

Interdisciplinary Learning: teaching resources

Authors: Nick Bunyan & Will Moindrot

Introduction

This guide outlines considerations for the design and implementation of interdisciplinary learning into your teaching to support student development in addressing complex problems and fostering integrated knowledge.

For the purposes of this guide, we define three key terms for working across disciplines:

- **Multidisciplinary learning** involves people from different disciplines working together, with each drawing on their own disciplinary knowledge. The disciplines remain distinct and the boundaries are maintained. For example, a team of a sociologist, an economist, and a geographer might each provide their unique perspective on a water management problem.
- **Interdisciplinary learning** goes a step further by integrating knowledge and methods from two or more disciplines to create a synthesized whole. It is not about the separate study of disciplines, but about the integration of knowledge and the creation of a "common ground" to achieve a more comprehensive understanding of a topic.
- **Transdisciplinary learning** builds upon this by also involving the integration of knowledge from academia with wider society, including non-academic stakeholders such as communities, industry, and government. This approach is crucial for jointly framing and co-creating new solutions to complex societal challenges.

It is important to note that these terms have historically been defined ambiguously and are often used interchangeably in the literature. We have adopted these specific definitions to provide a clear and actionable framework for colleagues. For the purpose of this guide, we will refer to all three concepts—multidisciplinary, interdisciplinary, and transdisciplinary—under the broad scope or spectrum of interdisciplinarity.

If you have any resources that you use in your teaching that you think will support this topic and be accessible to other subject areas, please contact cie@liverpool.ac.uk.

Decide on your aims & objectives for using interdisciplinary learning

Depending on the teaching approaches and learning activities that you use, interdisciplinary learning can typically support the development of:

- **Employability** – simulating collaborative interdisciplinary team working that students will encounter in many work and other settings.
- **Critical thinking** – fostering the ability to question norms, practices and opinions, reflect on different perspectives, analyse information, and assess the credibility of information sources.
- **Integrated problem-solving** – building the ability to work within a discipline and across disciplines, link theory to practice, and apply different problem-solving frameworks to complex problems.
- **Collaboration** – developing the ability to learn from and with others, respect different needs and perspectives, tackle conflicts, and undertake collaborative problem solving.
- **Communication** – enhancing the ability to communicate disciplinary understanding to non-specialists, and to process information from and between different disciplines, and between students and teachers from different disciplines.

In addition, transdisciplinary learning can foster:

- **Real-world problem-solving skills** – applicable to a wide range of challenges.
- **Enhanced creativity and innovation** – by exposing students to a wide diversity of perspectives and approaches, both within and outside the institution.

Develop learning outcomes that can support interdisciplinary learning

Appendix A lists some example interdisciplinary learning outcomes that can be adapted to various disciplinary and interdisciplinary contexts. These outcomes align with the Liverpool Learning Framework's emphasis on developing holistic skills and fostering communities of enquiry that are both disciplinary and interdisciplinary.

Select learning and teaching approaches that can support your interdisciplinary learning aims and learning outcomes

The learning and teaching approaches you design into your programme will vary with subject area, practical considerations, and your aims for interdisciplinary learning. We highlight the three broad types of teaching approaches commonly used to support these forms of collaboration below.

Multidisciplinary teaching

Multidisciplinary teaching is a conceptual approach where different disciplines work together, but each retains its distinct boundaries and contributions. This contrasts with interdisciplinary approaches, which aim to integrate knowledge to create a new, synthesised understanding.

Co-teaching/ team teaching

A multidisciplinary co-teaching approach involves different experts taking turns to teach, each presenting content from their specific discipline. For example, on a module about a global issue, a historian might lecture on the historical context, followed by an economist who discusses the economic impacts, with each discipline's contribution remaining distinct. This method is "relatively easy to coordinate with academic colleagues" and provides students with insights into how different experts approach a problem.

