Forum Insights

PROJECT TITLE:
Irish Engineering Graduates Advancing Global Manufacturing Competitiveness: Design Simulation for the Process Industries

Overview of the project:

Irish Chemical Engineering graduates have played a pivotal role in the development of the economically crucial pharma/biopharma sector in Ireland. This project harnesses all stakeholders, in the Irish Chemical/Process/Bioprocess Engineering education space, working together to ensure that teaching within the discipline is aligned with best pedagogical and professional practices, specifically with regard to design and simulation practices of relevance to the pharma/biopharma sector. The academic participants (UCD, CIT, DCU, DIT, UCC, UL) are supported by external (non-funded) partners: practicing engineers and graduate employers from the process and consultancy sectors; simulation software developers/providers; IChemE, the international accreditation body for the Chemical Engineering profession.

This project will yield suites of novel, shared, vertically-structured e-learning resources – to support students in integrating theory, experiment and simulation (using industry-standard simulation tools), across the different core modules of undergraduate Chemical Engineering curricula. There are 4 main subject areas: Fermentation, Chromatography, Distillation and Process Control. Each subject area is addressed both experimentally and via simulation to reinforce the underpinning theory and to allow students to explore core concepts beyond the limitations of a single laboratory experiment. The project will also yield a strategy sustainably embedding the effective use of these tools within Chemical Engineering degree programmes (and cognate Sciences), for the achievement of professionally-relevant graduate skills.

The project commenced on March 1 2016. Lead partners met formally in early March. A whole-team Inception Workshop was hosted by NIBRT on March 22 2016. The second whole-team Workshop will take place in UCC, on June 21 2016.

*Members of the **Project Team**, photographed after the Inception Workshop, in NIBRT, on Tuesday March 22, 2016.*

Academic Partners (including contact details of relevant individuals within partner institutions)

INSTITUTION/UNIT	INSTITUTIONAL/DISCIPLINE CONTACT	INSTITUTIONAL PARTICIPANTS
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External (non-funded) Partners

The project team gratefully acknowledges the generous support and active involvement of the following external partners:

- APC [www.approcess.com]
- IChemE Education Special Interest Group (EdSIG) [www.icheme.org]
- Jacobs Engineering [www.jacobs.com]
- National Institute for Bioprocessing Research & Training (NIBRT) [www.nibrt.ie]
- Scale-Up Systems (DynoChem) [www.scale-up.com]

Key outcomes of the project

- A suite of reusable, shared, pedagogically-appropriate resources (including screencasts, video, animations, simulations, interactive environments and assessment activities), in key Chemical/Process Engineering subject areas, of direct relevance to pharma/biopharma applications, culminating in development of user proficiency in the intelligent deployment of sophisticated process simulation tools and techniques.
- Development of an open, online platform, to house project learning suites, ensuring that the developed resources remain available (for use, modification and supplementation) post-project.

Outline how the project benefits the higher education sector nationally

- An exemplar project for similar initiatives within allied academic programmes, nationally and internationally, thereby raising the profile of Irish Chemical/Process Engineering education and practice and supporting the development and achievement of professional accreditation standards.
- Development of a cross-disciplinary community of engineering education practice, directly aligned to the needs of the pharma/biopharma sector, supporting enhanced and extended strategic partnerships between all relevant stakeholders, with a specific focus on student learning and development of core competencies.
- A coherently articulated, 'spiral learning' structured, theory-experiment-simulation approach, within Chemical/Process Engineering and cognate curricula in Ireland, specifically in the context of pharma/biopharma applications.
- Professional development for staff (academic, technical and support) on best practice in curriculum design and delivery of theory-experiment-simulation learning frameworks within undergraduate Chemical/Process Engineering.
- A platform, developed for full-time academic programmes but which will provide a framework than can be adapted to address specific needs of the pharma/biopharma sector in terms of training and upskilling.

Outline how the project benefits students

- The project itself is characterized by – and depends entirely upon - direct engagement of and with students, in developing the relevant experimental systems and associated simulations/exercises; in the iterative evaluation of resources, both through focus groups and in module-based pilot studies; in the use of the resources.
- Ultimately, the provision of authentic, incremental learning and assessment experiences for students, yielding enhanced graduate awareness and preparedness (particularly with regard to digital literacy) to enter and play higher-value professional roles in the pharma/biopharma sector.

7. Other national/international development work that complements this project

- The project team will work with the IChemE EdSIG, towards a Chemical/Process Engineering T&L Community of Engagement to champion and further the implementation and evaluation of the project during post-project roll-out, beyond the Irish Higher Education sector.
- The project builds directly from examples of relevant, high-quality multi-media pedagogical resources as developed, applied and evaluated within the Chemical Engineering education community in the US.

Who to contact for more information/next steps (if appropriate)

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