

METHODS IN GHANAIAN PRIMARY MATHEMATICS TEXTBOOKS AND TEACHERS' CLASSROOM PRACTICE

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This paper reports a study that investigated the congruence between the teaching methods presented in Ghanaian primary mathematics official curriculum materials and teachers' classroom practice. The study involved a range of methods – observation of classroom practice, content and discourse analyses of lessons in mathematics. It has provided further evidence to support the supposition that in less developed countries, the official school mathematics curriculum exerts powerful influence on classroom practice. It was found out that though there was rhetoric in the introduction of the curriculum materials on the use of teaching skills that suggest discovery methods, the analyses indicated that only few learning/teaching activities that would encourage the use of such discovery methods were included in the materials.

INTRODUCTION

Curriculum adaptation at the classroom level may be evidenced by differences between formal curriculum requirements, in terms of content and pedagogy, and the amount of curriculum actually covered during classroom teaching (Smylie, 1994). The implemented curriculum, which is analogous to the amount of content actually taught and the teaching methods employed, is a function of teachers' decisions related to translating formal curricula into specific instructional tasks and activities. The quality and/or appropriateness of the formal curricula materials therefore can have a considerable influence on teachers' ability to do this successfully, particularly in the least developed countries where many teachers hardly ever have access to other sources of information and activity for their teaching.

The official mathematics curriculum (i.e. syllabus and textbooks) for Ghanaian primary schools, used in the country in the last two decades, was originally written with the small intellectual elite, who will proceed to secondary and further education, in mind (Mereku, 1995). Concerns have been raised about low pupils' attainment in the subject which is often attributed to teachers' inability to teach a substantial part of the content of the curriculum. To address such concerns, the aim of this study was to investigate the extent to which primary teachers in Ghana translated the contents of the official mathematics curriculum into classroom reality. The curriculum was an adaptation of the products of the 'new-math' project spearheaded by the West African Regional Mathematics Programme in the 1970s (Lockard, 1972). To determine how well teachers can use methods and present content prescribed in official curriculum materials, the study involved measuring the extent of curriculum adaptation at the classroom level.

Not very many studies have used the difference between the two aspects of the curriculum - the intended and implemented - in investigating the extent of curriculum adaptation at the classroom level. Nevertheless, Smylie (*op. cit.*) observed that most of these studies revealed dramatic differences in how much a particular curriculum is taught despite specific mandates about coverage.

Porter et al (1988) observed that most researchers in the past who had focused their attention on teaching methods followed an “experimental” format (even though the degree of control was often low) in which two or more methods were compared. Typical comparisons include lecture versus discussion, open versus traditional classrooms, discovery versus expository or prescriptive teaching, phonics versus whole-word methods, and cooperative versus individualistic learning. Comparisons have also been made in studies on instructional media in which the effects of television, film, video, radio-assisted instruction, programmed instruction and computer-assisted instruction have been compared with each other or with traditional teaching (Doyle, 1987).

It is important to note that none of the studies mentioned above had investigated coverage of content and methods simultaneously. Ways in which coverage of methods can be investigated are however different from the ways in which research on teaching methods have been conducted. Unlike the comparative approach followed by most studies in teaching methods, coverage of methods in this study concerns the extent to which a particular teaching method is employed in teachers’ classroom practice and not necessarily how effectively the method has improved learners’ performance.

In order to identify differences between methods prescribed by the official curriculum and those used in teachers’ actual classroom teaching, the study used Brissenden’s (1980) framework for analyzing lessons in mathematics and the Birmingham model for discourse analysis (Sinclair and Coulthard, 1975; Messenger, 1991).

METHODOLOGY

The Winneba district was used for this study because it had conditions that made its educational provisions typical of that of the whole country, and offered all the opportunities that were required to carry out a survey of this kind. In all 35 teachers in 13 schools in the Winneba district were included in the sample. As the purpose of the study was to analyse the teaching methods presented in both the official curriculum materials and teachers’ instruction, the study used a range of methods for data collection. These were analysis of moves and discourse patterns in observed lessons and a survey of teaching skills used in teachers’ classroom practice.

Teachers were observed in ordinary classroom settings and notes were taken on how the teachers employed the basic moves in teaching the subject. The types of classroom organisation and the contexts created for the presentation of the lessons were also noted. Some of the lessons observed were recorded on audiotapes. These were later played back and transcribed. Also lesson activities suggested in the

teachers' handbook were transcribed. The two sets of transcripts were examined for the discourse patterns, types of classroom organisation created.