- Advanced planning and negotiation with co-teachers.
- Co-advising with industry representatives.
- Taking turns in teaching.
- Creating a learning community.
- Co-creation of syllabus and case studies.

Benefits:

- Can be relatively easy to coordinate with academic colleagues and external contacts.
- Supports the development of student's critical thinking competency by introducing diverse interdisciplinary perspectives for complex real-world issues.
- Can provide students with insights into how experts in different disciplines and work settings develop solutions to complex problems.

Challenges:

- If not employing active forms of student learning (e.g., problem-centred learning for example) co-teaching can tend to be knowledge focused and may not fully develop students integrated problem-solving, communication, and collaboration competencies.

Active learning partnerships

An active learning partnership can be used to implement a multidisciplinary project. For instance, students from two different subject areas could work together in groups on a complex problem. However, in a multidisciplinary model, these students would likely be assessed separately within their original modules, with the work from each student primarily reflecting their own disciplinary perspective. The guide already notes that this

approach "will not fully simulate a collaborative group process that requires students to negotiate solutions, manage conflicts, and integrate different perspectives," which is a key characteristic of multidisciplinary work. Active learning approaches that can be used include:

- Research and inquiry projects.
- Problem-centred learning.
- Case study methods.
- Role-playing.
- Simulations.
- Virtual methods.

Teaching approaches that leverage the group setting of teaching interdisciplinary courses include:

- Peer-assessment and review
- Peer-assisted Learning (PAL)
- Small-group teaching.

Benefits:

- Supports the development of student integrated problem-solving, communication, and collaboration competencies.
- Module leaders can develop collaborations and partnerships with colleagues without engaging with course change processes and school/ faculty requirements.

Challenges:

- Requires significant coordination and planning between staff to identify viable collaborations that are practical within timetabling restrictions etc. A strong trust and working relationship between staff from different disciplines is essential.
- Staff time and input are required to support students who are new to working in an interdisciplinary context, to introduce the active learning approaches that will be used, and to coordinate student engagement through group work facilitation etc.
- As students are typically assessed within their original modules, this approach will not fully simulate a collaborative group process that requires students to negotiate solutions, manage conflicts, and integrate different perspectives.

Interdisciplinary courses

These are full interdisciplinary or transdisciplinary courses that are either extra-curricular or embedded into programmes.

Benefits:

- Extra-curricular interdisciplinary courses can provide students with interdisciplinary learning experiences that might otherwise not be possible or available within their primary subject area.
- Signals to students that interdisciplinary learning is important and valued.
- If embedded and progressively developed across a programme, interdisciplinary (or transdisciplinary) learning modules can provide students with an opportunity to extensively develop their critical thinking, integrated problem-solving, collaboration, and communication competencies, aligned to solving complex real-world problems.

Challenges:

- Programme-level interdisciplinary learning courses require resources for planning, coordination, and support across faculty processes and requirements.
- Capacity building for staff's abilities to work effectively in interdisciplinary learning contexts is often required.

Transdisciplinary Learning: Engaging Beyond Academia

Transdisciplinary learning involves the integration of knowledge from academic disciplines with insights and active participation from non-academic stakeholders, aims for the joint framing of complex problems and the co-creation of solutions with real-world impact.

Pedagogical Approaches and Activities

Transdisciplinary learning thrives on authentic engagement, and students may be within interdisciplinary teams to address the complexities of a given challenge. Effective pedagogical approaches often include:

- **Authentic Problem-Based Learning:** Focus on real-world, ill-defined challenges that require active engagement with external partners (e.g., community organizations, industry, government, NGOs) for problem definition, data collection, and solution development.
- **Community/Service-Based Projects:** Students work directly with external groups to address identified societal needs, fostering civic engagement and applying academic knowledge in practical contexts.

- Co-creation Activities: Involve external partners in elements of curriculum design, project framing, or co-delivery of learning activities.
- Experiential Learning: Opportunities like fieldwork, internships, or placements with external organizations to bridge academic theory and societal practice.

