The NextGEng Project: First Steps of an International Co-Teaching Experience

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Abstract

International co-teaching refers to a teaching arrangement in which two or more teachers, at least one from a domestic university and at least one from an international university, work together to teach a student group. One of the main lines of action of the International Cooperation Framework for Next Generation Engineering Students project (NextGEng) is aligned with this educational model. This paper describes the design and preparation of team teaching activities for successfully implementing the co-teaching pilot program.

Keywords: team-teaching, engineering education, international collaborative teaching.

I. Introduction

Fast technological advances in all fields require multidisciplinary engineering approaches to achieve their integration into today's products and processes. Nowadays, increasingly complex knowledge results from sharing and collaboration among different disciplines. Hence, multidisciplinary knowledge and teamwork skills are critical for current engineering problems.

Co-teaching, also known as team teaching or collaborative teaching, can promote new teaching methods better aligned with multidisciplinary training. It is a collaborative approach to instruction that involves two or more teachers sharing the responsibility of

planning, delivering, and assessing the learning of a group of students (Rabin, 2020). Specialized literature defines 6 strategies of co-teaching (Friend, M., Cook, L., 2013): (i) one teach-one assist, (ii) one teach-one observe, (iii) station teaching, (iv) parallel teaching, (v) alternative teaching and (vi) team teaching. In all of them, teachers should

have compatible pedagogical philosophies to be more committed to working together (Salifu, 2020). It stands to reason that a team of teachers can prepare more comprehensive courses. One of the main benefits of co-teaching is the increased diversity of instruction, which allows teachers to use different strategies, methods, and materials to meet students' individual needs. Co-teaching can also improve students' academic outcomes by giving them more individualized attention, information, and support from multiple teachers. At the same time, team teaching allows teachers to improve their knowledge and teaching skills through communication with peers (Haag et al., 2023).

Despite the above positive points, Salonen and Savander-Ranne (2015) claim that interaction skills are key to developing team teaching methodologies. On the other hand, Vesikivi et al. (2019) informed about the teachers' concerns about the effort required to plan the activities and the evaluation and the loss of autonomy. Nevertheless, these authors noted that a smooth transition from conventional to team teaching methods mitigates those concerns. Financial costs, more complex logistics, and different interpretations of co-teaching between teachers are also highlighted as drawbacks (Mitek, 2022). Despite this, the advantages of co-teaching are likely to outweigh its disadvantages (Guise et al., 2023).

In view of the above, co-teaching strategies are an excellent tool to improve teaching, and for this reason, they are being implemented in the NextGEng project (NextGEng Project - Nextgeng.eu, 2022). NextGEng is the acronym of the International Cooperation Framework for Next Generation Engineering Students project. It is an Erasmus+ Cooperation partnership in higher education project that involves a consortium of six partners from European Higher Education Institutions (HEIs) and companies. It aims to develop an international cooperation framework that promotes international team-teaching, including actions to support collaborative international and experiential learning in engineering. To achieve this goal, NextGEng promotes three lines of action: a tailored training process for teachers, an international team-teaching pilot program, and cases for experiential learning (Satorres-Martínez et al., 2023).

This paper deals with the two first lines of action mentioned above. Section II describes the activities and results achieved during the training seminar. This seminar was the start of the international team-teaching pilot program, the second line of action in the NextGEng project. Section III presents the first activities carried out in this line. The main conclusions of the activities performed in both lines of action are given in

II. Tailored training process

The main goal of the tailored training process was to analyse and then improve the pedagogical tools used for each HEI NextGEng partner. For this, six joint courses, 18 courses in total from all HEI partners, were chosen to be upgraded. Through the analysis, lecturers became aware of methods used elsewhere and got help to evaluate their own ones. The training seminar was a workshop held at Jyväskylä (Finland) on the 30th–31st of January by JAMK partner. It aimed to strengthen HEI partners' student-centred teaching competencies, taking advantage of international co-teaching opportunities.

The following subsections describe both issues.

II.1. Analysis of the teaching methods

A survey was created to help plan the training days and to clear out the current teaching methods, usage of digital tools, and companies' involvement in the 18 chosen courses. It collected the following information: experience in co-teaching, the current situation with pedagogical methods and digital tools, the current state of producing learning material, assignments, and evaluation, and the current state of the courses' interactivity, internationality and closeness to working life.

All the teachers in the 18 courses responded to the survey, and 28 answers were analysed. Although 19 teachers stated that their teaching experience was more than 10 years at the university level, only 6 of the 28 teachers had co-teaching experience. Those with that experience said that co-teaching at the same time in the same course must be very well coordinated. Some noticed that it is an expensive way of teaching. At best, it was fruitful and brought new aspects for improving the learning process. Some of those with no experience teaching at the same time in the same course were willing to do so.

