

F. MATH

F1. The PerContare Project: proposed teaching strategies and some developed materials

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Abstract

PerContare is a 3-year project aimed at developing effective inclusive teaching strategies and materials to help primary school teachers (in grades 1, 2, and 3) address learning difficulties, especially those of students who are potentially at risk of being diagnosed with developmental dyscalculia. The teaching strategies and materials developed involve the use of digital and physical artifacts to help students construct mathematical meanings in a solid way. Each year the materials developed are pilot-tested in 15 experimental classrooms, and tested the year after in 5 new experimental classrooms whose results are compared with those of control classrooms. In this poster we describe some of the proposed teaching strategies and material that has been developed within the project.

Objectives

Starting from year 3 of primary school developmental dyscalculia (DD) can be diagnosed, and according to international data the estimated population affected is between 2% and 6% (Butterworth, 2004; Badian, 1983; Gross-Tsur et al., 1996; Kosc, 1974). Moreover, in Italy, about 20% of children in the first year of primary school present learning difficulties in mathematics (Lucangeli, 2005). Therefore, to lower the number of children with learning difficulties in mathematics, and

to avoid the diagnosis of “false positives” in early dyscalculia screening tests, it is important for teachers to offer all children adequate resources for developing numerical competence.

The field of cognitive psychology has studied the incidence and characteristics of developmental dyscalculia and has developed computer-based training tools for remediation of dyscalculic learners (for example, Wilson et al., 2006; Butterworth et al., 2011). On the other hand, mathematics educators have developed theories and teaching strategies that enhance students’ construction of mathematical meanings (for example Bartolini Bussi & Mariotti, 2008; Bartolini Bussi & Boni, 2009). However the two fields have seldom related to one another and enriched the others’ perspective. In this context, the scientific directors of the PerContare project², Maria Giuseppina Bartolini Bussi, and Giacomo Stella of the University of Modena and Reggio Emilia (Italy) decided to collaborate and received a 3-year funding to guide the PerContare Project, aimed at achieving the following goals: 1) to develop appropriate teaching strategies and materials for teachers of grades 1-3 to help all children build numerical competence; 2) to support teachers in learning to use these strategies and materials effectively; 3) to develop early screening tools to be used in grades 1, 2, and 3; 4) to develop intensive training tools for children who continue to exhibit difficulties in building basic number competence.

Methods

PerContare is currently in year 1 (of 3). Each year, teaching materials are developed and pilot-tested in 15 classes (we refer to these as *basic experimental classes*); the following year, the most recent materials developed are tested in *new experimental classes* whose results are compared with those of the same number of *control classes*. For example, materials for grade 1 are developed and tested according to the following cycle:

- (year 1) creation of the materials based on research and classroom practices of the 15 basic experimental teachers;
- (year 1) qualitative pilot-testing of specific activities in the 15 basic experimental classes;
- (year 1) pilot-testing of 2 screening tests to be administered the following year to the new experimental classes and control classes.
- (beginning of year 2) minimal online teacher training to prepare 5 new experimental teachers to test the package of materials;
- (year 2) use of the package in the 5 new experimental classrooms;
- (year 2) administration of 2 screening tests (mid-term and end-of-year) to the new experimental classes and control classes.

² The PerContare project has been funded for 3 years (2011-2014). For further information visit percontare.asphi.it

The project will be able to complete two cycles: one for a package of materials for grade 1, and one for a package of materials for grade 2. In addition a package for grade 3 will be prepared and pilot-tested.

The teaching strategies and materials to develop children's numerical competence involve the use of the following:

- activities with all fingers and the construction of cardboard hands with fingers that can be raised and put down (“contamani”),
- a number line – first from 1 to 9, then from 0 to 20, with a mobile place-marker (a paperclip or small plastic figurine),
- an abacus – children construct their own out of play-doh, wooden skewers and pasta, and/or they use the teacher's monochromatic plastic abacus.
- a pascaline³ – children are introduced to this artifact as a tool for counting, representing numbers, and understanding addition and subtraction;
- bee-bot⁴ – a programmable robot that can also be used in a virtual version on a computer and/or an interactive white board (*Focus on Bee-Bot* software).

Results and importance of the study

In the present poster we intend to describe some activities that have seemed to be particularly successful during their pilot-testing. It is premature to discuss other preliminary results of the study.

PerContare is an innovative project with great potential, as it is characterized by the fruitful collaboration of cognitive psychologists and mathematics educators who are attempting to find a combined approach for successfully overcoming learning difficulties in mathematics.

F2. Mental bisection of verbally presented numerical intervals in children from preschool to grade 3.

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³ Visit page 19 of the Quercetti catalogue at: http://issuu.com/arcastudio/docs/cat_scuola2011_12?viewMode=magazine&mode=embed

⁴ See <http://www.tts-group.co.uk/shops/tts/Products/PD1723538/Bee-Bot-Floor-Robot/> or <http://www.terrapinlogo.com/bee-botmain.php>