

Chapter 17

Speaking Mathematically: The Role of Language and Communication in Teaching and Learning of Mathematics

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ABSTRACT

In this chapter, we evaluated the role of language and communication in teaching and learning of mathematics. Language of instruction is very crucial to effective education at every level because linguistic difficulties have serious effects on children's ability to think, read and write effectively. Learning mathematics and the language of mathematics is a challenge for all students, but it is more challenging for students who have no opportunity to use academic language outside the school, if better performances of African children are to be expected in tests of intellectual ability the importance of mathematics instruction in a language that is meaningful to the student cannot be over emphasized. Teachers should translate back and forth the ordinary and technical language, embedded in the use of mathematics and also support the development of the multi-semiotic mathematics register through oral language that moves from the everyday to the technical mode. Students should be encouraged to produce extended discourse in mathematics classrooms and engage in discussion about the language through which word problems are constructed and practice with the writing to mathematical concepts in authentic ways.

INTRODUCTION

Language of instruction is very crucial to effective education at every level because it serves as a vital key to it. According to Bandele (1995), language is one of the factors that define culture and it occupies a very important position in the curriculum of any school system. Obemeata (1999) said that

the low proficiency of many Nigerian children in English language tends to mask their intelligence, this is because when Nigerian children are confronted with word problems in mathematics, they are usually handicapped by language difficulty. This implies that linguistic difficulties have serious effects on children's ability to think, read and write effectively.

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Linguistic difficulties also accounts for the observed slowness in students' mathematics performance. According to O'Halloran (1999), the child's creativity is enhanced if he comes to meet an already familiar language at school, on the contrary, the child's spirit of innovation may be inhibited if he (she) is confronted with an unfamiliar language at school. In support, Halliday (1978) said that once a child does not get the language register for a particular concept; subject; or course, such a child cannot perform well in that subject area. According to him, register is a set of meanings appropriate to a particular function of language, together with the words and structures which expresses these meanings. He therefore concluded that mathematics register is that register that belongs to the language of mathematics. Thus, learning the language of a new discipline is part of learning the new discipline; in fact, language and learning cannot be separated.

In solving mathematical problems, it is not enough to work with language alone because mathematics draws on multiple semiotic (meaning creating) system to construct knowledge. This semiotics includes symbols, oral speech, written words, and visual representations such as graphs and diagrams. In addition, Mathematics uses features such as order, position, relative, size and orientation in meaningful ways (Pimm, 1987). Consequently, Mathematics construct are often difficult to articulate in ordinary language because its symbolism has developed over time to express meanings that go beyond what ordinary language expresses. This assertion was supported by O'Halloran (1999), who said that mathematics symbolism can be used to describe relationships that represent information presented in ways that natural language cannot. While language provides the contextual information about the situation, the mathematics symbolism describes the pattern of relationships between the entities. Thus, the written language and oral language could work together

to construct meaning as the teacher and students interact in discussing Mathematical problem.

According to Lemke (2003), Language; mathematical registers; visual diagrams, as well as the gestures and actions of the participants in the classroom are to be used as components of a single semiotic system if better performances of African children are to be expected in tests of intellectual ability. He pointed out that learning mathematics is not just a question of manipulating symbols, but also of understanding how different systems form meaning and interact among themselves. He concluded that opportunity for gaining mathematical understanding is lost if mathematics is not taught, particularly at the introductory level as co-equal partner with language and visual representation in the analysis of natural and social phenomena.

Yoloye (1995) maintained that mathematics is highly technical with characteristics patterns of vocabulary and grammar. The technical vocabulary includes unique mathematical words and other words that have been made to have different meaning in mathematics. The former includes words such as sum or fraction, while the latter includes words such as place value; borrow; products; interest accrued; loss and profit etc. He further asserted that learning the new vocabulary that is centrally mathematical may be easier than learning the technical meanings for words that students already know in other contexts. Thus, students need to be able to use the technical vocabulary in meaningful patterns of language in mathematics. He therefore concluded that knowing mathematical words is not enough but the student also need to learn the language patterns associated with these words and how they construct meaning in mathematics. MacGregor (2002) using an example to illustrate stated that students who described a relation between numbers in an informal, unclear or immature way were unable to relate it to a mathematical operation. Consequently, it is crucial for teachers to apprentice students into the technical language of mathematics.

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