Primary school teachers in Seychelles reporting on their impressions of a mathematics teaching reform

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The Mathematics Lesson Structure reform in Seychelles is stimulating debates on the way mathematics teaching can be improved in the context of a small island developing state. Due to limited research on the reform, to date, its impact in schools has not been established empirically. Informal evidence suggests that teaching is gradually changing to accommodate the major ideas of the reform. A systematic inquiry is needed to develop an understanding of its impact on teaching and learning. This paper is a first step towards documenting the impact of the reform. Analyses carried out on data collected during the early years of implementation show that the teachers have been well sensitized to incorporate MLS in their practices even if they find some elements of the structure difficult to apply. The study suggests implications for in-service teacher education.

Keywords: Mathematics Lesson Structure, instructional reform, Seychelles, teacher change

Background

In 2003, following claims of weak pupils' performance in mathematics, (Khosa, Kanjee, & Monyooe 2002; Trencansky 2002; Valentin 2003) the Minister of Education commissioned a Mathematics Working Group (MWG) to study the situation and propose suggestions. The work of the working group converged into a project – the IPAM Project – with mission to work with schools to improve the quality of mathematics education. IPAM is an acronym formed from initial letters of words in the phrase: Improving Pupils' Achievement in Mathematics. Evidence from the main research done as part of this quest suggested teaching as the main activity needing improvement (Benstrong, Theresine, & Albert 2004). Most lessons were disorganized and unstructured. Of concern was the need to improve the pedagogical characteristic flow of lessons (Schmidt 1996) – the general pattern which lessons within a country tends to follow.

The quest to improve the instructional practices was inspired by the National Numeracy Strategy, mainly, the three part lesson structure (DfEE 1999) which was in place in the UK schools. NNS was commended for its three-part lessons which provided a framework for teachers to organize contents of a lesson. Pupils' achievement after the implementation of the structure showed slight improvement (Brown, Askew, & Millett 2003) and their confidence in mathematics improved during the first years of implementation (Kyriacou 2005). Since mathematics lessons in Seychelles, then, generally lacked a proper structure, it was thought that an adapted version of the UK model could serve as a starting point. A Mathematics Lesson

Structure (MLS) reform was introduced and made mandatory in 2006. The reform prescribes the way teachers should structure their daily maths lessons.

Time scale	Expectations
00 – 05	Stimulate the mind with a mental activity
06 – 10	Review last lesson for relation to current lesson
11 – 13	Establish focus of the current lesson
14 – 29	Make provision to develop pupils' conceptual understanding
30 – 37	Engage pupils in consolidation tasks
38 – 40	Conclude to bring out the gist of the lesson

Table 1: The progression of MLS lessons

Methods

This paper is drawn from findings of a survey carried out in 2008 about the teachers' instructional practices and their impressions of the reform. The discussion relates to four items of the questionnaire on which the teachers reported on their a) frequency of using MLS, b) motivation to use the MLS, c) difficulty of incorporating MLS in their actual lessons, and d) overall impression of the reform. The questionnaire was administered to all teachers who teach mathematics in the state primary schools (n = 430). The teachers were asked to complete the questionnaire on their own. The outcomes are discussed in this paper.

Results

Frequency of using MLS

Teachers' responses to how often they use the MLS structure as a basis for planning their daily lessons are shown in Table 2. Eighty five percent of the teachers reported "Very often" and 15% reported "Rarely". These values demonstrate teachers' strong allegiance with the call to adopt the structure. Even if these teachers were positive about the use of the structure, the 15% who responded rarely to the frequency of using a mandatory strategy creates some concerns.

Motivation to use MLS	Frequency scales	
	Very Often (%)	Rarely (%)
To facilitate planning	36	3
To improve the conduct of the lesson	29	
To improve some aspects of the teaching	9	1
To satisfy the recommendation	3	8
To organize pupil learning activities	4	
To improve pupils' learning of mathematics	4	3
Total	85	15

Table 2 Teachers' motivation to use the reform against the frequency of using it

The second item sought to ascertain the teachers' motivation for using MLS. They were to select one from six given reasons. These were the reasons which emerged as most popular among teachers as we participated together on activities in relation to MLS. The findings are reported in Table 2. To facilitate planning, and to improve the conduct of lesson, appeared as the most popular reasons why teachers

were using MLS as part of their instructional practices. About 11% chose the option "to satisfy the recommendation" as their top reason for using MLS. Four percent (4%) chose "to organize pupils' activities" as their main reason. Surprisingly, just 7% of them chose "to improve pupils' learning in mathematics" as the main motivation for using the reform idea in their teaching.

