

## Preparing Teachers to Teach Physics using Inquiry

Dr. Joanne Broggy

Projects Officer Teaching and Learning (Science)

National Centre for Excellence in Mathematics and Science Teaching and Learning (NCE-MSTL);

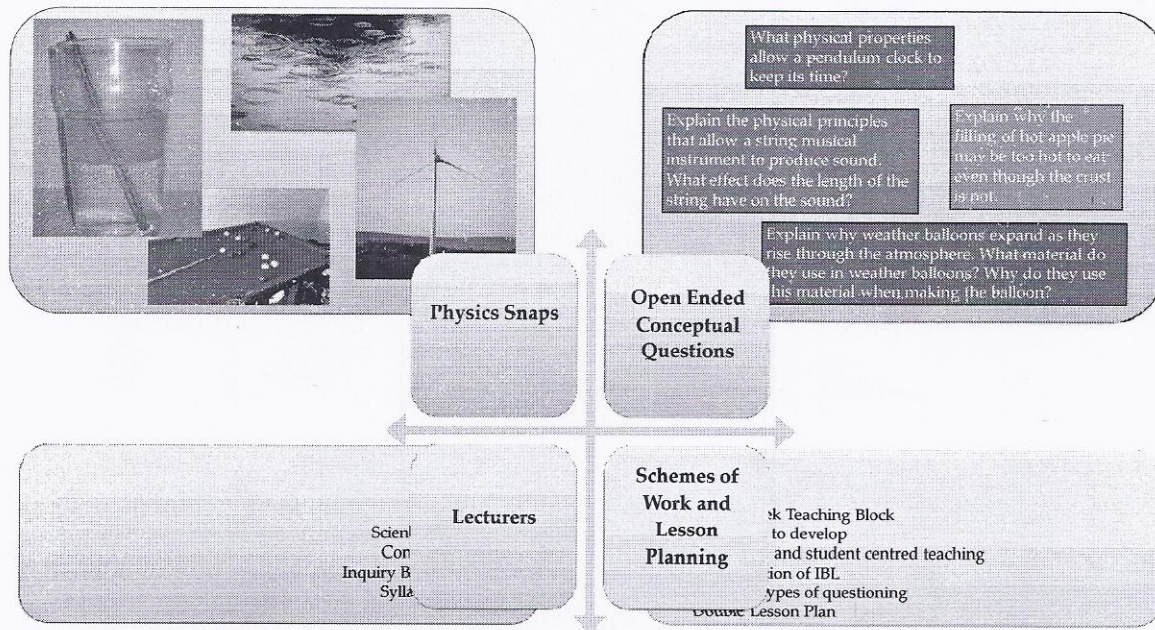
Contact Details: [joanne.broggy@ul.ie](mailto:joanne.broggy@ul.ie); Website: [www.nce-mstl.ie](http://www.nce-mstl.ie)

### Introduction

The Irish government's expansion policy on education has resulted in much larger numbers taking up higher education than ever before. The last ten years has seen an extensive expansion in the numbers entering higher education in Ireland which leads to the problem of a very diverse group of students in third level education, from varied backgrounds and level of experience. This problem is very evident in pre-service teacher education programmes in the University of Limerick. As teacher knowledge is an extremely important factor which influences student learning pre-service teacher training must align and cater to the needs of the changing population, both in second and third level.

This paper reports on the recent change in practice which took place in the University of Limerick whereby third year undergraduate education students experienced teacher training which was designed to target ill-equipped physics student teachers. Upcoming changes in curriculum design at junior and senior cycle science, as outlined by the National Council for Curriculum Assessment (NCCA, 2011), support the use of Inquiry Based Science Education (IBSE) methodologies in all classrooms. IBSE is well documented in national and international research as its use is associated with many gains including social, intellectual and mental. In light of this, an evidence-based research project was undertaken at the NCE-MSTL to help develop pre-service students' competence and confidence in teaching science through the use of IBSE.

Analysis of the data indicates that the inquiry based approach increased the pre-service teachers' attitude towards physics but also their confidence with regard to teaching secondary level science and physics.



### Results

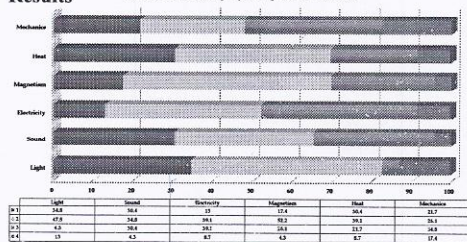


Figure 1: Confidence in Teaching Physics Prior to the Pedagogy Module

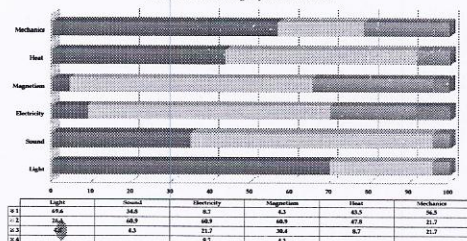


Figure 2: Confidence in Teaching Physics following the Pedagogy Module

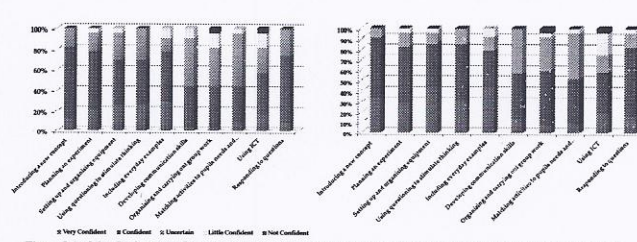


Figure 3 (a & b): Students' confidence in carrying out everyday procedures in the science classroom pre and post module

### Conclusions

- Prior to the module the students were not confident in teaching many physics topics
- Students struggled with planning lessons for effective student engagement
- The Physics snaps task and completing the mini project was enjoyed by the majority of the students and they felt that the experience helped them develop their skills both in physics understanding, group work and lesson planning.
- Pre test students felt that all the teacher characteristics were at least desirable [Gives each lesson a clear introduction and conclusion; Expects pupils to carefully follow instructions; Is skilful in the use of scientific equipment; Can present demonstrations accurately; Encourages pupils to use scientific words correctly; Relates new learning to pupils everyday experiences; Encourages pupils to carry out their own ideas in investigations; Uses good and suitable questions to stimulate and encourage pupils; Uses fun and exciting games to teach Physics]
- Expects pupils to carefully follow instructions – 13% felt it was not so important at post test and dropped from 'essential' status
- All other characteristics increased in the 'essential' category in the post questionnaire
- Trends were obvious but significant - Encourages pupils to use scientific words correctly; Can present demonstrations accurately

References  
NCCA, (2011) Towards a framework for Junior Certificate Cycle: Innovation and Identity, Dublin