The current situation with pedagogical methods was pretty much the same in all the courses. Problem- and project-based learning were implemented in 89% and 64% of the courses, respectively. To a lesser degree, cooperative and collaborative learning were also applied. Other used methodologies, but less than 25%, were flipped classroom, inquiry-based learning, game-based learning, and learning by teaching.

Concerning the learning material, lecture-based material was, as expected, the most

teacher-made form of material. In addition, the most popular were books, articles, and

videos that were written, produced, or published on their own.

Finally, the interaction between students and teachers were mostly during the lectu□res, seminar, or guidance sessions for small groups. Almost 50% of respondents reported

that exchange students participated in their last course implementation. Cooperation

with companies was limited to visiting lectures, visits to the company, and expert gui□dance from the company (e.g., mentoring).

II.2. Training seminar

It promoted and expanded participants' thinking of learning and student-centred

pedagogies. It lasted two days, and the attendees were required to complete a pre-as□signment to get familiar with student-centred learning and international co-teaching.

On the first day, experts in pedagogical innovation provided training on cooperative

team teaching, learner-centred approaches, and flexible assessment framed within the

modular organization of engineering courses. Then, the participants were divided into

groups, forming a total of 6 groups, one per subject. In each of the groups, company

partners were included. The current teaching methods in the selected courses were

analysed, and the companies gave an initial proposal of activities to be developed as a

part of the courses.

During the second day, each group prepared a plan for course upgrade and

team-teaching implementation. The plan included the following information: members

of the co-teaching team, course modules, a proposal for co-teaching implementation,

laboratories, seminars, or projects developed in partnership with companies, and the

co-teaching team meeting schedule. At the end of the day, each group leader presented

the plan for upgrading the course.

III. Preparation of Team teaching activities

Figure 1 shows the timeframe for the international team-teaching pilot program.

It started with the tailored training process and now we are working on the first round,

in which four of the six courses are being upgraded. By the end of September 2023, 6

modules per course and 11 laboratory work or tailored seminars in collaboration with

companies have to be finished.

The first round implementation of the international co-teaching experience has started in September 2023 and it will last until June 2024. One of the courses, Design Projects, has already started this phase and one international co-teaching experience was held in the University of Applied Science, JAMK, in Finland. Preliminary feedback of the experience has been positive and game-based learning methodologies has been applied during two international co-teaching sessions. In each of them were involved teachers from the host university JAMK and the Technical University of Cluj-Napoca (TUCN), from Romania, and the University of Jaén, from Spain. The co-teaching experience was carried out in English to all the students enrolled in the Design Project course in JAMK.

Basically, the co-teaching strategies implemented were: one teach-one assist (one primary lecturer and one assistant) and station teaching (class divided into small groups with different instructors). Once the first round implementation finished, the results have to be deeply analysed to serve as feedback for improving the second round course upgrading process. The international team-teaching pilot program finishes with the last

implementation to take place from September 2024 until June 2025. Opinion surveys to students and teachers will be done to assess the co-teaching experience.

Figure 1. Timeframe for the international team-teaching pilot program

IV. Conclusions

Collaboration among instructors, team teaching, or co-teaching is a promising approach to provide future engineers with the training and skills to face increasingly complex technological problems. This work presents the first steps for implementing and testing several co-teaching methods in the frame of the International Cooperation Framework for Next Generation Engineering Students project NextGEng (NextGEng Project-Nextgeng.eu, 2022). Regarding collaborative teaching, this project includes several actions as a training process for teachers about new teaching methodologies and the development and application of international team-teaching activities.

After initial assessing the used teaching methods, we noted that, of those teachers

involved in the 18 courses considered in this project, only a few plan and instruct collaboratively (6 of 28 surveyed). Furthermore, those with experience in co-teaching highlight the importance of coordination to get good results. Several point out that it requires additional efforts, but they generally identify co-teaching as a way to improve the learning process through new training methodologies.

The previous analysis was used to prepare a teachers' training course where presentations, debates, and collaborative activities helped to explain and clarify the potential advantages of new teaching student-centred methods and co-teaching. This course reduced the instructors' concerns about collaborative teaching due to the links and the motivational environment created. Additionally, the activity marked the beginning of the co-teaching implementation line of action. Thus, teachers grouped by similar courses prepared a plan for introducing in each course team-teaching. Through online meetings until August 2023, each group has defined the team-teaching activities, and

in September 2023 has started the first round of co-teaching sessions/activities. Considering the current results, the activity has already positively influenced the teachers' methodologies. It is expected to reduce the preparation time and increase instructors' and students' motivation in the subsequent implementation rounds.

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