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Opportunities for nurturing the mathematically talented secondary school students: Insights from some Sub-Saharan African Countries
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Opportunities for nurturing the mathematically talented secondary school students: Insights from some Sub-Saharan African Countries

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ABSTRACT Literature suggests that much of the mathematical talent resident in less-privileged student populations especially in Africa remains untapped. Yet the continent's success as a knowledge economy is heavily dependent on a highly skilled, informed and scientifically literate workforce. This paper draws from a study which investigated how mathematically talented students were identified and nurtured in some selected African countries. This goal was motivated by the need to respond to previous research which points to this gap. A survey of 16 countries in different geographical locations on the African continent provided data that answered the research questions. Discourse theory was used as a framework for exploring the various images and views about gifted education. Results show that in 11 countries (69%) participation in Mathematics Olympiads is the only method used to identify talent. No country (0%) had public schools for the gifted and no country (0%) trained teachers to handle gifted

learners. Given such results in the discussion it is argued that gifted learners are generally neglected and by neglecting to harness the talents of such students, Africa could be reducing its potential for economic and technological development. If all students attending formal schooling are to receive equitable education in these countries, it is recommended that governments recognise and nurture the talents of such gifted students, in a similar way that is done for visually or physically impaired students.

INTRODUCTION

Over two decades ago, the National Council of Teachers of Mathematics (NCTM) in the USA pointed out a looming but quiet crisis with regards to the education of the mathematically talented learners. Elaborating on this crisis, the council noted that; "the student most neglected, in terms of realizing full potential, is the gifted student of mathematics" (NCTM 1980 p18). Yet almost three decades after noticing the derelict of talented learners, not much has changed on the continent of Africa. At an International Workshop entitled; '*Setting a collaborative Mathematics Education Research Agenda for Africa and the United States'*, held in Dakar Senegal in 2006 (van der Westhuizen 2007) the nurturing of mathematical talent was one of the six prioritised areas of focus. This followed an observation made at this conference that much of the mathematical talent resident in under-served student populations especially in Africa remains untapped. One of the recommendations thereof was that research was needed on effective strategies for identifying such talented learners and creating opportunities and programs to nurture and develop mathematical talent. This is important given that a growing shortage of skilled manpower in science and technology could put in jeopardy national prosperity as it could rob African nations of their capacities for innovation and economic development.

Purpose of this study

Given this background, this study explored the extent to which mathematically talented students were identified and nurtured in some selected Sub-Saharan countries. The exploration was guided by the following research questions:

1. What are the strategies employed when identifying mathematically talented secondary school students?
2. How are the mathematical talents of these students nurtured?

This was premised on the view that such studies may provide insights into how to educate future teachers, plan and enact educational systems that can cater for diversity in and across students' populations.

A heuristic device for exploring the education of mathematically gifted in Africa

Over the last two decades a number of critical scholars have offered various idealised views and images of mathematics education; a few of which include mathematics education as 'a gate-keeper', ' an empowering tool', 'a social justice project', 'a civil rights project' or 'a broader democratic project'. In each case such researchers have all tried to make their descriptions look neutral and objective or made them look like the 'truth about reality'. Yet other researchers have been 'successful' in challenging such interpretations making them look 'untrue about reality'. In this sense it can be argued that research creates discourses about phenomena and objects which might not necessarily exist as such but that might exist in as much as the power or knowledge of the scientific endeavour has phrased them and therefore created them. Similarly, depending on how the aims and goals of gifted mathematics education are conceptualised and framed, it should be clear that gifted education simultaneously represents and serves a host of competing projects, each of which calls for a preferred structuring of teaching, learning, curriculum, assessment, research, policy and reform. Literature suggests that if we want to consider the welfare and life opportunities of young learners of mathematics, we need to interrogate the discourses under which images or views about the mathematically able child are produced and normalised (Walls 2004). Discourses can be viewed as the sets of language formulations, together with the systems of reason that emerge in the relationship between the phrasing of the world and the social practice. Discourse, as defined by Foucault, refers to:

…ways of constituting knowledge, together with the social practices, forms of subjectivity and power relations which inhere in such knowledges and relations between them. Discourses are more than ways of thinking and producing meaning. They constitute the 'nature' of the body, unconscious and conscious mind and emotional life of the subjects they seek to govern (Weedon 1987 p108).

