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Toolkit for Interdisciplinary Learning and Teaching (TILT)



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Welcome to TILT

TILT is a toolkit for interdisciplinary learning and teaching. It offers a collection of ideas, methods and resources to support anyone interested in the possibilities of working across, and beyond, disciplines. Whether you are a university student, a secondary school teacher, a researcher in education, or a course designer, this site will help you develop interdisciplinary approaches and connect across boundaries with others working in this expanded field.

The toolkit includes insights from interdisciplinary learners and educators, references to relevant publications, teaching resources, and videos from the interdisciplinary classroom.

While the content is closely related to programmes delivered by Edinburgh Futures Institute at the University of Edinburgh, the toolkit is available to support learning and teaching in a range of interdisciplinary contexts.

We would be delighted to hear from anyone with questions, suggestions, or proposals for future work. We are open to enquiries from doctoral and postdoctoral researchers working in this area.



What is Interdisciplinarity?

Why interdisciplinarity?

Interdisciplinary learning and teaching have become increasingly popular across different levels of education. They suggest new ways of working and offer a number of benefits, including:

- Deep engagement with complex challenges
- Ability to solve problems and develop critical thinking
- Increased relevance and responsiveness to the world
- Learning with a wide range of collaborators

In many educational contexts, including Western universities, training, study and assessment are traditionally organised around distinct disciplines. For a long time, interdisciplinary approaches have been developed to challenge this dominant model and to provide alternative spaces for working together across epistemic boundaries.

Today, new interdisciplinary programmes are being created, curricula are evolving to become more flexible and open to integration, and mixed research methods are being taught and practised.

By its very nature, interdisciplinarity means different things to different people, and is practised in various contexts with unique methods and applications. This is one of its main strengths. Perhaps the most compelling reason to develop interdisciplinary approaches is the agency that is afforded to chart new paths and find new ways of learning and teaching.

In this video, learners and educators from the University of Edinburgh's [Interdisciplinary Futures](#) degree introduce their approach to challenge-based learning and reflect on the value of interdisciplinary education.



[Watch the TILT: Interdisciplinary Futures video on Media Hopper with captions.](#)

Definitions and versions

The term interdisciplinary is contested and difficult to define, but as a model for learning and teaching, it has a lot of potential to bring us together with people we would not normally work with, and to challenge us to think in creative ways with new ideas and methods.

The prefix, inter- is a good place to start. Inter means between. When we work between disciplines, we create a space for connection, exchange and collaboration. Many definitions of interdisciplinarity emphasise this relational quality. For example, Katrine Lindvig and her co-authors adopt a broad definition referring to ‘any dialogue or interaction between two or more disciplines’ (2019, p. 348). Often, this dialogue or interaction is assumed to take place within the academy. Robert Frodeman refers to the ‘intra-academic integration of different types of disciplinary knowledge’ (2017, p. 4). In these examples, the integrity of disciplinary knowledge is maintained. However, Joe Moran explores the possibility of moving beyond disciplinarity:

“ [interdisciplinary] can suggest forging connections across the different disciplines; but it can also mean establishing a kind of undisciplined space in the interstices between disciplines, or even attempting to transcend disciplinary boundaries altogether. (Moran 2010, p. 14)

The idea of an undisciplined space implies a rejection of, or at least a willingness to test the ‘rules’ of educational systems and processes. This might take us outside the academy.

We might follow the Indigenous and non-Indigenous research collective of Bawaka Country to challenge ‘the notion of universities as the centre of knowledge production’ (2019, 694). Interdisciplinarity has the potential to move us out of our institutions to

engage with, learn from, and become with the world around us. If an understanding of disciplines can be expanded beyond Western conceptualisations of academic knowledge, then the idea of moving between disciplines takes place in a hugely expanded field.

These definitions and provocations represent different ways of thinking about and practising interdisciplinarity. If we understand interdisciplinarity broadly and accept that it might be practised in different ways in different contexts, then we avoid the prescriptiveness that may be inimical to the relational potential of this approach. Whether interdisciplinarity is understood as the careful integration of disciplinary perspectives, or a radical openness to our environments, it is a way of working that takes us beyond traditional approaches to education, into exciting new fields and practices. After all, as Moran suggests:

“ [...] the value of the term, ‘interdisciplinary’, lies in its flexibility and indeterminacy, and [...] there are potentially as many forms of interdisciplinarity as there are disciplines. In a sense, to suggest otherwise would be to ‘discipline’ it, to confine it within a set of theoretical and methodological orthodoxies. (Moran 2010, p.14)

Flexibility and indeterminacy are very much at the heart of this toolkit. This allows interdisciplinary learners and educators to remain open to new ways of working: ‘receptive to chance and perceptive of change’ (Overend & Lorimer 2018, p. 529).

Nevertheless, as the scholarship of interdisciplinary learning and teaching expands, there are many valuable conceptualisations of interdisciplinarity to draw on. The following sections offer some examples and explore some of the distinctions and models that emerge from the literature. This provides a context for the chapters of the Toolkit for Interdisciplinary Learning and Teaching (TILT), which support and promote a pluralistic engagement with interdisciplinarity. This is a selection of examples rather than an exhaustive typology.

Podcast

Interdisciplinary Futures student Emily Shaw asks What is Interdisciplinarity? and interviews interdisciplinary educators, David Overend and Gill Robinson:

 [Listen to the podcast](#)

Multi- / Inter- / Trans-

Interdisciplinarity is generally considered to be something quite different to multi-disciplinarity (meaning many disciplines), which brings together different perspectives and approaches, but does not necessarily integrate them. For example, Rebecca Turner and her colleagues at the University of Plymouth, explain the distinction:

“ [I]nterdisciplinarity involves the merging or integration of disciplinary

knowledge to offer novel perspectives, unlike multi-disciplinary approaches in which each discipline contributes from its epistemological origin but remains fundamentally unchanged by its encounter with alternative views. (Turner et al. 2024, p. 1093)

This suggests that interdisciplinarity has the power to change established disciplines by bringing them into new configurations and relationships with each other.

A good example of this is the way in which geographers have been drawn towards artistic methods in such a way that a whole new sub-discipline of creative geography has emerged. Artists can be geographers and geographers can be artists. And both now understand and apply each other's methods (Hawkins 2021).

Another common term is trans-disciplinary. This term is often used to describe an approach that not only moves between different academic disciplines, but may even escape the boundaries of the academy all together to engage with other types of knowledge and practice out there – in the 'real world' (Bammer 2013).

While universities are always inevitably part of the 'real world', the emphasis here is on collaborations that include diverse academic disciplines interfacing with external partners.

As Tanya Augsborg explains, one of the key conceptualisations of transdisciplinarity is 'as problem-focused with an emphasis on joint problem solving at the science, technology, and society interface that goes beyond the confines of academia' (2014, p. 235). A similar definition is offered by Andrew Barry and his co-authors:

“ [Transdisciplinarity] is taken to involve a transgression against or transcendence of disciplinary norms, whether in the pursuit of a fusion of disciplines, an approach oriented to complexity or real-world problem-solving, or one aimed at overcoming the distance between specialized and lay knowledges or between research and policy [...] (Barry et al. 2008, p. 27)

Insofar as it is useful to distinguish between 'intra-academic integration' (Frodeman), going 'beyond the confines of academia' (Augsburg) and 'real-world' problems (Bammer; Barry et al.), the inter and trans prefixes help to define different types of activity and collaboration that might comprise a project that takes a novel approach to learning and teaching.

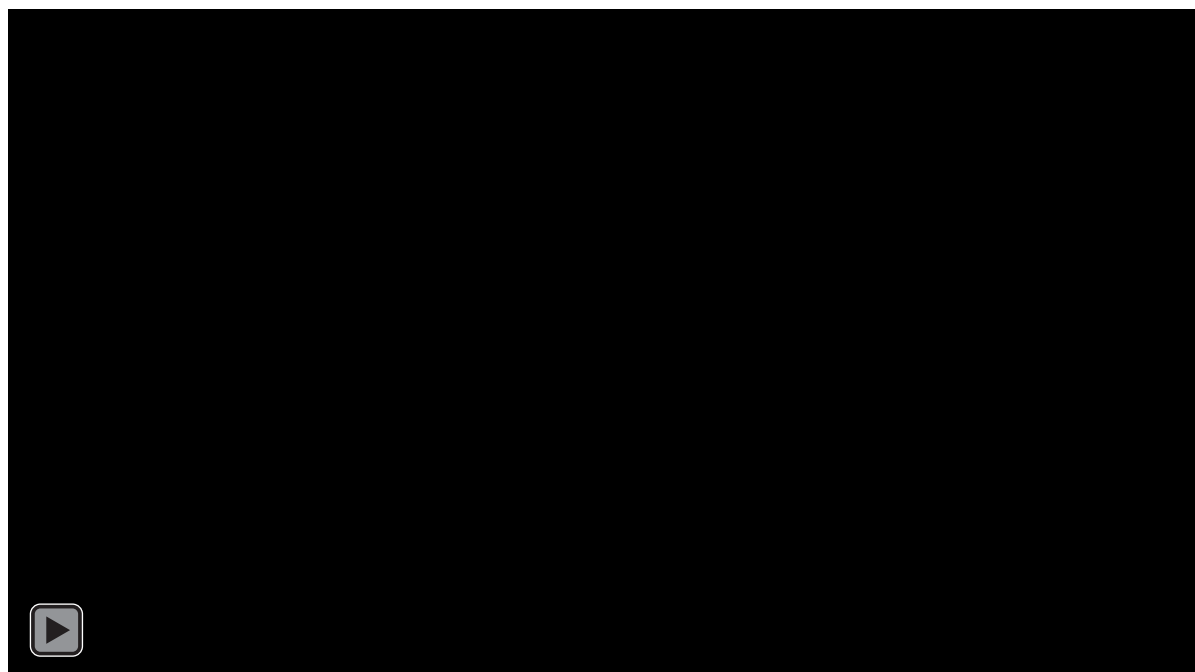
However, if a more pluralistic understanding of interdisciplinarity is accepted, then the boundaries between these terms may usefully be understood as more fluid and adaptable. It is important not to get too hung up on semantics and TILT follows Barry et al. in using 'interdisciplinary' to refer to a broad spectrum of activities, from the exploratory collaboration of multi-disciplinarity to the paradigm shifting potentials of trans-disciplinarity.

Activity: Manifesto making

Due to the vast range of competing definitions of interdisciplinarity, it can be useful for a new group to find some common ground. An effective activity is to write a manifesto together.

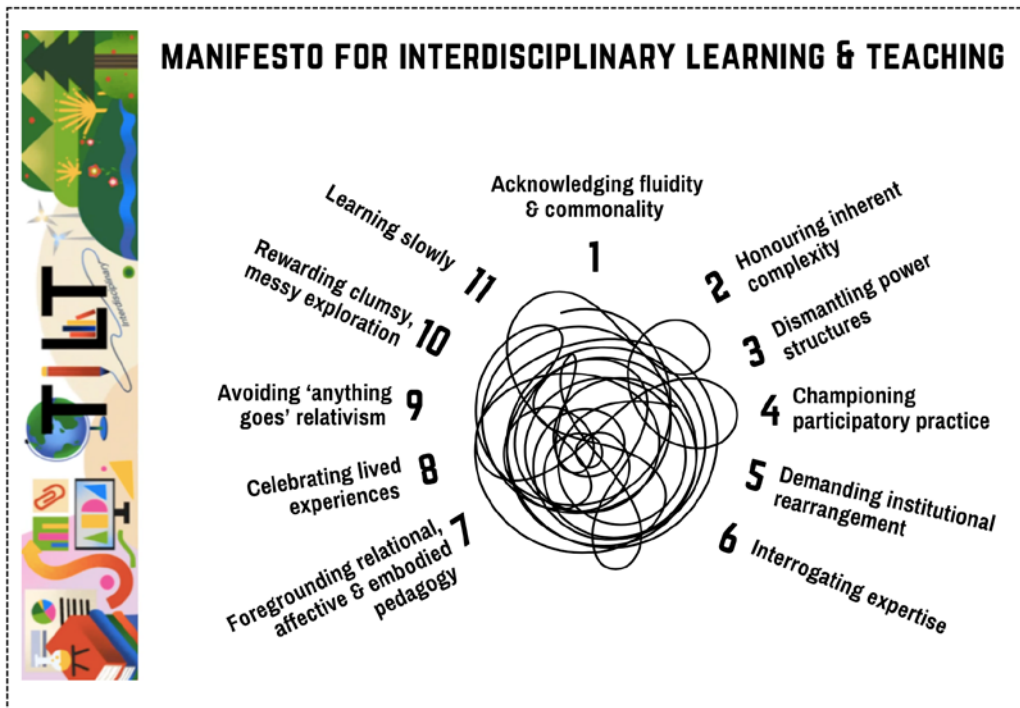
Manifestos often initially appear confident and totalising, suggesting an authority not yet possessed; they propose an imagined and desired future, but they simultaneously deploy irony and ambiguity to balance, or even counter their own prescriptiveness. This means that manifestos should open up debate, rather than closing it down.

Here is an example of a [manifesto for interdisciplinary learning and teaching](#), compiled by Jenny Scoles, Clare Cullen and Maddie Winter at the University of Edinburgh, with a film by Simon Dures:



[Watch the TILT: Manifesto video on Media Hopper with captions.](#)

This manifesto can be used as part of a teaching activity by asking learners to decide which statements they agree with, which they are opposed to, and which they would want to rewrite. This will help groups decide what is important to them as they embark on an interdisciplinary learning journey. The document could be returned to at the end of a course or project, to see if the statements need to change.



Modes and models

Of course, if we define everything that we do in relation to disciplinarity (whether multi-, inter- or trans-), then the idea of the discipline still carries a lot of weight. There is, perhaps, a tension between 'inter' and 'discipline' in some of these formulations, as alternative spaces are created that paradoxically rely on the disciplinary infrastructure that they exist within.

Agonistic-antagonistic model: An antagonistic (or more positively, agonistic) relationship occasionally emerges between the integrity of the disciplines and the practice of interdisciplinarity. Barry and his co-authors (2008) see such tensions as a strength of interdisciplinarity, drawing on radical democratic theory to emphasise the inherent value of conflicts, tensions and agonism, 'to challenge and transform existing ways of thinking about the nature of art and science, as well as the relations between artists and scientists and their objects and publics' (p. 25). The disruptive potential of interdisciplinarity can be a powerful way of challenging and changing established ways of working.

For Barry and his co-authors, 'interdisciplinarity should not necessarily be understood additively as the sum of two or more disciplinary components or as achieved through a synthesis of different approaches' (ibid p. 28). The agonistic-antagonistic model is in contradistinction to more utilitarian approaches, which emphasise the importance of integration. In some cases, a refusal of integration defines an interdisciplinary approach. Rather than using yet another prefix and suggesting an anti-disciplinarity, a conflicted 'relation to existing forms of disciplinary knowledge and practice' is identified, in which 'interdisciplinarity springs from a self-conscious dialogue with, criticism of or opposition to the intellectual, ethical or political limits of established disciplines' (p. 29). In this sense, interdisciplinarity holds the potential for disruption and political intervention.

