Ollscoil
Teicneolaíochta
an Atlantaigh

Atlantic
Technological
University

MA Teaching & Learning Applied Project:

DigitalEd 2026

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WARPPEd

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Supporting critical thinking about ‘wicked’ environmental problems in early undergraduate science students

Research objectives

To review learning outcomes stated on programme and module descriptors within the context of critical thinking skills

To evaluate undergraduate students' perceptions of critical thinking about 'wicked' environmental problems

To assess staff expectations and experiences of critical thinking in undergraduate students

Situated within –

- **Constructivism**: Cognitivism, with Vygotsky's 'scaffolding', Piaget's 'stages', and Bruner's 'modes' of processing information
- **Humanism**: person centred approach (Rogers, 1977)
- **Sustainability education**: Critical thinking is described by UNESCO as an ability "to question norms, practices, and opinions; to reflect on one's values, perceptions, and actions; and to take a position in the sustainability discourse" (Rieckmann, 2018)

Data collection

- Desk study
- Staff interviews
- Student focus groups
- Triangulation

Desk study

On completion of this programme the learner will/should be able to:

PLO	Programme Learning Outcome
PLO 1	Describe the inter-relationships between characteristics of aquatic ecosystems
PLO 2	Crtique the role of environmental legislation in the conservation of aquatic species and habitats
PLO 3	Demonstrate advanced knowledge of aquatic resource management
PLO 4	Apply advanced techniques in data management, analysis and visualisation, including spatial components
PLO 5	Evaluate human impact and interaction with the hydrosphere

Interviews

Critical thinking

“individuality”, “not taking the first answer”, “evaluate”, “previous knowledge”

Wicked environmental problems

“complex”, “tricky”, “pressing”, “climate change”, “biodiversity loss”

Students

“I can see students that tend to be critical thinkers straight away”, get them “questioning something that they have heard their whole life”

Challenges

“students are not used to being verbal about it”, “students are just a little bit shy”

Focus groups

“I actually don't like studying that stuff because I feel so powerless”

What is Critical Thinking?

UNESCO describes critical thinking in the context of sustainability education as the ability “to question norms, practices, and opinions; to reflect on one's values, perceptions, and actions; and to take a position in the sustainability discourse”. It empowers you to analyse information, form reasoned judgments, and contribute meaningfully to solutions.

Understanding ‘Wicked’ Environmental Problems

‘Wicked’ environmental problems are complex, multi-faceted issues involving multiple stakeholders with conflicting views. They defy simple solutions and require collaborative, innovative approaches. Think climate change, biodiversity loss, and pollution – issues with far-reaching consequences and no easy answers.

Coping with the Weight of Knowledge

It's natural to feel overwhelmed when grappling with these challenges. Here's how to stay engaged and empowered:

- Remember these are **complex and global issues**, not problems that one person can fix.
- **Acknowledge** that eco-anxiety is real. It's okay to feel concerned and seek support.
- **Observe** examples of resilience in nature. Nature's ability to adapt can inspire hope.
- **Strive for a sustainable future**:
  - **Gain** information and knowledge.
  - **Find** other similar individuals/groups.
  - **Discover** what you can do:
    - Speak up
    - Take action
    - Hold those with power to account
    - For example: support petitions, join organisations, make career choices, make consumer choices, vote, lobby

Useful Links

- Natural History Museum, UK – What you can do to help the planet https://www.nhm.ac.uk/discover/what-you-can-do-to-help-the-planet.html
- Natural History Museum, UK – How to cope with eco-anxiety https://www.nhm.ac.uk/discover/how-to-cope-with-eco-anxiety.html

Relevant Organisations in Ireland

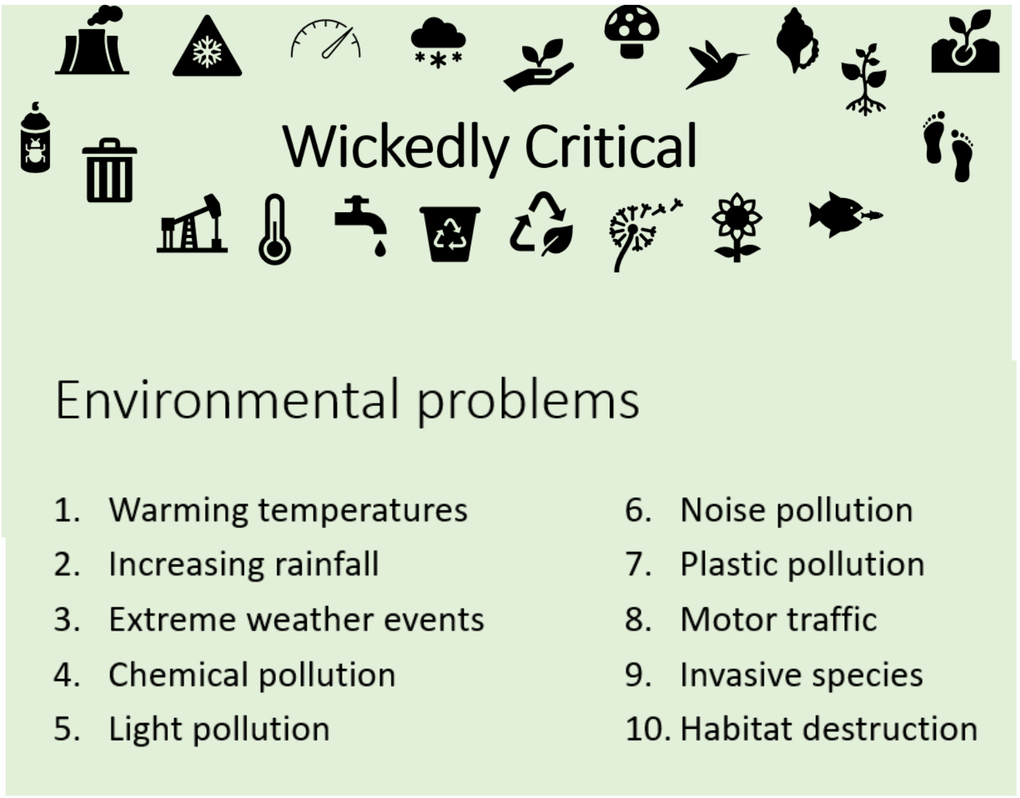
- ECO-UNESCO Youth Climate Advocate Programme https://ecounesco.ie/
- An Taisce's Climate Ambassador Programme https://climateambassador.ie/
- Friends of the Earth https://www.friendsoftheearth.ie/
- Extinction Rebellion Ireland https://extinctionrebellionireland.com/
- Stop Climate Chaos https://www.stopclimatechaos.ie/
- Environmental Sciences Association of Ireland https://www.esaiweb.org/
- Irish Wildlife Trust https://iwt.ie/

By embracing critical thinking and taking action, you can contribute to a more sustainable future.

"resources (workshops or material)
- not about critical thinking per se
- that implies that you have to use critical thinking
- activities that promote critical thinking"

Resource package

- 'Wicked' environmental problems
- Group lesson
- Stakeholder identification and empathy
- Proposing solutions



Go raibh míle maith agaibh

Thank you ☺

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