

Studying Student Experience of Technology Enhanced Assessment Methods (TEAM) in Science and Health in Ireland

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ABSTRACT

This is a cross institution project involving four Institutes of Technology in Ireland. The objective of this project is to assess the use of technology to enhance the assessment of laboratory sessions in Science and Health. In science, health and engineering, the laboratory sessions are at the core of the learning process for skill development. These laboratory sessions focus on the skills acquisition. The Irish Institute of Technology sector, in particular, develops these skills and considers them essential for 'professionally ready' graduates. In terms of student progression and retention, the assessment structure has been identified as having a significant impact on student engagement.

The Technology Enhanced Assessment Methods (TEAM) project led by Dundalk Institute of Technology and partnering with Institute of Technology Sligo, Athlone Institute of Technology and Institute of Technology Carlow is exploring the potential offered by digital technologies to address these concerns. It aims to develop a framework for applying the principles of effective assessment and feedback to practical assessment. The TEAM project also aims to facilitate dialogue among stakeholders about what it is we want student to learn in laboratory sessions and how our assessment can facilitate this. A peer network of discipline-specific academics and students in the Science and Health field has been established across all four Institutes. As the network focuses on authentic skills assessment in all core modules, including physics and chemistry, the best practice from this project will inform future assessment procedures across laboratory sessions and may be considered for application within a Science and Materials Engineering context.

Assessing the skills acquired in this environment takes many forms. Using student and stakeholder feedback along with an extensive literature review of the area, the team identified key technologies that cut across science and health disciplines, with the potential to influence and enable the learning process. The emphasis was on developing a powerful learning environment approach to enable students to deepen their learning through engagement with the process. The areas identified are: (i) Pre-practical preparation (videos and quizzes), (ii) Electronic laboratory notebooks and ePortfolios, (iii) Digital Feedback technologies and (iv) Rubrics.

This paper describes the student experience and perceptions of the adoption of digital technology in science practical assessments. It also describes the process involved in setting up the pilot structure and it presents the initial results from the student survey.

INTRODUCTION

In all areas of Science and Material Engineering, the laboratory sessions are fundamental to the development of both technical and transferable skills. They enhance the employability, ground the learning in the practical application of knowledge, and lead the student to self-awareness of the discipline.

In Ireland, the Institute of Technology sector embodies this culture and develops graduates with the required practical skills to ensure that graduates are ‘professionally ready’ and comfortable with the transition to employment.

At undergraduate level, where students spend most of their time in the laboratory, it is important that the correct skills are acquired and assessed. However, there can be an overemphasis on assessment in general (excessive laboratory reports) rather than integration of knowledge and understanding and the development of other skill sets (including technical and metacognitive). [1, 2]. Therefore there is substantial scope to improve the laboratory assessment practices and make the laboratory session a ‘powerful learning environment’ [3], to ensure authenticity and appropriate skill development. Within the laboratory sessions, each discipline has its own requirements regarding the level of skill required by the student in different areas and therefore alternate approaches are tailored to each discipline.

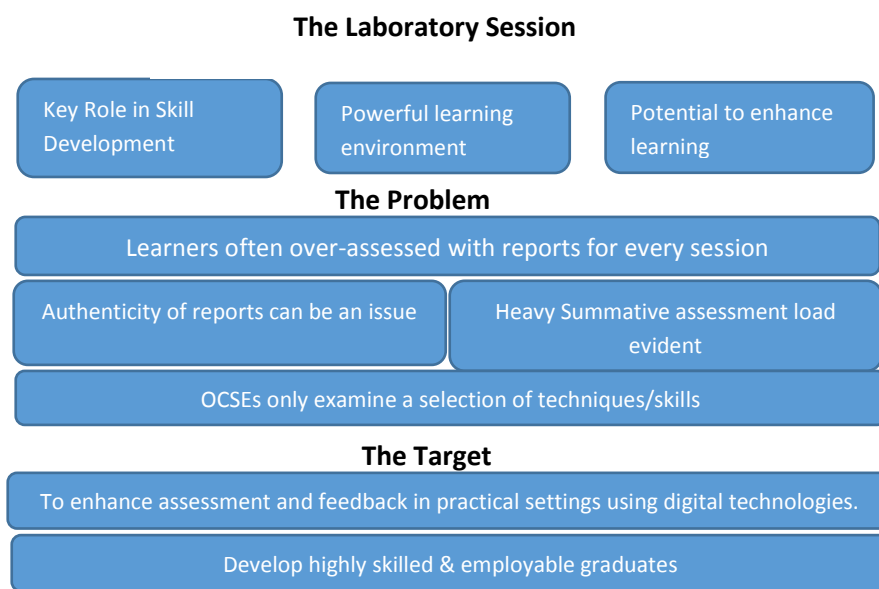


Figure 1. TEAM Project Overview (*Objective Structured Clinical Examination (OSCE) is applicable to Health Science clinical sessions only) [4]