A Foucaultian notion of discourse (1) holds that:

- discourse is a culturally constructed representation of reality, not an exact copy

- discourse constructs knowledge and thus governs, through the production of categories of knowledge and assemblages of texts, what it is possible to talk about and what is not (the taken for granted rules of inclusion/exclusion). As such, it re/produces both power and knowledge simultaneously
- discourse defines subjects framing and positioning who it is possible to be and what it is possible to do
- power circulates throughout society and, while hierarchized, is not simply a top-down phenomenon
- it is possible to examine regimes of power through the historicized deconstruction of systems or regimes of meaning-making constructed in and as discourse, that is to see how and why some categories of thinking and lines of argument have come to be generally taken as truths while other ways of thinking/being/doing are marginalized

Turning this way of understanding discourse into a method to apply to the analysis of gifted education practices means asking questions such as:

1. What is being represented here as a truth or as a norm?
2. How is this constructed? What 'evidence' is used? What is left out? What is foregrounded and back grounded?
3. How has this come to be?
4. What is made problematic and what is not? What alternative meanings/explanations are ignored? What is kept apart and what is joined together?
5. What interests are being mobilized and served by this and what are not?
6. What identities, actions, practices are made possible and /or desirable and/or required by this way of thinking/talking/understanding? What are disallowed? What is normalized and what is pathologised?

So in searching for a framework for interrogating the education of mathematically gifted learners in Africa; this study borrowed from this broader discourse theory and in particular considered Foucault's notion of discourse as the one fit for the purpose. In Foucault's view, education and schooling can be viewed as a discursive domain productive of idealised visions of the mathematically able child, and maintained through everyday assessment and grouping practices that compare, differentiate, hierarchize, homogenise, exclude – in other words, normalise (Foucault 1977). Foucault was particularly interested in how discourses work to subjugate individuals and how individuals are constituted through the multiplicity of organisms, forces, energies, materials, desires and thoughts. To researchers intending to use Foucault's notion of discourse, Kendall and Wickham (1999 p42) recommended

… recognising a discourse as a corpus of statements whose organisation is regular and systematic, identifying the rules of the production of such statements, identifying the rules that delimit the sayable (which of course are never rules of closure), identifying the rules that create spaces in which new statements can be made, identifying rules that ensure a practice is material and discursive at the same time.

While Foucault did not provide a framework for conceptualising these discourses; Walls (2004) however provided a heuristic device within which the 'sayable' about mathematically able child may be explored (Fig. 1).

<insert figure 1 here>

Admittedly there could be other discourses that might have been left out from this conceptualisation, given the complexities of the mathematics education project. However, these few elements were considered sufficient for the study to analyse how education for the mathematically gifted has been normalised in African countries. Central to Foucault's notion is the idea that 'discourses are productive', thus he argued that penological discourses produce the 'criminal' and medical discourses produce the 'insane' or 'healthy'. In this sense, sinners, the insane or slow, average or gifted learners of mathematics are made visible and signified through a discourse. Foucault however pointed out that negotiation of norms within domains of practice involves both subjugation and opposition (Foucault 1977) and where such systems create and maintain social disadvantage, he suggested that it may be possible to look for founding discourses to provide alternative views of 'best practice'. This study was premised on this view that the way education for the mathematically gifted learners is normalized in many African countries disadvantages such learners hence the intention to provide alternative practices.

Some discourses that have shaped debates about mathematically gifted education

It is not the intention of this paper to go into too much detail on the different discourses that have been central to the debates about gifted education but just to highlight briefly some of them and how they have shaped some of society's images of talented learners.

