

TEACHERS ARE THE PROBLEM IN SMT, NOT GIRLS!

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Introduction The central goal of the **Female Education in Mathematics and Science in Africa (FEMSA)** project is to improve the participation and performance of girls in Science, Mathematics and Technology (SMT) subjects at primary and secondary school levels and to invigorate ministries of education and policy makers to make the necessary adjustments in curriculum, teacher training and examinations to ensure fuller participation and better achievement in SMT subjects by both boys and girls. A second important objective is to develop innovative, interesting and girl-friendly approaches to the learning (it's all about helping the girls to learn, not about teaching them!) of SMT subjects which will take into account girls' out of school experiences and their needs in life after school. A Mid-Term Review of Phase II of the FEMSA project was carried out during July and August of 2000. In the course of the MTR report on project activities in Tanzania by Dr. Anna Obura, the leader of the Review Team, the following startling statements were made.

Constant reference is made in the project programme to *problems* rather than to *issues*, as if everything, related to girls is a problem and as if girls have nothing but problems, problems, problems. It has to be said that this is not a view unique to Tanzania. On the contrary.

However, this constitutes a gender problem in itself, a *gender* bias which works consistently against a positive image of girls when girls are constantly referred to (in a GE programme!) in terms of *girls' problems*. In-depth analysis reveals that the problems that girls face may lie in the hands of people beyond girls, and it would be more correct to speak of the problems of those other people than call them *girls' problems*. If girls have to face negative experiences as a result of the problematic attitudes and behavior of other people, then indeed girls do have a difficulty to face, or a *problem* in this sense, being the victims of others' attitudes and actions. However, in order to turn attention to the causes of 'girls' problems', it would be salutary to talk of *societal problems* or *the problem of those other people who cause difficulties for girls*, or to refer to the *resulting difficulties* of girls. The onus is on us all to find more conceptually clear terms in which to express these phenomena.

The objective of this article is to focus on some of the problems posed for girls, in their learning of SMT subjects, by teachers and teacher educators as revealed by the

FEMSA experience.

Problems Posed for Female Learners of SMT by Teachers Over a two-year period the four Phase I FEMSA countries, Cameroon, Ghana, Tanzania and Uganda, carried out a detailed study of the status of girls' participation and performance in SMT subjects in primary and secondary schools. It was found that fewer girls than boys have access to SMT studies, and that girls generally perform less well than boys. These findings were borne out by small-scale studies carried out in the eight new Phase II countries, Burkina Faso, Kenya, Mali, Malawi, Mozambique, Senegal, Swaziland and Zambia. The attitudes and approaches of teachers were found to play a major part in this state of affairs across all twelve countries. It is interesting to note that teachers generally see themselves as blame-free for this situation and seem unwilling to find any fault with the syllabuses, examinations or indeed their own teaching approaches. They tend to accept the situation as being almost inevitable and out of their control.

Only after prolonged probing of the situation does the realisation dawn that, yes, perhaps something could be done about the situation at the school levels. On the other hand, students and parents are much more critical of teaching approaches, syllabuses and examinations.

The FEMSA studies reveal that the following are the major areas which contribute to teacher fostered problems for girls.

- **Attitudes of teachers**
- **Poor Expectations of Girls' Performance**
- **Classroom Dynamics**
- **Insensitive Teaching**
- **Didactic Approach to the Learning of Mathematics and Science**

Attitudes of Teachers There is a strong, all-prevailing, traditional, conservative belief among parents, teachers and students that mathematics and science subjects are a male preserve. The attitudes of teachers has by far the greatest impact. Many teachers, including women teachers, despite much lip service to the equality of girls and boys, just do not believe that girls have the ability to study mathematics and science: they believe that these disciplines call for struggle and determination and they simply do not believe that the girls are capable of coping with "difficult" subjects. Among women who have succeeded in mathematics and the sciences. There is a strong belief that teachers actively discourage girls from studying these sciences there is a strong belief that teachers actively discourage girls studying these disciplines. The result is that teachers generally have low expectations of girls' ability to perform well in SMT.

Poor Expectations of Girls' Performance The following set of statements by a Maths or Science teacher reading out the results of a termly test is common in many classes.

Mary Kiarie, 37%. Mary! You have really tried during this test!

John Simiyu, 73%. Hey, my friend! This is not good enough! You must really work harder next term!

Has this kind of scenario been a feature of your SMT classes?

Classroom Dynamics Poor expectations of girls' performance leads to the kind of SMT classroom dynamics, where girls are treated very differently from boys. Class observation revealed that teachers do not encourage girls during SMT lessons, and fact, at times, actively discourage them. One way they do this is by directing only simple recall type of questions to them and directing the more difficult, reasoning type of question to boys. There is often a misguided effort on the part of teachers to save the girls from potential difficulties with SMT and to save themselves from having to teach the girls, which they claim would require 'enormous effort'. This kind of treatment can only reinforce and confirm in the minds of both boys and girls what society and literature peddles around 'that science is for boys only'. Boys therefore, over time, develop at these subjects which they consider a male domain. They harass the girls and regard them as being incapable of engaging in difficult learning tasks such as handling SMT subjects.