The Technology Enhanced Assessment Methods (TEAM) project sought to investigate the potential use of digital technologies to enhance the laboratory experience in a range of science disciplines. The two year project has been funded by the Irish National Forum for the Enhancement of Teaching and Learning (NFETL) in Irish Higher Education. The multi institution enhancement project, involves four Institutes of Technology in Ireland. It is led by Dundalk Institute of Technology, with partners: Institute of Technology Carlow, Institute of Technology Athlone and Institute of Technology Sligo. The four Higher Education Institutes are located across the country and teams from each Institute were identified to run the project pilots.

The aim of the project was to investigate and assess the impact of technology on assessment in practical settings in Science and Health disciplines across the four Irish Institutes of Technology. The rationale for the intervention and the identification of the themes were developed as shown in the project overview in Figure 1.

METHODOLOGY

One of the most important decisions in the planning process for this project was the selection of the project leads in each Institute. The management of the project determined the impact and success of the project. In order to develop the project and ensure engagement from staff, the project lead in each Institute is the Head of the Faculty, (HOF) of Science/ Science & Health. Having a senior manager as the project lead enabled a top down change management strategy to be implemented. As a leader, the Head of Faculty was in a strategic position to encourage the implementation of all emerging best practice to within the Faculty. The team, through the peer network also used the bottom up management approach. The peer network in each Institute project committee had mixed expertise in the areas of education, discipline specific and information technology. The linkage of the two approached was via the team steering committee, where the Heads of Faculty and members of each Institute project committee drove the project.

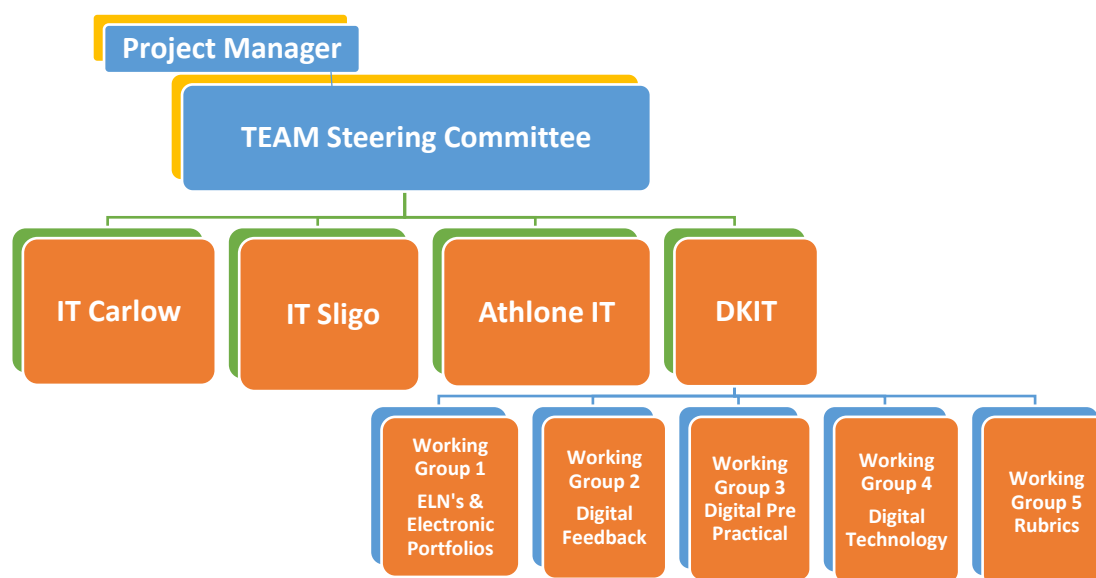


Figure 2. TEAM Project Management Structure

The management of the project underpins the project, as the cross institutional project required each institution to take ownership while still ensuring overall cohesion. This is illustrated in Figure 2, where the overall project steering committee meets on a regular basis using technology (virtual meetings, Dropbox, Skype etc.) to drive each phase forward. In each Institute, the working groups are replicated and the input is fed back through the management system.