Teachers' compliance

There are indeed several pedagogical ideas that the MLS reform is aiming to promote. During the development and monitoring of the reform many teachers reported that it can be difficult to include all the elements in one lessons even during one week. Some of these reform ideas, they said, are inappropriate for a variety of lessons. So teachers were asked how often they include the various components of MLS in their actual lessons. Table 3 shows the results. The MLS requirements, begin the lesson with a mental activity, and provide key examples for learners to follow were "most of the time" included in the lesson by all the teachers (100%). More than 80% of them selected "most of the time" to all the basic requirements of MLS lesson parts. However, the two requirements which relate to varying the learning and teaching experiences were less popular in lessons. The percentages of teachers reported "rarely" to 'use all the learners' organization' and 'use all the teaching strategies recommended' were relatively high – 43% and 47% respectively.

Implementing the MLS requirements

Some elements of MLS are easier to be incorporated in lessons than others. Some strategies which are uncommon in everyday teaching require greater support to be applied in lessons. In a fourth item, the teachers were asked to indicate the extent to which they find it easy or difficult to incorporate each element of MLS in their teaching. The results are reported in Table 3. All teachers (100%) found it easy to begin their lessons with a mental activity. More than 90% found it easy to review last lesson, tell the pupils the focus of current lessons, and provide key examples for learners to follow. On the other hand more than two thirds of the teachers found it difficult to: allocate consolidation tasks, use all the suggested learners' organization or teaching strategies.

	Frequency scales		Difficulty level	
	Most of the time	Rarely	Easy	Difficult
Begin lesson with a mental activity	100	-	100	-
Provide key examples for learners to follow	100	-	91	9
Review last lesson	97	3	94	6
Incorporate real life examples	96	4	83	17
Create space for consolidation tasks in lesson	95	5	14	86
Tell pupils the focus of current lesson	91	9	98	2
Provide a concluding activity in every lesson	80	20	36	64
Use all suggested learners' organization	57	43	23	77
Use all suggested teaching strategies	53	47	30	70

Table 3 Teachers' responses to their actual application of MLS in their teaching

Teachers' general attitude to MLS

Another item of the questionnaire required the teachers to indicate their overall attitude to MLS. Teachers' attitude to MLS was measured by the percentages of those who agreed to positive statements about the reform. Table 4 reports the findings. The data indicates that the teachers were overwhelmingly positive about MLS. More than 80% of them were agreeing with statements such as: It was a good idea to introduce MLS in schools; there are changes in the quality of teaching since MLS has been introduced (for the latter item I suspect that they were referring to positive changes); and MLS is being useful. The low percentages of teachers who agreed to negative statements such as, MLS restricts teacher – creativity, and MLS limits teaching and learning, show that generally the reform has been well received in the primary schools in Seychelles at least by the teachers who were using it.

Items	Percentages (%)
The IPAM Project is having an impact in my schools	91.6
It was a good idea to introduce MLS in schools	89.8
A remarkable change in the quality of teaching since MLS	82.0
I find MLS very useful	81.7
Teachers find MLS as a vital teaching tool	77.4
MLS is not necessarily applicable at all levels	32.2
MLS restricts teachers' creativity	29.5
MLS limits teaching and learning	20.9

Table 4 Percentages of teachers who agreed to each items

Discussion

The MLS reform represents a significant development in the teaching of mathematics in Seychelles although it has not been adequately researched or evaluated. There is only one empirical study which has been carried out so far on the reform (Valentin 2007). This limits what is known about the effect MLS is having in schools. Subsequently, it is becoming difficult to continue to persuade teachers to use the structure as there is no substantial case built on it. This paper reports on a study that is addressing this gap. A new empirical perspective about the reform is being generated.