When synthesis and integration are emphasised, there is a risk of closing down possibilities, or even unquestioningly shoring up disciplinary dominance (ibid). This is

sometimes seen in the various ways in which disciplines have been interconnected in response to large-scale global challenges, such as climate change.

Challenge-led interdisciplinary learning: The challenge-led model of interdisciplinarity is widely practised in different educational contexts. When disciplinary tradition and established ways of doing things are removed from, or repositioned within, a learning experience, complex challenges can provide a valuable point of focus. The rationale for interdisciplinarity at the modern university often refers to problems that cannot be adequately addressed within a single discipline. The opening of Keisuke Okamura's article on the evidence for research impact and dynamism of interdisciplinarity is one of many examples of this argument:

“ **Many of the world's contemporary challenges are inherently complex and cannot be addressed or resolved by any single discipline, requiring a multifaceted and integrated approach across disciplines. (Okamura 2019, p. 2)**

The challenge-led approach has huge potential for societal and planetary benefits. However, it is not the only way of practising interdisciplinarity and all too often, challenge-led and interdisciplinary learning are perceived as synonymous, particularly in the modern university.

Interdisciplinary environments: One alternative approach is to explore an interdisciplinary environment, such as the contemporary city (Overend et al. 2024, Cullen et al. 2024). In the University of Edinburgh's [Creating Edinburgh: The interdisciplinary city](#) (available as an Open Educational Resource), students are invited to explore the city as an interdisciplinary learning space. The course is organised around a series of topics, which include Decolonising Edinburgh, Sustainable Edinburgh and Designing Edinburgh. Learners follow a set route each week, returning to the classroom to share experiences and documents from their urban fieldwork, building an interdisciplinary understanding of the perspectives, practices and people who comprise the city.

Diffractioning interdisciplinarity: Another way of thinking about the potential of interdisciplinary learning and teaching is through Karen Barad's (2007) concept of diffraction. Arising from an interdisciplinary dialogue between physics and feminist theory, Barad's complex ideas have been taken up in education studies as a way to move away from the interpretive and analytical approaches, which can reinforce and reproduce existing hierarchies (Bozalek & Zembylas 2018, Murriss 2022, Spector 2015). By turning ideas and experiences over and over (re-turning), diffractive methods produce difference and resist closure.

Here are two lesson plans created for TILT by David Jay (Anglia Ruskin University), to introduce a diffractive methodology to the interdisciplinary classroom: PDFs are available for [Tracing Entanglements](#) and [Diffractive Questioning](#), both of which are intended to be used flexibly as practical activities in different learning contexts. Tracing Entanglements uses objects to foster diffractive thinking; and Diffractive Questioning promotes the values of open and generative questions.

The diffractive model might be understood as post-disciplinary. This is because the synthesis that is required to organise knowledge within the confines of a discipline is perpetually deferred by Barad's practice of continually re-turning ideas, concepts and methods. Or perhaps, more helpfully, it can be used as part of a rich assemblage of learning and teaching practices that emerge around the idea of interdisciplinarity.

It will be clear by now that there are many different, occasionally conflicting, ways of understanding interdisciplinarity. Embracing this plurality, the Toolkit for Interdisciplinary Learning and Teaching has been created to support a range of diverse modes and models. TILT therefore offers a collection of different methods, focusses, activities, and principles. It is hoped that this will complement and enhance the work of learners and educators in this expanded field, inspiring new approaches and ways of working.



Working with Challenges

As discussed in the What is Interdisciplinarity chapter of this book, there are various approaches available that allow us to work between disciplines in different ways. One model that has been very popular, in a variety of educational contexts, is challenge-led learning.

Richard L. Wallace and Susan G. Clark argue that ‘[i]nterdisciplinarity is inherently “problem-oriented” – that is, its theory and methods are designed to address the complexity of social and environmental problems’ (2017, 222). Such problems, including ‘climate change, poverty and conflict’ are sometimes called ‘wicked problems’, which are ‘messy and cannot be fully defined’ (McCune n.d.). These challenges ‘have no single obvious solution, require imaginative interdisciplinary problem solving, and bring together multiple stakeholders with diverse perspectives’. It is clear to see how interdisciplinary approaches can be of value in this context.

Challenge-led learning is an approach to interdisciplinarity that often involves collaboration between academia and external stakeholders, including partnerships with industry and international organisations (Klein 2017). This wider movement towards problem-based approaches has strongly influenced the development of interdisciplinary research and education in the modern university.

However, it is important to remember that such dominant models are not the only way of practising interdisciplinarity. While a range of positive and progressive learning outcomes can arise from ‘challenge-led’ and ‘problem-oriented’ approaches, there is a risk of a functional and solution-focussed experience, which could limit creativity and exploration. How can challenge-led learning maintain these qualities? Some of the activities suggested in this chapter have this aim.

With this caveat in mind, TILT offers some starting points for working with global challenges. The four subsections below each represent a different category of challenge questions: inequality and wealth, sustainability and biodiversity, peace and conflict, and global health. These categories are not discrete or exhaustive. Rather, they suggest some potential areas of enquiry, all of which interconnect and overlap in productive and generative ways.

Each category includes an overview, a suggested challenge question (which aspires to positive change), and a series of sub-questions that interconnect with the other categories. Suggested activities, resources and examples are included to inform the development of challenge-led learning in the interdisciplinary classroom.

All of these topics can be overwhelming and difficult to spend time with. It is important to consider how learners and teachers might be affected by the questions and activities. The chapter on Ethical Practice considers some of the positive and inclusive practices that could enhance an interdisciplinary approach to education, without causing unnecessary distress or missing the opportunity for careful and sensitive collaboration.

Inequality and wealth



According to the United Nations (n.d. a), 'inequality threatens long-term social and economic development, harms poverty reduction and destroys people's sense of fulfillment and self-worth'. Inequality is a particularly powerful topic for interdisciplinary learning and teaching, because it requires a recognition of interconnectedness:

“ In today's world, we are all interconnected. Problems and challenges like poverty, climate change, migration or economic crises are never just confined to one country or region. Even the richest countries still have communities living in abject poverty. The oldest democracies still wrestle with racism, homophobia and transphobia, and religious intolerance. Global inequality affects us all, no matter who we are or where we are from. (United Nations, n.d. a)

Economic inequality is just one part of a much wider, more complicated story. Nevertheless, it offers a productive starting point for work in this area. It brings us very quickly into the world of data, and visualisations such as this one offer striking representations of global wealth distribution.

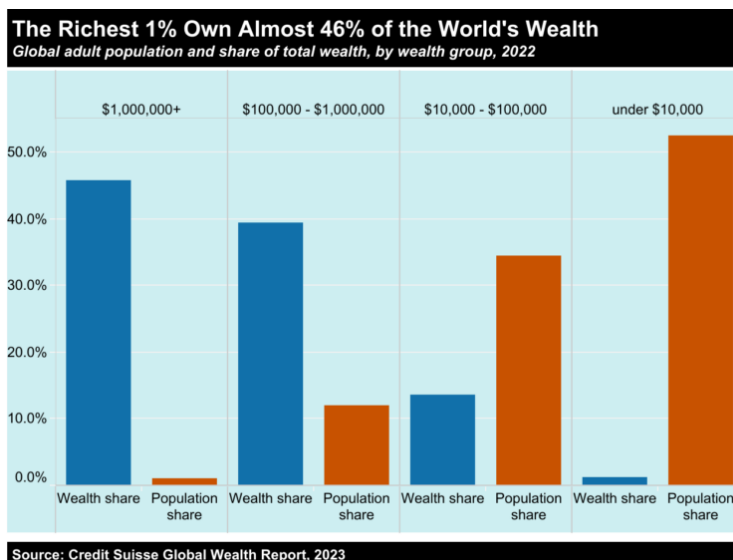


Image available at <https://inequality.org/facts/global-inequality/>. CC BY 3.0.

While it may be useful to start with a question related to wealth distribution, there are a range of social, cultural and ecological power dynamics that can be brought into the discussion. The sample questions here aim to bring a range of global challenges into a dialogue, suggesting that interconnectedness is at the heart of inequalities research.

Challenge question:

How can we reduce the gap between rich and poor?

Subquestions:

How is wealth distributed?

Who has access to greenspaces?

What is the relationship between crime and inequality?

How does inequality affect access to healthcare?

Suggested activities:

- 1. Games** – an effective way of exploring inequality in the classroom can be through card or board games, role play and simulations. [Active Learning in Political Science](#) has a collection of links to lesson plans that use games (the Economics section and the game on Global Inequality are relevant to this challenge topic on Inequality and Wealth). Games such as the [2030 SDGs Game](#) can be used to demonstrate what is at stake if our primary goal is acquisition of wealth. Or get creative with coins, counters, cards or sweets.
- 2. Maps** – a powerful way of visualising wealth inequality, maps such as those published by the Office for National Statistics can prompt discussion and inspire further research. [Explore economic inequality in the UK](#) and ask, ‘What are the regional differences in income and productivity?’. This example also provides a [dataset](#), which can be further explored through the TILT chapter on Methods for interdisciplinary research. Create new maps from data, such as house prices, [Airbnb properties](#), or proximity to greenspace, and consider what this tells you about a city’s inequality.
- 3. Intersectionality** – the problem with focussing on wealth and economic inequality is that it can obscure other forms of social and cultural inequality, all of which interconnect in various ways. Intersectionality is ‘way to think about how these distinctions [of race, gender, social class, sexuality, etc.] are socially constructed such that they depend on one another for meaning’ (Cole 2016, ix). [This video](#) introduces different models of intersectionality, which can be used to introduce Ashlee Christoffersen’s framework for competing concepts of intersectionality (2021, 579). The framework can be used as a teaching resource by asking learners to work in groups, researching examples of policy and practice that align with Christoffersen’s five concepts.
- 4. Ethical practice** – the TILT chapter on Ethical Practice offers a range of concepts, methods and resources that can be useful for any learning and teaching activities that focus on inequalities.

Sustainability and biodiversity



Sustainability incorporates a wide range of interconnected factors. As such, it is a popular topic for interdisciplinary education. There are many definitions of sustainability, and the term is used in various contexts, from economics to culture. Environmental sustainability is a key concern for many, and a useful starting point is provided by the campaigning charity, Greenpeace:

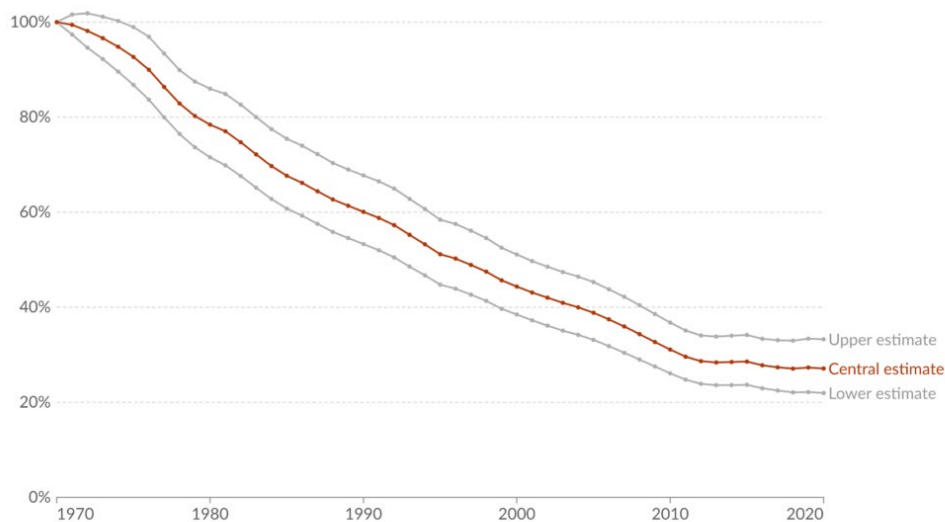
“ Sustainability is a way of using resources that could continue forever. A sustainable activity is able to be sustained without running out of resources or causing harm. If something is unsustainable, it means it’s using up resources faster than they’re being replaced. Eventually the resources will run out and the activity won’t be able to carry on. (Greenpeace n.d.)

As the environmentalist George Monbiot (2012) points out, there is an all-too-easy slippage from sustainability, through ‘sustainable development’ to the flatly contradictory notion of ‘sustained growth’. The term ‘green growth’ also offers a provocative topic for debate.

The wide-reaching purview of sustainable development is highlighted by the United Nations’ Sustainable Development Goals (SDGs). Again, the interconnectedness of global challenges is emphasised, as ‘ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests’ (United Nations n.d. b).

All of the 17 SDGs could offer productive topics for interdisciplinary education. For example, the goals for ‘life below water’ and ‘life on land’ raise some important questions about biodiversity that can be used effectively to structure interdisciplinary learning and teaching. Some exciting, difficult, and cautiously hopeful projects can emerge from an interdisciplinary response to the biodiversity crisis, which is strikingly illustrated by the Living Planet Index:

The Living Planet Index (LPI) measures the average decline in monitored wildlife populations¹. The index value measures the change in abundance in 34,836 populations across 5,495 native species relative to the year 1970 (i.e. 1970 = 100%).



Data source: World Wildlife Fund and Zoological Society of London (2024)

OurWorldinData.org/biodiversity | CC BY

1. Population: A population is a group of individuals of the same species that live in the same geographic area. A species will often have multiple or many populations, each living in a different area.

The global LPI as presented in the [Living Planet Report 2024](#) (WWF) shows that a subset of 34,836 populations of 5,495 species has declined by an average 73% in abundance between 1970 and 2020 (WWF & ZSL 2024).

There is a lot to ask about this data. Why 1970? Which regions are omitted or underrepresented? Which species are left out of the picture? Nevertheless, the striking decline in biodiversity over half a century of data collection, is a provocative starting place.

These sample questions aim to highlight the ways in which biodiversity is impacted by, and makes an impact on, other global challenges such as inequality, conflict and global health.

Challenge question:

How can we enhance biodiversity?

Subquestions:

How and in what ways has biodiversity been impacted by globalisation?

Who owns the land and controls its use?

What is the impact of conflict on ecosystems?

How is wellbeing affected by biodiversity?

Suggested activities:

1. Biodiversity sampling – moving outside the classroom into local greenspaces is a valuable way of connecting learners to the natural world. Sampling can be conducted using string and tent pegs to demark sampling areas. A 12m long string can be folded into 4 and arranged in a square using 4 people in a team at each corner. Groups can

spend 20 minutes at a number of separate locations and use a spreadsheet to record data sightings. They can use the recommended apps (Woodland Trust app, Merlin, Picture Insect and Google Lens) to help with species identification, which they can download and familiarise themselves with prior to the workshop. Discussion can then focus on overall impressions of biodiversity and questions of land usage at the site. (For an interesting interdisciplinary discussion of using quadrants, see Sanders and Davies (2023). This chapter connects to the discussion of Karen Barad in the TILT chapters on What is Interdisciplinarity? and Ethical Practice, by bringing Barad's theory into the use of quadrants in outdoor learning and ecology education).