This allows each Institute to be autonomous in developing their own cross-discipline team, drive their individual initiatives and contribute to the cross-institution collaborative project. The bottom-up development of the project comes from each Institute engaging with individual lecturers to develop their own pilots as part of each working group. This is the key enabling step of the project. In order to ensure that the interventions were of benefit to the students, there were student champions in each Institute. These were self-selected in the initial phase. The other stakeholders in this project are the potential, employers. Each Institute launched the project, once the key pilot staff and student champions were identified. This structure allowed for meaningful engagement from all stakeholders including the wider student body and employers.

It is vital that the interventions and the technologies used are beneficial in developing the employability of the students. The aim of developing a framework for applying the principles of effective assessment and feedback was achieved

by having a specific project plan where the dialogue between all stakeholders identified key themes. The three phases of the project are identified in the Project Plan in Figure 3.

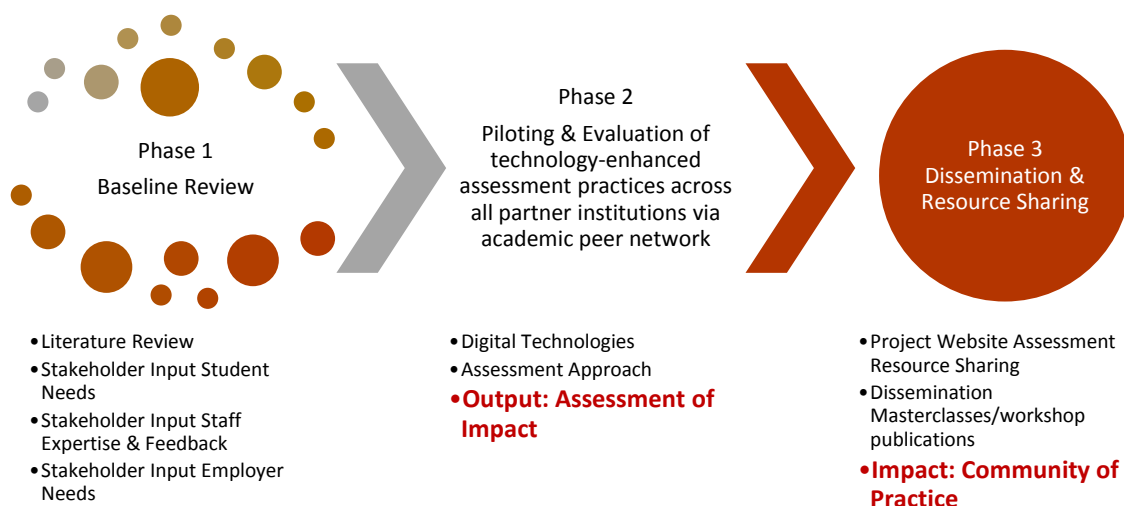


Figure 3. Project Plan for the TEAM project

In Phase 1, a total of 651 students across the four institutes responded to a survey which examined their perceptions of laboratory sessions and the use of technology in this context. Four areas of intervention were identified and these were (i) Pre-laboratory/practical preparation (videos, quizzes), (ii) Electronic laboratory notebooks and ePortfolios, (iii) Digital Feedback and (iv) Rubrics. The second phase of the project is underway and the pilots are being evaluated. The outcome of this phase will assess the impact of the pilots. Phase 3 will develop the community of practice to deliver change in the laboratory sessions.

RESULTS

The output from the survey carried out in Phase 1 is shown in Figure 4. The literature review on the assessment protocols has been carried out [5]. With seventy three percent of respondents stating that they would like to see more technology enhanced teaching and learning strategies used in the laboratory session, the necessity for this project is warranted. This, with the survey results, informed and enabled the four themes. These themes are the areas for intervention listed above. The website to support the project and the wider higher education community has been developed and is being continuously populated with supporting material [6]. This will ensure the sustainability of the project in the future.

Responsibility for identifying, enabling and monitoring the pilot projects in each Institute was overseen by the steering committee. The project steering committee then decided on the analysis metrics. In preparation for Phase 2 and to ensure consistency, the TEAM steering committee developed pre- and post-surveys for the students participating in the pilots. Each individual pilot lead was responsible for designing their own survey. However, in order to facilitate an overall analysis of the project each questionnaire included a set questions from a centrally approved bank of questions.