During the early implementation years, teachers were positive about MLS even though it required them to make drastic change to their fundamental methods of teaching. This overall positive reaction to MLS may be due to their overall perception that the mathematics education reform was having an impact in their schools. Almost 92% of them agreed to the later perception. Eighty two percent felt that introducing MLS was a good idea. The notion of teacher receptivity (Ma et al. 2009; Waugh & Godfrey 1993) can be used to make sense of this positive impression teachers had on MLS. The teachers welcomed the reform and were ready to try it out. Receptivity is a key factor for the overall success of classroom change initiatives (Waugh & Godfrey 1993). Moreover, the idea that teachers are "active brokers" in the quest to reform teaching (Spillane 1999) is strongly supported by data of this small investigation. By referring to the teachers as active brokers, I want to emphasize that the success of the MLS implementation is due in part to the effort and fidelity of the teachers about the reform quest. Even if the introduction of MLS required them to make significant changes to the core of their practice, their will to improve their teaching motivated

most of them to embark on the reform. Just as (Fullan, 1982) argues teachers' motivation to fully implement the reform ideas depends on the extent to which they feel the intents of the reform will work. On the basis of evidence reported here, the teachers in this study appeared to strongly believe that MLS would work, at least would improve their teaching.

The development of MLS was part of a bigger project to improve the quality of mathematics education which the teachers themselves agreed upon. Furthermore, school representatives participated actively in the development of the lesson structure. Perhaps, another reason for their high compliance may be due to the fact that they were part of the decision to improve mathematics, and they could have realized that such effort to improve their teaching in the first instance will have positive impact on attainment. Teachers' belief that MLS is having an impact in their schools is high, although it is somewhat surprising that only 7% were motivated to use the reform mainly on the ground that it will improve the pupils' learning. On the other hand the proportion of teachers who reported that they use MLS primarily to satisfy policy requirement is high (11%). Since the teachers' main motivation to comply with the reform idea can be, to satisfy recommendation, then policy makers who monitor the implementation of reform activities should be careful when they interpret compliance figures. Since only 7% of the teachers indicated that their main motivation to use MLS is to improve pupils' learning may be suggesting that the teachers viewed MLS more like a pedagogical improvement tools than a learning improvement tool.

Unfortunately, teachers' responses to the difficulty to incorporate the various elements of MLS in their practices suggest that fundamental features of mathematics teaching were still under developed in the primary schools in Seychelles during the early years of implementation. It shows that many of them were using a limited range of teaching strategies. In fact these conditions were imposed on teachers to increase variations so as to cater for mixed ability classes. The fact that the various teaching and learning strategies were largely not being implemented suggests that mixed ability teaching might be a challenge to achieve in the Seychelles' schools.

The data illustrates how teachers' perception of a reform initiative being effective may lead to a widespread application. Moreover, this study provides hope to policy makers in reform-minded education settings that the pedagogical characteristic flow of a country can be altered. More importantly, whatever strategies that one applies towards reforming teaching, should convey the message that the reform will work, and should contain indications *how* and *why* it may work. The evidence emerging from this study indicates that the majority of the teachers began to implement MLS with a strong positive attitude – a prerequisite for success of instructional reform. This initial attitude may has led the teacher to comply, although they have had difficulty to use some of the non routine practices such as varying strategies, pupils' organization, and in terms of lesson structuring, formulate a conclusion for their lessons. Unfortunately, due to limited research on the reform, it is not possible to formulate a picture of how teaching of mathematics in Seychelles has changed over the years as an effect of this reform.

Conclusion

The self-reported data generated by this study suggest that changing the culture of mathematics teaching in Seychelles is possible. This approach to reforming teaching – prescribing instructional practices – may works in disadvantage settings especially in situation where traditional long term training is difficult. The mere fact that teachers

who used MLS on a daily basis continue to hold a strong positive impression about the reform suggests that such model to teaching mathematics has scope to develop into a model of effective teaching for teachers with inadequate or no training in mathematics education. Additional research inquiring on the cognitive aspect of the model is now imperative.

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