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## Maths in-service Teacher Training and The Restructuring of Secondary Education in East-Timor

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### Abstract

East Timor is undergoing a profound restructuring of its secondary education. For its success, it is crucial that foreign entities maintain their support regarding in-service training of secondary school teachers. In this context, we defined the following research questions: Under which conditions is in-service teacher training in Mathematics (Maths from this point onwards) being implemented in East Timor? How is it being done, mainly regarding the curricular materials produced - curriculum, syllabus, textbooks and teacher's guides? What are the trainer's representations of the secondary educational context and of the teachers' pedagogical practices? We opted for a qualitative case study framed within a constructivist paradigm. Regarding the technique of data collection, we chose the inquiry through a semi-structured interview, informal conversations and the direct observation of training sessions, which were audio recorded. Data collected were submitted to content analysis, which was guided by categories that emerged from the research questions and objectives. As main results, we highlight that resources, beyond those produced in the scope of international cooperation, are still very scarce. The training course is mainly focused on the resolution of the tasks proposed in textbooks, though curricular, didactical and mathematical aspects are also discussed. The pedagogical practices of Timorese teachers are still based on a very traditional paradigm, but some changes are emerging. So, we can corroborate that change is a slow process, especially with regard to the educational context. In-service teacher training can be vital to support an adequate implementation of the restructuring of secondary education. However, many other initiatives need to be developed, from a macro (educational policies) to a micro school level.

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## 1. Contextualization

Since its recent and problematic independence (Oenarto, 2000; United Nations, 2002), in 2002, the Timorese Government has embarked upon several approaches to restore the country's basic (2003) and pre-secondary (2007) education with the support of international funding and development agencies (Lucas & Cabrita, n/d). More recently, the General Secondary Education Curriculum (GSEC) was restructured with the collaboration of Portuguese institutions (Albergaria Almeida, Martinho & Cabrita, n/d). Due to historical reasons (Taylor-Leech, 2008) related to years of Portuguese colonization, Portugal has been assisting this process through funding from national agencies and institutions such as the Calouste Gulbenkian Foundation (CGF) and the Camões Institute for Cooperation and Language (CICL).

Regarding the GSEC, a Portuguese team was responsible for developing and producing all curriculum materials, in a participatory way, in which the voices of the parties involved were taken into account – the curricular plan; 14 syllabus (4 for the General Component, 5 related to Social Sciences and Humanities and 5 for Sciences and Technologies); 42 textbooks (14 for each year) and 42 teacher's guide (Martins, 2013).

But the restructuring project also included the training of Timorese teachers to strengthen Portuguese as the instruction language and to support a substantive implementation of the respective disciplinary programs, as highlighted by numerous studies (Lessing and Witt, 2007; Montagnes 2010; Norman, 2005). In-service teacher training is vital, because many teachers enter the teaching profession for the first time and others have few experience. Even those with previous teaching experience may need training for the use of the new curricular materials (IIEP-UNESCO, 2006). Such training “help teachers acquire or deepen their knowledge about the subject matter content, teaching skills, and assessment methods required to implement an existing or a new curriculum” (Leu and Ginsburg 2011, p. 21).

So, in the actual context of curricular reform in East Timor, the Ministry of Education has invested heavily in in-service teacher training in order to obtain competent and trained teachers (ME-RDTL, 2012) and since May 2012, training on the new curriculum is being provided to Timorese teachers and is expected to continue until the end of 2014. Training is mainly taking place in East Timor, and involves 14 Portuguese teachers that are training in-service Timorese teachers of secondary education. After receiving training, these teachers replicate the training to other Timorese teachers under the supervision of Portuguese teachers.

After 2 years of implementation, it is time to evaluate what is being done, to identify the deviations and to know the resonance of all the work done so far. In this context, we developed a research project entitled Evaluating the impact of restructuring secondary education in East Timor - a study in the context of international cooperation which comprises two phases: monitoring and evaluating (Albergaria Almeida, Martinho & Cabrita, 2014).