Girls shy away from any active participation during SMT lessons, for fear of letting themselves down in front of their peers, but more, for fear of being taunted by their male classmates. Taunting of girls by boys in schools is a serious issue that intimidates some girls to an extent that they never voluntarily offer to answer any questions in class. Because SMT subjects were considered masculine (therefore 'unladylike'), many girls were reluctant to try and excel at these subjects, as this would draw attention to them in ways that would make them feel uncomfortable. Girls complain that boys call them names when they try to ask teachers questions. Boys, on the other hand, blame girls for being unable to stomach jokes and name calling coined out of terms learned in science classes. And this situation is tolerated by many teachers and school administrations.

The research showed that there is rampant harassment of girls by their male schoolmates and at times, male teachers too. This harassment may be sexual, physical or emotional, instilling fear in the girls to the extent that girls rarely go to male teachers for help.

Insensitive Teaching Many teachers are unaware of the special difficulties that girls face in the learning of mathematics and science: they are insensitive to the different out-of-school experiences which girls bring to the study of the subject; they do not take account of the anxiety many girls undergo when topics such as reproduction are dealt with in the classroom, or when girls are asked to use unfamiliar equipment and apparatus, or cope with live specimens; they do not understand when girls, especially from traditional and conservative backgrounds,

seem unwilling to enter into discussions or ask questions, especially in mixed classrooms.

Didactic Approach to the Learning of Mathematics and Science Parents who participated in the group discussions identified use of inappropriate teaching methods as one of the factors that contribute to the low participation and performance of girls in Mathematics and Science. They felt that the teaching methods used were not practical enough and that teachers made little effort to relate the concepts learnt and the examples/illustrations used to real life, especially within the context of the pupils' own lives and environment. They felt this had a negative effect on pupils' interest and motivation to study SMT subjects. The entrepreneurial skills of market women, kiosk owners and street vendors involving quick-fire mathematical calculations; instant judgement of what is a good buy or a good sale; and the means of mathematical reckoning they use; the use of patterns in tailoring and dress-making as an example of symmetry; the kind of geometry involved in basket weaving, tile making, bead work, hair styles, so beautifully exemplified by Paulus Gerdes in his magnificent book *Geometry From Africa*, etc., are never mentioned in mathematics classes. All kinds of modern and complex mechanical examples of friction are quoted in science classes, but the grinding of grain into flour, carried out by millions of women every day is ignored.

The sentiments expressed by the parents were reinforced by the findings of the classroom observations carried out as part of the school studies. The findings, which were strikingly similar in all the countries, indicate that teachers favour teacher-centred, knowledge based teaching methods that leave little room for learners' participation. The most commonly used teaching methods at both primary and secondary level were found to be lecturing; question and answer; explanations of procedures and note giving, in that order. Little practical work is done due to shortage of equipment and consumables, and the development of a scientific way of thinking is abandoned in favour of the learning of nomenclature, definitions and stock standard procedures.

If we are to have meaningful and sustained development in sub-Saharan Africa, we cannot afford to deprive over half of the population of the region in virtually every country from the long-term and vitally essential benefits of SMT. We need not merely to increase the number of women engaged in careers as professional scientists, mathematicians and technologists and other science-based occupations, but to enable the ordinary peasant farmer to avail of the many new technologies, improved farming and animal husbandry techniques, simple labour saving devices, and increased knowledge of environment and soil and water conservation, and the basic knowledge to provide a healthy home and family. We must provide every girl with the basic scientific, mathematical and technological expertise which will enable her to better solve her everyday problems and enrich her life in the village and on the shamba.

Conclusion I have tried in this article to outline some of the ways in which teachers of SMT subjects create problems and difficulties for girls in their learning of SMT disciplines, as revealed in the FEMSA studies. I hope it will lead to some reflection

on the part of SMT teachers, an examination of the approaches we bring to creating a learning environment for girls (and boys), a willingness to make these disciplines accessible to all students (and the girls' most consistent cry is Why can't they help us to understand?), and through a more thorough understanding of the problems help to alleviate the girls' difficulties. And I would like teacher educators to give serious thought to what might constitute the core ingredients of a girl friendly teaching/learning methodology, which could be introduced into normal classroom practice and both in-service and pre-service training of SMT teachers, and to sensitise their students to a realisation of the constraints and difficulties faced by girls in their learning of SMT, which are brought about by the attitudes and actions of teachers.

I would hope that in future articles I might have the opportunity to make known the kind of interventions which FEMSA has been implementing in order to improve the participation and performance of girls in SMT. I finish with a further quote from the Tanzania MTR report on the effects of these efforts.

Girls are happy-many are ecstatic about SMT. They talk in wonder about how they have found their place in SMT classes. Their faces light up and they laugh as they compare their new-found confidence with the dismal experiences they had a few years ago and the expectations they had of themselves faced with the continual prospect of failing in maths and science classes. Teachers, too, share this enthusiasm. They are getting used to explaining to visitors about their newly performing SMT girls. They are proud of themselves and the time and effort they put into FEMSA activities.