write new answers to the same questions, thus further deepening their understanding. This is particularly useful for helping them to move from an unsophisticated epistemic position like dualism or relativism to the more sophisticated critical pluralism.

Method of formative evaluation of interdisciplinarity

1. Ask students to provide written answers to the questions below early in an interdisciplinary subject. This can be done during a tutorial, but this takes precious teaching time, and they could be answered as a homework assignment.

2. Collect the evaluation forms and use them to diagnose misconceptions about interdisciplinary teaching and learning (and to celebrate clear student understanding).

3. Use the diagnosis to direct the teaching in the interdisciplinary subject. The teaching should be explicit about the interdisciplinary nature of the subject so that students are able to provide more sophisticated answers to all the questions by the end of the subject.

4. Optional: Near the end of the subject have students write answers to the same questions. Then give them back their original answers so they can compare and discuss what they have learned and where they have developed a deeper understanding.

This evaluation method serves a number of important teaching and learning functions. 1) It provides insight into how well students understand the interdisciplinary nature of a subject, and can 2) diagnose misunderstandings. 3) It makes students aware of the interdisciplinary nature of a subject, and by reflecting on these questions, they develop a deeper and clearer understanding of what is expected in this subject. 4) When the evaluation is used to compare the first set of answers with the second, it demonstrates to students and teachers where interdisciplinary learning has occurred.

The questions

"This subject is interdisciplinary in nature and the teaching and learning involved may be different from what you have encountered previously. Your answers to the following questions will help you to develop a better idea of interdisciplinary teaching and learning, and will help the teaching team make this subject as useful and enjoyable as possible.

What is your current answer to the following questions? "I'm not sure" is an acceptable answer at this stage of the subject. By the end of the subject, the aim is for you to have developed deeper and more sophisticated answers to these questions."

1. What is the main point of this subject? What are we trying to achieve?
2. How can each of the disciplines involved in this subject contribute to this task?
3. What are the limitations of each of these disciplines in relation to this task?
4. What does it mean to do interdisciplinary work? Why do we do interdisciplinary work?
5. Why is interdisciplinary work important in this subject, given what we are trying to achieve?
6. How do we best go about interdisciplinary work?

Summative evaluation (What student survey questions could be asked?)

Summative evaluation occurs at the end of a process of teaching and learning in order to evaluate the overall success of a subject. A summative evaluation of interdisciplinary teaching and learning would target how a subject has met the interdisciplinary objectives. To evaluate this, you might add extra questions to student surveys that specifically target interdisciplinary learning. For example:

- This subject challenged me to think in new ways
- This subject introduced me to new perspectives and ways of knowing
- In this subject I made connections between knowledge from multiple disciplines
- This subject drew from various disciplines to create a deeper understanding of an issue
- This subject improved my understanding of what interdisciplinary inquiry is
- This subject improved my understanding of how to do interdisciplinary inquiry
- This subject improved my understanding of why interdisciplinary inquiry is important
- There was a clear synthesis of the various disciplines involved in this subject
- In this subject I learned how to integrate, balance and accommodate different perspectives

What criteria can be used for quality assurance of interdisciplinary subjects?

The final issue to be considered in this guide is the quality assurance of interdisciplinary subjects at an institutional level. The data collected using the summative and formative evaluation methods discussed in the last section is vital for this purpose. However, further criteria are needed that target the specifically interdisciplinary aspects of a subject. When evaluating the quality of an interdisciplinary subject, consider the extent to which the subject:[3]

Curriculum content

- presents multiple perspectives and ways of knowing;

- is based on a strong teaching-research nexus, and so reflects high quality disciplinary and interdisciplinary research;

- has clear and explicit interdisciplinary expectations and aims;

- gives students a clear understanding of what interdisciplinary inquiry is and its importance;

- makes explicit each different way of knowing presented in the subject;

- explicitly describes the integrative structure and interdisciplinary operations needed for synthesising the diverse perspectives;

- has assessment tasks that reflect interdisciplinary aims and objectives;

Student cohort

- leads to a strong cohort experience for students from multiple core disciplines;

- has teaching that is appropriate and accessible for students from multiple disciplines;

- provides a high quality learning experience for students from multiple disciplines;

- neither rewards nor penalises students from any particular disciplinary background. In other words, the disciplinary background of students does not effect their results and, for example, Arts and Science students do equally well;

Outcomes

- enables students to produce interdisciplinary work;

- ensures that students learn to critically synthesise and evaluate knowledge from a broad range of disciplines;

- leads students to "understand the relativity of discipline knowledge and the value of bringing different perspectives to bear on a field of inquiry" (Eliott, et. al., 2009);

Academic teaching team

- has teaching staff with sufficient teaching expertise to teach interdisciplinary content to cohorts with mixed disciplinary backgrounds; and

- has teaching staff with sufficient disciplinary and interdisciplinary expertise to teach both the disciplinary and interdisciplinary skills and understandings.

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[3] Some of these features are specific to interdisciplinary subjects that are taught by cross-faculty teams, and have a multi-faculty student cohort. Other features are applicable to any interdisciplinary subject.

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