3U Research – Award Winners of the N-STEP, Strand 1 Funding Call 2013/14

Submitting Applicant	Partner Investigators	Project Title	Summary of Project
Bob Lawlor **Department of** **Electronic** **Engineering, NUIM.**	Dermot Brabazon, School of Mechanical and Manufacturing Engineering, DCU. Kevin Casey, Department of Computer Science, DCU. Alison Farrell, Centre for Teaching and Learning, NUIM. Judith Strawbridge, School of Pharmacy, RCSI.	Interdisciplinary Communication Skills - facilitating students from different disciplines to learn with, from and about each other.	Our group project involves exploring interdisciplinary communication skills and collaborative learning across STEM disciplines. In order to examine the topic we completed a literature review and surveyed staff about their views on interdisciplinary communication and collaborative learning at undergraduate level. We also held two focus groups on the topic with staff in June 2014. Though our primary intended project outcome was a design model for interdisciplinary approaches to communication skills, as a result of the literature review we have redefined our purposes and we will instead, in the first instance, present guiding principles for the effective integration of interdisciplinary communication skills training into existing and future programmes.
Eloise Tan, Learning **Innovation Unit, DCU.**	Aneta Hayes, Language and Culture Unit, RCSI Bahrain.	Assessment and culturally diverse students: learning from students' narratives to improve STEM practice.	
Jane Holland, **Dept of Anatomy,** **RCSI.**	Eric Clarke, Health Informatics, RCSI. Evelyn Kelleher, School of Nursing, DCU.	Examining the relationships between attendance, online engagement and assessment outcomes in undergraduates; an observational prospective, multicentre study	Non-attendance is known to have a detrimental effect on performance, but traditional manual monitoring of attendance may be problematic. Our study utilises the Reports and Logs function within Moodle to identify on-line indicators of students who are struggling or disengaging from the course during the first semester of the academic year. Initial analyses within the RCSI

	Morag Munroe, Learning Innovation Unit, DCU.		Junior Cycle cohort show that online activity correlates with summative performance and is more predictive for outcomes among repeat students than physical attendance. Both these indices were less contributory for first-time students, for whom continuous assessment performance has a larger effect size.
Ann O'Shea, Department of Mathematics and Statistics, NUIM.	Brien Nolan, School of Mathematical Sciences, DCU.

Ciaran Mac an Bhaird , Department of Mathematics and Statistics, NUIM. | A study of the opportunities for creative reasoning in undergraduate Calculus courses | In this project, we study the opportunities for creative reasoning in mathematics afforded to first year undergraduate students. We will use the framework developed by Johan Lithner to characterize different types of mathematical reasoning. He defines reasoning as 'the line of thought adopted to produce assertions and reach conclusions in task-solving'. His definition includes both high and low quality arguments and is not restricted to formal proofs. For this reason, the framework is useful in studying the thinking processes required to solve problems in calculus courses, where often proofs are not given or required but students are expected to make plausible arguments and conclusions. Lithner distinguishes between *imitative reasoning* (which is related to rote learning and mimicry of algorithms) and *creative reasoning* (which involves plausible mathematically-founded arguments). In this project, we use this framework to classify the reasoning opportunities available in a wide range of first year modules offered in our universities. Studies have shown that the types of tasks assigned to students can affect their learning and that the use of tasks with lower levels of cognitive demand leads to rote-learning by students and a consequent inability to solve unfamiliar problems or to transfer mathematical knowledge to other areas competently and appropriately. It is therefore important to investigate whether first year students in our university are given sufficient opportunities to develop their reasoning and thinking skills. |

Brien Nolan, School of Mathematical Sciences, DCU.	Majella Dempsey, Department of Education, NUIM James Lovatt, School of Education Studies, DCU Ann O'Shea, Department of Mathematics and Statistics, NUIM Angela Rickard, Department of Education, NUIM.	Building Mathematical Knowledge for Teaching (MKT) for Pre-Service Mathematics Teachers	Mathematical Knowledge for Teaching (MKT) refers to the mathematical knowledge required to carry out the work of teaching. This is distinct from common mathematical knowledge (e.g. knowing how to deal with percentages), but blends this with pedagogical knowledge and skills to enable the teacher to undertake the many and varied mathematical tasks required in day-to-day teaching (e.g. representing mathematical ideas, anticipating student difficulties, connecting mathematics with the students' environment). In this project, we (i) assess pre-service mathematics teachers' awareness and level of MKT, and (ii) study how best to build this with in a taught programme focusing on MKT and the students' conceptions of quality mathematics teaching.
Judith Strawbridge, School of Pharmacy, RCSI.	Mark Philbin, School of Nursing and Human Studies, DCU Paul Gallagher, School of Pharmacy, RCSI	An Exploration of Student Views and Expectations about a New Integrated Pharmacy Programme	Pharmacy education is changing from a 4 year undergraduate programme and internship to a 5 year integrated programme. The project determined students' expectations and their perceptions of the merits, value and challenges of studying pharmacy through an integrated programme. Nine focus groups were conducted across the three institutions delivering pharmacy programmes in Ireland. Thematic analysis revealed students felt that an integrated programme would provide better context for learning and preparedness for practice. They expected experiential learning in all sectors. There was strong support for optional subjects, placements overseas and interprofessional education. Students identified that fiscal constraints might impact on the attractiveness of the degree. This study has informed developments Nationally, and will be of interest to educators further afield.

Seamus McLoone and Rudi Villing, Dept. of Electronic Engineering, NUIM.	Conor Brennan, School of Electronic Engineering, DCU	Investigating the use of smart devices as a means of providing real-time responses in a distributed classroom	Student response systems (SRSs) offer several important pedagogical benefits including improved student learning, increased student interaction, improved student attendance, better student satisfaction and the creation of an enjoyable learning atmosphere. Most notably, they provide a mechanism for anonymous submission, thus allowing students to respond without the fear of being identified. While several different types of such systems exist, most of them have several drawbacks associated with them. These include (i) limited input capabilities, as the SRSs typically only offer a multiple-choice option and/or a numerical and textual based submission, (ii) practical issues in terms of portability, as the lecturer is typically responsible for having to carry a large number of devices to the classroom, and (iii) lack of suitability for distributed classrooms, as most SRSs employ short range infra-red communication that restricts their use to the physical classroom. In this project, we propose and implement a smart phone based student response system that overcomes these issues. This new system builds upon existing work by the authors, whereby a tablet-based system was developed for in-class use. This project has two key aspects – the first relates to modifications to the existing tablet-based solution and the second is the evaluation of the new system in a distributed classroom setting.
Michelle Flood, School of Pharmacy, RCSI	David Wraith, Department of Mathematics & Statistics, NUI Maynooth. Frank Doyle, Division of Population Health Sciences (Psychology),	The role of metacognition in mathematical reasoning and problem solving	This study investigated the metacognitive skills used by third-level students of different educational backgrounds when completing mathematical problems. Metacognition, involves consciously exerting control over one's thought process when engaging with a task includes behaviours such as predicting, planning, revising, clarifying and checking. Participants were presented with a range of non-routine mathematical problems, and asked to complete them while verbalising their thoughts using a think aloud protocol.

	RCSI.		Data were recorded digitally, transcribed and analysed. The study aimed to identify which metacognitive skills are used by students of different backgrounds and which skills are associated with successful completion of the problems.