CONCEPTUALIZING CLIMATE CHANGE EDUCATION IN THE FRAMEWORK OF HIGHER EDUCATION

1ST PEER-LEARNING ACTIVITY OF THE PROJECT

"ACADEMIC DEVELOPMENT THROUGH BILATERAL PEER-LEARNING ACTIVITIES ON MISSION-ORIENTED INNOVATION FOR CLIMATE NEUTRAL AND SMART CITIES"

INSTITUTIONAL COOPERATION PROGRAMME WITHIN EEA & NORWAY GRANTS

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THE IMPORTANCE OF CLIMATE CHANGE IN EDUCATION

The role of universities in climate change education (CCE)

- The role of universities in climate change education (CCE) is of great importance if the scientific, social, environmental and political challenges the world faces are to be met.

- It is essential to understand the range of CCE strategies being taken globally by Higher Education Institutions (HEIs) and to explore and analyse the ways that HEIs could better address this challenge.

- There is current consensus that human population should aim for a global mean temperature rise of no more than 1.5°C from 1990 levels (IPCC, 2018) requiring action on two critical fronts: mitigation and adaptation.

- The implementation of adaptation and mitigation strategies needs capable policymakers and an informed public.

- Educated people are more aware of the risks climate change poses and are better equipped to make informed decisions about responses at local, national and international scales.

- While climate change education is important at all levels, from primary schools to universities, it is the higher education sector that is most in need of developing a systemic approach.

UNIVERSITIES NEED TO ENCOURAGE BOTH STUDENTS AND STAFF TO ENGAGE WITH THE CHALLENGES WE ARE FACING – TO PROMOTE RESEARCH, TO DEVELOP SOLUTIONS FOR CLIMATE CHANGE MITIGATION AND ADAPTATION AND TO TAKE A LEADING ROLE IN THE PUBLIC DISCOURSE THAT IS NECESSARY.

Article 12 of the Paris Agreement encourages nations to "enhance climate change education, training, public awareness, public participation and public access to information" (UNFCCC, 2015).

HOW UNIVERSITIES ARE EMBEDDING CCE INTO THEIR CURRICULA

WHAT ARE THE DIFFERENT IMPLEMENTATION STRATEGIES OF HEIS TO CCE? IS THERE A PREFERENCE FOR ONE APPROACH?

CONCEPTUALISING CLIMATE CHANGE EDUCATION

CCE still an under-researched topic

- There have been only a few attempts to conceptualise CCE and define the associated skills, knowledge and competencies.

- Approaches to embed CCE are limited, fragmented and often focused on one discipline. Even within a specific discipline there is limited research on how CCE could be embedded.

- Mochizuki and Bryan (2015) suggest that CCE could be taught applying one of the well-known holistic framework of Education for Sustainable Development (ESD) the four pillars of education as conceptualised in the so called 'Delors Report' to UNESCO in 1996 of the International Commission on Education for the Twenty-First Century (Delors, 1996), with a special focus on two of the pillars:

1. Learning to know: Students need to understand the causes and consequences of CC as well as CC mitigation and adaptation tools.

2. Learning to do: Students need to develop cross-cutting skills such as coping with one's emotion such as fear, being able to adapt fast to different situations and learning contexts, understanding systems and envisioning different solutions and future scenarios.

A CCE FRAMEWORK

The four quadrants of climate change education integration into the curricula

- A CCE framework was developed by Petra Molthan-Hill et al. (2019) to provide an insight into present practice in a wide range of universities and to develop an analytical framework that will enable anyone interested in embedding CCE in their institution to critically reflect and systematize their own approach.

- The framework specifically recognises four different approaches adopted by universities in undertaking CCE: Piggybacking, Mainstreaming, Specialising and Connecting.

- The study recommends the development of curricula that add the relevant climate change adaptation and mitigation tools to each discipline through an incremental approach while taking into consideration staff time and resources costs.

- Starting from less resource intensive decision may the the preferable approach.

	Existing Structures	New Structures
Narrow curricular	**Quadrant 1** **Piggybacking** Integration of climate change education (CCE) within existing structures by adding CCE to individual sessions of courses or modules	**Quadrant II** **Specialising** Creation of specific climate change modules, courses or degrees such as a MSc in Climate Change
Broad curricular	**Quadrant III** **Mainstreaming** Integration of climate change education within existing structures but with the emphasis on a broader cross-curricular perspective (entire curriculum)	**Quadrant IV** **Connecting (Transdisciplinary)** Integration of climate change education through new cross-disciplinary offerings such as a course on climate change offered to all student within a university or faculty integrating teaching content from different disciplines.