- 2. Biodiversity footprints** – while the calculation of carbon footprints is widely practised across multiple sectors, the concept of biodiversity footprints is developing. An individual or group activity could identify a particular source of biodiversity decline (an arts project, a class or an individual's commute, for example) and calculate biodiversity impact. Lasse Miettinen (2024) provides a valuable step-by-step guide which could be adapted for a learning project. This involves: collecting data on the subject to be measured; deriving pressures on nature; deriving impact on biodiversity; and combining these impacts to calculate the biodiversity footprint.
- 3. Biodiversity resources** – The World Wide Fund for Nature has a wide range of [biodiversity resources for educators](#), primarily aimed at grades 6-8, but adaptable across learning levels. This includes workshop plans for role-playing activities, creating news reports, and designing products. The disciplinary alignment is indicated (science or art, for example), but there is a productive slippage between approaches in many of these tasks.
- 4. Cards** – WWF also provides a collection of [wildlife species cards](#), which provide learners with a fun way to learn about animals, their importance in their ecosystems, characteristics, lifestyles, and the threats they face. Use these cards as a stand-alone resource or to supplement other lessons.

Peace and Conflict



Conflict can be explored at different scales: from large-scale global warfare to local political events, to individual struggles that we experience every day. These forms of conflict are not distinct or discrete categories. Rather, there are myriad complex

interconnections between our everyday lives, sense of identity, membership of communities and international contexts. Interdisciplinarity can be a powerful model for learning across and between these different forms of conflict.

There is a huge amount of data on global conflict, some of which can provide an effective starting point to address this topic. The Center for Preventive Action (USA) manages a useful [Global Conflict Tracker](#), which provides ‘an interactive guide to ongoing conflicts around the world of concern to the United States’. This includes contextual information and a range of resources on almost thirty global conflicts.

Yuval Noah Harari and Itzik Yahav offer some valuable resources for learners and educators through their social impact company, [Sapienship](#). These questions can orientate a learning community addressing a challenging topic:

1. Is your country at war? If so, do you see a way out?
2. What are some of the reasons countries go to war?
3. Is there such a thing as a just war? What distinguishes a just war from an unjust one?
4. People often believe that some wars will last forever. Why do you think that is?
5. Can you think of something that lasts forever? If yes, what is it? If not, why do you think nothing lasts forever
6. Yuval Noah Harari once said, ‘The single greatest constant of history is that everything changes.’ What do you think he meant by that? Do you agree?
7. Are you afraid of change? What kind of change do you fear the most, and how do you cope with it?

As with many of the topics introduced in this chapter, work on conflict can be very difficult and upsetting, particularly for those who have had direct experience of war. The Red Cross have issued a valuable guide, [How to talk to children and young people about conflict](#). While this resource is age-specific, read alongside some of the ideas and activities in the TILT Ethical Practice chapter, it is a useful prompt towards careful and ethical approaches to learning and teaching about conflict.

Challenge question:

How can shared values reduce conflict?

Subquestions:

How has conflict changed in the 21st century?

What forms of inequality emerge in fragile or conflict-affected economies?

Why is peace necessary for sustainable development?

How does conflict affect mental health?

Suggested activities:

- 1. Preparing to discuss conflict** – Share the conflict questions from Sapienship (above) with learners before a class. Ask them to reflect on them individually in preparation for a group discussion. During the class, ask whether anyone would like to share their thoughts in response to any of the questions. This ensures readiness and willingness to talk about potentially challenging topics, which may include lived experience of war.
- 2. Quiz** – introduce international conflict with this [interactive quiz](#) by Gapminder, which usefully challenges common misconceptions about global conflict.
- 3. Case studies** – Using the global conflict tracker, ask small groups of learners to research a specific conflict in order to present an overview of key issues to the rest of the class. Encourage a critical consideration of how and why the data is presented in the way that it is. Are there any biases apparent in this resource?
- 4. Conflict resolution activities** – There are many conflict resolution games available, each of which offers different ways of exploring conflict that may be appropriate for the interdisciplinary classroom. One good example is the Conflict Resolution Network's [Conflict Resolving Game](#), which 'asks participants to build on, and add value to, each other's points'. The game 'rewards creative response to another's statement, rather than opposing it' and as such can foster interdisciplinary dialogue and integration. It is also important to reflect on what the final goal should be in conflict resolution. The TILT chapter on Ethical Practice refers to Wolfgang Deitrich's (2014) discussion of 'elicitive transformation resolution', a method of conflict resolution which challenges notions of a finalised stage called 'peace'. Could this approach be incorporated into activities, which sometimes obscure the cultural and ideological differences that might be important to identify and avow?

Global health



Interdisciplinarity has become an important approach to addressing the challenge of global health. For example, [The Usher Institute](#) at the University of Edinburgh brings

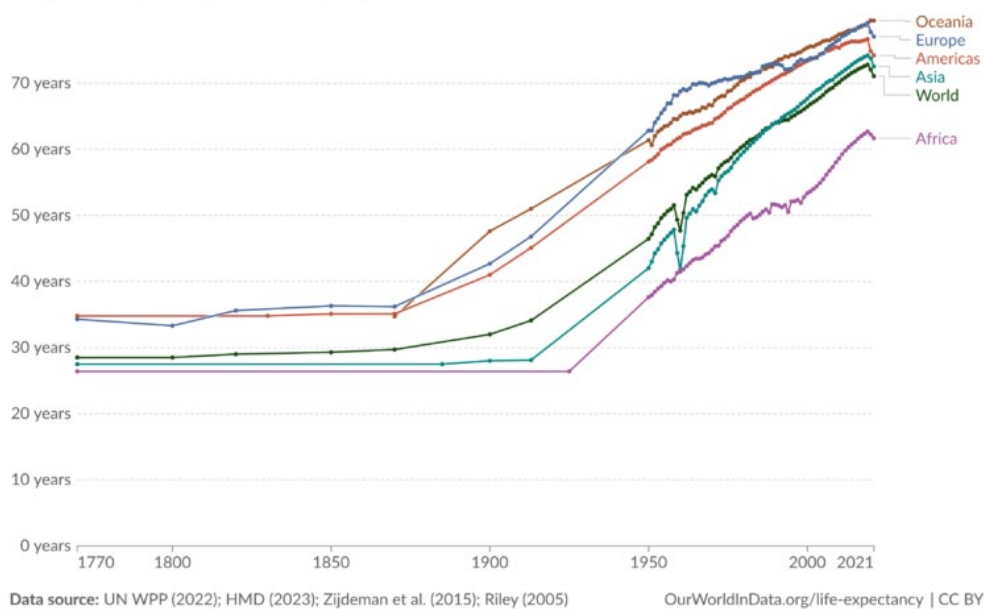
together researchers in epidemiology, statistics and modelling, informatics, computer science, clinical science, sociology, social policy, governance, ethics, politics, medical law psychology, economics, geography, health promotion and medicine. These researchers are working together to improve the health and wellbeing of patients, communities and populations locally and globally.

There is great potential in addressing global health as a challenge for interdisciplinary learning and teaching. A good place to start is the World Health Organisations series of Fact Sheets, which cover a wide range of topics, from [Climate change](#) to [Food safety](#). As with all the topics in this chapter, it soon becomes clear that global challenges are interconnected. Collaboration across knowledge areas is essential.

Exploring global health data soon reveals massive inequality. This chart, available on the Our World in Data page for Global Health, summarises the available data on life expectancy over the last few centuries:

Life expectancy

The period life expectancy¹ at birth, in a given year.



1. Period life expectancy: Period life expectancy is a metric that summarizes death rates across all age groups in one particular year. For a given year, it represents the average lifespan for a hypothetical group of people, if they experienced the same age-specific death rates throughout their whole lives as the age-specific death rates seen in that particular year. Learn more in our article: [Life expectancy - What does this actually mean?](#)

For an interactive version of this chart, see <https://ourworldindata.org/grapher/life-expectancy>

As always, any encounter with data opens up more questions than it answers. Life expectancy is a difficult thing to measure, because it is only possible to consider a historic cohort (those who have already died) or take a hypothetical approach to a period, even though mortality rates are changing all the time (Ortiz-Ospina 2017). These data also raise questions about why there is a difference in global regions, what the different causes of mortality rates might be, and what factors might impact results (for example, inequality, sustainability and conflict). The following questions suggest ways of bringing these global challenges into a dialogue:

Challenge question:

How can we improve global health?

Subquestions:

What is an interdisciplinary approach to health care?

How is healthy life expectancy distributed?

What is the connection between biodiversity and global health?

What are the effects of conflict on regional health?

Suggested activities:

- 1. Public health resources** – Ablconnect at Harvard University includes public health learning activities, including: [Humanitarian Funding Simulation](#) – learners participate in a simulation of groups proposing grants to a funding agency to deal with a humanitarian crisis; and [Adopt a Country](#) – learners ‘adopt’ a country to follow and research for the semester.
- 2. Debate** – CFR Education from the Council on Foreign Relations (USA) provides a list of questions on global health, for example: ‘How well prepared for a major disease outbreak is the world?’. These can be used to prompt debate between groups, or offer starting points for independent research tasks.
- 3. Poetry** – the Scottish Poetry Library hosts the [Poetry for Wellbeing toolkit](#) (created by Autumn Roesch-Marsh, Ariane Critchley and Samuel Tongue), which offers a practical guide to running your own poetry group, with an emphasis on how reading and writing poetry can support positive mental health, and is available for anyone to use and download. The programme is created primarily for social workers, but the ideas and activities are valuable in lots of different contexts.



Collaboration

Collaboration is an important, and often essential, part of interdisciplinary learning and teaching; it can take various forms. However, teamwork is not always well supported in learning programmes and collaboration is sometimes just expected to happen. This chapter highlights the benefits of teamwork for learners. It provides some resources and tasks to support collaborative learning and teaching across four categories: Working in groups, Leadership, Collaboration across disciplines, and Working with external partners.

There are a number of specific challenges posed by interdisciplinary collaboration, as discussed in this video by Utrecht University, which considers issues around complexity, diversity, interdependence and creativity:



[Watch the video on YouTube](#)

Working in groups

Group or teamwork can be demanding and difficult, yet it is vital participants learn to work well with each other – understanding how to compromise and, where desirable, to find consensus. Diverse teams made up of learners from various disciplinary backgrounds with different life experiences informed by their gender, race, class, ability, etc. encourage learners to develop intercultural and interpersonal skills.

Fostering positive working relationships built on trust is a vital first step towards successful teamwork (Barkley, Cross, & Major 2014). Participants should be encouraged to spend time getting to know each other at the beginning of any project. This process can be better facilitated through something like this [Group Skills and Project Planning worksheet](#).

A teamwork contract can be used, setting out ground rules as well as role and task assignments can help to pre-empt or mitigate conflict as participants work together. By making expectations explicit, individual members can hold each other accountable, making them more autonomous as they progress.

[Interactional Discourse Lab](#) is a tool that can help both educators and students to capture and make sense of their group's dynamic and effectiveness. It can be used to offer insights for students about their engagement- prompting reflection and growth; it can also offer alternative options for assessment of teamwork.

Leadership

Leadership is already a hotly contested concept amongst educators and researchers. In practice, however, leadership is discursively constructed by higher education institutions as a set of skills that can be acquired; this is largely in response to labour market demands. This characterisation most resembles the process (Burns 1978) and systems-oriented (Senge et al. 2015) perspectives in the literature—whereby leadership is characterised as

something that can be taught. Notably, however, such an approach locates leadership within the leader. The primary unit of analysis and for improvement is the person—reinscribing leader-centricity.

Various frameworks to account for skill acquisition related to leadership have been developed. Professionalised disciplines, like engineering or business management, have taken a pragmatic approach. For example, educators have set out six Elements of Engineering Leadership: character development, business knowledge, interpersonal skills, intrapersonal skills, management skills, and the study of leadership (Daly & Baruah 2021), and MBA programs list leadership amongst their top learning outcomes (Okudan & Rzaa 2006). In contrast, theatre studies grapples with leadership ‘as an art’ (Biehl-Missal 2010), as something to be understood with and through performance and aesthetics (Katz-Buonincontro 2011). While sociologists seek to uncover the origins of leadership (Garfield, Syme, & Hagen 2020), approaching it as highly politicised (Viviani 2017), and drawing on theories of power put forth by Bourdieu and Foucault to inform the teaching of leadership (Bogotch et al. 2008; Gunter 2010). In anthropology, teaching leadership is underpinned by ‘methods that take sociocultural dynamics seriously’ (Johnson 2007, p. 213).

Data collected from the Edinburgh Futures Institute’s undergraduate course, [Students as Change Agents](#), provided evidence for the ways in which traditional and disciplined concepts of leadership are troubled in the interdisciplinary classroom (Winter & Overend, 2024). There is often no obvious content expert in the interdisciplinary classroom and, especially in challenge-based interdisciplinary contexts, the instructor or coach plays the role of a facilitator rather than a traditional lecturer. The analysis produces a novel characterisation of interdisciplinary leadership as a ‘temporal sensibility that can be taken up, put down, passed around and shared by any and all members’ of a team (ibid., p. 85).

As mentioned in other chapters of TILT (see Ethical Practice), interdisciplinary education can be an emotional and challenging process. Part of the uncertainty of the learning process is that many things learners take for granted in disciplined classrooms no longer apply—including traditional leadership and teamwork roles. Here is a [Challenging Assumptions about Leadership workshop plan](#) aimed at ushering learners through the assumptions they hold about leadership.

Collaboration across disciplines

Despite the common desire and anticipated value of collaboration across disciplines, working together rarely unfolds in the ways we expect. In his work on radical collegiality, Michael Fielding (1999), addresses both practical and theoretical notions of collaboration and collegiality in order to purposefully differentiate between them. He argues that ‘collaboration is an overridingly instrumental form of activity’ bred of individualistic teaching cultures, while collegiality is ‘communal in form and in substance’ as ‘its intentions and practices make no sense outside a way of life and a tradition which is expressive of collective aspiration’ (ibid., 17). The three primary strategies for fostering an inclusive collegiality are:

1. Energising equality: the power of peer learning,
2. Students as teachers: teachers as learners,
3. Taking democracy seriously: reconstructing education as a democratic project.

It can be difficult to know where to start with a co-creative process. [The Co-creation of Learning and Teaching Typology table](#) (Bovill 2019) is a useful tool for identifying, individually or collectively, how a co-creative project might progress.

Working with External Partners

Collaborating with external partners can be especially stimulating for interdisciplinary learning. In this section we outline the role external partners play on one of the undergraduate courses offered by Edinburgh Futures Institute and highlight some of the ways external partners can be engaged with.

Students as Change Agents and External Partners:

Students as Change Agents (SACHA) was originally offered at the University of Edinburgh as an extracurricular program in 2019, and in the years that followed engaged more than 30 external partners. A curricular version, offered by the Edinburgh Futures Institute since 2022, works with partner organisations who pose an interdisciplinary problem for learners to respond to. For instance, the partner for the pilot run, the Data for Children Collaborative, posed the question, ‘How might the mental health of children living in Scotland be improved?’. The next year’s question was, ‘How can we effectively communicate and engage with marginalised communities in order to empower climate action?’. Recent iterations of the course dealt with issues concerning the safeguarding of children and diversity in the construction sector. The student teams work towards presenting a set of recommendations to the partner along with a written report; they also receive feedback from the partner throughout the process.

Learners on SACHA often noted that working with an external partner was novel in the context of their university experience:

“ I was excited to get a more hands-on opportunity to use my knowledge and interact with real world partners rather than with theory just re-enforcing my own worldview and solutions onto the problems. The biggest opportunity was to get really deep into the challenge posed by the external partner. I liked that we were able to talk with them.

