Develop an Interdisciplinary Course using the Interdisciplinarity Toolbox

Coralie Johnson, Miles MacLeod, Klaasjan Visscher

University of Twente

Jan van der Veen

Eindhoven University of Technology

OVERVIEW OF WORKSHOP

The ability to engage in interdisciplinary research and problem-solving are essential skills for contemporary engineers, particularly when it comes to addressing issues relating to sustainability, which cross disciplinary boundaries. Based on grant funding from the Netherlands Initiative for Education Research (NRO) the University of Twente has developed an interactive web-based system for assisting instructors in the design of interdisciplinary courses for engineers and scientists, called the Twente Toolbox for Interdisciplinary Education. The Twente ID toolbox maps out the landscape of different interdisciplinary course design structures, skill targets and learning goals. These are linked to specific in-class tasks and assessment tools, for assisting students in obtaining those goals, as well as course design tools for instructors. In the session participants will receive guided instruction on how to use the system and will apply it to help develop a new course. Doing so will generate familiar with the toolbox website and its underlying conceptualization of interdisciplinary learning.

KEYWORDS

Interdisciplinarity; Twente Toolbox; course design

DURATION

60 minutes.

ACTIVITIES

For participants we provide a structured interaction with our Interdisciplinarity(ID) Toolbox, which helps instructors design project-based courses and discover relevant students tasks for their designs. We furnish participants with a case example of an interdisciplinary course involving a certain theme or real-world problem (e.g. related to sustainability), and specific engineering and other scientific groups. We explore the use the ID toolbox to position course with respect to skill development targets, and with respect to group and problem structure. With this information at hand, participants will explore and evaluate potential student tasks to support students. We end with a discussion on the virtues of the ID Toolbox including whether it has helped instructors better understand their own goals with respect to

interdisciplinary training, what the alternative options might be and ultimately whether they have in fact discovered useful new resources.

TARGET AUDIENCE

Participants are ideally involved in the design, management or delivery of interdisciplinary courses or programmes, but anyone interested in the topic can also be involved. As noted we provide sample cases to work on in a hypothetical manner.

OUTCOMES

In the first place participants will gain familiarity with the ID toolbox and how to use it for course design and improvement. Secondly participants will become familiar with different interdisciplinary course structures (designs) and the landscape of learning goals those designs suit. This will help conceptualize and position their own goals and designs, and recognize and consider alternative options. Thirdly participants will gain awareness of a range of different student tasks relevant for interdisciplinary learning.

SPECIAL REQUIREMENTS

None

BIOGRAPHICAL INFORMATION

Jan van der Veen: is a full professor at the Eindhoven School of Education (ESoE), Eindhoven University of Technology. His research interests include Science and Engineering Education, Teacher Education and Educational Technology. Jan is a co-developer of the ID toolkit

Coralie Johnson is an educational consultant with the BMS faculty at the University of Twente specializing in teacher training, and researching interdisciplinary training. Coralie is a co-developer of the ID toolkit.

Klaasjan Visscher is an associate professor at the University of Twente. His current research and teaching focuses on innovation ecosystems, transdisciplinary innovation and education, and the embedding of new technologies in organizations and society. Klaasjan is the principal investigator for the ID toolkit project.

Corresponding author

Miles MacLeod is an assistant professor at the University of Twente. He specializes on the student of interdisciplinary research, and interdisciplinary education. He is a co-developer on the ID toolkit project.

Miles MacLeod
University of Twente
Dept. Of Philosophy
Drienerlolaan 5
Enschede 7522DN

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The Netherlands
+31629996981
m.a.j.macleod@utwente.nl

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Curriculum Change and Curriculum Agility

<table>
<tr><td>CDIO Workshop Title:</td><td>Develop an Interdisciplinary Course using the Twente Interdisciplinarity Toolbox</td><td>Date:</td><td>June 2023</td></tr>
<tr><td rowspan="2">Learning objectives:</td><td rowspan="2">By the end of the workshop, participants are …

1. …informed about the Twente Interdisciplinary Toolbox website.
2. … able to solve hypothetical educational problems through the Twente Interdisciplinary Toolbox website.
3. … able to recognize a broad range of interdisciplinary learning goals and design options
4. ….able to select relevant ILOs and appropriate design options for interdisciplinary courses from those options…
5. … able to select appropriate resources relevant to those ILOs and design choices.</td><td>Group size:</td><td>Approximately 30, working in groups of 3.</td></tr>
<tr><td>Time allocation:</td><td>60 mins</td></tr>
<tr><td>Short description:</td><td colspan="3">Description

In this session, participants will be presented with a short introduction to the website, then split into groups of 3 to try to consider one of three interdisciplinary educational design tasks (provided by us) within the framework of project-based or challenge-based learning. These design tasks will encompass setting ILOs, making decisions about student group structures and problem structures, and linking these to relevant students tasks and assessment tools. Design options and a step-wise design framework is provided by the website. The website provides linkages between design options and relevant students tasks to help scaffolding design decisions. An online mural application will be used to share outcomes and summarise findings.

Participants will also be asked to consider courses they are familiar with and they might be improved using the website material. They will also be asked to provide feedback on the website itself and where improvements might be made.</td></tr>
<tr><td>Preparation:</td><td colspan="3"><u>Presenters:</u>
• PPT slides (with interactive elements) , context cards (for groups), pens, paper, suitably arranged classroom for groupwork.
<u>Participants:</u>
• Laptop or smartphone with internet connection.
• No preparation needed, however teachers of ID courses may get most benefit.</td></tr>
</table>

TIME	Instructional function* [purpose of instruction/ task/ etc.]	Educational activity [The teacher does…]	Audience activity [The audience does..]	Extra information
5 min.	*Welcome*	1. Leads ice-breaking activity (8 mins). 2. Informs audience of objectives for today (1 min).	1. Participates in ice-breaker. 2. Listens.	Set audience at ease and inform them of the purpose of today's session.
5 min.	*Introduction*	Shares link of Twente toolbox and goes through the basics.	Listens, opens site on own device.	Audience now has access to website that is the basis of today's session.
20 min	Core: Activity 1	Explains the educational task	Within groups, participants work on setting: 1. ILOs 2. Group structure 3. Problem-solving goals (for the student project task) 4. Problem-design structure using the decision tree within the website, and following the step-wise course design provided there.	Activity involves 3 different educational design tasks. As a basic example: "design a project-based course on sustainable design for water supply systems involving these groups: social scientists, civil engineers and ecologists." (more details with actual case) Teacher in groups of 3 work towards solving the problem by using the website resources for course - building.
5 min		Discuss answers	Share solutions with rest of the audience verbally.	
15 min	Core: Activity 2	Explain the educational task	Within groups participants discuss - using the toolbox website - relevant tasks students could be given to scaffold their interaction and problem-solving in accordance with the information from Activity 1.	The toolbox website is able to feed relevant tasks to instructors based on learning goals and other aspects of course design. Participants can use this to discover and discuss a relevant subset of tasks.
2 min		Direct audience to the Miro or MURAL site to share outcomes.	Share answers (aligned with problems displayed on MURAL or Miro)	Answers can be shared to the MURAL or Miro app,
8 min	*Review*	Elicits what was learnt today, stimulates discussion on the uses of this type of site.	Offers ideas and feedback on their experience and relevance to their own courses. Suggests improvements or possible areas of concern of the site.	Gaining insights into the usability of the site will help the audience and the website creators make adjustments to