Benefits:

- Directly connects learning to authentic societal issues, enhancing the practical applicability and impact of students' knowledge.
- Develops capabilities for tackling complex, multi-faceted challenges that extend beyond disciplinary boundaries.
- Fosters crucial skills in communication, negotiation, and collaboration with diverse academic and non-academic stakeholders.
- Increases student engagement and motivation through work on authentic problems with real-world consequences.
- Prepares graduates for careers requiring boundary-spanning and knowledge brokering skills.

Challenges:

- Managing expectations and coordinating with multiple external stakeholders can be complex and time-consuming.
- Requires significant investment in building and maintaining authentic external partnerships and resources.
- Designing effective assessment strategies for collaborative, real-world projects with external partners can be challenging.
- Integrating diverse forms of knowledge (academic, experiential, practical) contributed by various stakeholders may require specific scaffolding.

Summary of the three different learning and teaching approaches to interdisciplinary learning:

Approach	Benefits	Challenges	Competencies
Multidisciplinary learning	The benefits of this approach are aligned with co-teaching and active learning partnerships. For example, it is easy to set up and integrate into current teaching, and it can engage students in	The challenges are aligned with co-teaching and active learning partnerships. For example, it tends to employ separate assessments for each student cohort	Critical thinking Communication Integrated problem-solving

	real-world learning without encountering the institutional organisational challenges associated with an interdisciplinary course.	and does not fully simulate real-world interdisciplinary working. It also relies on strong working relationships between academic staff.	
Interdisciplinary learning	The benefits are aligned with Interdisciplinary courses. For example, if students are engaged in real-world problem-solving activities, interdisciplinary modules can effectively simulate real-world contexts.	The challenges are aligned with Interdisciplinary courses. For example, it can be problematic to coordinate across school and faculty structures, particularly for assessments. It also requires resourcing and staff capacity building.	Critical thinking Communication Integrated problem-solving Collaboration
Transdisciplinary Learning	Directly connects learning to authentic societal issues, enhancing the practical applicability and impact of students' knowledge. It develops capabilities for tackling complex, multi-faceted challenges that extend beyond disciplinary boundaries.	Managing expectations and coordinating with multiple external stakeholders can be complex and time-consuming. It requires significant investment in building and maintaining authentic external partnerships and resources.	Critical thinking, Communication, Integrated problem-solving, Collaboration, Boundary-spanning, Knowledge brokering.

Course design considerations

Considerations for designing courses with interdisciplinary learning:

Aim to integrate interdisciplinarity in ways that reinforce students' disciplinary learning

- Designing interdisciplinary group work to build on disciplinary learning helps to engage all students, not just those predisposed to interdisciplinary approaches.
- This approach can help demonstrate the relevance of interdisciplinary perspectives even when it is not immediately obvious within a specific discipline.
- Most straightforwardly, this could involve giving students complex problems or cases through which they practice applying new disciplinary skills or concepts.
- Multidisciplinary learning could be considered as a foundational step. For examples, a programme might start with multidisciplinary approaches in the first year to expose students to different disciplinary perspectives before moving to more integrated, interdisciplinary methods in later years.

Guide students to integrate knowledge in interdisciplinary settings

- Students generally need support to integrate different disciplinary knowledge, moving beyond simple accumulation.
- A common topic or overarching theme can provide valuable focus for integration.
- Where courses are team-taught by disciplinary specialists across faculties, early introductory framing and concluding synthesis sessions can model for students how different disciplines can respond to each other when addressing a given problem

Designing interdisciplinary group work to build on disciplinary learning helps to reach all students rather than only the willing

- It can help illustrate the broader applicability and relevance of disciplinary knowledge.
- This could involve providing students with complex problems or cases through which they practice applying new disciplinary skills or concepts.
- At its most advanced, this could take the form of incorporating inter- or transdisciplinary learning into a disciplinary degree programme.

