4TU.RESPONSIBLE SUSTAINABILITY CHALLENGE: DEVELOPING AND RUNNING AN INTER-UNIVERSITY CHALLENGE-BASED MASTER HONOURS PROGRAMME

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ABSTRACT

We showcase our 4TU Responsible Sustainability Challenge Master Honours track as a successful case of ongoing inter-university educational collaboration. The experiences of this endeavour could be used as a guiding example for similar collaborations. The organisational cooperation among the universities was evaluated through qualitative analysis based on interviews with eight involved collaborators. Our experiences show that to utilise the benefits of inter-university collaborations for both students and institutions, a careful consideration of the organisational structure is needed beforehand. It is especially important to evaluate the prerequisite

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conditions of the collaboration, educational alignment, and administrative tasks, as well as develop a suitable coordination system that would regulate the vision and the practical implications of the development and operation of the course.

1 INTRODUCTION

1.1 Interdisciplinary & Inter-university Future

The current developments in industry require engineers to work increasingly along other disciplines to understand the needs of diverse fields and specialisations (Van Den Beemt et al. 2020). The demands of industry consequently require educational institutions to further integrate interdisciplinarity within their degree programmes. This will allow students to develop and practice collaboration skills and other transversal skills necessary for understanding and working with people from other disciplines. This need is currently addressed within single universities by developing (intra-faculty) dedicated courses. However, courses shared among universities are less utilised as a learning framework for interdisciplinarity (Dimitrienko et al. 2020). The current practice paper aims to showcase one such success case of an inter-university collaboration.

Inter-university education is collaboratively developed, taught, and supported by multiple universities (Coombe 2015). This can provide an opportunity for students to engage with a wide range of disciplines, experts, teachers, and stakeholders, creating a fertile ground for the development of transversal skills (Dawson et al. 2024). Transversal skills such as critical thinking, creativity, and interpersonal skills, appear to be of crucial importance in the future engineering industry (Kovacs et al. 2020). Furthermore, by training skills on the intersection of scientific areas and increasing the number of available human and material resources, e.g. knowledge base, expertise, facilities (Dimitrienko et al. 2020), students and future employees are better equipped for the changing requirements of industry and academia (Blagorazumnaia & Trifonova 2023). However, such inter-university cooperations requires a stable ground of collaboration and clear agreements among institutions.

1.2 Development of the collaborative 4TU.Federation Master Honours track

The 4TU.Federation (4TU) is an inter-university federation of four technical universities in the Netherlands, namely Eindhoven University of Technology, Delft University of Technology, University of Twente and Wageningen University & Research, which work together in the vision of "*connecting, representing and innovating in the areas of education, research and valorisation*" (4TU.Federation 2024). The involved universities cooperate in research to build upon each other's knowledge and offer more opportunities to their students. To develop their collaboration further, the 4TU.Federation piloted an inter-university Master Honours track under the title 4TU *Responsible Sustainability Challenge (4TU.RSC)*. As a track, 4TU.RSC serves as a specialisation among the Honours programmes of the collaborating universities in which students can follow a predetermined trajectory of development centred around the dedicated topic of sustainability, in which individual components (i.e. project work, online lectures and on-site events at the universities) contribute to the overall learning goals shared by these universities. The initial idea was developed by all four universities, however, Wageningen University only partook

in the initial development, as they did not offer a Master Honours programme during the time of development and could therefore not embed the track in their Honours curriculum.

In practice, 4TU.RSC is delivered as an extracurricular track for selected Master students, working on a sustainability challenge while receiving coaching, workshops, and lectures provided by educators of the three universities. The track is organised, developed, and provided under the Honours programmes of the three collaborating universities. The Honours programmes are provided for ambitious and talented students who want to do something next to their study. A key characteristic of the Honours programmes at the participating universities in this collaboration is that students must apply for them and are subsequently selected if they fit the criteria of the Honours programme of each participating university. The exact method of student recruitment and selection differ between the universities..

Since the Honours programmes are outside of the official curriculum, more experimentation with education is possible. Integrating a new course in any institution involves usually a demanding and long procedure. Additionally, Honours students are considered and selected on being motivated and able to work in complex and innovative educational structures, making them very good at handling a programme with a lot of parties, teachers, and stakeholders. These were the main considerations for the 4TU.RSC to be developed and provided by the Honours programmes.

2   METHODOLOGY

The main objective of this practice paper is to provide insight into the creation and running of inter-university education. To those ends all involved organisation staff were approached and asked to participate in an interview (appendix A). Eight semi-structured interviews were conducted with 4TU.RSC track coordinators, Honours programme managers/coordinators, educational experts, and 4TU representatives. The interviewees were involved at various stages of the preparation and/or delivery processes for each of the two running periods of 4TU.RSC. All interviewees gave their informed consent via video or voice agreement to be recorded and transcribed. The transcripts of the interviews were coded by two researchers using a deductive approach (Azungah 2018). Similar content was coded under the same code, with the count of that code increasing by one for each instance in the transcripts..

