

Chapter 10

SMASH:

Blended Training for Parent Education in Mathematics and Science

Maria Meletiou-Mavrotheris
European University Cyprus, Cyprus

Efstathios Mavrotheris
Open University of Cyprus, Cyprus

ABSTRACT

At a time when mathematics and science provide essential knowledge tools and the foundations for lifelong learning skills, cross-national studies of student achievement in Europe indicate lack of mathematical and scientific competence for a considerable proportion of the student population. 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 an innovative intercultural parent-trainer training course and related resources for professionals involved in parent education initiatives. The course, which is delivered through combined use of e-learning and physical meetings, provides these professionals with current knowledge, techniques, and implementation tools for the provision of high-quality, culturally differentiated training in mathematics and science education to parents of elementary and middle school children (ages 6-15) in their communities. Online multilingual resources support and promote the program's activities and objectives by offering open access to the parent-trainer training course content and tools.

BACKGROUND TO THE PROJECT

In technology-based society, where mathematics and science provide essential knowledge tools and the foundations for more advanced or specialized training either in higher education or through lifelong

learning, several studies indicate the lack of mathematical and scientific competence of a considerable proportion of both the adult and student population around Europe (IALS, PISA, TIMSS). Research also indicates that pupils with poor quantitative skills are likely to have fallen behind by the age of ten. Thus, if the European Union is to achieve the objective set by the European Council for a

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considerable increase in the number of European college-level students graduating in mathematics, science and technology and pursuing technical careers, it should put more focus on improving student achievement in mathematics and science at a young age (Commission of the European Communities, 2007). The Joint Interim Report “Education and Training 2010” adopted by the Council and the Commission in 2004, highlights the need for accelerated reforms and calls on Member States to take action in order to motivate young people to take a greater interest in science and mathematics, and to undertake scientific and technical studies and careers (Council of the European Union, 2004). Several of the Lisbon Education & Training Indicators measure progress towards improved recruitment and performance of students in mathematics and science.

Significant reform efforts in mathematics and science education are occurring at both the European and national levels. It has been recognized that 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. Numerous initiatives are underway aimed at raising the quality of teaching and learning through the development and implementation of pedagogically sound, technology-based tools and curricula. 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. In its December 2004 progress report, Working Group D “Increasing Participation in Mathematics, Sciences and Technology” notes the general lack of initiatives

in the EU that aim to involve parents (European Commission, 2004). The report points out that stronger and more and effective partnerships between schools and parents are an important area for policy makers to consider.

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 (Kellaghan et al., 1993; Huntsinger et al., 1999; Carter, 2002; Chen, 2001; 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 parents encountered school mathematics and science as drill-oriented subjects, made up of rules and procedures to be memorized, thus many of them maintain a very algorithmic approach and, often, negative attitudes towards the subjects. Moreover, most parents lack the necessary knowledge to guide their children towards constructive uses of technology in support of their learning and developmental needs (Becta, 2001). As a result, although the majority of children in Europe have access to a computer at home (Mavrotheris et al., 2004; Ramboll Management, 2006) and spend far more time using ICT than they do at school (Becta, 2001; Ramboll Management, 2006), computers are not utilized constructively. Rather, children often use technology at home for non-educational purposes such as playing computer games (Mavrotheris et al., 2004).

Parent education is considered an “essential component” of successful parental involvement (Freedman and Montgomery, 1994; Covarrubia, 2000; DiCamillo, 2001). To spur reform in mathematics and science education, parents should be

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