

ASTONRAIL - Intellectual Output 4 - Recommendations

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Analysis of the current methods and development of new methods for skills development:

In order to develop skills in rail higher education, the project conducted a study of present techniques and developed new approaches in the focus areas by using the three key components of the improvement cycle: revise, reflect and innovate. The following outcomes were achieved in the respective areas:

1. Skills development approach in rail higher education

In reviewing rail higher education skill development approaches, it was revealed that the current practice includes lecture, practice sessions, seminars, laboratories, and technical visits followed by a two-hour closed-book test. After careful reflection it was found that as opposed to being limited to a specific subject area, creative activities are constrained by the availability of resources, staff, and time. The innovative idea suggest that the practice should incorporate a combination of teaching and learning methods. An extension of technical visits with task assignments to groups and final presentations by students (meddler in the middle teacher). The involvement of extra-academic teachers with field experience, the involvement of teachers from other universities, as well as practical activities related to emerging technologies in the railway industry, linked to research whenever possible. Digital platforms such as YouTube channels, podcasts, and streaming can be used to facilitate informal learning in a creative way. It is observed that the use and attraction of these new approaches is growing among students. Teaching methods based on peer interaction Student-led workshops Online connections with diverse laboratories are some of the ways to improve lectures to introduce key concepts and approaches like assigning specific tasks, frequent problem-solving sessions, team activities, frequent practical sessions, implementation of digital platform and giving assess to recording of the lectures can impact the learning outcome greatly.

2. Teaching and learning environment

Currently, teaching and learning take place only in the classroom. However, this could be changed by including activities at round tables, in libraries, and even online. Shifting the focus from possible theoretical lectures to various industrial visits followed by report writing or feedback will lead to an increase in the active role of students. Also, promoting online learning on carefully selected concepts using fun and effective platforms like VR may greatly enhance the teaching and learning environment.

3. The role of the teacher in rail higher education

According to the study, the role of the teacher in rail higher education is to be the sage on the stage, as well as a meddler during student-to-student presentations. In order to improve it, more roles could be envisaged when new methods of teaching and learning are introduced, such as extending the role of meddler in the middle, enhancing the role of the teacher based on the context of the class, or adding the role of a guide on the side in case of problem based-learning methods.

4. The classroom assessment techniques

In the current practice student-to-student feedback is less or not used as part of the evaluation of student performance, and all work produced by the students is evaluated and taken into account as part of the final assessment (exam + practice + exhibit). According to the study, the reflections of students on the class work must be included as part of the assessment process and the Assessment Techniques should be extended to include a systematic method of using student-to-student feedback to enhance student performance, in addition to using online assessment. This will improve not only final assessment based on exams and reports but also include student participation in class using tasks with open questions.

5. Course related and teacher related student feedback

In terms of course-related and teacher-related student feedback, the study concludes that the mid-term student survey should be revised, the final course survey should include feedback from students on the whole course, the topic-specific mid-term student survey should be improved, and the final survey should comprise student feedback on the whole course.

6. Assessment method for every rail subject-specific module

The current assessment procedure involves a two-hour on-campus closed-book written exam and/or an oral exam that is favourably taken into account for a systemic evaluation. To balance the test pressure at the end of the semester, use of a number of brief assessments

throughout the semester can be included. The revision of crucial outcomes from course-related feedback is necessary for improvement (course survey and reflective task). Both questioning and answering are subject to evaluation by the teacher.

7. Research-based teaching and learning for rail skills development

In light of the revisions made to the research-based teaching and learning technique for rail skills development, it has been observed that seminars by Ph.D. students as well as presentations of ongoing research papers and lectures based on the results are occurring. By assigning tasks in research and designing new rail systems that are more secure and safer, as well as focusing the paper discussion task and laboratory activities on current teacher research projects, the program will be enhanced.

8. Career prospect for every graduate in any European country

In considering career prospects for graduates in any European country, we discovered that content and networking opportunities are rather limited to local practice, with additional support for graduates outside the region. Internationalization of the learning process is not encouraged by teachers. There is a limited amount of time, resources, and training available. The use of digital technologies can contribute to the creation of new teaching experiences outside the classroom and the strengthening of ties between students across Europe. Among the innovations suggested are a more flexible module specification and access to European networking events, a greater number of international internship opportunities, and more programs (BA and MSc) utilizing new technologies to support content and teaching practice that can overcome current obstacles. These technologies contribute to inspiring and motivating teachers. A recommendation of the improvement would be to include students in module-specific revisions and encourage them to participate in networking events. It is imperative to encourage institutions to invest more time and resources in enhancing online learning through curated content. There are few tools available for teachers to promote international experiences. Using the Erasmus program to study abroad is a great way to encourage students to do so.