

Gender equality in the mathematics and science school curriculum

A component of this study focused on teachers' beliefs about, and attitudes towards girls studying mathematics and science in schools.

Context

Gender equality is a characteristic of democratic states. Promotion of gender equality is an international concern and a global priority. As far back as 1960, UNESCO adopted a convention affirming the Universal Declaration of Human Rights principle that every person has a right to education. Today, gender equity in education is used as a development indicator. The aim of target 3A of the Millennium Development Goals (MDG) is to eliminate gender disparity in primary and secondary education.

This policy brief focuses on the extent to which gender equality policies and interventions impact on teachers' commitment to MDG3. It investigates South African educators' perceptions, attitudes and beliefs regarding girls' access to, participation and success in mathematics and science in high schools.

The study underpinning this brief:

- surveyed teachers' awareness and understanding of international and national gender equality policies, strategies and interventions;
- studied their perceptions about girls' access to, participation and success in mathematics and science;
- identified strategies to promote girls' representation, participation and performance in mathematics and science; and
- developed policy recommendations and identified implications for the school and classroom, as well as for further research and practice.

Policy framework

Gender equality is enshrined in the Bill of Rights of the South African Constitution. Section 15 of the South African Schools Act (No. 84 of 1996) reconfirms that the Department of Education (DoE) and all other educational institutions are required to observe the fundamental rights provided in the Constitution.

Bound by this provision, the department is legally required to integrate gender issues into their policies. To facilitate gender mainstreaming, the DoE has policies that advance gender equity and strategies to improve the representation, participation and performance of girls in the fields of mathematics, science and technology.

Research data and findings

A situational analysis was completed in the form of a survey. A questionnaire was administered to 735 teachers from four provinces (Eastern Cape, Gauteng, KwaZulu-

policy brief

More than half of all the teachers consulted do not have internet access at school.

About half of the teachers who participated in the survey are unfamiliar with the policies and strategies that promote gender equality.

Natal and Mpumalanga). Survey data were captured, coded and statistically analysed. The most significant findings are summarised in this policy brief.

Fifty-seven per cent of the teachers that participated in the survey were females between the age of 33 and 50 years. More than half (58%) of participating teachers did not have internet access at their school.

As indicated in Table 1, many of the teachers had no knowledge of international or national policies and strategies that guide gender equality or that promote the participation of girls in mathematics and science. The data also shows the extent to which informed teachers found the policies and strategies adequate in addressing the issues at hand.

Table 1: Teachers' awareness and evaluation of relevant policies and strategies

	Awareness		Evaluation	
	None (%)	Adequate (%)	Inadequate (%)	
National policies: maths and science education promotion	46	36	14	
National policy: gender equity in the school curriculum	54	26	14	
International policies: maths and science education promotion	62	18	15	
National strategies: effective maths and science education	22	58	15	
National strategies: girls' participation in maths and science	54	22	19	

The literature confirms that a safe, secure classroom and school environment is conducive to learning. Studies also suggest that girls' learning styles tend to differ from those of boys. Although most teachers (80%) agreed that there is a need for a variety of strategies to teach mathematics and science, this study showed that many teachers were not familiar with different teaching strategies in general, let alone those pertaining to girls as differentiated from boys.

Gender equity in education is dependent on ensuring that the classroom and school environments are safe for girls. Part of making the school and classroom environment safe, secure and conducive to learning should entail investing, understanding and utilising suitable teaching-learning methods for girls.