There was a questionnaire survey of teaching skills used by teachers. The survey was intended to provide information on how often the primary teacher used selected teaching skills in mathematics instruction. The list of teaching skills included in the questionnaire used in this study were derived from previous studies on effective teaching skills (Kyriacou, 1982; Taylor, Rosenshine, 1979) and modified to expose the use of the discovery teaching method. To ensure the items (or teaching skills) in this instrument could discriminate between teachers who use discovery-teaching methods and teachers who do not, the teaching skills included were those that favour these methods. Research assistants indicated on a likert-scale from 1 to 3 (i.e. representing- very often, sometimes and never) how often they observed teachers use selected teaching skills in mathematics instruction.

Results

On one hand, the general guidelines on the delivery of the curriculum in the syllabus and instructions on lessons in the teacher's handbooks were examined for the types of classroom exchanges - eliciting, informing, directing or checking - they involve. The discourse patterns involved in these exchanges were observed. It was found that the general guidelines on the delivery of the curriculum in the syllabus and teacher's handbooks recommend that teachers should use investigational or activity methods which are directed towards learning tasks which will encourage inquiry, creativity, and manipulative and manual skills.

The analysis of the transcribed lesson activities indicated that instructions in the teacher's handbooks follow a common pattern of classroom discourse. In this common pattern, the teacher initiates a move (usually eliciting a verbal response) for a response from individual pupils or pupils in chorus. These were occasionally followed by feedback. In terms of the types of classroom exchanges they were intended for, the instructions in the teacher's handbooks may be described mainly as elicit and inform exchanges. These are exchanges in which teacher initiation moves predominate.

The instructions generally follow a pattern of lesson presentation that can be described as 'teacher-led class discussion using situations and examples, followed by pupils' examples and exercises. The teaching and learning activities in the official curriculum can therefore be said to subscribe to the expository or traditional teaching method. The instructions in the teacher's handbooks appear to indicate, though not very clearly, that teachers should make pupils learn through activity and not by passive reception of what is taught, and emphasise understanding rather than rote memorisation. But the style of lesson presentation in the handbooks stress teaching strategies associated mainly with the exposition teaching method.

On the other hand, teachers' use of the discovery teaching method in their classroom practice was examined in terms of- 'how often teaching skills that increase the

chances of the pupils' discovery' - were used in instruction. The success in fostering inquiry and guiding discovery in the classroom in terms of the teacher's use of certain presentation skills. The proportion of teachers found never using these skills, and those found using them occasionally or often, are presented in Table 1.

Table 1. Teachers' use of skills likely to induce learning by discovery

Teaching skills	Percentage of Teachers Indicating		
	Never	Occasionally	Often
Giving meaningful answers to pupils' questions	82.9	2.4	14.6
Using approaches that bring conceptual understanding	18.2	63.6	18.2
Encouraging pupils to use their own methods in solving problem	95.5	4.5	0
Using mainly textbook examples and exercises	2.3	0	97.7
Using methods which do not encourage discussion	11.6	9.3	79.1
Teaching challenging mathematics only from textbooks	0	29.5	70.5
Preparing and using teaching/learning material in lessons	45.5	54.5	0
Setting and marking of homework	58.1	34.9	7.0
Engaging pupils in practical and game activities in lessons	68.2	31.8	0

As a consequence of the infrequent use of teaching/learning materials and practical activities, pupils have little chance of asking questions. Just about 17 per cent of the teachers were found to have provided meaningful answers to pupils' questions mainly because many of the teachers hardly engaged pupils in activities that will urge them to ask questions. Though about 70 per cent of the teachers were found to be teaching challenging mathematics, as many as 98 per cent of them were found using solely examples and exercises set in the official textbooks. The table also shows that the majority of teachers make pupils to use only the standard textbook methods irrespective of their abilities.

Mathematics lessons in most classrooms visited followed a similar pattern. There was little difference in the sequence of presentation, form of classroom organisation and classroom discourse patterns. The sequence of presentation generally followed the pattern that can be described as 'teacher-led class discussion using situations and examples, followed by pupils' examples and exercises. The failure of the teachers to use structured teaching materials and practical and game activities, and to rely solely

on textbook routine tasks, indicate that the few who attempt to teach for conceptual understanding and application rely mainly on exposition and teach for reception and not discovery learning.

DISCUSSIONS

The general guidelines on the delivery of the curriculum in the syllabus and teacher's guides recommend that teachers should use investigational or activity methods which are directed towards learning tasks which will encourage inquiry, creativity, and manipulative and manual skills. But the explanations and descriptions given to these methods tend to confuse classroom teachers with those intended to induce learning by discovery.

This confusion is due partly to the rhetoric on the use of teaching skills that suggest the discovery method in the introductory part of the curriculum materials, which themselves provided little variety of activities that can induce discovery learning. Though there was frequent use of the word- *discover*- in stating teaching objectives of the content prescribed in the syllabus and teachers' handbooks, the activities that followed were presented in ways that encourage teachers to teach by exposition. It can therefore be argued that both the official curriculum and the teachers who implement it emphasised the expository teaching method.

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