Their exposure to ‘real world problems’ inspired learners to become more active, or pursue careers in relevant fields:

“ I have been completely inspired to get more involved in environmental activism and the positive response from the team to our ideas, and presentation has given me the confidence to aim for the career in politics which I have always wanted to do, but not had the confidence to properly pursue.

External partners also recognise the value of their collaboration with the university and students:

“ Having such insightful and really well articulated ideas has really given us a lot of food for thought, and it will totally inform our work. I’ve been hugely impressed by

both the calibre and enthusiasm of the students involved. We will mull over all that has been shared and consider if there are elements we can implement- now or in the future.

Connecting with External Partners

The Public Services Innovation Lab at Edinburgh Futures Institute works to connect academics, practitioners, community members and other stakeholders to explore challenges they are facing together. Their work involves, appraising opportunities, sharing guidelines for collaboration to avoid siloing, and striving towards innovation and change. [The Scottish Prevention Hub](#), for example, is a collaboration between EFI, Police Scotland, and Public Health Scotland. Staff from all three partners are co-located within the EFI, focusing their efforts on reducing inequalities.

In her work as Director of Public Services, Kristy Docherty (2024) has identified seven challenges to collaboration, as illustrated below.



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A four-principles approach, as shown below, provides the framework for collaboration at the Scottish Prevention Hub. Although the model was developed specifically to reduce health inequalities in Scotland with a focus on prevention, the approach can be applied to various contexts.



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When thinking about connecting with external partners it might be assumed that these relationships should be brokered at the institutional level, by representatives of the university. However, learners themselves come from rich communities of organisations and groups and are well placed to establish connections with partners as well.

Further resources on group work

- A [Teaching Matters](#) series on SACHA (2024) explores issues around mentoring, group dynamics, reflection and co-creation. A [Teaching Matters](#) series on [Group Work](#) (2025) is also available.
- In a [Times Higher Education blog post](#), William J. Owen and Leah Chambers (2024) share their tips on how to turn individual wins into team achievements in group work. They argue for a systematic approach, which aligns with the principles of collaborative learning, and suggest a pre-project group development tasks and reflective activities to form a better group dynamic.
- Rotman Commerce, based at University of Toronto offers some useful [Teamwork resources](#), such as Tips for Teamwork, and an example of a 'Teamwork contract'.
- In a [Teaching Matters blog post](#), Dr Rosie Stenhouse introduces study circles as a teaching method based on the critical pedagogy of learning circles (Suoranta and Moio 2006), which aim to develop collective social expertise. Students work in learning circles for two hours per week, and the group becomes a key medium for student learning. Learning within the group context requires students to engage with the process, which is addressed through the structure and framing of the study circles, and the assessment process.
- The Association for Learning Development in Higher Education provides [resources](#) designed to help assess and develop students' group work skills.



Interdisciplinary Methods

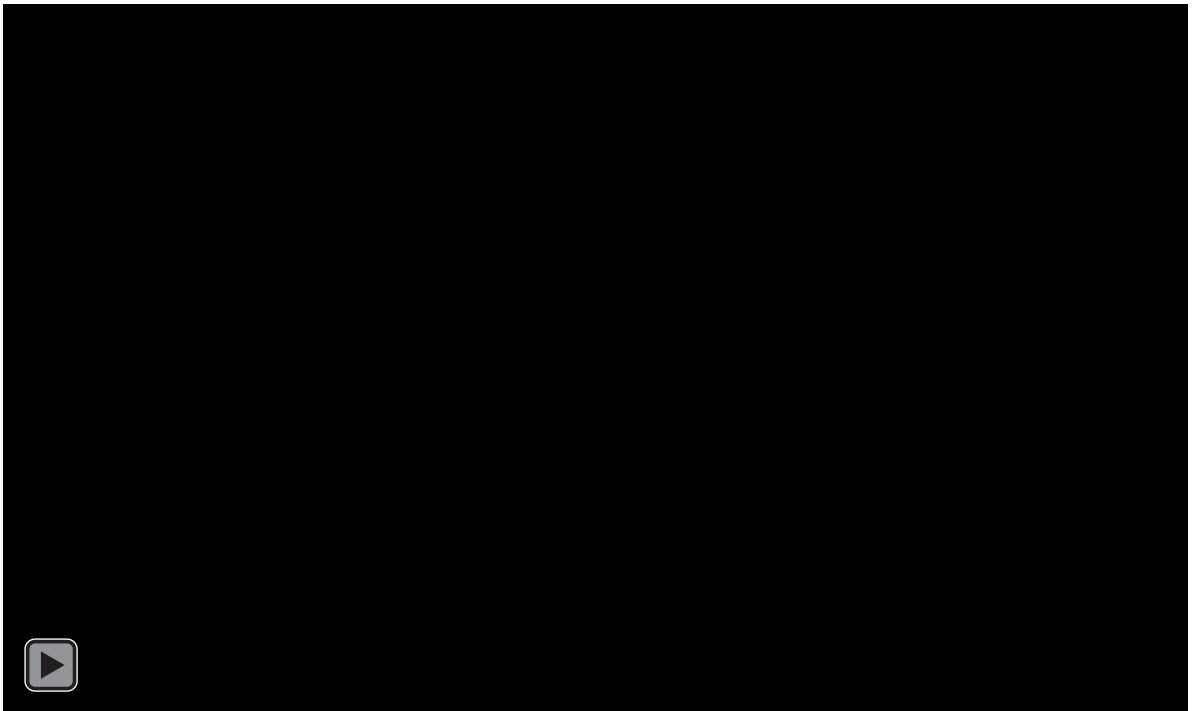
One of the challenges of interdisciplinary education is how to engage learners with the wide range of research methods available from across the disciplines. Complex projects with multiple opportunities and demands can reach their full potential if the right methods are selected and practised with confidence and creativity. At the start of a new project, it can be difficult to know what to prioritise, which processes to invest in, and who to reach out to:

- How can we understand the community's view on this problem?
- What forms of documentation could we use to capture this work?
- Do we need to appoint an arts facilitator?
- What can a statistician bring to this project?
- How could we use coding to streamline this process?

This chapter explores some of the options available to interdisciplinary learners who might be considering questions like these. It provides a selection of research methods that can be used for a variety of interdisciplinary projects. And it considers how some of these methods can be brought together effectively to address a range of challenges.

The conviction underpinning this chapter is that there is great value in developing a foundational understanding of a wide range of research methods. The intention is not towards expertise in all of these approaches (although researchers may well specialise in multiple methods). Rather, in order to prepare ourselves to work in interdisciplinary teams on complex problems, we need to become familiar with how different researchers and practitioners work. Interdisciplinary enquiry begins with shared reference points and an understanding of alternative approaches.

The approach taken by the [MA\(hons\) Interdisciplinary Futures](#) at The University of Edinburgh is to introduce a series of challenge questions, each of which is addressed from multiple methodological perspectives. Students take part in a collection of workshops, each of which offers a different approach to the same problem. The four workstations are: Data Collection, Data Analysis, Cultural Analysis and Creative Practice. On the methods courses, Researching Global Challenges ([RGC1](#) and [RGC2](#)), learning takes place in a large teaching space, with students visiting each of the four workstations in turn. Looking around the room, they can see other groups who are working on the same question with very different activities. This video introduces methods training on these courses.



[Watch the TILT: Methods Workshops video on Media Hopper with captions.](#)

Introducing interdisciplinary learners to a wide range of methodological approaches means that communication and collaboration will happen more easily and efficiently. If we take time to engage with working processes that are unlike those with which we are most familiar, then we are likely to see the value in them and consider incorporating them into our projects.

This approach sets out to expand the ‘toolkit’ that is available for interdisciplinary projects. However, engaging with multiple methods does not guarantee interdisciplinarity. As Catherine Lyall and her co-authors point out, ‘interdisciplinary research does not occur automatically’ (2015, p. 1), but requires strategies for synthesis and collaboration. The methods in this chapter are therefore presented as potential components of an interdisciplinary enquiry, which can emerge within the wider context of interdisciplinary learning and teaching, informed by a holistic approach to collaboration, assessment strategies and ethical practice.

Some of the methods introduced in this chapter are particularly suited to an interdisciplinary approach, as they require a combination of diverse practices that are brought together in response to a specific challenge. Celia Lury introduces such compound methods, understood in the *Routledge Handbook of Interdisciplinary Research Methods* as combined research activities, which incorporate ‘a variety of practices’ (2018, p. 7). Thematic coding, ethnography, decolonising methods, and deep mapping are all examples of compound methods, which could be adopted as potentially, if not inherently, interdisciplinary activities.

Each of the following four categories of research methods includes a brief introduction, some suggested activities or lesson plans, and a list of resources. It is important to note that these are not discrete categories: they blend into each other and overlap, and their potential as interdisciplinary methods emerges in their combination as a ‘methodological bundle’. If interdisciplinarity is to be given a chance to develop in these contexts, a confident grounding in these categories may be the best place to start.

Data Collection

Data Collection is the process of gathering information, using various methods and for a specific purpose (Creswell 2022). Data can be qualitative (qualities, characteristics, words) (Ritchie et al. 2014; Silverman 2002), or quantitative (numbers) (Chivers & Chivers 2022). While collected data will also be analysed, the emphasis here is on methods for building new datasets.



Data collection training might include:

- **Surveys** – collecting information about a group of people by asking them questions (often about opinions, beliefs, characteristics, preferences etc.) and then analysing the results. Used in both cross-sectional studies (collect data just once), and in longitudinal studies (survey the same sample several times over an extended period).
- **Interviews** – Based on verbal communication and spoken narratives, interviews recognise that participants actively construct their social world and can verbalise their insights. The process is relational and used to explore complex issues and processes, private and sensitive subjects.
- **Big data** – working with large datasets, which might be changing and growing at the point of encounter. Used in a variety of areas including machine learning.
- **Social media** – Collection of social media content and metadata, which ‘contain useful information for understanding human-nature interactions in space and time’ (Toivonen et al. 2019).

Resources:

This [Data Collection and Analysis activity plan](#) includes suggestions for workshop activities:

- Exploring the use of data analysis
- Exploring the research question
- Exploring terms and concepts encountered in introductory data analysis texts
- Interpreting data in a research paper or report

Further reading:

- Creswell, J. W., & Creswell, J. D. (2022). *Research Design: Qualitative, quantitative, and mixed methods approaches*, 6th ed. Sage.
- Chivers, T. & Chivers, D. (2022) *How to Read Numbers: A guide to statistics in the news (and knowing when to trust them)*. Weidenfeld & Nicolson.
- Ritchie, J., Lewis, J., McNaughton Nicholls, C., & Ormston, R. (eds.) (2014) *Qualitative Research Practice: A guide for social science students and researchers*, 2nd ed. Sage.
- Silverman, D. (ed.) (2021). *Doing Qualitative Research*, 6th ed. Sage.

Data Analysis

Data Analysis is what happens after a dataset has been created or located. The aim of data analysis is to interpret, describe, or model information that has been purposefully collected to draw insights and conclusions about a particular question under investigation. These insights should be linked to higher order concepts and theories. Depending on the type of data, various systems, tools and programmes are available to clean, store, organise, interpret and communicate complex information.



Data analysis training might include:

- **Descriptive statistics** – exploratory analysis used to understand frequencies, averages and correlations. It is about summarising, or describing, the data numerically or visually, rather than making decisions based on causation. The process often involves creating tables, charts and summary statistics, such as percentages, from raw data.
- **Thematic coding/analysis** – for use with qualitative datasets, this analysis aims to identify, analyse, and interpret patterns or themes, and relate them to the research questions and higher order concepts. The most common analysis method is known as ‘thematic coding’ and it is useful for interdisciplinary research due to its flexibility (Braun & Clarke 2006).

- **Data visualisation** – translation of raw data into aesthetically appealing visual formats, for example, graphs, tables or graphics. The purpose is to make it easier for an audience to process information faster and more efficiently. Data visualisation should help others identify patterns, trends, and correlations in the data; it should tell a story that can help in informed decision-making.
- **NVivo** – popular qualitative data analysis software for storing, organising, transcribing and thematically coding qualitative and mixed methods datasets. Its latest edition uses AI to drive sentiment categorisation and preliminary thematic analysis.
- **Mapping interactional dynamics** – analysis rooted in principles of interactional sociolinguistics which ‘studies the language use of people in face-to-face interaction’ (Jaspers, 2023), focuses on the relationality of speech and types of speech to make sense of participants’ evolving dynamic. With the use of tools like IDLab, interactional discourse analysis can help make sense of a team’s dynamic, encouraging self-awareness and responsiveness.

Further reading:

- Braun, V., & Clarke, V. (2006) Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Clarke V., & Braun V. (2013). Teaching Thematic Analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, 26(2), 120–123.
- Finlay, L. (2021). Thematic Analysis: The ‘good’, the ‘bad’ and the ‘ugly’. *European Journal for Qualitative Research in Psychotherapy*, 11, 103–116.
- Jaspers, J. (2023). Interactional Sociolinguistics and Discourse Analysis. In Michael Handford & James Paul Gee (eds.) *The Routledge Handbook of Discourse Analysis* 2nd ed. (pp. 85-97). Routledge.

Cultural Analysis

Cultural Analysis uses a range of methods to understand and interpret the meanings of various types of cultural texts, including art, literature, performance, film and images. It is multidimensional and ‘seeks to make sense of the ontological complexity of cultural phenomena’ (McGuigan 2010, p. 1). The emphasis here is on examining artefacts that have already been created.



Cultural analysis training might include:

- **Semiotics** – the study of signs and their meaning, semiotics offers a useful structure for reading a wide range of cultural texts and decoding their meaning (Chandler 2022).
- **Narrative analysis** – understanding personal experience of research participants by interpreting story structure and identifying narrative devices.
- **Visual analysis** – a structured approach to decoding meaning in images and understanding the compositional choices of the image creator.
- **Film analysis** – the technical and compositional elements of film images are analysed with attention to sound, camera angles, editing and arrangement of the screen picture.
- **Discourse analysis** – attention is given to the linguistic content and socio-linguistic context of writing and speech, often in dialogue.
- **Ethnography** – analysis of human cultures and societies, including qualitative methods such as interviews and observations, often taking place in the field.
- **Participant observation** – joining a particular group or organisation as a researcher and taking part in the phenomena being studied.
- **Decolonising methods** – a recognition that research has often been exploitative and can be decolonised by a wide range of practices that are respectful, reciprocal and reflexive. Linda Tuhiwai Smith (2012) advocates strategies of: Claiming, Testimonies, Storytelling, Celebrating survival, Remembering, Indigenising, Intervening, Revitalising, Connecting, Reading, Writing. Representing, Gendering, Envisioning, Reframing, Restoring, Returning, Democratising, Networking, Naming, Protecting, Creating, Negotiating, Discovering and Sharing.

Resources:

1. **Semiotics** – This lesson plan is an [Introduction to semiotics](#) – the study of signs. It provides a valuable starting point for a series of workshops that explore how we read and interpret a variety of cultural texts (from books to videos, fashion and cities).
2. **Visual analysis** – The Writing Studio at Duke University provides a useful introduction

to [visual analysis](#) in art history. The approach can easily be adapted to understand how a range of visual sources create meaning.