3   RESULTS

The list of codes from the transcripts could be divided into three broad categories: the requirements for, the benefits of, and the challenges in organising and running inter-university education. The following paragraphs present shortly the main categories as those were defined based on the information shared by the interviewees. Topics which were mentioned four times or more by the interviewees are included in the results within their categories:

    a. *Requirements*, or the prerequisites necessary to build such a collaboration.
    b. *Benefits*, or the added value of such collaborations.
    c. *Challenges*, or the difficulties that such collaborations introduce.

3.1 Requirements

The first main area consisted of the requirements regarding the process of developing, initiating, and operating inter-university educational programmes. The most often mentioned requirement was alignment among Honours programme structures and institutional overarching Honours programme learning goals. Each of the 4TU universities have different structures in the Honours programmes. These differences relate to the application period, the selection criteria, and the number of credits in an Honours programme. Even the level of centralisation of the Honours programmes differs, where some universities have (a part of the) organisation on the faculty level while others maintain a university-wide programme. All these factors created a complex web of policy, scheduling issues, and requirements which the organisational team had to navigate before the track creation process could begin. The track was re-evaluated after the first year, and some strategy changes were made to be as accessible as possible for students from all universities. These changes included a restructuring of the division of credit to allow the different partner universities to take ownership over study modules which were close to their expertise.

As the content of the track, especially the learning goals and visions, needed to be aligned among the institutions and the Honours programmes, administrative complications were also introduced in the original prerequisites for setting up the collaboration. For instance, some of the collaborators defined the Master level of the learning objectives differently, had varying understanding of the appropriateness of challenge-based learning (CBL) outcomes for this educational level, and had different approval requirements for new tracks.

Given this intense administrative and aligning work, collaborative and co-creative team spirit appeared also as a prerequisite. The openness to hear other perspectives and to discuss concerns, ideas, doubts, etc. among the collaborating members made aligning the programme structure and learning goals easier. All members appeared to contribute their own expertise and knowledge and be responsible for accomplishing several tasks on behalf of the common goal. The flat hierarchy among the contributing members supported their responsibility and was the driving force towards a good collaboration. The same spirit of openness and collaboration was also extended towards the external parties throughout the whole process of preparation and operation of the track. Given the CBL character of the programme, education experts and stakeholders (e.g. companies contributing as experts from practice) were also involved in the co-creation process of the track. This diversity of expertise and points of view embedded in the programme development contributed to its extensive multidisciplinary character and enriched its knowledge database.

3.2 Benefits

The main reason of the 4TU collaboration on this track was the preparation of the students towards an inter-disciplinary future career and the understanding of differences between schools of thought within the same discipline. Interestingly, some of those benefits were also mentioned in the interviews conducted as advantages for the universities. Each institution, and their representatives, embodied a role to fulfil specific tasks. The programme required more involvement from all parties in a mostly unexplored type of collaboration. This meant that some members of the team were present and involved in elements of the track creation process where they normally would not be. This allowed for perspectives and practices to be shared, and new learning to be introduced. Hence, the interdisciplinary knowledge of the universities was equally improved.

The co-creation of this track further enhanced the network of each of the universities. The programme allowed the team members to get even more familiar with the other 4TU universities and get acquainted with professionals from diverse departments. Sharing perspectives, enriching the knowledge databases, and exchanging good practices among institutions were the most prominent benefits of the collaboration spirit that was enhanced through the development and delivery of this track. An important addition was strengthening the relationships between the Honours programmes. Given the strong ties between the programmes, enabling additional future collaborations was proposed as an important outcome of this collaboration. Finally, given the interaction with external experts and local companies as stakeholders, the network of the institutions was enriched even further in industry, allowing for other kind of collaborations and possible connection of the local students to relevant companies.

3.3 Challenges

Next to the prerequisites and benefits of this inter-university educational collaboration, there are several challenges that also need to be taken into consideration. The most named challenge is coordination. From the very beginning of this endeavour, no specific coordinator was assigned among the universities. The goal of this choice was to ensure a flat hierarchy, and equal involvement of each member. However, the cooperation between the different educational institutions, with different approaches, organisation and even teaching backgrounds, imposed complications in the collaboration. Practical matters, such as meetings, agreements and more abstract issues, such as the vision and the collaboration plans, were undetermined. Multiple interviewees suggested that clear guidance regarding important topics of the cooperation would have ensured smoother interaction, and improved cooperation.

Due to this lack of coordination, practical implications were often mentioned to arise in the collaboration between the different members. It was not always clear under whose responsibility some tasks belonged, what the planning of the track was, and which adjustments to the local programmes or promotion strategies needed to occur.