The project draws on Monitoring and Evaluation theories which relate with Evidence Based Policy as an approach that seeks to provide sound evidence that can be used to inform policy-making (Gertler, Martinez, Premand, Rawlings & Vermeersch, 2011; Nutley, Walter & Davies, 2007; Stern, Stame, Mayne, Forss, Davies & Befani, 2012). In this respect, by monitoring - what is being done - we hope to assess whether the new curriculum is being implemented as planned and, if necessary, to adjust implementation design to ground-level realities; by evaluating the intervention we aim to determine its relevance, efficiency, effectiveness, impact, and sustainability (Baker, 2000; Leeuw & Vaessen, 2009). The project is currently focused on the monitoring phase and therefore seeks to examine what is happening regarding the implementation of the new curriculum.

This article focuses, specifically, on the implementation of the new Maths curriculum and therefore draws on the voice of the Portuguese teacher trainer to describe it. It also draws on data collected through the observation and audio recording of in-service teacher training sessions.

## 2. Problem statement, research questions and purpose of the study

East Timor is undergoing a profound restructuring of its general secondary education, supported by Portuguese cooperation initiatives, that presupposes a change in the dominant educational paradigm. For the success of its implementation, it is crucial that foreign entities maintain their support regarding in-service training of secondary school teachers, namely in Maths.

This part of the research project is oriented by the main questions: How and under which conditions is Maths in-service teacher training being implemented in East Timor? What are the trainer's representations of the secondary educational context and of the teachers' pedagogical practices?

Its principal objectives are to analyse: the conditions under which Maths in-service teacher training is being implemented in East Timor; how it is being done, mainly regarding the curricular materials produced - curriculum, syllabus, textbooks and teacher's guides – and the trainer's representations of the secondary educational context and of the teachers' pedagogical practices.

### 3. Research Methods

Regarding methodological issues, the research project adopts a qualitative (Denzin & Lincoln, 1994) case study (Stake, 1995; Yin, 1984) framed within a constructivist paradigm (Creswell, 2003; Mertens, 2005).

Regarding the technique of data collection, we chose the inquiry through a semi-structured interview, focused on 5 main aspects. The first focuses on how teacher training regarding the new curricular plan and supporting materials is being implemented; the second focuses on the main strengths and weaknesses found by the Portuguese trainers in the new curricular plan, and on identifying their perceptions of the trainees' opinions on the new curricular plan; the third focuses on the trainers' opinions on how Timorese teachers are implementing the new curricular programs and making use of the respective teacher's guides and textbooks; the fourth focuses on teaching, learning, and evaluation methodologies being adopted by Timorese teachers, and the last one focuses on the trainers' opinions on how Timorese students use textbooks. (Capelo & Cabrita, in press).

We also observed and audio recorded in-service teacher training sessions, during which field notes were registered and informal talks took place.

Data collected were submitted to content analysis (Neuendorf, 2002), which was guided by categories that emerged from the research questions and objectives. To avoid unnecessary repetition, the mentioned categories will be presented in the following section.

### 4. Findings

The Maths teacher trainer (MTT) is 32 years old. She holds a degree and a Masters (not completed) in Mathematics Education. MTT has 5 years of experience teaching in Portugal and 2 years in Guinea. MTT attended continuing education courses and went to East Timor in 2012.

#### 4.1. The training sessions

In 2012, in Dili, MTT held a training course (117h) for 13 in-service teachers (one from each Timorese district), who would later become teacher trainers. All Timorese trainees completed their studies in Mathematics at the University of Timor-Leste. Motivation to attend the training course, however, was partly due to the financial subsidy that supported it. Training sessions focused on the 10th grade and lasted for 1 month (about 5 hours per day). As one of the teachers did not attend the course and could not, therefore, replicate it to other Timorese teachers, MTT conducted an extra course for 20 teachers.

In 2013, MTT held another training course (250h), focused on the 11th grade, offered to 8 of the 12 Timorese trainers who attended the training course held in 2012. MTT also supervised 30 teachers from six schools in Dili.