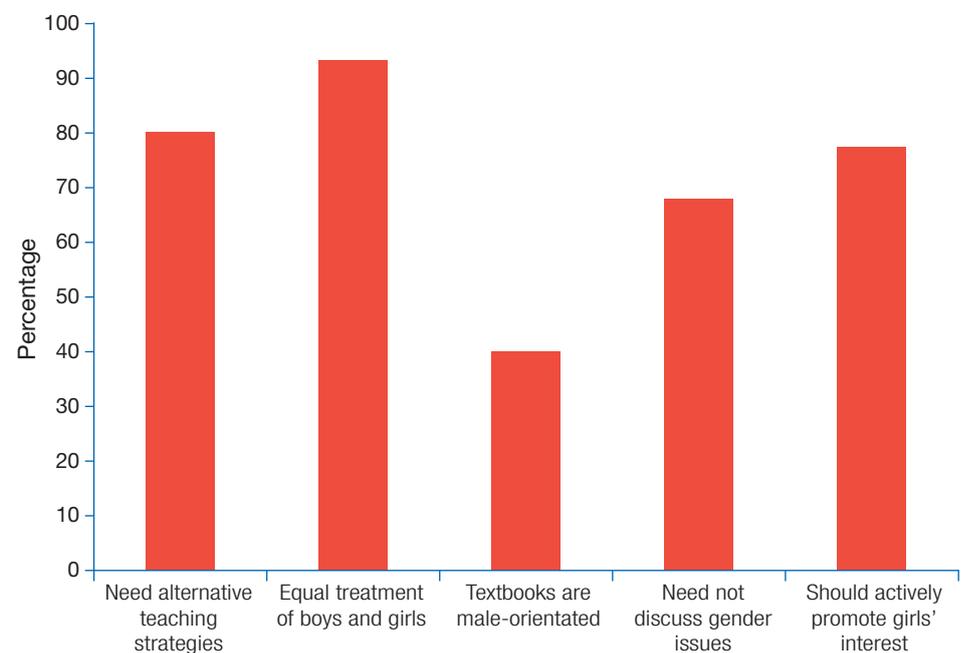
Studies have shown that girls can perform as well as boys in mathematics, science and technology. Yet boys mostly outperform girls in these subjects. This is specifically the case in developing countries such as South Africa. Reasons for the general low participation and success of girls in mathematics and science are many and complex. The focus of this study however, was to determine whether teachers' perceptions contribute to this state of affairs.

Seventy three per cent (73%) of participating educators disagreed that boys are naturally more inclined to excel in mathematics and science. Almost all the teachers (93%) agreed that boys and girls should receive equal treatment in the mathematics and science classrooms. However, these findings about teachers' beliefs are not consistent with the stereotypical behaviour of many who expect lower performance in mathematics and science from girls than from boys.

Results from this study reveal that most teachers feel the need for further training or alternative strategies for teaching mathematics and science.

The literature shows that the mathematics and science curriculum tends to be girl-unfriendly; for example, illustrations and activities in text books tend to be male orientated. Nonetheless, less than half of the teachers surveyed in this study (40%) thought the books they used were gender-biased (see Figure 1). One of the problems with entrenched perceptions is that the perceivers are convinced there is nothing wrong with their way of doing things. Therefore it is very likely that many South African teachers do not see gender-bias in the books they use despite its abundance therein.

Figure 1: Teachers' beliefs and perceptions about gender in mathematics and science teaching



Because they grow up in a male-dominated environment, boys tend to dominate the classroom. In spite of this tendency, 68% of the teachers were of the opinion that gender issues need not be discussed in classrooms.

The literature shows that in many parts of the world, out-of-school activities have been successfully used to promote girls' interest and participation in mathematics and science. The majority of the teachers who participated in this study (77%) were of the view that such activities are necessary.

In the South African context, the challenge is to develop appropriate out-of-school activities that can be held in safe and secure environments.

Recommendations

To realise the goal of improving girls' access to and participation in mathematics and science, the following three broad recommendations underpin gender-response objectives.

1. Policy, school and classroom practice, and support

To strengthen girls' access to, participation and success in mathematics and science in high schools, it is necessary to:

- measure and monitor student achievement in these subjects;
- offer after-school programmes that assist girls to improve their performance;

- develop weaker students in mathematics and science through extra coaching;
- provide teachers with resources to strengthen gender-inclusive curricula;
- increase resources that support technology transfer, e.g. computers and internet access;
- improve school security to disallow potential sexual harassment and abuse;
- design out-of-school activities in safe environments to promote mathematics and science education; and
- mainstream the school curriculum in such a way that gender equality and improved access to mathematics and science education for girls is sustained.

2. Teacher education and professional development

As the key agents for policy implementation and addressing gender inequality in schools and classrooms, teachers require appropriate knowledge, values and skills. Findings from this study suggest that while teachers have some understanding of and may sometimes even believe in the values of gender equality, they lack adequate knowledge about the policies, as well as pedagogical knowledge for translating this into gender-sensitive practice in their classrooms. This should be addressed in teacher education curricula as well as in ongoing professional development for teachers, school managers and governance structures.

3. Further research

This study probed only the surface of teachers' understandings and enactment of national and international gender equity policies, particularly MDG3. Further research is needed to fully understand the phenomenon of how teachers and schools negotiate and translate policy into practice.

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