



AN CHOMHAIRLE MHÚINTEOIREACHTA
The Teaching Council

Learning and Teaching with Lego Mindstorms Technology in the Twenty-first Century Classroom

Research by Ita Ahern (2009/10 Bursary Scheme)

Overview of Research

The research aimed to investigate the impact of the Lego Mindstorms Programmable Brick on the acquisition of twenty-first century skills in project-based learning in an urban all-boys' school. The research involved an examination of the process of critical thinking development and problem-solving in a constructionist learning environment.

Rationale and Aims

The aim of the research was to explore the use of collaborative learning using ICTs and whether this might be beneficial in the acquisition of twenty-first century skills. Specifically, the research focused on the use of the Lego Mindstorms components and software. This can be thought of as a type of programmable robotics set.

The twenty-first century skills are defined as:

- technological literacy
- creativity and innovation
- critical thinking and problem-solving and
- communication and collaboration.

The researcher argues that this new kind of literacy, “the ability to access, manage, integrate, evaluate and create information” via digital means, would be required for success in today's knowledge economy.

Design and Methodology

The research was conducted in an urban boys' primary school. The fifth class group was chosen for the purposes of the study. The researcher adopted a qualitative case study research methodology, exploring the question of how the integration of Lego Mindstorms technology may enhance the acquisition of twenty-first century skills in project-based learning in the primary school.

Ethical considerations were taken into account with permission sought from management, staff and parents to carry out the research at an early stage.

Findings and Recommendations

It is argued in the findings that the themes of collaborative learning and cooperation emerged during the study as did the participants' acquisition of the twenty-first century skills. Children learn much

more effectively, it is suggested, when they are engaged in constructing personally meaningful objects, a finding which concurs with the relevant literature in this area. Learning and innovation were demonstrated in the creative use of the Lego components, with participants demonstrating critical thinking and problem-solving skills. Furthermore, the findings suggest an extensive use and development of skills in the areas of information literacy, media literacy and ICTs. Finally, evidence regarding the positive engagement with life and career skills, such as initiative, self-direction and communication skills, is also discussed.

The researcher recommends that consideration should be given to providing the Lego Mindstorms technology for all primary schools in Ireland to support creativity and the acquisition of the digital and ICT skills needed for the future. It is also recommended that teachers need to be made aware of developments in education, particularly in relation to the 'new literacy' of twenty-first century skills.

Further research is suggested in investigating the use of the technology in language development for children experiencing English as an additional language.