- 3. Decolonising methods** – This worksheet for [Methods of decolonisation](#) provides a description of the 25 methods introduced by Linda Tuhiwai Smith. These can be used in a variety of projects that draw attention to the ways in which research can become more respectful, reciprocal and reflexive.

Further reading:

- Chandler, D. 2002. *Semiotics: The basics*. Routledge.
- McGuigan, J. 2010. *Cultural Analysis*. Sage.
- Smith, L. T. 2012. *Decolonizing Methodologies: Research and Indigenous peoples*, 2nd ed. Zed Books.

Creative Practice

Creative Practice is the use of artistic methods to generate new cultural texts. The process of creation is often just as important as the output and this section includes a range of collaborative and participatory methods that can be used in a variety of research contexts. In this context, creative practice is understood as a research methodology (Nelson 2022).



Creative practice training might include:

- **Drawing** – facilitating visual responses to a challenge question can indicate themes and trends; collaborative drawing can encourage creative approaches to team research.
- **Zine making** – quick, DIY magazines allow exploration of research topics through cutting, sticking, drawing and folding, focussing attention on creating, interpreting and visualising information.
- **Photography** – no longer reliant on specialist equipment, participants can use their own devices and consider visual storytelling as an important research tool.

- **Film making** – the stages of development, pre-production, production, post-production and distribution, can all inform a research process.
- **Speculative fiction** – creative writing can be used to imagine possible futures, inviting a close consideration of the impact of the choices that we make today (Fischer and Mehnert 2021).
- **Creative engagements with place** – mapping, participatory methods and art making can all be used to shift perceptions and modes of engagement with our communities and environments (Modeen & Biggs 2021).

Resources:

1. **Collaborative drawing** – This lesson plan for [Collaborative drawing](#) offers a way into creative methods, for groups of learners who may have a wide range of experience.
2. **Zines** – This lesson plan for [Zine making](#) offers another creative method: DIY magazines that can be created quickly during a learning session. See also Dan Swanton's [What's a zine?](#) zine, used in assessment of geography students at the University of Edinburgh.
3. **Poetry** – The Scottish Poetry Library and the Binks Hub have developed a series of [Poetry for wellbeing workshops](#). This is also suggested in the Global Health section in the Working with Challenges chapter. Originally created with and for social workers, the tasks and lesson plans can be adapted to various contexts and can be embedded within a research methods course.

Further reading:

- Nelson, R. (2022). *Practice as Research in the Arts (and Beyond): Principles, processes, contexts, achievements*. Springer.
- Fischer, N. & Mehnert, W. (2021). Building Possible Worlds: A speculation based framework to reflect on images of the future, *Journal of Futures Studies*, 3. 25-38.
- Modeen, M, & Biggs, I. 2021. *Creative Engagements with Ecologies of Place: Geopoetics, deep mapping and slow residencies*. Routledge.



Assessment Strategies

Interdisciplinary learning and teaching often challenge established models and offer alternative ways of knowing and responding to the world. This is explored at the level of classroom activities and lesson plans throughout TILT, in chapters on Working with Challenges, Methods for Interdisciplinary Practice, Collaboration and Ethical Practice. This chapter addresses how assessment can be authentically aligned with these methods, approaches and activities.

There are many examples of interdisciplinary learning experiences that might offer exciting, challenging and innovative content, but assess learning exclusively through exams and essays. These traditional modes of assessment have their place and can certainly be used effectively in the interdisciplinary classroom. However, they are not the only ones available. Group assessment, Ungrading, and Reflection are considered in this chapter, along with a range of assessment formats. Context, resources and suggestions are offered to encourage a wider engagement in alternative approaches. This video introduces some of the ways in which interdisciplinary learning can be assessed, including the possibility of ‘ungrading’.



[Watch the TILT: Assessment for Interdisciplinary Education video on Media Hopper with captions.](#)

The rapid development of AI, such as generative artificial intelligence – including OpenAI’s ChatGPT and Google’s Gemini – has been cause for concern across many areas of education (Koh & Doroudi 2023). These new technologies can compromise assessment practices that require only recall of knowledge and abstracted argumentation. At the same time, ‘authentic assessment’ has become a key concern for educators looking to bring form and content together, allowing assessment practices to support the key skills and attributes required for the world of work and for life beyond the classroom. For Verónica Villarroel and her co-authors, this amounts to a paradigm shift, ‘involving a transformation from a culture of objective and standardised tests that are focused on measuring portions of atomised knowledge, towards a more complex and comprehensive assessment of

knowledge and higher-order skills' (2017, p. 840). See also Baeten, Struyven & Dochy 2013; Shepard 2000; Birenbaum 2003). There is great potential for interdisciplinary learning and teaching to develop new, authentic assessment practices that adapt to new educational contexts, supplementing the academic capabilities for which essays and exams might be most valuable.

There are also a number of important ethical practices that can be enhanced by adopting alternative assessment models. For example, expanding the range of assessment types can be a key factor in widening participation, as non-traditional learners might be excluded by educational programmes that rely exclusively on ostensibly high-level academic skills, such as essay writing (Burnell 2019). Strategies such as ungrading and allowing choice of submission formats can demonstrate care for inclusivity and provide opportunities for confidence and creativity that could otherwise be limited. Furthermore, as mental health and wellbeing crises affect learners' experiences and opportunities, the pressures and demands of assessment should be recognised. Educators have a responsibility to design assessment that is attentive and responsive to these struggles and realities. For learners undertaking assessment tasks and educators designing and marking assessment, the following sections introduce a range of approaches that might prompt new ways of working that enhance an interdisciplinary education.

Group assessment

In the chapter on Collaboration, group work is introduced as a vital component of interdisciplinary practice. Assessment can be an important part of an educational experience that prioritises working with others and developing shared approaches. However, learners often feel negatively towards group assessment (White, et al. 2005). It can be difficult to negotiate varying levels of participation and to work actively with compromise, particularly when the high stakes of professional recognition, progression, and degree classifications are in play. This leads some educators to avoid group assessments entirely, leading to interdisciplinary learning experiences that might emphasise collaboration through a range of innovative teaching activities only to abandon it altogether when individual students submit work for assessment.

How can group work be assessed in ways that recognise individual contributions at the same time as maintaining principles of co-creation? How can learners be empowered to utilise team work as well as individual study in their assignments? How can we support learners as they move fluidly between analytical, interpretive, action-based, collaborative and participatory projects? The following strategies offer ways to develop authentic group assessment that genuinely aligns with collaborative learning outcomes:

- **Peer review** – Incorporating an element of peer review among group members allows individual learners to input into the marking process, expressing their own perceptions of individual contributions within the group.
- **Individual commentary** – An individual pro forma could be used as part of the submission process. Commentary and reflection on the collaboration process and assessment of the final submission might guide individual adjustments to a group mark, for example awarding 10 extra marks for outstanding contribution and deducting 10 for poor engagement. It is also important to attend to ways in which power differences might shape constructions of 'outstanding' and 'poor'.
- **Negotiated assessment** – Inviting students to negotiate elements of their assessment

can work well to develop a sense of ownership and agency (Kleiman 2007). For example, a learner could be permitted to allocate a proportion of their mark to an individual written reflection or ‘put all their eggs in one basket’ by going with the full group’s mark entirely.

- **Methods training** – While some final submissions may require individual authorship, introducing learners to a wide range of collaborative and participatory research methods might encourage a greater use at the research stage, which would inform the writing process in new ways. This is not group assessment as such, but it opens up individual assessment to collaborative processes.

Ungrading

Ungrading is more than just an assessment technique and course policy, it is ‘a pedagogical paradigm with implications for every classroom process, potentially creating more effective learning environments and freeing instructors to focus more on supporting learning...[and] places the focus of education back on what is being learned and why, rather than what is being produced and for whom.’ (Baylor University, n.d.). In an ungrading approach, students are not awarded ranked grades but are provided with written feedback on the assignments and assessments at the end the course. In this way, the pedagogical focus is on promoting learning, rather than achieving grades (Blum 2020). In some cases, such as first and second year courses on the undergraduate interdisciplinary degree at the University of Edinburgh, a pass or fail is awarded based on threshold criteria set for passing each course.

Davies (2021) lists the benefits of pass/fail to include:

- Requiring teachers to be more explicit about the standards of their discipline.
- Promoting student-centred learning, and a more active and engaged approach from the learners
- Decreasing the feeling of competition between learners.

Ungrading rubrics

The ‘Assessing Assignments’ section in the Reflection Toolkit (n.d.) stresses that, ‘while “pass/fail” of assessment is lower stakes than many other forms of summative assessments and “for completion” is generally very low stakes, you still have the responsibility of ensuring that learners have enough information on how to complete the assignment satisfactorily’. While the suggestion that ungrading leads to lower stakes might be questioned, nevertheless, as with summative assessments, pass/fail requires both criteria and rubrics. York University’s website, [Teaching Commons](#), offers examples of rubrics from a variety of courses, for example, Gonzales’ (2015) [Single Point Rubric](#), and Leander’s (2022) [self-assessment form](#), adapted from Susan Blum’s (2020) book on ungrading.

Another approach is to [co-create a grade related criteria matrix with students](#) (Holt 2024), where learners are invited to discuss and draft some wording for each grade descriptor. This could also be adapted for pass/fail criterion.

When to employ an ungrading approach:

Introducing ungrading in the first year, or even second year, is a good way of encouraging learners to engage in low-stakes (or at least, different-stakes) assessment, building up their confidence as well as their assessment literacy. As Jessie Stommel (2020) argues, the first step in ungrading is getting teachers to talk about assessment to learners: ‘demystifying grades (and the culture around them) helps give students a sense of ownership over their own education’. The pass/fail approach works well in group work and is a key factor in the design on Edinburgh Futures Institute undergraduate courses in Years 1 and 2. As an EFI student highlighted:

“ I chose EFI courses as I enjoyed the idea of different types of assessment as well as the pass/fail aspect of those assessments. Specifically for [the Students as Change Agents course] I really like how we get to work in groups for our actual assessment, that’s something that I found really enticing and unique about this course.

Reflection

“ Reflective practice examines our thoughts, actions and experience, and ask[s] why they happened that way with the goal of improving ourselves or our understanding. (University of Edinburgh’s Reflection toolkit n.d.)

The link between learning and reflection has been well documented in academic literature, and many studies have shown that reflective activities for learners, such as keeping a reflective journal, can reinforce their learning. Reflection also may facilitate a more ethical practice. In this section, we consider reflection as an assessment approach.

Reflection and constructive alignment

The model of constructive alignment can be useful when thinking about embedding reflection in course design. That is, there should be alignment between learning outcomes, reflection activities, and assessment practices (Harvey et al. 2010). There are also some interesting counterpositions to constructive alignment (Gough 2013).

The University of Edinburgh’s [Facilitator’s toolkit](#), which is part of the [Reflection Toolkit](#) (n.d.), is a treasure trove of reflection-based learning and teaching resources, suggestions and tips to implement reflective practice as part of a course. The Facilitator’s toolkit shows that reflection can be positioned as:

- **A learning outcome:** For example, the LO could read, ‘The ability to critically reflect’. If reflection is used as a learning outcome, it should also appear as teaching strategy or assessment.
- **An assessment:** For example, the learners could be set a summative report on their course where they are asked to reflect on what they have learned and how they will use it in the future. This way we can easily see if they have obtained our learning outcomes.

- **A strategy:** Learners could be asked to discuss a set of reflective prompts with peers during a lecture, perhaps about their study habits or how they tackle assignments, while also identifying places for improvements. This could lead learners to become more effective in meeting the learning outcomes or completing the assessment.

The Facilitator’s toolkit [Assessing reflection](#) section provides advice about when and how to assess reflection, including examples of assessment rubrics, and [assessment criteria](#).

Reflection can be used as a method for checking-in with learners halfway through an initiative and offering formative feedback, and helpful feedforward. Examples include:

- Individual entries from a reflective journal
- A reflective blogpost
- Interim essays on development during the course or on benchmark statements
- Drafts on reflective summative assessments
- Reflective workbooks

Summative assessment examples of reflection-based assessment, and which can work well using an ungrading approach, include:

- Blogging
- Reflective diary or workbook
- Skills-development logs
- Reflective videos/audio recordings

Below are several other suggestions for how to approach reflection in assessment:

[Assessment in tutorials](#) – Lawrence Dritsas (2019) introduced a 500–1000 word ‘tutorial reflection’, worth 20 percent of the course mark, where learners spend the final five minutes of every tutorial recording how they felt about the class discussion, including their preparation.

[Reflection in SACHA](#) – David Wilson, Zoe Lai and Finn Eilenberger (2024) were students on a Students as Change Agents course, in which reflection is a fundamental pedagogical strategy. They suggest that reflection should not be graded in and of itself, but should be a practice that is embedded and intertwined within other methods of assessment: ‘heavily graded reflections can often hinder authenticity. Combining reflections with essays, presentations, or debates may be a more effective assessment strategy, comprehensively evaluating learning while preserving the integrity of reflective practices.’

[Assessing blogs and a grade-related marking criteria](#) – Nina Morris and Hazel Christie (2020) provide a marking template, as an open education resource, for academic staff who wish to incorporate assessed blogs into their undergraduate or postgraduate curriculum and are designed to be adapted to suit individual course needs.

Programme level assessment

In higher education, assessment is most often contained at course level, which risks

atomised learning experience that are not clearly aligned to wider programme-level learning outcomes. Moving assessment activities from course level to programme level has the benefit of encouraging a holistic approach to learning, which makes connections across distinct activities and experiences. It can also help to reduce assessment points across a programme, supporting manageable and sustainable learning and teaching. The following assessment strategies are examples of programme-level assessment that aim for consolidation of diverse learning experiences.

Portfolios – Alison Cullinane (2024) explores ‘Embedding a reflective portfolio for student development in science courses’, noting challenges, suggestions and solutions for using reflective portfolios as an overarching feature of the curricula. For Cullinane, portfolios ‘are a great way to track student achievement and move away from exams being the sole marker of success’. Portfolios are often more common in arts subjects such as design, architecture or fine art. They can take different forms, from books to websites and exhibitions.

Workbooks – designed effectively, workbooks can be used to reinforce the ‘narrative’ of a programme, guiding learners through a pro forma that asks for specific content – summaries of work undertaken at course level, reflections on application of methods or developing knowledge about a topic, for example. The ‘workbook’ could be conceived alternatively as a journal, a logbook or a diary. There is opportunity to use this as a strategy to distribute assessment activities across the year, rather than setting a number of course-level deadlines at the end of a term of learning.

Showcases – also more common in arts subjects, such as performance or music, a showcase event, which might be part of a wider festival, offers a way for learners to present or perform their work to an invited or public audience. Showcases, exhibitions or launches can be online or in events spaces, and can be used effectively to connect graduates to potential employers, as well as connecting in meaningful ways to organisations and communities.

