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THE LEARNING AND TEACHING OF MATHEMATICS IN MULTICULTURAL CLASSROOMS IN SOUTH AFRICA

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By simple definition, the term 'multicultural' generally refers to a mixture of cultures or more than one race group. In general, South Africa is a multicultural country having schools that are occupied by a single race group or many, the latter of which is becoming more and more common. With culture variations come multifaceted language, understanding and conceptualizing differences, which ultimately results in ambivalence when comprehending and interpreting mathematical concepts. This article looks at the learning and teaching of mathematics from the perspective of a multiracial classroom.

It is possible to separate the learners of South Africa on the basis of their diversity in backgrounds and cultures, however, it is not possible to categorize their intellectual abilities and capacities of learning in any given environmental context (the learning environment). As stated in Cooper and Dunne (2004), this means that there would be differences in the understanding of mathematics based on the socio-economic background of the individual because each learner who is employed in a job would apply mathematics differently compared to a scholar (be it at school or other institution). This is because a worker's mathematical or statistical knowledge

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is trained to do what their job requires from them, whereas a learner would be taught to follow the principles of mathematics i.e. the explanation of theoretical concepts and theorems, the utilization of formulae, and the solving of problems. But is the latter really essential for the real world? This is a question that boggles most of us but if you ask me, I would think this depends on the individual and what he is trying to find. For example, an architect would find the theorems of geometry and formulae of analytical geometry more relevant than a financial manager who might just require basic arithmetic to calculate the financial budget at the beginning of the next financial year. The implication of this is that we should not pass judgment blindly on the utilization of mathematics in the non-academic world.

In the non-academic and teaching environments, the individuals that are encountered are from different ethnic backgrounds, are of different gender and have variation in languages. This makes it difficult to improve the proficiency of mathematics education in South Africa. The most recent locally published paper on multilingual teacher-learner interactions were published by Setati and Barwell (2008). In a multiracial context these interactions have profound implications for learners in that it would enable them to grasp and advance their ideas and knowledge in mathematics, while, for some learners, this would enable them to learn a language that was otherwise unknown to them or in which they were not previously fluent in. However, we should remember that the effectiveness of learning and teaching mathematics is dependent on the time spent in conceptualizing and practicing the mathematical problems in an interactive way – 'practice makes perfect'. The interaction between student-student and student-teacher must be effective, but at the same time the amount of help offered by the educator should be limited so as to facilitate 'learner-centered problem solving amongst learners'. This as highlighted in Kilpatrick *et al.* (2001) would allow for the improvement of mathematical education. These interactions would also enable learners to acquire the skills needed to compete with learners at their own level in their learning environment.

In group learning mathematical activities, learners of the same culture who have the same mother tongue language would communicate ideas and concepts more effectively and therefore would communicate ideas and concepts more effectively and therefore improve their understanding of mathematics at the same level if they are at the same level (grade or standard) and if they have the same learning ability. Brijlall (2008) suggests that this is more likely to occur when learners select their own members into a discussion group. On the other hand, the learners who engage with learners of greater intellectual mathematics competence (learners at higher standards or tertiary institutions) are more likely to likely to be more advanced in mathematical thinking, learning and teaching processes as compared to those who don't, but only if they are vigilant, attentive and assertive to the mathematical approaches used by their acquaintances, peers and educators.

There is a huge difference between the techniques that are used by educators (teachers and lecturers) and this is possibly selected according to the comfortability

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of the educator to teach in a particular way and/or in a particular cultural language. Similarly, learners would select different methods and strategies to master information. However, it is common sense that there is no obvious relation between the chosen study method by a learner and the race group that utilizes the method. Furthermore, there is an indirect relationship between the type of method used to teach learners mathematics and the information 'absorbed' by a particular learner. Maharaj (2007) has proposed a strategy of facilitating the teaching of mathematics the teaching of mathematics by the use of spot tests. I believe that oral questioning would create a way for educators to assess whether the learner can conceptualize a particular teaching method while written task assessments would allow educators to assess the trail of thoughts that a learner has leading up to a particular solution while identifying possible flaws along the answers. Oral spotting of a weaker mathematics performer would enable such learners to gain confidence in the learning-teaching environment and thus strengthen the ability of learners (in general) to question the educator. This would holistically provoke the acquisition of mathematical knowledge across the many, and amongst multicultural groups. Brijlall (2008) has suggested a method of allowing learners to gain confidence within a group by allowing the learners to adjust to each others social background and educational competence. However, this can only be effectively achieved if learners are randomly selected and placed within groups.

Two other effective implementations that could be used in teaching mathematics are analogy and constructive defining as explained in de Villiers (2008). Analogy would allow for commonality between like terms, formulae and theorems to be realized, for example, while constructive defining would allow for new ideas to come into fruition. However, both these reasoning techniques require the same level of competence by the learner in order to grasp, identify and 'catch on' the similarities and discrepancies in a specific mathematical taught area. De Villiers (2008) has further stated that teachers can improve their methods of teaching by understanding 'the history of mathematics' and 'by reading books on problem solving, problem posing, and heuristic reasoning, and perhaps most importantly, from being mathematically active oneself, and reflecting one's own struggles and triumphs. All in all, this would improve the learners 'intelligence', 'academic potential' and 'reasoning ability'.

It is sad that the learners from rural areas who have parents that are not as financially stable as those from urbanized areas, may find it difficult to purchase mathematics books, equipment and technologies to assist in improving their children's mathematics. Underprivileged schools in rural and urbanized areas might not be able to provide their learners with adequate mathematics resources so as to 'boost' learning potential. Such schools (and schools having environments that are not conducive to learning)would lead to a learner having a poor education (in general), thus a poor understanding of the mathematics skills that are required and used to run the economy, impeding on their contribution to humanity and and thus depriving the growth of the economy. It is disappointing to know with certainty that

such learners may not enter a tertiary institution or get employed. It is therefore also a parents right and responsibility to help play a pivotal role in their children's education at home as a well as within their multicultural classroom. But all-in-all, we should treasure our mathematics.

This write-up was inspired by the article written by Brijlall (2008) on 'The Collaborative Learning in a Multilingual Class'.

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