In 2014, the training course is focused on the 12th grade and involves 8 Timorese trainers, two of whom attended the sessions for the first time. The training course (198h) runs 3 days per week (3 hour sessions). Activities planned also include a 2 week supervision period in Dili, Baucau and/or Maliana and pedagogical support in schools from different districts during a 6 month period.

According to MTT, the first in-service teacher training session was devoted to the analysis of the curricular plan and syllabus. The other sessions were dedicated to: the analysis of the Maths textbook; the resolution of all the activities proposed in the textbook; the discussion of mathematical concepts and to the clarification/explanation of

Portuguese vocabulary. Sometimes, the teacher trainer highlighted connections between the textbook and the teacher's guide and discussed didactic and educational assessment issues.

In one of the observed training sessions, in Dili, MTT started by handing in the attendance sheet and by writing the summary on the board, which was slowly read aloud:

*Lesson n° 4*  
*Date 12/05/2014*  
*Summary: Correction of task 3*  
*Lateral derivatives*  
*Derivative and continuity*  
*Resolution of tasks 4, 5 e 6.*

While trainees copied the summary to their notebooks, MTT asked if they had solved task 3, something that had been assigned as homework. As no answers were obtained, MTT explored Example c) on the board, related with the physical interpretation of derivatives (available at [http://issuu.com/universidade-de-aveiro/docs/matematica\\_manualaluno12](http://issuu.com/universidade-de-aveiro/docs/matematica_manualaluno12)). All trainees follow the explanation using their own textbooks.

Afterwards, they attempted to solve task 3 by following the Example explored by MTT previously. In the meantime, MTT walked around the classroom (see Fig. 1a) and when noticing some difficulties on the part of trainees, clarified them on the board by, inclusively, simulating a bullet trajectory (a situation that was described in the task). As they were taking too much time to solve the task, one of the trainees volunteered to solve the task on the board (see Fig. 1b). The trainee verbalized, in Portuguese, all the steps of the task resolution. At this time, MTT took the opportunity to correct some linguistic aspects.

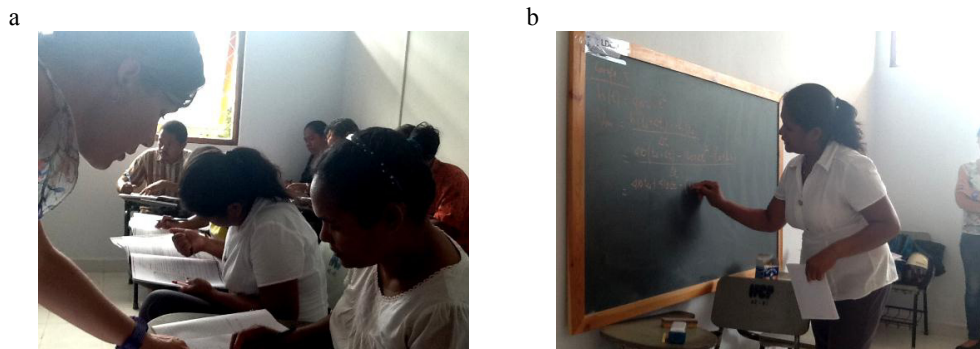


Fig. 1. (a) MTT clarifying questions; (b) trainee solving the task on the board.

She also stressed the need to copy every single step of the resolution to the notebooks, something that they should also demand to their students.

Then, MTT explored the topic lateral derivatives by specifying that these are left-hand derivatives and right-hand derivatives and related them to the topic left and right-hand limits, which was explored in the 11th grade training course. She registered the conditions of the existence of the limit of a function on a point on the board and referred that the same happens with the derivative. Such conditions were also registered in detail on the board. While trainees copied the matter to their notebooks (at a low pace mainly caused by the high temperature felt in the room), MTT explained the meaning of “analogous”, a concept that the trainees did not know. She also emphasized that the exploration of the topic derivatives in the 12th grade should be done in articulation with matters from the 10th and 11th grades. Besides, the topic derivatives favours the establishment of intra-mathematical connections (geometrically, the derivative represents a slope) and physics (velocity and acceleration).

The same approach was used for the topics that were explored afterwards.

