

Personal qualities and teaching practices of mathematics teachers

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This paper is a report of a study into the impact of a professional development programme designed to bring about changes in the classroom practices of teachers and change in their beliefs and attitudes. The programme is offered to in-service teachers of mathematics over a period of two years. The study is focussed on the assumption that what a teacher believes about mathematics and teaching mathematics is integrally related to the quality of mathematics being taught in the classroom (Thompson, 1992).

In addition, the attitudes to mathematics itself may affect the teacher's attitudes to the teaching of mathematics, which in turn have a powerful impact on the atmosphere and ethos of the mathematics classroom (Ernest, 1989). Also notable is the importance ascribed to the teacher's reflectivity concerning the teaching and learning of mathematics and implementation of change in the classroom. Professional Development Program The Rhodes University Mathematics Education Project (RUMEP) offers an accredited, part-time professional development programme for in-service primary and secondary teachers of mathematics.

The program has been in operation since 1994. The intention of the program is to develop and support teachers in improving their mathematical and pedagogical competence. A further outcome is for teachers to gain a better understanding of the teaching and learning of mathematics, to challenge teachers' beliefs about practice, encourages reflection on practice, and to assist teachers in the understanding and sense making of the new curriculum that challenge their current teaching practices.

One of the main goals of the professional development intervention is that teachers will learn new ideas about how students learn mathematics, changing their instruction to a student-centred approach using a variety of instructional methods. The focus is to develop confident and resourceful key (leader) teachers who will inspire and assist the professional development of colleagues to improve the quality of mathematics teaching and learning in schools. As mathematics teachers participate in the in-service programme that is committed to reform-based teaching and learning, they encounter mathematics instruction within an socio-constructivist framework.

From a constructivist point of view the emphasis is on the teacher as learner, a person who will experience teaching and learning situations and give personal meaning to those experiences through reflection (Tobin and Imwold, 1993). The design of our programme provides teachers with these types of opportunities. They are involved in challenging mathematics activities and problem solving experiences that are related to the content that they are expected to teach.

Schorr (2000) also supports the need for teachers themselves to be learners of mathematics. He suggests that to effectively teach mathematics teachers must gain competence and understanding of the mathematics that they are expected to teach. Inspired by a shift toward reflective practice recommended in our new curriculum, I have made an attempt to assist teachers in the reflective process. Thus teachers need to prepare a mathematics portfolio that allows them to reflect and analyse their teaching.

Green and Smyser (1996) describe teacher portfolios as a mean to integrate all the aspects of teaching so that teachers can see for themselves where <https://assignbuster.com/personal-qualities-and-teaching-practices-of-mathematics-teachers/>

they are and where they are going professionally. Definition of Teacher Beliefs It has been widely reported that teachers' beliefs gratefully influence their classroom practices. In order to make a study of teachers' beliefs I need to define what is meant by beliefs. Beliefs are defined as personal constructs that can provide an understanding of a teacher's practice (Nespor, 1987; Pajares, 1992; Richardson, 1996).

Background The most significant contributions of research in education suggests that teacher's beliefs relate to their classroom practice (Thompson, 1992; Fang, 1996; Kagan, 1992). According to Brophy and Good (1974) cited in Fang (1996) a better understanding of teachers' belief system or conceptual base will significantly contribute to enhancing educational effectiveness. Belief systems are described as dynamic in nature, undergoing change and restructuring as individuals evaluate their beliefs against their experiences. (Thompson, 1992).

Teacher Beliefs and Practice To understand teaching from teachers' perspectives, we have to understand the beliefs with which they define their work. (Nespor, 1987, p. 223). This view is further supported by Underhill (1988) when he stressed the importance to assess teacher beliefs and to know how to affect them if we expect to improve mathematics instruction. Pajares (1992) pointed out that few would argue that the beliefs teachers hold, influence their perceptions and judgments, which, in turn, affect their behaviour in the classroom.

Shuck (1997) reported that teacher educators do not realise the power and the tenacity of pre-service teachers' beliefs and attitudes ... in a way does not sufficiently recognise, the influence of these beliefs on their learning. (p. <https://assignbuster.com/personal-qualities-and-teaching-practices-of-mathematics-teachers/>)

530). As mathematics educators, we accept the notion that teachers' beliefs are related to their classroom practices, but whether the changes in beliefs follow changes in practice or vice versa, should not hinder the purpose of professional development goals, viz the process of change.

The important thing is the notion that changes in beliefs, ways of thinking, and classroom actions all come into play in the teacher-change process. We should therefore not worry to determine which comes first in the change process. Beliefs and Mathematics Teaching and Learning It has become an accepted idea that teachers' beliefs plays an important role in shaping teachers' characteristic patterns of instructional behaviour (Thompson, 1992).

Discussing findings of studies in mathematics teachers' beliefs, Ernest (1989) noted that among the many key elements that influence the practice of mathematics teaching, the following three are most notable: 1. The teacher's mental contents or schemas, particularly the systems of beliefs concerning mathematics and its teaching and learning; 2. The social context of the teaching situation, particularly the constraints and opportunities it provides; and 3. The teacher's level of thought processes and reflections.

The mathematics teacher's mental contents or schemas includes knowledge of mathematics, beliefs concerning mathematics and its teaching and learning, and other factors. He further describes the key belief components of the mathematics teacher are the teacher's: * view or conception of the nature of mathematics, * model or view of the nature of mathematics teaching, * model or view of the process of learning mathematics.

Influencing teachers' beliefs, therefore, are essential to changing teachers' classroom practices.