Supporting effective teaching partnerships

Effective partnerships in interdisciplinary teaching are typically based on three components: relevant experience; complementary personality and working styles; and shared beliefs about learning. Dedicate sufficient time with colleagues in planning the course to ensure you agree on:

- A shared pedagogical philosophy.
- Clear perception of roles and expectations.
- Negotiated teaching approaches.
- Agreed assessment criteria.
- Clear responsibility for grading (if co-assessed).

Opportunities to Network with other practitioners

Interdisciplinary Teaching & Research Group

A new interdisciplinary teaching & research group is in formation Autumn 2025, with a website and further details to follow soon. Please contact Kerry.traynor@liverpool.ac.uk or William.moindrot@liverpool.ac.uk.

Interdisciplinary Centre for Sustainability Research (ICSR)

Nexus for interdisciplinary research and impact at Liverpool, the Centre's mission is to support teams of researchers who can collectively tackle the United Nations Sustainable Development Goals (SDGs): [Interdisciplinary Centre for Sustainability Research \(ICSR\)](#).

Further Reading and Case Studies

A selection of case studies and further reading to support interdisciplinary and transdisciplinary learning.

Ahearne, G., & Murphy, M. (2023). [Building the future: The case for inter-faculty learning](#). Times Higher Education.

Ahearne, G., & Jones, M. (2023, June 8). [Embedding employability through cross-faculty learning](#). Wonkhe.

Vrije Universiteit Amsterdam. (n.d.). [Multi-, inter- and transdisciplinarity: What is what?](#)

[Interdisciplinary provision in higher education. Current and future challenges](#) (HEA report, 2015)

[Education for Sustainable Development: a review of the literature 2015–2022](#) (QAA report, 2023) (Note: While this reference is ESD-specific, the underlying pedagogical principles for interdisciplinarity discussed are broadly transferable.)

Additional resources

[Multi-cultural group work](#)

[Problem-centred learning for ESD teaching resources](#)

[Systems thinking teaching resources](#) in the [ESD toolkit](#).

Further support

Contact CIE about opportunities to connect with other subject areas or outside organisations cie@liverpool.ac.uk.

Appendix A: Example interdisciplinary learning outcomes and learning activities.

(These examples can be adapted across various disciplines and interdisciplinary contexts, aligning with the Liverpool Learning Framework's emphasis on developing holistic skills and fostering diverse communities of enquiry.)

Multidisciplinary Learning Outcomes and Activities

These outcomes focus on developing skills in collaboration and communication across disciplines, without necessarily requiring the full integration of knowledge to create a synthesised solution.

1. Multidisciplinary Awareness: Identify and describe how two or more disciplines approach a common problem from their unique perspectives.

Example Activity: Students from different disciplines (e.g., health sciences and sociology) read and analyse separate articles on a public health issue and then present their findings to each other, highlighting how their disciplinary lens shapes their understanding.

2. Communicating Across Disciplines: Communicate disciplinary insights to a group of peers from other fields in a clear and accessible manner.

Example Activity: In a co-taught module, students from different disciplines work in groups to create a short video or presentation explaining a concept from their own field to their peers.

3. Collaborative Problem Exploration: Work collaboratively with peers from different disciplines to explore and define a complex problem, with each team member contributing from their own disciplinary expertise.

Example Activity: A group of students from engineering, business, and art and design are tasked with defining the problem of urban waste management, with each student contributing their unique perspective on the challenge.

Interdisciplinary Learning Outcomes and Activities

These outcomes focus on the integration of knowledge from two or more disciplines to create a new, synthesized whole.

1. Critical Analysis Across Disciplines: Critically analyse problems by applying concepts and methodologies from at least two different disciplines.

Example Activity: Conduct a research project where students must utilise both sociological theories and statistical methods to examine a complex social issue.