Source: Petra Molthan-Hill et al. (2019), The integration of climate change education (adapted and modified 'Integration of Sustainability Matrix' Godemann et al., 2011 and Rusinko, 2010).

A CCE FRAMEWORK

- Piggybacking

Examples:
  - A case study integrated into a module on food production
  - Additional books on the reading lists for a law degree.
  - Using a dataset showing the impact climate change has on weather patterns in a quantitative module.

- Case: Nottingham Trent University in the UK, designing a card game to be used in the faculty of education or a role-play about the climate change negotiation at the 21st Conference of Parties of the United Nations Framework Convention on Climate Change in Paris in 2015.

A CCE FRAMEWORK

Mainstreaming

Examples:

- Every discipline in a business degree could address CCE, so a module on accounting could include carbon accounting, a module on human resource management could include carbon literacy, and an operation module might include reduced energy costs and associated carbon reduction.

- Case: University of Dar es Salaam in Tanzania. Their curriculum aims to allow every university student to obtain at least a basic understanding of climate change studies and sustainable development.

A CCE FRAMEWORK

Specialising

- This approach utilises new structures to address a rather narrow curriculum.

- Specific Masters degree programmes that are often associated with the expectation employers have of future employees to fulfil specialist tasks related to climate change management.

- Case: The MSc in Global Change of the Facultad Politecnica (Universidad Nacional de Asuncion), Paraguay, aims to build capacity to conduct practice-oriented research on climate change and variability science and management.

- Curricula seek to develop common scientific language and basic knowledge across disciplines to face the challenge of interdisciplinarity, and between the academia and society. The ultimate goal of the MScCG programme is to become an agent for sustainability and climate change teaching and research (Nagy et al., 2017).

- Graduates in interdisciplinary environmental sciences and sustainable development are increasingly in demand, as are environmental engineers and Graduates from a business or economics degree with climate change, sustainability and carbon market as part of their curriculum.

A CCE FRAMEWORK

New structures

Connecting

The most innovative approach with the aim to cover a broad curriculum with a newly designed offer.

Examples:

- SPOC (Small Private Online Course, a version of a MOOC (Massive Open Online Course) but only accessible for on-campus students with a focus on energy or climate change.

- a module that all Undergraduates have to take in their first year of study such as the module "Science Bears Responsibility" in the Leuphana's Bachelor's Programme.

The new module or course might offer to students from different disciplines general information on climate change science for example, which the students will then later adapt to their discipline.

A CCE FRAMEWORK

Connecting

- Students also can learn in a module or course to reflect on a challenge through the lenses of different disciplines.

MOOC on food and climate change might look at the problem from the perspectives of agriculture, law, food production, nutrition and so on encouraging students to appreciate and apply transdisciplinary approaches in analysing and solving challenges.

Case: The Carbon Literacy Project in Manchester, UK

This is a wider project run by Community Interest Company Cooler Projects on behalf of the Carbon Literacy Trust, which includes different sectors - for example, they initiated a successful Carbon Literacy training scheme within the television and film sector to achieve the accreditation as 'sustainable production'.

A CCE FRAMEWORK

New structures

Connecting

Manchester Metropolitan University is one of the participants in the broader Manchester project offering Carbon Literacy training to all its students through the Carbon Literacy for Students (CL4Ss).

As the Carbon Literacy Project has as one of its principles peer-to-peer teaching, students are trained to deliver the training to their peers in a cascade-training model

The aims of the CL4Ss training is that each student knows the basic principles of climate change science, understands how it impacts their lives, including their disciplinary area and future job sector, makes an active commitment to reduce their carbon footprint (both now and in future employment), and develops skill in communication to encourage others to do likewise.

The university funds this work using its unique Environmental Education Fund, which is an internal mechanism to compensate for the climate costs of student air travel.

Such a training scheme could be easily copied and embedded in other universities in the world.

A CCE FRAMEWORK

Conclusion

- The current and future level of international attention paid to climate change means that its relevance is likely to increase in the coming years.

- It is therefore crucial that higher education institutions, especially the ones so far limited to Piggybacking, move forward in the hierarchy, towards Mainstreaming, Specialising and Connecting to handle a problem which is global in nature, but whose impacts are especially felt at the local and regional level.

# A FRAMEWORK OF CURRICULA TOPOGRAPHY IN THE UNIVERSITY

A TOPOGRAPHY OF LEARNING EXPERIENCES WITH WHICH STUDENTS CAN ENGAGE. TOPOGRAPHY IS HERE USED METAPHORICALLY TO REFER TO THE VARIED LANDSCAPE OF LEARNING OPPORTUNITIES, WITH DIVERSE OPPORTUNITIES FOR LEARNING ABOUT CLIMATE CHANGE IN DIFFERENT SPACES, IN DIFFERENT FORMATS, FROM AND WITH DIFFERENT PEOPLE, AND WITH DIFFERENT OUTCOMES.