#### 4.2. The curriculum materials

In the teacher trainer opinion, the Timorese trainees point out that one of the strengths of the curriculum, which did not exist before, is that it standardizes instruction in all schools in East Timor. Nevertheless, they consider it a very formal document and they have difficulty in perceiving it.

Regarding the syllabus (also non-existent before), MTT refers that trainees highlight that it standardizes teaching; it is a good guidance document; it is very extensive and presents new issues (e.g. Geometry) a topic that trainees do not feel prepared to teach. Furthermore, they think it is difficult to distinguish general from specific competencies, and competencies from transversal learning goals.

According to MTT, they also consider that the textbooks depict Timorese reality, which is a way to standardize content; they find they are well structured and in accordance with the syllabus and that the images are coherent with contents. Yet, they refer some typos that should be corrected and, again, that textbooks are very extensive (in 2013, they were still working with the 10th grade textbook) and that understanding/using the Portuguese language is difficult.

Concerning the teacher's guides, in MTT's opinion, they report the variety of activities and depth of some issues as positive aspects, but they refer it should have more exercises and should include the resolution of the exercises from the textbook, which are missing in the 10th grade teacher's guide.

#### 4.3. Educational conditions

Regarding educational conditions, from a macro to a micro level, the teacher trainer points out that: classrooms are not sufficiently equipped (something we observed in loco and registered – Fig. 2); there are 4 periods of Mathematics per week, but the duration of each period varies; the school director and the disciplinary groups are not very active and effective and the number of students per class is quite high (40, 50, ...). In 2012, the 10th grade textbooks and teacher's guide were printed. However, only in 2014 were the materials regarding the 11th and 12th grades printed. In 2013, teachers and students only had access to photocopies. Furthermore, since 2012 most of the students did not take textbooks home – the teacher was responsible for taking and bringing textbooks into the classroom.

The aforementioned data was confirmed by trainees during the informal conversations we had with them.



Fig. 2. a classroom in the secondary school *4 de Setembro* in Dili.

#### 4.4. Teaching and learning of mathematics

A regular lesson, in the perspective of the Portuguese Maths trainer, is described as:

- the summary is not written;
- the resolution of the homework is made by the best student on the blackboard;
- contents are transmitted by the teachers, who follow the student's textbook. They explain contents by writing them on the blackboard or showing them using cardboards and the students copy them;
- the students solve exercises individually or the teachers solve them on the blackboard and students copy them;

- the homework is written on the blackboard and students copy it to do it at home.

So, according to the teacher trainer, Timorese teachers generally implement traditional teaching practices. They also report some difficulties such as: the lack of basic resources in schools; the lack of textbooks for students at home and the Portuguese language.

Learning is assessed through paper and pencil tests and national examinations are based on multiple choice questions. In the trainer's opinion, such assessment strategies will probably remain unchanged, because students tend to get good grades.

Despite the aforementioned aspects, some changes are already emerging – the trainees try to implement new didactical approaches by applying a student-centred teaching strategy and other kinds of classroom dynamics, like peer and group work.

## 5. Final Remarks

As pointed out by several authors, change is a slow process, especially with regard to the educational context (Nicolai, 2009). Many factors such as i) “the lack of adequate human and monetary resources”, ii) “inefficient administrations”, iii) “the politics and power plays of the emerging leadership” and iv) “the frequent turnover of both ministers and ministry staff” (ibid., p. 78) can slow the reform efforts.

Furthermore, as we mentioned before, in-service teacher training can be vital to support an adequate implementation of the restructuring of secondary education (Norman, 2005). Only with such support can they evolve from curriculum-transmitters to curriculum-makers and even to curriculum-developers (Shawer, 2010).

In the particular case of East Timor, Timorese teachers, in general, Maths Timorese trainers, in particular, require continuous training in Portuguese and on the effective use of textbooks and learning materials. They need to update their knowledge and skills and to deal with change on the one hand, and managing human resources (e.g. students) better on the other.

However, many other initiatives need to be developed, from a macro (educational policies) to a micro school level.

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