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## **'Support for Applicable Mathematics' – selected results of a teaching intervention**

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### **Background**

The integration of applications and modelling within mathematics curricula worldwide is still regarded as being in a period of transition. We have still to reach a stage of general classification, or a settled consensus on its role within mathematics education (Niss, 1987; Burkhardt, 2006). However, it cannot be overlooked that applications and modelling have secured a grip in post-elementary curricula in most countries (Niss, 1987, Burkhardt, 2006). The need for students to learn mathematics through the medium of applications and modelling is widely accepted and its merits for inclusion are widely recognised (Burkhardt, 2006; Ferrucci & Carter, 2003; James, 1985; Mustoe, 1992). Current practices in the teaching and learning of mathematics in senior-cycle schools often generally fail to make the necessary connections between mathematics and its place in real-life (NCCA, 2005). As a result, there is considerable concern about the low level of mathematical skills of students emerging from second-level education and, in particular, of those proceeding to third-level education (NCCA, 2005).

### **Research Questions**

The research problem is to investigate the use of applications in the transition from second-level to university mathematics. The study aims to design, develop, implement and evaluate a teaching intervention aimed at the teaching and learning of upper second-level mathematics which involves the use of ICT. The mathematics focus is aimed at highlighting the potential of mathematics in relation to real-life contexts within a distinct modelling approach. This research will draw on insights into the factors determining the level of understanding and attitudes towards learning school mathematics at upper-secondary level garnered from the literature review and the author's personal experience as secondary school mathematics teacher.

### **Methods**

Previously researchers such as Bajpai (1975) and the Harvard Calculus Consortium (Hughes-Hallett, 1991) devised approaches to improve the teaching of third-level undergraduate mathematics. As part of his doctoral studies the author has adapted these approaches so as to design and implement a teaching intervention entitled: "Support for Applicable Mathematics", which is primarily aimed at the teaching and learning of applications at upper-second level mathematics in Ireland. This intervention is specifically designed to make the students aware of the relevance of mathematics to their everyday lives and hence improve their interest and attitudes towards mathematics.

### **Frame**

The intervention was developed so as to ensure the adaptation of the research framework APOS theory. The author proposed an adaptation of APOS theory, developed, as a result of the work of Dubinsky and his colleagues in the Research in Undergraduate Mathematics Education Community (RUMEC), to suit the needs of the learners. It is intended that the questionnaire will inform the author of the existing perceptions of students regarding applicable mathematics.

### **Research findings**

This paper documents the design and implementation of the intervention, including the administration of a questionnaire to the participating students, and reports some preliminary findings from the questionnaire. Initial analysis provides evidence that many students are unable to appreciate the role

of mathematics in everyday life, where they fail to understand or realise the influence that mathematics can exert on one's future education and/or work-life.

Although the findings of this research study are based on the opinions of mathematics students within an Irish school setting, the results are generalisable to other educators regardless of where they teach. Mathematics educators need to maximise the possible contribution of applications in both the curriculum and assessment process within senior-cycle mathematics courses, thereby addressing an important aspect of the ongoing 'Mathematics Problem'. Without such intervention, we will continue to provide a schooling experience that is conducive to the under-preparedness of our students entering third-level mathematics courses.