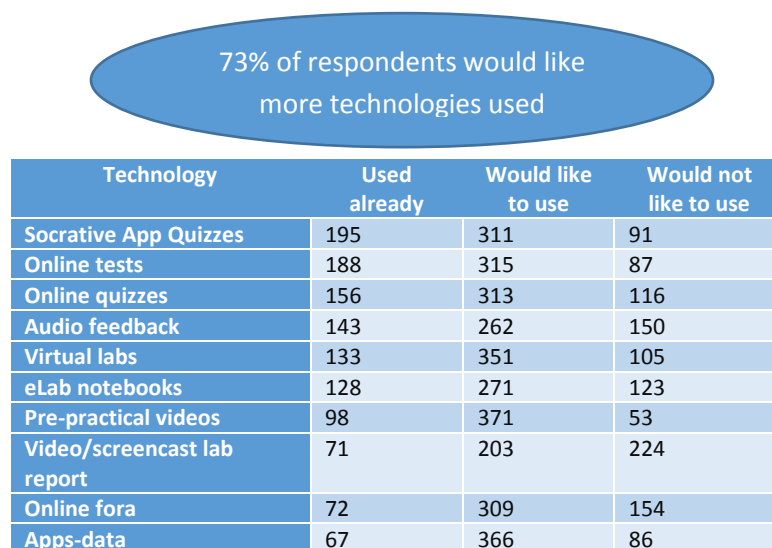


Figure 4. Results from the survey from 651 students. [adapted from 4]

Presently the surveys data is being collated and analysis has begun. Initial feedback from the lecturers and the students is very positive. This project has developed a very successful working model for collaborative research across four Institutes of Technology in Ireland. The students involved in this research were partners on the journey and involved in the development of the working model at every stage.

In Phase 2 the projects were distributed across the four institutes. With over 59 pilots involving 50 academic staff and 1,481 students from 45 programmes, as shown in Figure 5. This project crossed all disciplines, across Science and Health and implemented a series of pilots under each of the four themes identified.

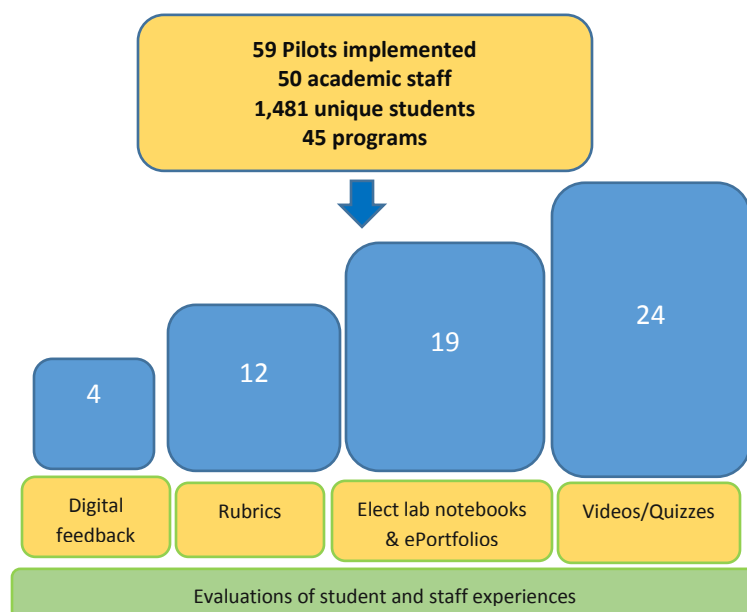


Figure 5. Phase 2 of the TEAM project [adapted from 4]

CONCLUSIONS

Laboratory sessions require updating and this project has shown that this can be achieved through the use of technology to aid learning and assessment. The successful implementation of the pilots has engaged students and faculty. As the data from Phase 2 is being analysed, identifying best practice from the pilot feedback is a key aim of Phase 3 of the project. The dissemination of this information will enable lecturers and students to use appropriate technology based assessment to enrich the learning environment in the future.

This project engaged a wide variety of lecturing staff in the different disciplines due to the management structure used. The push from the bottom from the steering committee members on the ground, enabled by the buy in and leadership from the management, at Head of Faculty level, ensured that this project was successful.

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