

# **THE INTERPRETATIONAL SPACE IN THE CURRICULUM: INTENTIONS AND INTERPRETATIONS OF MATHEMATICAL REASONING IN THE NEW CURRICULUM FOR SECONDARY SCHOOLS IN MOZAMBIQUE**

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## **BACKGROUND**

In general, Mozambican students are not exposed to approaches where they can interact with teachers and peers. Fagilde (2001) argued that students don't have opportunities to speak in the classroom. Their participation is limited to isolated words, agree with the teachers' statements or complete sentences initiated by the teachers. Accordingly, they encounter difficulties to contribute in a classroom discussion. Usually they use ordinary language, quasi-mathematical language to avoid sophisticated language, gesture and unspoken but shared assumptions (Pirie, 1998). This environment, where students are not stimulated to express their thoughts, to justify what they do, does not promote the evolution of students' reasoning. In such a classroom culture, that is common in many Mozambican classrooms, it is not surprising to find the difficulties students face to verbalize their thoughts, to reason about the concepts and relations between them or to ask or think about the reasons for applying a determined procedure or method in solving problems.

As a result of Mozambican teachers' participation in international conferences, and through discussions between them, there are already some teachers, who step by step are giving more space to the students, creating opportunities for discussions with and between students in the classroom.

In addition, the National curriculum in Mozambique is being changed. This change has started from primary school and gradually moved to the secondary school.

## **THE MOZAMBIKAN CURRICULUM**

Interpretations of the term curriculum have been subject to many changes, resulting in an extension of meaning not only including the intended learning outcomes (as manifested in curriculum documents), but also "hidden" unintentional effects and the ways teachers interpret curriculum documents (Jackson, 1992). Robitaille et al. (1993) make a useful distinction between three levels of the Curriculum: the *intended* curriculum, which is reflected in curriculum guides, course outlines, syllabi and textbooks adopted by the educational system, the *implemented* curriculum that echoes what actually is taught in the classroom and the *attained* curriculum, that express what students actually have learned. In the present project the term National Curriculum refers to the document that encompasses the subjects, the knowledge,

skills and understanding required in each subject and how students' progress is to be assessed and reported, that is to the intended curriculum.

Within the framework of the National Curriculum, schools are free to plan and organize teaching and learning in the way that best meets the needs of their students. Therefore, the implementation of the curriculum depends on the teacher's beliefs and knowledge and his(her) interpretation of the National texts. Accordingly, s(he) selects the topics, methods and the textbooks. This selection may not be consistent with the intended curriculum.

The intended curriculum is a guide for the teacher. Mathematics and methodological aspects valorized by the curriculum may be expressed in each of its components such content, assessment and methodology. For instances, if the curriculum valorize the development of mathematical reasoning in the classroom, one would expect to find the concept "reasoning" or evidence of issues, proposed activities or methodological instructions that may promote mathematical reasoning. In addition, one would expect that the proposed instruction for students' assessments considers and expresses the reasoning processes.

The curricula in Mozambique, in the colonial era and in the three decades after the independence, were a body of knowledge that was presented by the teacher to silent students that have the mission of reproducing the exercises as the teacher did. It did not emphasise features such as explanation, justification and argumentation that are the core of mathematical reasoning in the classroom. In 1996 new curricula have been gradually introduced in Mozambican primary school, and in 2004 an intermediary curriculum for Grade 8 has ran in some pilot schools. The new curriculum from Grade 8 will be introduced in 2008 in all Mozambican secondary schools and gradually in each following year in the subsequent grade. These curricula, in contrast to the old one, promote a learner-centered approach and are competency based. They emphasise, to some extent, the value of mathematical reasoning in the learning and teaching process.

The Mozambican programs are in general divided in seven sections: the introduction to the discipline, general aims, content, specific aims, detailed topics, methodological suggestions and assessment. In addition, occasionally there is a lesson plan in the intermediary program for grade 8. So it can be expected to find lesson plans also in the other upcoming new programs.

## **THE NARROWING OF THE INTERPRETATIONAL SPACE**

The new curriculum in Mozambique reflects an international trend towards taking into account new insights into the way students learn and retain knowledge. However, studies focussing on classroom interaction show that even in countries where a more "learner centred" approach has been advocated, the space for students' involvement seems to be limited. The practice of justifying statements, explaining solutions and procedures and arguing about alternatives, a practice that aims at

contributing to the development of students' independent mathematical reasoning skills, is constrained by principles of classroom communications. Jablonka (2002), in a study of competently taught 8<sup>th</sup> grade mathematics classrooms in Hong Kong, Germany and the U.S.A, finds some principles that amount to the restriction of students' mathematical reasoning. For example, reasoning among the students exclusively occurred in situations, in which they realised that their results differed. Also, the teachers showed a tendency to give reasons only in case of incorrect solutions. The study of Brodie, Lelliott and Davis (2002) shows some restrictions in the ways in which teachers have taken up learner-centred practices after an in-service programme in South Africa. At the beginning, the teachers had a tendency to adopt only superficial features of the program.

Teacher's qualification and interpretation of curriculum documents, classroom size, shortage of resources, financial problems that lead teachers to teach in more than one school, lack of time to think thoroughly about their lessons and methods, are some of the constraints that may be added to the obstacles found by researchers, for the implementation of the curriculum in Mozambique and other underdeveloped countries.

### **THE AIM OF THE STUDY**

As was said before, the introduction of aspects related to fostering students' mathematical reasoning in the Mozambican curricula is very recent. Therefore, it is important to monitor and evaluate the process of implementation in order to provide institutions involved in the process with a base for accompanying actions.

The present study aims to focus on the extent, forms and functions of mathematical reasoning in Mozambican classrooms.

### **METHODOLOGY**

Aspects valorized in the curriculum may influence the way teachers behave in the classroom. Therefore, it is essential to investigate what is stated in the curriculum about mathematical reasoning. For that reason, the study will be carried out in two dimensions: one refers to the intended and the other to the implemented curriculum in Mozambican secondary schools. On the one hand, I will analyze the Mozambican programs to seek the extent to which it puts across the relevance of argumentation, justification, explanation and other features of reasoning in the classroom. On the other hand, I will observe lessons during a semester and interview teachers. In the classroom, I will take mathematical reasoning represented by instances of teacher or students utterances that contain giving reasons for statements, explanations for any method or process used for solving problems, arguments expressing agreement or disagreement with peers' claims and resolutions of tasks. I hope the collected data will form a base for analyzing the requirements expressed in the curricula and how

teachers interpret and are influenced by the curriculum and how they implement these requirements.

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