THE CURRICULUM TOPOGRAPHY APPROACH

A framework for understanding the topography of learning about climate change in universities.

- It addresses the need for diverse forms of learning (knowledge, skills and values; learning about, for and through);

- it is based on learner agency rather than coercion;

- Learner agency is a term that captures the important goal of students being active learners who can make choices and take actions to fully participate in their learning communities.

- It has two facets:

  1. the sites of learning (classroom, campus and community), the places where engagements take place;

  2. the curricular features (disciplinarity, certification, continuity, embeddedness etc.), in three groups – access, ownership and connection.
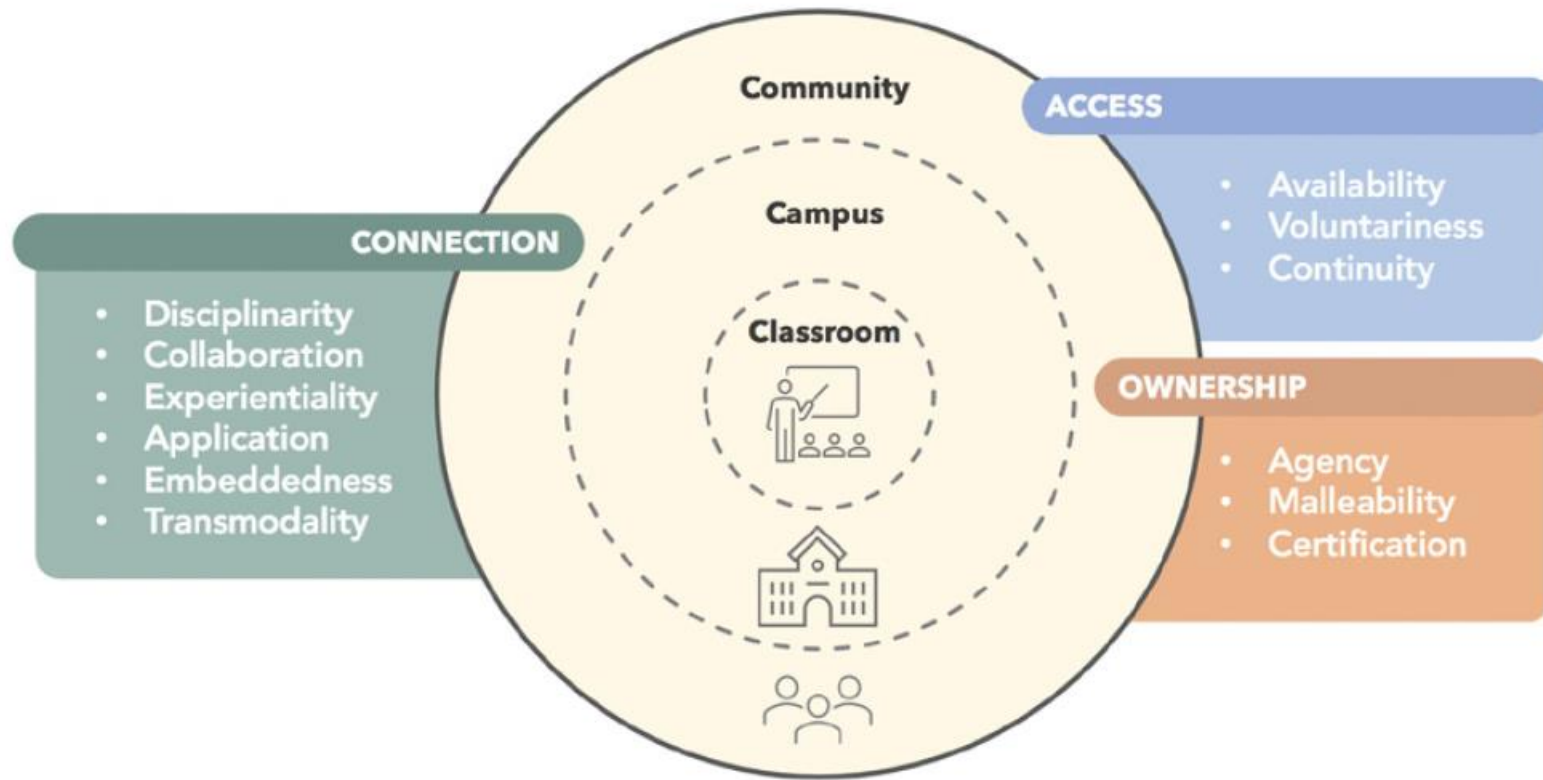
Source: Transforming Universities for a Changing Climate Working Paper Series No. 6, Tristan McCowan, 2021

Classroom:

The first C refers to the formal curriculum, which may or may not be delivered within a literal classroom. Provision here is likely to take the form of either discrete provision, such as an optional module on climate change, or embedding across all modules.