Assessment types

Offering alternative assessment activities to students that can offer choice and flexibility, as well as creativity and enjoyment, can benefit both students and those who are marking them. Furthermore, designing authentic assessment, such as research bids and writing abstracts, will reflect the demands of real-world professional tasks that students will face upon graduation. For EFI programmes, this is a crucial course design element, which is appreciated by the students: ‘I really enjoyed that class as it had those aspects of interdisciplinary study as well as different forms of assessment’. Below are some examples of **innovative, creative and authentic assessment activities**:

- **Seen exam questions:** Students are given the question ahead of the exam, which allows them time to research and prepare. Normally, students are not permitted to take in texts or notes to the actual exam.
- **Peer marking and feedback:** Students and teachers work together to negotiate a shared understanding of the assessment criteria, and then students are tasked with making constructive judgements about each other’s (or another group’s) work that they have been allocated. Students must engage deeply with the assessment criteria to fairly award marks, or grades and generate feedback for their peers.

- **Blogs:** Writing a short blog post can be more challenging than initially expected. Students are tasked with writing in the first person, are encouraged to share their emotions and opinions, and are writing for a lay audience to understand the topic with a relatively small number of words.
- **Exhibition or performance:** A physical creation or manifestation of a set task. While they are a summative assessment, the process of building up to the final exhibit or performance includes ongoing assessment, feedback, and rehearsal and revision.
- **Research bid:** A chance for students to practice developing convincing arguments to secure research funding. Assessment criteria could include looking for evidence of the overall quality of the proposed research; the novelty and importance of the idea; the contribution it will make to the field (and beyond); the viability of the methodology and project management schedule; and the wider impacts beyond academia.
- **Dragon's Den pitch:** Based on the popular TV show, students need to research, prepare, rehearse and deliver a pitch about a business idea to a lay audience. Assessment could be a live pitch to a panel of 'dragon' judges.
- **Respond to a news article:** This could be a personal reflection to an article, or a more formal, structured response.
- **Write a podcast episode or TV show script:** Students are tasked with a writing assignment but one that can engage the imagination by scripting an audio or audio-visual narrative. The focus on a script reduces the demand on students to produce the actual podcast episode or video show, which may be too demanding, for example, for a short course.
- **Zine:** DIY magazines, which have been used effectively as a mode of assessment by geographer, Dan Swanton, as he explains in the [What's a zine?](#) zine.
- **Debates:** These could be hosted in-person or online and involve teams or individuals, and requires students to heighten their critical thinking and collaborative learning skills. Assessment could be a debate-based oral group exam, or a reflective summative essay on a series of debates held by the students during the course.
- **Poster:** Academic posters are a good alternative to a heavy-text assessment task. Requires students to learn infographic and visual design, to hone summarising and narrative skills to clearly and concisely convey complex information or research findings, and can be set as a group project.
- **Journal club:** Students organise themselves into a dedicated group to read, review and discuss nominated relevant journal articles or books, with a reflection or summary of the discussion and review serving as the assessment task.
- **Write an abstract to an article or an executive summary to a report:** An important comprehension and summarising skill, this task asks students to write a strictly word-limited synopsis of an academic article or report.
- **Conference as assessment:** A student conference could be organised for students to present their final projects, and the presentations are assessed and moderated by staff (and/or fellow students).
- Finally, this Times Higher Education blog post by Monica Francesca Contrino and Rocío Elizabeth Cortez Márquez (2022) offers ten suggestions for [creative assessment ideas](#).

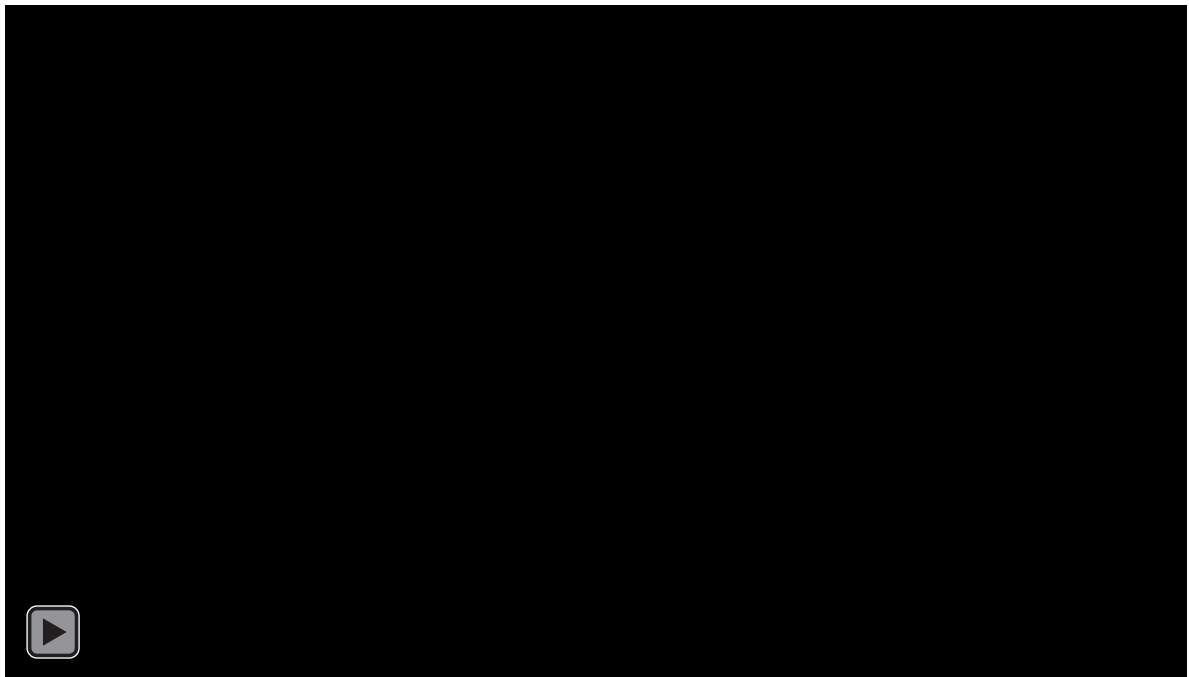


Ethical Practice

Education in formal institutions has historically been a site of both exclusion and oppression through various means, including the top-down imposition of curricula, knowledge, values and constructs. This institutional baggage, combined with entrenched and often outdated educational models, can be at odds with what is needed to deliver meaningful interdisciplinary learning and teaching.

The approaches to interdisciplinary teaching and learning that we advocate demand a redistribution of power; decolonisation of knowing, teaching and learning; a reconceptualization of the notion of leadership and of expertise; and an appreciation of the ways educators and students, in bringing the whole self to the learning, are at times vulnerable in their openness to share and collaborate. There is clearly a need for educators and students alike to cultivate an ethical practice that upholds inclusivity, integrates reflective and diffractive practices and honours emotionality.

Although Ethical Practice is offered as a distinct chapter within this toolkit, it informs all the other methods and approaches that are included. Consequently, there will be regular references to and signposts for other TILT chapters to support the integration of ethical practices into interdisciplinary learning and teaching. In this video, learners and educators on the University of Edinburgh's Interdisciplinary Futures degree discuss the value of reflective practice and the potential for a careful, inclusive and ethical model of education.



[Watch the TILT: Ethical Practice video on Media Hopper with captions.](#)

Inclusivity

The very skills and strategies that interdisciplinary educators will have to both cultivate and practice, are also needed by the students that they teach – requiring a collaborative approach between both between learners and educators, with an emphasis on inclusive

practices (see ‘Working in Groups’ the Collaboration chapter). Doing this through the lens of inclusivity provides an opportunity to refine and champion educational models that empower historically marginalised populations through collaborative dialogue, co-creation process and critically reflexive thinking – as outlined in Paulo Freire’s *Pedagogy of the Oppressed* (1970). In this section we highlight various practical methods for doing this – alongside relevant practical recommendations and considerations.

Humble inquiry – Edgar Shein described this as the gentle art of asking instead of telling; of ‘drawing someone out, of asking questions to which you do not know the answer, of building a relationship based on curiosity and interest in the other person.’ It is further described as an approach whereby researchers and practitioners (or staff and students) do ‘not just ask questions... but adopt a total attitude that includes listening more deeply to how others respond to the inquiry, responding appropriately and revealing more of themselves in the relationship-building process’ (Shein & Shein 2021, 3).

Convergent facilitation – The humble inquiry approach can be embedded into other techniques, such as Miki Kashtan’s (2020) convergent facilitation – a participatory approach for collaborative decision making. Although it can be used for many types of group decision making, it is particularly effective for making difficult decisions, and in situations where groups can be polarised and hold divisive opinions. Crucially, Kashtan believes that inviting ‘outliers’ into decision-making processes elicits alternative perspectives that might enrich the conversation and strengthen the final decision by transcending dichotomous positions. Such ‘outliers’ and their ‘dissenting’ views can be ‘gifts’ that catalyse breakthrough moments. Ultimately, cultivating faith, trust and goodwill within the group from the very beginning is central to convergent facilitation; without this, a willingness to care for the whole – instead of fighting for one’s individual position – would be impossible.

Conflict resolution – As in challenge-led interdisciplinary contexts, such inclusive practices shift the role of educator from expert to facilitator; it is not so much about what one knows but about how one can bring together different perspectives and elicit ways beyond conflict. Wolfgang Deitrich’s (2014) ‘elicitive transformation resolution’ is one such method of conflict resolution which challenges notions of a finalised stage called ‘peace’ by instead ‘acknowledg[ing] that the energy for transformation is already in the dysfunctional system... [and] in the hands... hearts and the minds of the [participating] parties’ (Dietrich quoted in UNESCO Chair for Peace Studies 2014). Within in this approach, facilitators ‘do not know the result... but... [rather] elicit the potential of the parties to find new options for acting [and] interacting with each other and move away from dysfunctional modes’. Such an approach might be well placed in addressing the global challenge of conflict (see ‘Working with Challenges’ in the Collaboration chapter).

Redistribution of power – Inclusivity disperses any residues of the educator’s ‘power-over’ the learning process, instead embodying the ‘power-to’, ‘power-with’ and ‘power-within’ practices that can harness the potential of each participant/stakeholder (Pansardi & Bindi 2021), something that can be at odds with existing power structures and hierarchies. As with Collaboration, Fielding’s (1999) three primary strategies for radical collegiality to make educational practice inclusive applies

1. Energising equality: the power of peer learning,
2. Students as teachers: teachers as learners,
3. Taking democracy seriously: reconstructing education as a democratic project.

Decolonising education, teaching and learning – True inclusivity within education can only emerge if all stakeholders not only acknowledge education’s colonial history, but also challenge and dismantle its colonial legacy. Cherrington et. al (2018, 1) believe that ‘decolonisation in education ... [demands] expressions of enactments aimed at disrupting prevailing power structures and institutional cultures to shed light on democratised practices and spaces that bring to the fore previously marginalised voices and knowledges’. But it also necessitates honest interrogation of the assumptions of what does and does not constitute ‘knowledge’ and ‘knowing’. Indeed, Indigenous and non-Euro-Western researchers, scholars and educators have long emphasised that processes of knowledge production – what is considered valuable and valid and what is not – negate the diverse ways of being, knowing and becoming that are integral to their respective cultures and traditions (Kimmerer 2013; Narvaez 2014; Chilisa 2020; Topa & Narvaez 2022; Mungai 2022). If interdisciplinary education is to eschew rigidity and stasis, to co-create new shared spaces for learning (see the What is Interdisciplinarity? chapter), educators and students must heed Chilisa’s (2020, 5) call to conduct research and engage in learning ‘without perpetuating self-serving Western... paradigms that construct Western ways of knowing as superiors to the Other’s ways of knowing’. All need to critically reflect on and question their own assumptions about knowledge, knowing and learning and be proactive in broadening these conceptualisations to include the diversity of human worldviews and experience.

Recommendation/Considerations for ethical practice of inclusivity in interdisciplinary teaching and learning

- Challenge-led, solutions-oriented learning demands an awareness that learners will not be solving the world’s wicked problems through the outcomes of their research and collaborative learning; rather, they will be exploring the possibilities of how to tackle them.
- This is not to demean their endeavours but to emphasise that, through inquiring with a humility about the true scope of their work and the very real ‘wickedness’ of the problems, the processes of embracing ‘messiness’ and of illuminating the complexities of local and global challenges are inherently valuable.
- Being an educator of interdisciplinary requires organic shifting between the role of teacher and that of facilitator.
- Facilitation is an ongoing practice through which attunement to the needs of specific individuals and circumstances is critical and experience (trial and error) will enhance the practitioner’s ability to make decisions about how to guide and work with participants towards co-created objectives.
- Given the discomfort and uncertainty learners can initially feel when they begin to work in an interdisciplinary way, educators must work towards guaranteeing learners’ emotional safety during potentially triggering and uncomfortable learning experiences.
- Educators therefore must learn how to effectively balance the need to cede control to other participants and the co-creation process with the need to ensure sufficient boundaries and structures to guide the learning through challenging discussions, spaces and periods.

- For guidance to be relevant and helpful, educators need sufficient knowledge about central issues and methodologies; however, more important is knowing the learners as individuals and how far each individual needs specific support in a particular situation. When educators invite learners to co-create solutions or pathways forward, the holistic relationality of becoming-with (Haraway 2016) learners promotes authentic inclusion.
- Integral to this process is supporting learners to become more confident and competent in resolving conflict autonomously, so that educator is not a default mediator (see the chapter in this book about Collaboration).
- Learning communities embarking on their interdisciplinary journey might benefit from pausing to take stock of the perspectives, values and objectives of each stakeholder about interdisciplinarity. This is where an equitable and inclusive process of co-creating a manifesto might draw out areas in which ideas and expectations overlap and/or diverge. For more information about manifesto making for interdisciplinary learning and teaching, see the What is Interdisciplinarity? chapter in this book.
- Decolonisation is not a metaphor, nor does it have a synonym (Tuck & Yang 2012). In this way, the modes of deconstruction available to us in higher education institutions, short of destroying them entirely, are important, imperfect, and not enough. In any case, efforts to decentre settler perspectives by incorporating social justice and critical metaphors can be fruitful (though not always). This requires honestly interrogating past and present systems that perpetuate colonial conceptions of knowledge, knowing and learning on both an institutional and individual level. The participatory, democratic collegiality that is integral to interdisciplinary teaching and learning (see the Collaboration chapter in this book) offers a firm platform upon which to begin decolonising education.

Reflection, Critical Reflection, Reflexivity and Diffraction

Alongside more discrete approaches outlined earlier (e.g. humble enquiry), techniques such as reflection, reflexivity and diffraction give learners the time, space and frameworks to capture (amongst other things) the output and wider impact of these approaches, in the broader context of their learning and development. Reflection (and reflective practice) has a long tradition going back to the seminal work of Dewey (1933) on reflective thinking for personal and intellectual growth.

Reflection is defined in the [Reflector's Toolkit](#) (n.d.) as 'the conscious examination of past experiences, thoughts and ways of doing things. Its goal is to surface learning about oneself and the situation, and to bring meaning to it in order to inform the present and the future. It challenges the status quo of practice, thoughts and assumptions and may therefore inform our decision, actions, attitudes, beliefs and understanding about ourselves'. The main premise of reflection is that participants need to critically reflect on what is going or went well, and what is not (or did not) go well (and their role in this), and to then deeply consider how this will inform what they do next (Boud et al. 1993; Schon 1983). Crucially, the literature suggests that reflection is not something that happens at the end of a course but should be integrated meaningfully throughout it.