This was also reflected in the student evaluations of the pilot, who provided the feedback that communication was often unclear and late. Next to coordinating among the inter-university organisational team, the local institutions needed to ensure alignment with their own curricula. Furthermore, developing such a complex interdisciplinary track required more dedication and time investment. Finally, even though the track was running under the Honours programmes of each institution, not every programme operates in the same way regarding timetables, student entry requirements, and even rules and regulations. Central coordination could offer early solutions to those matters.

Instead, to ensure solving those raising issues and dealing with the newest developments, the members of this collaboration needed to have regular meetings. Those meetings appeared to be more productive when they occurred in person. In the online meetings, several interviewees reported to have the impression of less commitment and/or lower motivation. Meetings in person appeared to be more productive and better for the team spirit. However, regular physical meetings require time and financial investment. The traveling hours of the teachers and the coordinators needed to be weighed against the increased team spirit and the successful cooperation.

4 DISCUSSION

Taking into consideration the input of the members of the organisational team of 4TU.RSC, there are some relevant conclusions that could serve as valuable guiding sources in future inter-university innovative educational projects. Thereby, it is important to underline that such collaborations are not only profitable for the students partaking in this education, but also for the educators and the institutions. Strengthening the collaboration spirit, learning from the interdisciplinary environment and the different practices and approaches of each university, as well as continuously networking with old and new stakeholders enlighten the reasons of such endeavours.

However, while preparing and delivering such inter-university courses, it is fundamental to take several implications into account. Firstly, coordination might be a key for smooth collaboration. A designated individual or group of people in this coordinating position could safeguard the vision and alignment to the local institutions, take the key decisions, arrange practical implications, such as adjustments, administrative challenges, and promotion to students, as well as decide when physical or online meetings are necessary for the best collaboration procedure. The 4TU.RSC initiators choose for a flat hierarchy structure, which led to equally successful results. The coordination tasks were adopted organically by various parties. However, having such a central role could smoothen the cooperation, especially during the development period.

Prior to initiating inter-university courses, it is important to test if the universities intending to start the course provide a good organisational foundation for such an endeavour. Meaning that the participating universities must be flexible enough to adapt to potential organisational limitations of the partnering universities. The most important factor is the evaluation of the alignment between the learning goals of such

an inter-university course and the local institutional courses, as well as the administrative complications that might come along such an innovation, such as scheduling issues between universities, adjustment of educational level definitions that might be relevant for international forms of such collaborations, and more. Above that, all those prerequisites can only be successful if a collaborative and co-creative team spirit is present or can be developed among the involved members. The 4TU collaboration had a significant advantage on that front, given the already existing collaboration. Until the initiation of 4TU.RSC, the 4TU mainly focused on research and promotion of the good practices of each university. The 4TU.RSC was their first educational track developed, but the strong cooperation ties were already well established.

5 CONCLUSION AND ACKNOWLEDGEMENTS

In conclusion, inter-university courses appear to have many advantages for both the students and the institutions. The experience of developing and providing the 4TU.RSC Honours track has shown that alignment is one of the most important factors for a successful collaboration. This must be evaluated by the participating institution, and the case of the 4TU.RSC has shown that dedicated coordination may make this process more efficient and thorough. Future attempts in establishing inter-university courses can take the present paper into account when establishing the collaboration structure. However, further longitudinal and empirical data would also be required to carefully assess the applicability of inter-university collaborations.

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7 APPENDIX

Interview questions

- **Personal Data**:
    - o What was your role within the 4TU.RSC program?
    - o Which tasks did you fulfil for the 4TU.RSC program?
    - o During which moments were you involved in the 4TU.RSC program? (preparation 1st round, round 1 running, preparation 2nd round, round 2 running)
    - o What expertise did you bring to the 4TU.RSC program?

- **Preparation Period (preparation 1st & 2nd round)**:
    - o Which processes were necessary for setting up (or iterating) the 4TU.RSC program?
    - o Who did you need to communicate with in order to organize the 4TU.RSC program?
    - o Which were the most complicated discussion points in the development of 4TU.RSC program?
    - o How did the teamwork/ collaboration process develop among the involved members?
    - o What were the most valuable opportunities that 4TU / inter-university collaboration provided?

- **During Course Progression**:
    - o What difficulties did you experience in the cooperation/ coordination of the course?
    - o How did you ensure the quality of the program throughout the process?
    - o How did you ensure smooth collaboration among the involved members?
    - o Were there points of disagreement among the involved members?
    - o What were the most valuable opportunities that providing 4TU / inter-university education provided?

- **Closing & Next Steps**:
    - o How did you evaluate the cooperation with all the members?
    - o What were the most important learning points after the completion of the cooperation?
    - o How did you decide on the next steps (progression, next level, alternative iteration) of the program?
    - o What would you propose for future similar inter-university collaborations?