Campus:

Learning also takes place in other parts of the university space, whether physical or virtual. For example, through student associations, artistic and recreational activities, or through engagements in environmental initiatives on campus such as recycling or reducing energy usage.

Community:

Finally, learning can take place beyond the campus in activities organised by or through the university. These activities may be part of formal courses, such as research projects, linked internships or work placements. Or they may be entirely independent of students' programmes of study, such as volunteering work, campaigning and mobilisation. Community here is used in a figurative sense, and may not be literally the local community surrounding the university.

The three primary sites of learning, designated by the 3 Cs of classroom, campus and community.

Source: Transforming Universities for a Changing Climate Working Paper Series No. 6, Tristan McCowan, 2021

THE CURRICULUM TOPOGRAPHY APPROACH

Access

- *Availability*: is the provision available for all students, or only for those of certain courses? Is it potentially universalisable, or necessarily restricted to limited numbers?

- *Voluntariness*: is the provision compulsory for all students, compulsory for some students, or voluntary? If not officially obligatory, are there *de facto* forms of compulsion?

- *Continuity*: is the learning ongoing throughout students' trajectory at university, available in a specific year, or a 'oneoff', appearing at particular moments?

THE CURRICULUM TOPOGRAPHY APPROACH

Ownership

Agency: who initiated the activity? Is the initiative university-led, lecturer-led or student-led? Who participates in and controls the decision-making process or the content of the activities?

Certification: does the activity lead to the obtaining of credits leading to a degree? Or is there any other formal recognition of the activity that can provide exchange value for students in seeking further study, employment and other opportunities?

Malleability: how open or closed is the content to modification and development? Is it predefined or constructed during the activity?

THE CURRICULUM TOPOGRAPHY APPROACH

Connection

- **Connection**

Disciplinarity: to what extent is the activity linked to a specific academic discipline, and oriented around disciplinary bodies of knowledge, principles of enquiry and methods? Or if not, is it multidisciplinary, interdisciplinary or transdisciplinary?

Embeddedness: is the provision part of an existing taught course or research study or other university programme? Or is it a freestanding activity?

Application: to what extent is the learning abstract andtheoretical, or applied to contexts of practice?

Experientiality: Are there experiential elements, involving learners' participation in real life situations? Or alternatively is it preparatory learning, or involving simulations?

Collaboration: what level of collective working does the activity involve? Is it a lone process of learning, or of interaction between student and lecturer, between peers or of multiple forms of actor?

Transmodality: what connections are evident between teaching, research, community engagement and campus sustainability? How porous or isolated are these areas from each other, and to what extent are positive synergies generated?

THE CURRICULUM TOPOGRAPHY APPROACH

	Cross-cutting module	Philosophy curriculum	Outreach with agricultural communities	Design of new student centre
SPACES				
Classroom	√	√		
Campus				√
Community			√	
FEATURES				
Access				
Availability	Available to all	Only philosophy students	Only certain courses	Available to all
Voluntariness	Voluntary	Compulsory	Compulsory	Voluntary
Continuity	First year	Continuous	First year	One-off
Ownership				
Agency	Staff-initiated and led	Staff-initiated and led	Staff-initiated, student-led	Staff-initiated, student-led
Certification	Credit-bearing	Credit-bearing	Credit-bearing	No certification
Malleability	Content predefined	Content predefined	Content constructed	Content constructed
Connection				
Disciplinarity	Non-disciplinary*	Disciplinary	Disciplinary	Non-disciplinary
Embeddedness	Independent of degree courses	Part of degree courses	Part of degree courses	Independent of degree courses
Application	Abstract and applied	Abstract	Applied	Applied
Experientiality	Preparatory	Preparatory	Experiential	Experiential
Collaboration	Individual with some group work	Individual with some group work	Individual and collaborative	Collaborative
Transmodality	Teaching/ research	Teaching/ research	Teaching/ research/ community engagement	Limited

Topographical features in four curricular interventions.

Source: Transforming Universities for a Changing Climate Working Paper Series No. 6, Tristan McCowan, 2021

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