Reflective practices help learners reorientate their relationship with learning and teaching, provoking them to focus on how rather than what they learn, and how this can be situated in broader contexts. Reflective practices nurture awareness of self, others and the socio-cultural, political, economic and historical contexts within which one researches

and learns. Reflection is also the basis on which reflexivity can be developed, both are essential for educators and students to nurture an inclusive learning environment, by helping them to recognise the emotional experiences of others before, during and after the learning. All the considerations educators take when using reflection as a mode of assessment should also be acknowledged in the development of and application of their own educational practice. When Practising reflection in one's teaching is an opportunity to model, in real-time, how reflective practices can enrich their ability to work and learn effectively and meaningfully both independently and in groups. Reflection can be used as an approach to inform learning with and from others, from the perspective of both the educator and the learner.

Reflexivity

While reflection is primarily focused on having an awareness of self and applying this accordingly by reflecting on what they have learned and what this means to them (based on the idea that there is a reality from which we can separate ourselves), reflexivity takes this process further – where implications from learning are considered in a much wider and fluid context (based on the idea that we continually construct the meanings of our worlds and ourselves). Rather than analysing what has happened (and using this to inform what happens next), reflexivity is about automatically self-assessing and reacting to circumstances as they unfold. Reflexivity is about finding strategies that can be used to question and challenge attitudes, assumptions and beliefs – and to help understand how complex roles are related to others.

Diffractional Practices

Believing that reflection and reflexivity 'only displace the same elsewhere', Haraway (1997, 273) moved beyond reflective practices by calling for 'diffraction', describing it as 'an optical metaphor for... efforts to make a difference in the world'. Instead of mirroring, reproducing or representing sameness, diffraction elicits 'another kind of critical consciousness'. This provocation has since been championed by Barad, who continues to pioneer diffractive methodologies by 'reading insights through one another in attending... and responding to details and specificities of relations of difference and how they matter' (Barad, 2007, 71). Barad emphasises that diffractive practices are not representational, but performative, embodied and dynamic, consequently making 'manifest the extraordinary liveliness of the world' (Barad, 2007, 91).

Diffraction promotes diversity, inclusion and justice by inviting into learning experiences the plurality of individual experience and perspective, thereby disrupting rigid constructions of societal stereotypes to create space for complex dynamism of individual identity. Diffraction can enhance thinking and learning in many ways that promote both interdisciplinarity and ethical educational practice:

- Diffraction **is not only an endeavour of the mind**; it is an embodied practice that engages in fundamental ways with how the body, emotions and spirit are implicated in knowing and experiencing the world (Barad, 2007; Bozalek & Zembylas, 2016). Thus, diffraction provokes educators and learners not only to bring 'the whole self' to the learning, but to honour 'the whole self' brought by others into the new shared interdisciplinary space(s) between them.

- Diffraction demands ongoing **questioning**: asking questions, and then addressing the prior questions about the assumptions of those questions, and so on, to acknowledge that ‘questioning is part of the world and the reworlding of the world’ (Barad & Gandorfer 2021, 18). For some practical activities for asking diffractive questions, see the chapter on What is Interdisciplinarity? Crucially, ethical diffractive questioning necessitates an approach like that encapsulated in ‘humble inquiry’: seeking to learn and understand with sensitivity, humility and respect towards the dignity of others.
- By reconfiguring the boundaries between theory and practice, diffraction can **deconstruct dualisms and blur boundaries, thereby** disrupting practices that reinforce injustices to cultivate new ways of thinking for learners and educators alike (Spector, 2015).
- Diffraction **does not conceive bodies or beings as static** and is **open to the diversity of identity, perspective and experience** that exists in the world. Diffraction also **seeks to understand difference and connection**, rather than sameness and separation/distinction. Striving to engage in ‘more-than-reflection’, Hill (2017) advocates for diffractive practices in education through cultivating the relational ontology of ‘becoming-with the world’; ‘displacing and diffracting the selves who teach’; and ‘embracing difference, interference and spaces-in-between’.
- Diffraction **disrupts linear notions of time**, and thereby honours the complex multidimensional and multidirectional ways that experience and learning intra-act. Diffraction is also ‘**attentive to the details** of the phenomena we want to understand’ (Ibid., 84-85) and therefore, enables learning about the ‘specific material configurations of the world’s becoming’ implicit in phenomena and their very nature (Barad, 2007, 84–85).
- Diffraction provokes its practitioners to explore the myriad ways they are rendered ‘**response-able**’ by others, how they render others response-able in turn and ‘at what cost borne by whom’ (Haraway, 2016). Through cultivating ‘**response-ability**’, educators and students become more able to respond ethically to, and to take ethical responsibility for, the challenges of 21st century (Barad 2007; Barad & Gandorfer 2021).

Practical examples of diffractive practices in a range of educational contexts:

- Murriss, K. (2022). *Karen Barad as Educator: Agential Realism and Education*. Springer.
- Spector, K. (2015), Meeting Pedagogical Encounters Halfway. *Journal of Adolescent & Adult Literacy*, 58(6), 447–50.
- Bozalek, V., & Zembylas, M. (2017). Diffraction or Reflection? Sketching the contours of two methodologies in educational research. *International Journal of Qualitative Studies in Education*, 30(2), 111–27.
- Hill, C. M. (2017). More-Than-Reflective Practice: Becoming a diffractive practitioner. *Teacher Learning and Professional Development*, 2(1), 1–17.
- Cullen, C.; Jay, D.; Overend, D.; & Winter, M. (2024). Creating Edinburgh: Diffracting interdisciplinary learning and teaching in the contemporary city. *Humanities and Social Sciences Communications*, 11(1), 1151.

Recommendation/Considerations for ethical practice of reflection, reflexivity and diffraction in interdisciplinary teaching and learning

- Following Bozalek and Zembylas (2017, 112), we encourage educators and learners to resist constructing a hierarchy among reflective and diffractive practices by instead putting ‘the two practices in conversation [and] delving more deeply into their continuities and breaks’.
- It is not about establishing either/or binaries between reflection and diffraction; as Spector (2015, 448) stresses, what others have termed reflective practices ‘may contain an element of diffraction’.
- There is a historical continuity through which reflective practices have given rise to diffraction.
- It is essential to recognise that different learning contexts and educational objectives will be better served by one over another, or by a combination of two or more such practices.
- It is important to scaffold learners’ introductions to reflective and diffractive practices, and gradually remove these supports as they become more familiar and confident.
- Such guidance will differ for each learner in different contexts, as will the rate at which they progress to independent practice.
- Similarly, offering a variety and choice of media and methods through which learners can reflect on and diffract their experiences and learning may facilitate greater authenticity and engagement.
- Respect confidentiality between learner and educator. Not only might this nurture authenticity, but it can also help to build trust and understanding between educator and learner.
- Reflection, reflexivity and diffraction all require self-awareness and self-understanding: who am I now? Why do I perceive or conceptualise the world in the ways that I do? Inviting students to bring their whole selves – who they are beyond the boundaries of the formal learning environment – recognises the multidimensional ways that learning happens and honours the place of learners’ emotions and embodied experiences in their ways of knowing.
- Inviting students and colleagues to bring their whole selves further necessitates a safe space and environment in which they can be vulnerable and experience discomfort.
- What might arise if educators meet students halfway by similarly bringing their authentic selves to the learning?

Emotionality

Emotionality and emotional engagement (both positive and negative) are key and often under-recognised factors in the interdisciplinary classroom. Crucially, many students will experience a range of emotions as they transition from disciplined pedagogies to those of interdisciplinary teaching and learning. This undisciplining process elicits uncertainty, feelings of being overwhelmed, anxiety, frustration, conflict and the challenges of

navigating social relationships (Overend et al. 2026). But the undisciplined spaces of interdisciplinary education also generate excitement, wonder, a sense of freedom to explore and self-direct learning. Within the authentic nature of interdisciplinarity, students have space to become emotionally invested in their projects and will often experience both the joys and frustrations associated with developing higher levels of knowledge and skills (Moon 2004; Boud & Miller 1996). This raises several questions (summarised below) for both educators and students – both in surfacing and accepting the range of emotions that can be experienced and supporting them through this.

- What are the benefits to learning (and how can they be realised) if educators and students acknowledge the emotional vulnerability, uncertainty and unpredictability that often presents when students transition from a familiar, stable disciplined approach to the often messy interdisciplinary contexts, and the undisciplining that is needed in these?
- How can educators recognise, validate and support students' emotionality in an ethical way during this process of undisciplining?
- How can students check-in with, and stay true to their own emotions (and those of their peers) during this process in a way that is inclusive, empathetic and ethical?
- How do educators surface and recognise positive emotions as a key carrier of learning, alongside the sense of achievement often found when overcoming challenges (Erk et al. 2003; Roth 2001; Schleich 2003)?

Recommendations/considerations for ethical practice for emotionality in interdisciplinary teaching and learning

- Emotional frontloading is key to preparing learners for potential negative emotions that may arise through interdisciplinary teaching and learning.
- Crucially, not all negative emotions are destructive; some may in fact be constructive to learning, if educators guide learners to reflect and diffract their experiences appropriately.
- Thus, making the time and space both during and after learning experiences for learners to express how they are feeling can ease emerging discomfort or uncertainty.
- Through ongoing consideration of how to reassure and encourage learners through the transitional process from being disciplined to being undisciplined, educators can continue to adapt their approaches to meet learners' needs as they arise and evolve.
- By bringing the whole self to, and being vulnerable in, learning processes, educators can not only model for students emotionality but also nurture the trust and safety that students will need to themselves be vulnerable and bring the whole self.
- How can strategies like the 'humble inquiry' be used to find out about the lived experiences and expertise of others (students, peers, colleagues) through asking meaningful questions and listening actively and with compassion to individuals' responses?
- Ungrading assessments can reduce anxiety and free learners up for appropriate risk-taking and exploration in their learning and research. When (co-)designing learning and assessment experiences, consider the following questions:

- What opportunities and possibilities could be incorporated into teaching that will elicit a rich emotional engagement with the learning material?
- How might activities and assessments be designed and/or co-created to ensure learners feel safe to experiment and confident that their experimentations fall within the parameters of assessment criteria?
- Adopting a coaching or facilitation approach rather than one based on instruction from a disciplined 'expert' will necessitate suitable training so that educator-coaches effectively and empathetically manage student wellbeing (anxiety, stress), conflict and frustration. This further necessitates dedicated time for development of coaching, modelling and mentoring for skills and competences
- Can modelling be effectively done/consolidated within a limited number of weeks? Does this take extended periods of time?
- Balance ongoing care for students' wellbeing with the potential benefits to learning of experiencing challenges. Reflective practices play an important role in enabling learners to see and understand the benefits of challenge to their learning, while diffraction encourages students take their learning in new, and perhaps unexpected, directions.
- Seek opportunities to nurture one's own and other's response-ability (Haraway 2016). Clearly this raises questions about the distribution of power within and without the classroom, and therefore demands ongoing consideration and practise of approaches that nurture humility, empathy for and awareness of others. Critically reflecting on the strength and limitations of one's own agency, power and privilege is an important starting point to being to interrogate the power structures that define the learning experiences and interactions within the classroom. Additionally, through strategies such as 'humble inquiry' and 'convergent facilitation', educators can more become more sensitively attuned to the contexts within which their individual students have lived/are living, students' own lived experiences and how these contexts and experiences impact their learning.
- What and who renders you response-able in the world? From what and whom do your power and agency arise?
- How do you use and share power? What are the implications of this for others (students, colleagues, peers) and the wider environment?
- How can you nurture power-with and power-to so that others have space and agency to experience, learn and share their expertise?
- How do you recognise, interrogate and challenge power structures in the classroom, as well as those in the wider institution and society of which the classroom is often a microcosm?
- How can you create opportunities for students to practice their power-with and power-to through working collegially in groups?



References and Further Resources

This page includes all the references from the TILT book, along with further resources to support interdisciplinary learning and teaching projects:

Resources

[Teaching Matters](#) is the University of Edinburgh's website, blog and podcast for debate about learning and teaching, for sharing ideas and approaches to teaching, and for showcasing successes. Teaching Matters includes a wide range of blogs exploring Interdisciplinarity. This includes a 2026 series on [Navigating complexity through interdisciplinary learning and teaching](#).

[Open Educational Resources](#) in the 'interdisciplinary' category, at the University of Edinburgh. Digital resources used in the context of teaching and learning that have been released by the copyright holder under an open licence permitting their use and re-purposing by others.

[The Interdisciplinary Learning Network](#) aims to support collaboration amongst educators of children and young people. It will be particularly relevant for teachers, teacher educators, school leaders, educators in further and higher education, and policymakers.

[Interdisciplinary Learning and Teaching UK](#) is for further and higher education staff interested in interdisciplinary learning and teaching activities and pedagogical theory and practice that underpins work already taking place throughout the UK Higher Education sector.

[The SHAPE-ID Toolkit](#) includes tools and resources to make informed decisions about interdisciplinary and transdisciplinary research within Arts, Humanities and Social Sciences alongside societal partners and researchers from Sciences, Technology, Engineering and Mathematics. This toolkit provides guidance for policymakers, funders, research performing organisations, researchers and research partners to help make better decisions and promote change in policymaking, funding and educational institutions.

[Issues in Interdisciplinary Studies](#), founded in 1982, is an international, peer-reviewed publication of the Association for Interdisciplinary Studies, dedicated to advancing the theory and practice of the many varieties of interdisciplinarity in the academy and in society at large. Includes an article by members of the TILT team (Winter & Overend 2024).

References

Augsburg, T. (2014) Becoming transdisciplinary: The emergence of the transdisciplinary individual, *World Futures*, 70(3-4), 233-247.

Baeten, M., Struyven, K., & Dochy, F. (2013). Student-centred teaching methods: Can they optimise students' approaches to learning in professional higher education? *Studies in Educational Evaluation*, 39(1), 14-22.