2. Interdisciplinary Collaboration and Communication: Demonstrate the ability to effectively collaborate and communicate across disciplinary boundaries.

Example Activity: Form cross-disciplinary teams to develop a proposal for a community development project, requiring input from fields such as urban planning, economics, and environmental studies.

3. Innovative Problem-Solving: Apply interdisciplinary approaches to propose innovative solutions to complex real-world problems.

Example Activity: Host a hackathon where students from computer science, business, and design work together to create a new tech-driven service or product.

4. Ethical Consideration in Diverse Fields: Evaluate the ethical implications of decisions and actions in their own and other disciplines.

Example Activity: Analyse a case study involving a moral dilemma in healthcare, requiring understanding of both medical practices and ethical theories.

5. Integrating Theory and Practice from Multiple Disciplines: Integrate theoretical knowledge with practical applications from more than one academic discipline.

Example Activity: Design and implement a community service project that requires applying psychological theories of human behaviour and education techniques.

6. Global and Cultural Perspectives: Analyse global challenges by incorporating perspectives from different cultural and disciplinary backgrounds.

Example Activity: Participate in a global virtual exchange program where students collaborate with peers from different countries and academic majors to address complex global issues.

7. Reflective and Adaptive Learning: Reflect on their interdisciplinary learning experiences and adapt their approaches based on this reflection.

Example Activity: Maintain a reflective journal throughout an interdisciplinary course, documenting the learning process and how different disciplinary perspectives have influenced their understanding.

8. Research Skills Across Disciplines: Demonstrate the ability to conduct research using methodologies from multiple disciplines.

Example Activity: Undertake a thesis project that requires integrating research methods from both the humanities and the sciences.

9. Interdisciplinary Project Management: Manage a project effectively, incorporating knowledge and skills from various disciplines.

Example Activity: Plan and execute a community event that involves aspects of event management, marketing, and cultural studies.

10. Digital Literacy and Technology Integration: Utilise digital tools and technology effectively in an interdisciplinary context.

Example Activity: Create a multimedia presentation or digital art project that combines coding skills, artistic design, and narrative storytelling.

11. Complex System Analysis: Analyse the impact of a complex issue (e.g., population health, technological shifts) from the perspectives of multiple relevant disciplines (e.g., social sciences, public policy, engineering).

12. Innovative Solution Design: Design and implement innovative solutions for complex challenges using a combination of disciplinary tools (e.g., engineering, business, and policy tools).

13. Comparative Cultural Analysis: Compare and contrast artistic expressions and cultural influences of different civilizations or eras using diverse lenses (e.g., visual arts, literature, and music).

Transdisciplinary Learning Outcomes and Activities

These outcomes focus on the joint framing of problems and the co-creation of solutions with non-academic partners from wider society.

1. Stakeholder Collaboration: Collaborate with non-academic stakeholders (e.g., community members, industry professionals, policymakers) to co-define and explore a real-world problem.

Example Activity: Students work with a local council and community group to co-develop a proposal for improving public green spaces in a specific neighbourhood, integrating academic research with local knowledge and needs.

2. Integrating Diverse Knowledge: Synthesise academic knowledge with experiential or practical knowledge from external partners to propose a holistic solution to a societal challenge.

Example Activity: On a module about sustainable food systems, students conduct research and then work with local farmers and food bank organisers to co-design a model for a more resilient community food network.

3. Real-world Impact Assessment: Evaluate the potential social, ethical, and practical impact of a proposed solution on a community or industry, incorporating feedback from all relevant stakeholders.

Example Activity: A group of students from different disciplines present a new technological solution to an industry partner and then revise their proposal based on the practical constraints and feedback provided by the company's engineers and business development team.



© 2025 by the University of Liverpool, Centre for Innovation in Education.

Interdisciplinary Learning: teaching resources by Nick Bunyan & Will Moindrot is made available under a [Creative Commons Attribution Non Commercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).