The focus of this study with regard to teacher's beliefs can be identified towards the assumption that teachers who hold more learner-centred, socioconstructivist orientated beliefs, would translate into their classroom practices greater enthusiasm toward problem-solving activities, actively engaging their learners constructing mathematical concepts, developing mathematical thinkers and problem solvers. Analysis, Discussion of Data Sources analysed so far are beginning to provide insight into teacher beliefs, and changes in classroom practices.

Beliefs of Teachers The teacher's unedited responses here suggest not only how they have changed their practices, but how their beliefs impacted on the changes. The following teacher was asked to describe what was the most important thing she learned during the course, she said, ... I realise more and more with all the work that we have done here I can see in the results of what I do or present whether my planning was done well enough ... I really enjoy planning. It actually makes work so much easier when you do proper planning.

Also you ask yourself questions while planning that help you to see how exactly what you are planning is going to work, and even the questions just become a natural part of the planning after a while. The next teacher believed that her changing role of a reflective practitioner enabled her to the opportunities it provides. I have changed because now I am a reflective practitioner. I always look back at my teaching strategies, my planning and

my objectives ... I assess the skills of my learners continuously and not only knowledge at the end of the term.

Some teachers believed that learning in the classroom preceded their acceptance of new theories and practices. Everything that we do is a learning process and when we are able to apply what we've learnt and can see how successful or unsuccessful it is, then we can say that learning is fruitful and worthwhile ... I can also see how important it is to allow learners to experience and discover things for themselves and to allow them to come up with own strategies in finding solutions to problems, because I can see how positively this effects their learning ... One theme that emerged was some frustrations experienced by the teacher as learner.

According to Aiken (1972) there is dynamic interaction between attitudes and behaviour, attitudes affect achievement and achievement affects attitude. The following teacher's response to the question to report what they did in class and secondly express personal concern ... Under report ... Maths 24 is a mathematical tool. We explored addition, subtraction, multiplication, place value, integers ... Under personal concern ... My performance in maths 24 was very weak. After doing it I felt bad and down and this had an impact on my class participation. ... I wonder how I am going to help my learners when I'm struggling to do the activities.

Negative feelings were expressed about some of the professional development experiences ... I am dissatisfied about the computer session. Last time in January we made tremendous progress. But this time there is no progress whatsoever. For three days I couldn't master a single aspect. I just do things by luck. Teacher's self-confidence and enjoyment plays an integral

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part of their beliefs in teaching a subject. If teachers, like the teacher above, do not have the confidence in understanding certain mathematical tasks or activities it will affect their motivation of their learners.

On the other hand, if beliefs are the best indicators of people's decisions (Bandura, 1986) teachers may decide not to teach certain concepts that they are not self-confident with. The interaction of beliefs and practices have strong implications for teaching and learning. I believe that this type of interaction is critical for the success of any in-service program. It has been recommended that teacher beliefs need to be recognised by in-service programs as these programs can be better designed to meet teachers' needs. Richardson (1996) agrees that reflecting on beliefs and practice is important if instructional change is to occur.

Teachers' Reflections In addition to strive towards belief change in teachers, the professional development program also attempts to inspire teachers to reflect on their practice. This is another attempt to encourage the particular teachers to adopt a favourable attitude towards the teaching of mathematics. Lawrenz (1984) stated that the development of appropriate attitudes is important in facilitating behaviour change. Further, teachers pass their attitudes along to their students. In order to briefly discuss teachers' attitudes I will look at the reflective statements of the participant teachers.

Aiken (1972) says that the " term attitude means approximately the same thing as enjoyment, interest, and to some extent, level of anxiety". (p. 229).

Ernest (1989) describes teacher's attitudes to mathematics, liking, enjoyment and interest in mathematics, or their opposites, He continues and refers to the teacher's attitudes to the teaching of mathematics, these <https://assignbuster.com/personal-qualities-and-teaching-practices-of-mathematics-teachers/>

include liking, enjoyment and enthusiasm for the teaching of mathematics and confidence in the teachers own mathematics teaching ability (or their opposites). The following is a reflection on practice and student learning.

The activity was comparison and recognition of fraction parts with the same denominator. Learners were not able to respond to the questions because of a language problem. They could only do that after they were asked in their own mother tongue. He later writes I developed a dictionary with them where we wrote difficult words and their explanations. Explanations with examples are also in their mother tongue for better understanding. The teacher's writing reveal a sense of personal efficacy, that is the degree to which teachers believed that they can bring about student learning.

The teacher also, provided appropriate means to lead learners to independency. Learners can use the dictionary whenever they come across a difficult word. Karp (1991) writes, teachers with positive attitudes incorporate instructional materials and representations that provide students with resources other than the teacher for self-instruction. She mentions too, in contrast are the teachers with negative attitudes, the teachers with positive attitudes toward mathematics use instructional methods that encourage independence.

As mathematics educators it is important that we realise that context is a contributing factor on the attitudes to, and implementation of change. This is evident from the reflection of a teacher, teaching in a deep rural area. The community is far removed from the progression and development of the school. The anxiety and yet some positivity is evident in this writing

Teaching mathematics is very hard and challenging.

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This occurs more especially when one is teaching in a community who does not know their role in this school or doesn't know the value of learning. People who randomly prevent their children to attend school one cannot be sure of the learners. Today they behave like this and tomorrow differently one has to be enthusiastic it gives me hope to see some progress, there is change. If teachers feel enthusiastic and confident their attitudes towards implementing new practices are influenced. It is therefore important for professional developers to become knowledgeable about the beliefs and attitudes that the participants hold, and their current practices.

Conclusion Karp (1991) emphasises the need for teacher education institutions and school district administrators to develop programs to help pre-and in service teachers to recognise and overcome the problem of negative attitudes toward mathematics and the instructional consequences of these attitudes. It seems reasonable to conclude that more time spent in courses that promote mathematical content knowledge, practical experiences and classroom support would further benefit in-service teachers.