- Bammer, G. (2013). *Disciplining interdisciplinarity: Integration and implementation sciences for researching complex real-world problems*. ANU Press.
- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Barad, K., & Gandorfer, D. (2021). Political desirings: Yearnings for mattering (,) differently. *Theory & Event*, 24(1), 14–66.
- Barkley, E. F., Cross, K. P., & Major, C. H. (2014). *Collaborative learning techniques*. Jossey-Bass.
- Barry, A., Born, G., & Weszkalnys, G. (2008). Logics of interdisciplinarity. *Economy and Society*, 37(1), 20–49.
- Bawaka Country, Suchet-Pearson, S., Wright, S., Lloyd, K., Tofa, M., Sweeney, J., Burarrwanga, L., Ganambarr, R., Ganambarr-Stubbs, M., Ganambarr, B., & Maymuru, D. (2019). Goŋ Gurtha: Enacting response-abilities as situated co-becoming. *Environment and Planning D: Society and Space*, 37(4), 682–702.
- Baylor University (n.d.). Ungrading. <https://atl.web.baylor.edu/teaching-guides/assessing-student-learning-and-teaching/ungrading>. Accessed 5 March 2026.
- Biehl-Missal, B. (2010). Hero takes a fall: A lesson from theatre for leadership. *Leadership*, 6(3), 279–294.
- Birenbaum, M. (2003). New insights into learning and teaching and their implications for assessment. In: M. Segers, F. Dochy & E. Cascallar (eds.). *Optimizing new modes of assessment: In search of qualities and standards*, (pp. 13–36). Kluwer Academic Publishers.
- Blum, S. D. (ed.). (2020). *Ungrading: Why rating students undermines learning (and what to do instead)*. West Virginia University Press.
- Bogotch, I., Beachum, F., Blount, J., Brooks, J., & English, F. (2008). *Radicalizing educational leadership: Dimensions of social justice* (Vol. 2). Brill.
- Boud, D., Cohen, R. & Walker, D. (1993). *Using experience for learning*. Open University Press.
- Bovill, C. (2019). A co-creation of learning and teaching typology: What kind of co-creation are you planning or doing? *International Journal for Students as Partners*, 3(2), 91–98.
- Bozalek, V. & Zembylas, M. (2018). Practicing reflection or diffraction? Implications for research methodologies in education. In: R. Braidotti, V. Bozalek, T. Shefer & M. Zembylas (eds.), *Socially just pedagogies: Posthumanist, feminist and materialist perspectives in higher education*, (pp. 47–62). Bloomsbury.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Burnell, I. (2019). Widening participation for non-traditional students: Can using alternative assessment methods level the playing field in higher education? *Widening Participation and Lifelong Learning*, 21(3), 162–173.
- Burns, J. (1978). *Leadership*. Harper & Row.
- Chandler, D. (2002). *Semiotics: The basics*. Routledge.

- Chivers, T., & Chivers, D. (2022) *How to read numbers: A guide to statistics in the news (and knowing when to trust them)*. Weidenfeld & Nicolson.
- Christoffersen, A. (2021). The politics of intersectional practice: Competing concepts of intersectionality. *Policy & Politics*, 49(4), 573-593.
- Clarke, V., & Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, 26(2), 120–123.
- Cole, E. R. (2016). 'Foreword: Teaching intersectionality for our times'. In: K.A. Case (ed.). *Intersectional pedagogy: Complicating identity and social justice*, (pp. ix-xii). Routledge.
- Creswell, J. W., & Creswell, J. D. (2022). *Research Design: Qualitative, quantitative, and mixed methods approaches*, 6th ed. Sage.
- Cullinane, A. (2024). Embedding a reflective portfolio for student development in science courses: Challenges, suggestions, and solutions. *Teaching Matters*. <https://www.teaching-matters-blog.ed.ac.uk/embedding-a-reflective-portfolio-for-student-development-in-science-courses-challenges-suggestions-and-solutions/>. Accessed 6 March 2026.
- Cullen, C., Jay, D., Overend, D. & Winter, M. (2024). Creating Edinburgh: Diffracting interdisciplinary learning and teaching in the contemporary city. *Humanities and Social Sciences Communications*, 11, 1151.
- Daley, J., & Baruah, B. (2021). Leadership skills development among engineering students in Higher Education: An analysis of the Russell Group universities in the UK. *European Journal of Engineering Education*, 46(4), 528-556.
- Davies, L.J. (2021). No grades, no classes, just pass/fail. LSE Higher Education Blog, <https://blogs.lse.ac.uk/highereducation/2021/10/08/no-grades-no-classes-just-pass-fail/>. Accessed 5 March 2026.
- Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. D.C Heath & Company.
- Dietrich, W. (2014). A brief introduction to transrational peace research and elicitive conflict transformation. *Journal of Conflictology*, 5(2), 48-57.
- Docherty, K. (2024). A 4-principle approach for strengthening relationships and working differently. Edinburgh Futures Institute. <https://efi.ed.ac.uk/a-4-principle-approach-for-strengthening-relationships-and-working-differently/>. Accessed 5 March 2026.
- Dritsas, L. (2019). Assessing tutorial participation through reflective practice. *Teaching Matters*. <https://www.teaching-matters-blog.ed.ac.uk/assessing-tutorial-participation-through-reflective-practice/>. Accessed 5 March 2026.
- Fielding, M. (1999). Radical collegiality: Affirming teaching as an inclusive professional practice, *Australian Educational Researcher*, 26(2), 1-34.
- Finlay, L. (2021). Thematic analysis: The 'good', the 'bad' and the 'ugly'. *European Journal for Qualitative Research in Psychotherapy*, 11, 103–116.
- Fischer, N., & Mehnert, W. (2021). Building Possible Worlds: A speculation based framework to reflect on images of the future, *Journal of Futures Studies*, 25(3), 25-38.
- Freire, P. (1970). *Pedagogy of the Oppressed*. Seabury Press.
- Frodeman, R. (2017). *The future of interdisciplinarity: An introduction to the 2nd edition*.

In R. Frodeman, J. T. Klein, & R. C. Dos Santos Pacheco (eds.), *The Oxford handbook of interdisciplinarity*, 2nd ed., (pp. 3-8). Oxford University Press.

Garfield, Z. H., Syme, K. L., & Hagen, E. H. (2020). Universal and variable leadership dimensions across human societies. *Evolution and Human Behavior*, 41(5), 397-414.

Gough, N. (2013). Towards Deconstructive Nonalignment: A complexivist view of curriculum, teaching and learning. *South African Journal of Higher Education*, 27(5), 1213-1233.

Greenpeace. (n.d.) Sustainability: A simple guide to a vital idea. <https://www.greenpeace.org.uk/challenges/sustainability>. Accessed 5 March 2026.

Gonzales, J. (2015) Meet the single point rubric, *Cult of pedagogy blog*. <https://www.cultofpedagogy.com/single-point-rubric/>. Accessed 5 March 2026.

Gunter, H. (2010). A sociological approach to educational leadership. *British Journal of Sociology of Education*, 31(4), 519-527.

Harvey, M., Coulson, D., Mackaway, J. & Winchester-Seeto, T. (2010). Aligning reflection in the cooperative education curriculum. *Journal of Co-operative Education*, 11(1), 137-152.

Hawkins, H. (2021). *Geography, art, research: Artistic research in the GeoHumanities*. Routledge.

Haraway, D. (2016). *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.

Haraway, D. (2018). *Modest_Witness@Second_Millennium.FemaleMan@_Meets_OncoMouse™*, 2nd ed. (Original work published in 1997). Routledge.

Hill, C. M. (2017). More-than-reflective practice: Becoming a diffractive practitioner, *Teacher Learning and Professional Development*, 2(1), 1-17.

Johnson, A. R. (2007). An anthropological approach to the study of leadership: Lessons learned on improving leadership practice. *Transformation*, 24(3/4), 213-221.

Kashtan, M. (2020). *The highest common denominator: Using convergent facilitation to reach breakthrough collaborative decisions*. Fearless Heart Publications.

Katz-Buonincontro, J. (2011). Improvisational theatre as public pedagogy: A case study of 'aesthetic' pedagogy in leadership development. *Policy Futures in Education*, 9(6), 769-779.

Kleiman, P. (2007). Negotiating assessment: An approach to assessing practical work, including assessment criteria. PALATINE, Higher Education Academy. <https://cielassociates.co.uk/wp-content/uploads/2014/08/KLEIMAN2007Negotiating-Assessment.pdf>. Accessed 5 March 2026.

Klein J. T. (2017). Typologies of interdisciplinarity: The boundary work of definition. In: R. Frodeman (ed.), *The Oxford handbook of interdisciplinarity*, 2nd ed. (pp. 21-34), Oxford University Press.

Koh, E., & Doroudi, S. (2023). Learning, teaching, and assessment with generative artificial intelligence: towards a plateau of productivity. *Learning: Research and Practice*, 9(2), 109-116.

Leander, C. (2022). Why I ungrade, and a how-to primer, *University of British Columbia Blogs*. <https://blogs.ubc.ca/celesteleander/2022/03/17/why-i-ungrade-and-a-how-to-primer/>. Accessed 6 March 2026.

- Lindvig, K., Lyall, C. & Meagher, L.R. (2019). Creating interdisciplinary education within monodisciplinary structures: the art of managing interstitiality, *Studies in Higher Education*, 44(2), 347-360.
- Lury, C. (2018). 'Introduction: Activating the present of interdisciplinary methods', In: C. Lury, R. Fensham, A. Heller-Nicholas, S. Lammes, A. Last, M. Michael & E. Uprichard (eds.), *Routledge handbook of interdisciplinary research methods*, (pp.1-25), Routledge.
- Lyall, C., Bruce, A., Tait, J., & Meagher, L. (2015). *Interdisciplinary Research Journeys: Practical Strategies for Capturing Creativity*. Bloomsbury Academic.
- McCune, V., Tauritz, R., Boyd, S., Cross, A., & Higgins, P. (n.d.). About: The Wicked Problems Project. University of Edinburgh. <http://www.wickedproblems.ed.ac.uk/sample-page/>. Accessed 6 March 2026.
- McGuigan, J. (2010). *Cultural analysis*. Sage.
- Miettinen, L. (2024). We can now measure biodiversity footprints – here's how. *Sitra*. <https://www.sitra.fi/en/articles/we-can-now-measure-biodiversity-footprints-heres-how/>. Accessed 6 March 2026.
- Modeen, M. & Biggs, I. (2021). *Creative engagements with ecologies of place: Geopoetics, deep mapping and slow residencies*. Routledge.
- Monbiot, G. (2012). How 'sustainability' became 'sustained growth'. <https://www.monbiot.com/2012/06/22/how-sustainability-became-sustained-growth/>. Accessed 6 March 2026.
- Moran, J. (2010). *Interdisciplinarity*, Routledge.
- Murris, K. (2022). *Karen Barad as educator: Agential realism and education*. Springer.
- Nelson, R. (2022). *Practice as research in the arts (and beyond): Principles, processes, contexts, achievements*. Springer.
- Okamura, K. (2019). Interdisciplinarity revisited: evidence for research impact and dynamism. *Palgrave Communications*, 5(1), 141.
- Okudan, G. E., & Rzasa, S. E. (2006). A project-based approach to entrepreneurial leadership education. *Technovation*, 26(2), 195-210.
- Ortiz-Ospina, E. (2017). 'Life Expectancy' – What does this actually mean? OurWorldInData.org. <https://ourworldindata.org/life-expectancy-how-is-it-calculated-and-how-should-it-be-interpreted>. Accessed 6 March 2026.
- Overend, D. & Lorimer, J. (2018). Wild performatives: Experiments in rewilding at Knepp Wildland Project. *GeoHumanities*, 4(2), 527-542.
- Overend, D., Ewing, S. & Swanton, D. (2024). 'Loose ends and missing links': Learning journeys in the postdigital city. In: J. Lamb & L. Carvalho (eds.) *Postdigital learning spaces: Towards convivial, equitable, and sustainable spaces for learning*, (pp. 99-118). Springer.
- Overend, D., Choi, S., Cross, A. & Winter, M. (2026). Future change agents: Emotional interactions in the challenge-based classroom: In S. Scott & I. Kemp (eds.), *Interdisciplinary Learning and Teaching: Practice and pedagogies*, (pp. 138-160). Ethics Press.
- Pansardi, P. & Bindi, M. (2021) The new concepts of power? Power-over, power-to and power-with, *Journal of Political Power*, 14(1), 51-71.

Reflection Toolkit, the (n.d.), McCabe, G. & Thejll-Madsen, T. (eds.). University of Edinburgh. <https://reflection.ed.ac.uk>. Accessed 6 March 2026.

Ritchie, J., Lewis, J., McNaughton Nicholls, C., & Ormston, R. (eds.) (2014) *Qualitative research practice: A guide for social science students and researchers*, 2nd ed. Sage.

Sanders, D., & Davies, P. (2023). Bringing Barad into outdoor learning: A reflective case study concerning quadrats and agential cuts in ecology education. In: P. Patrick (ed.), *How People Learn in Informal Science Environments*, (pp. 313-333), Springer.

Schein, E. H. (2013). *Humble inquiry: The gentle art of asking instead of telling*. Berrett-Koehler.

Schön, D. (1983). *The reflective practitioner. How professionals think in action*. Temple Smith.

Senge, P., Hamilton, H., & Kania, J. (2015). The dawn of system leadership. *Stanford Social Innovation Review*, 13(1), 27-33.

Shepard, L. (2000). The Role of Assessment in a Learning Culture. *Educational Researcher*, 29(7), 4-14.

Silverman, D. (ed.) (2021). *Doing qualitative research*, 6th ed. Sage.

Smith, L. T. (2012). *Decolonizing Methodologies: Research and Indigenous peoples*, 2nd ed. Zed Books.

Spector, K. (2015). Meeting pedagogical encounters halfway. *Journal of Adolescent and Adult Literacy*, 58(6), 447-450.

Stommel, J. (2020) Ungrading: An FAQ. <https://www.jessestommel.com/ungrading-an-faq/>. Accessed 5 March 2026.

Toivonen, T., Heikinheimo, V., Fink, C., Hausmann, A., Hiippala, T., Järv, O., Tenkanen, H. & Di Minin, E., (2019). Social media data for conservation science: A methodological overview. *Biological Conservation*, 233, 298-315.

Turner, R., Cotton, D., Morrison, D. & Kneale, P. (2024). Embedding interdisciplinary learning into the first-year undergraduate curriculum: drivers and barriers in a cross-institutional enhancement project. *Teaching in Higher Education*, 29(4), 1092-1108.

United Nations (n.d.-a), Goal 10: Reduce inequality within and among countries, Sustainable Development Goals. <https://www.un.org/sustainabledevelopment/inequality/>. Accessed 6 March 2026.

United Nations (n.d.-b), The 17 Goals, Sustainable Development Goals. <https://sdgs.un.org/goals>. Accessed 6 March 2026.

UNESCO Chair for Peace Studies, 'Elicitive Conflict Transformation,' <https://www.youtube.com/watch?v=uQuOIbY3c4g>. Accessed 6 March 2026.

Villarroel, V., Bloxham, S., Bruna, D., Bruna, C., & Herrera-Seda, C. (2017). Authentic assessment: creating a blueprint for course design. *Assessment and Evaluation in Higher Education*, 43(5), 840-854.

Viviani, L. (2017). A political sociology of populism and leadership. *Società Mutamento Politica*, 8(15), 279-304.

Wallace, R. L., & Clark, S. G. (2017) Barriers to Interdisciplinarity in environmental studies: A case of alarming trends in faculty and programmatic wellbeing. *Issues in Integrative Studies*, 35(1), 221-247.

White, F., Lloyd, H., Kennedy, G., & Stewart, C. (2005). An investigation of undergraduate students' feelings and attitudes towards group work and group assessment. *Research and Development in Higher Education*, 28(1), 618-623.

Wilson, D., Lai, Z., & Eilenberger, F. (2024). Mirrors of growth: The power of reflections in learning. Teaching Matters. <https://www.teaching-matters-blog.ed.ac.uk/mirrors-of-growth-the-power-of-reflections-in-learning/>. Accessed 6 March 2026.

Winter, M. & Overend, D. (2024). Troubling leadership in the interdisciplinary challenge-based classroom. *Issues in Interdisciplinary Studies*, 41(2), 77-100.

WWF (World Wide Fund for Nature) & ZSL (Zoological Society of London). (2024). Living Planet Index. <https://www.livingplanetindex.org/lpi>. Accessed 6 March 2026.

WWF. (2024). Living Planet report 2024: A system in peril. WWF.