

# Chapter 4

## SMASH:

### An Inquiry-Based Approach to Parent Education in Math and Science

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#### EXECUTIVE SUMMARY

*Acknowledging the central role of parents in children's learning, the EU-funded project SMASH aims to raise the educational standards of European youth in mathematics and science by cultivating underlying home cultures as springboards for learning. The project consortium has developed, pilot tested, and delivered an innovative intercultural parent-trainer training course and related resources for professionals involved in parent education initiatives. Through the adoption of a blended learning approach that combines e-learning with physical meetings, the course equips these professionals with current knowledge, techniques, and implementation tools for the provision of high-quality, inquiry-based parent training in mathematics and science education. Individuals completing the course are trained to offer programs designed to educate parents of elementary and middle school children (ages 6-15) in how to best support their child's mathematics and science learning at home using pedagogically sound strategies and technologies. Parents unable to attend parent-training sessions could still study independently using the project information base, which provides open access to the project's outputs and resources.*

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## INTRODUCTION

Low proficiency in mathematics and science is highly correlated with low academic attainment, which leads to lower participation in the labour market and in lifelong learning activities after compulsory schooling (Commission of the European Communities, 2007). Despite, however, the fact that the development of scientific and technological knowledge and literacy is a fundamental requirement in modern society, cross-national studies of student achievement (e.g. Trends in International Mathematics and Science Study [TIMSS], Programme for International Student Assessment [PISA]) indicate lack of mathematical and scientific competence for a considerable proportion of the student population in around Europe and internationally. Research also indicates that pupils with poor quantitative and scientific skills are likely to have fallen behind by the age of ten. Thus, efforts to achieve higher levels of mathematical and scientific literacy for all students should focus on strengthening children's skills in mathematics and science at a young age.

Educational leaders and professional organizations in mathematics and science education have, for several years, been stressing the need for providing active learning environments that encourage students through authentic inquiry to establish the relevance and meaning of mathematical and scientific concepts. The core of school mathematics and science should no longer be the teaching of techniques and calculations that computers can do much faster and more reliably, but the development of problem-solving skills that students will need to effectively live and function in a highly complex society. Currently, numerous initiatives are underway in many countries aimed at raising the quality of teaching and learning through the development and implementation of pedagogically sound, inquiry-based learning environments. Despite their usefulness, these initiatives tend to focus on formal education systems and to underestimate the influence of the informal learning occurring outside school. In particular, while teachers are being offered professional development opportunities on pedagogical and technology trends in mathematics and science education, no analogous opportunities are being offered to the other important stakeholder in improved education – parents.

Parents are the central contributors to a child's education, thus having them involved and engaged in the educational process of their children is of paramount importance to their academic achievement in mathematics and science. The research literature indicates a very strong positive relationship between school performance and a conducive to learning home environment (Chen, 2001; Carter, 2002; Downey, 2005). Given the fundamental changes that have occurred in both the content and pedagogy of mathematics and science, the majority of parents do not have the needed knowledge to create an environment within the home that fosters their child's development and is coordinated with classroom work. The vast majority of

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