

Exemplary practice and outcome-based mathematics instruction in Kenyan schools

Prácticas ejemplares basadas en resultados de instrucción de las matemáticas en las escuelas de Kenya

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Abstract

The general performance in mathematics among secondary school students in Kenya has over the years been poor. There is evidence that the learning environment is murky and often intractable. This calls for exemplary practice and outcome based instruction where teachers have to create a learning environment in which the learners' capabilities as well as their existing ideas could be effectively used to produce change in the learners' cognitive structures through collaborative social interactions.

Key words: exemplary practice, outcome based instruction, mathematics.

Resumen

El desempeño general en matemáticas entre estudiantes de la escuela secundaria en Kenia, durante años ha sido pobre. Hay evidencia que el ambiente de aprendizaje es oscuro y a menudo insuperable. Esto exige cambios hacia la práctica ejemplar y la instrucción basada en los resultados, donde los profesores tienen que crear un ambiente de aprendizaje en el cual las capacidades de los alumnos y sus ideas existentes se podrían utilizar con eficacia para producir cambio en sus estructuras cognoscitivas a través de interacciones sociales de colaboración.

Palabras clave: práctica ejemplar, enseñanza, matemáticas.

INTRODUCTION

Teaching and learning are complex and context bound activities. In Kenya, the context in which the teaching and learning occur are murky and often intractable. Consequently, teaching and learning situations are often embedded in a matrix of large class, lack of instructional resources, bare laboratories, declining economies and de-motivated, militant and under-achieving students (CHEMWEI, 2003; KIBOSS, 2000; WASIKE, 2003; WEKESA, 2003). It is against this background that teachers are expected to produce meaningful learning outcomes. This is an arduous process and it takes an exemplary teacher to systematically arrange the learning environment such that it will afford students an opportunity to meaningfully interact with the learning situation. This can only exist within a context and the context in Kenya is that of disadvantaged schools with ill equipped laboratories, overcrowded classrooms and learners with varied cultures and languages. (WASIKE, 2003; WEKESA 2003). This socio-cultural context is an important starting point if learning is considered to be an active process. This is particularly important since studies do not only show that students bring their own meanings and explanations of phenomena into the classrooms but also that their ideas affect what they can meaningfully learn (OKERE, 1996; WASIKE, 2003).

EXEMPLARY PRACTICE AND OUTCOME-BASED INSTRUCTION

Exemplary practice in mathematics instruction essentially involves using appropriate theories about how students learn mathematics to create a learning environment in which the learners capabilities as well as their existing ideas could be effectively used to produce change in the learners cognitive structures (KIBOSS, 2000; WASIKE, 2003). If learning is considered to be a process of knowledge construction, then the role of the learners in constructing such knowledge becomes an important one because the way the learner acts and thinks in a classroom is a product of his/her socialization (OKERE, 1996; WASIKE, 2003). Thus, the role of social interaction in exemplary practice becomes critical for meaningful learning.

Outcome-based mathematics instruction doesn't only depend on objectives to be achieved but also processes involved in reaching the desired outcomes. This means that what constitutes outcomes to a behaviourist may differ from a constructivist (JONASSEN, 1994; SANGA, 1982; WASIKE, 2003). As such, a behaviourist is interested in how well the teacher has successfully transmitted knowledge to the learner and the learner has successfully acquired it while a constructivist is interested in how the teacher successfully created a conducive learning environment for students to make sense of their experiences in a learning situation and whether stu-

dents have succeeded in constructing their own knowledge (DRIVER & BELL, 1986). As a result outcomes can be taken to represent ontological reality as a behaviourist would view it or personal constructions unique to each cognizing being as a constructivist would view (OKERE, 1996; KIBOSS, 2000; WASIKE, 2003).

The exemplary practice and outcome-based instruction as exposed in the Kenyan curriculum (Kenya Institute of Education [KIE], 2002) embraces student-centered approaches to learning. In this regard, the learner is viewed as active participant in the learning process, who should take responsibility for their own learning, while teachers by and large facilitate learning process (ALLEN, 1996; KIBOSS, 1997; SANGA, 1982; WASIKE, 2003). Therefore the knowledge imparted by the curriculum should be relevant and related to the learners' real life situations and the learning programs should not be either teacher or student proof (KIE, 2002). Thus, they should allow for some innovative and creative input from both the learners and teachers.

THE CO-OPERATIVE CONTEXT FOR EXEMPLARY PRACTICE AND OUTCOME-BASED INSTRUCTION

The challenge facing the classroom teacher is how to come up with specific outcomes that would direct learning activities of the learners without constraining them to specific learning strategies and contexts. It is not uncommon to find students collectively protesting against things that they are not pleased with since gang activities are a common phenomenon in their lives. Indeed students' movements and organizations are common features of student activities. Hence the learning in this context has always been submerged in a cooperative cultural milieu in which the goals of the group are achieved through a collective effort of its members (SANGA, 1982; WASIKE, 2003). In this regard students learn collaborative skills as well as ways of negotiating and receiving ideas from others. This is in the realization that the classroom teacher has a responsibility to socialize the learner into a culture of science and mathematics, its thought, forms and concomitant language (ALLEN, 1996) as well as help the learner to learn relevant content of the discipline (WASIKE, 2003). Hence the need to create a learning environment that would allow learners the latitude to interact freely with the learning environment in the process of knowledge construction.

Insuing from this argument, a co-operative strategy is posited as an exemplary teaching strategy for various reasons vis-a-viz learners negotiate meanings and resolve their cognitive discrepancies in small cooperative groups. This is important in multicultural and multilingual classrooms as in Kenya where each learner will bring into the classroom a culture and language that are uniquely theirs. Apparently, the teacher needs to structure the lesson cooperatively so that learners can work together to accomplish a shared goal. This requires change in the role of the teacher from the conveyer of knowledge to that of a facilitator of knowledge (Allen, 1996; KIBOSS, 2000; WASIKE, 2003).

The nature of learning activities, and the classroom as a group activity may influence the teacher and learner roles in this type of environment. The nature of the learning activities is also largely dependant on individuals' participation and contribution to the group and the effects of the group on both the individual and the group. These factors affect the teaching and learning in a variety of ways because the conditions within the co-operative learning is constantly changing. As such co-operative learning is critically important because learning is a social activity (WASIKE, 2003)

Similarly, classroom learning is a group activity in which the nature of activities varies according to certain factors such as the role of the teacher, the role of the learners and the nature of instructional activities. Consequently, in the teaching learning process the teacher's role on the one hand is influenced by his/her way of doing things and the talking while the learners roles on the other hand is influenced by the way they engage in the classroom learning process and how they interpret it.