Political discourse

From an African political perspective; the connection between democracy and mathematics education is not a new topic in the field of mathematics education research. In Africa mathematics education evokes negative emotions towards colonial education because Africans in general and blacks in particular were not allowed to do mathematics at school by law. Many critics would argue that Bantu education in general and mathematics education in particular was designed to keep black people enslaved. Post democracy many African governments have therefore focused on reversing the effects of that 'evil system' of education – making mathematics education first and foremost a 'political project'. So in the late 80's and early 90's, many African governments pursuing a democratic agenda strived in principle for equality in educational rights and opportunities. Consistent with this equity principle, social programs (including education) planned for the citizens were then based on a notion of parity, fairness, impartiality or equal opportunity for all. This equity principle was however (mis) interpreted as a recommendation to provide all students with identical instruction regardless of their personal characteristics, backgrounds, or physical challenges. This drive for social justice and the democratic view to education then led to the cancellation of ability tracking in mathematics, and the domination of heterogeneous mathematics education. Following Foucault's position, it can be argued that such a practice creates a 'social disadvantage' for the gifted learners. Thus according to Leikin (2011) the political interpretation of the equity principle as associated with the education of mathematically gifted students is therefore not a trivial matter.

Educational discourse

While on one side mathematics education is seen as a way of addressing political injustices, from an educational perspective Apple (1992) warned that it was not only in the treatment of race, gender, and class differences in schools that society should be cognisant of inequalities but this realisation needed to be extended to some of the predominant uses of mathematical knowledge. Mathematics education has a special position in many educational systems. In today's economy the important thing is that technical/administrative knowledge (mathematical) is available for use, not necessarily that large numbers of people have it especially if distributing such knowledge more widely is more expensive (Apple 1992). The possession of such knowledge is crucial in the highly competitive economic system we live in hence those who have such knowledge (the gifted) need to be identified and nurtured. Education systems should then be organised to ultimately produce and not just distribute particular kinds of knowledge that are needed by business and industry. Schools should then be organised as well to sponsor those students who may ultimately produce this knowledge. With specific reference to mathematics, Diezmann and Watters (2002) argue that the concept of equal opportunity for all seems to be ill defined to mean basic numeracy and this concept of equal treatment for all appears to leave talented learners not catered for. So from an educational perspective critics would argue that denying opportunities to gifted students who have the potential to acquire this technical knowledge, in the name of equal opportunity for all, would be another form of the very same ‘enslavery’ that we are trying to get them out of.

Critics of the political stance to gifted mathematics education would also argue from an educational perspective that the central function of the educational system is providing each and every student regardless of his/her social and economic status with learning opportunities that match their potential and promote it to the maximal extent. In this sense providing for gifted education may be seen as the expression of the equity principle because education must provide equal opportunities to all students to learn, realise their potential. These critics also show that recent curriculum reforms in mathematics and science emphasise on our school systems meeting higher standards as a way of reducing the critical shortage of skilled manpower in science and technology. Consistent with that observation Petrello (2000) argued that by ignoring the education of the mathematically talented students it seemed detrimental to hinder the group of students who would have little trouble meeting these expected high standards.

Psychological discourse

From a psychological perspective, one important element in serving the gifted is being able to accurately identify gifted students. However, a number of issues compromise practitioners’ ability to identify gifted students. Such issues include the varying definitions of giftedness. Some professionals will define giftedness by an intelligence test score above 130 or 140, or two or more standard deviations above the norm, or the top 2.5% of the population. Some will define "giftedness" based on scholastic achievement: a gifted child works 2 or more grade levels above his or her age or gifted children have advanced scores on a particular academic test. Due to this lack of conceptual clarity as to the nature of giftedness, identification processes have varied widely. So from a psychological perspective, identifying gifted individuals raises important issues regarding the types of evidence of giftedness and the validity of assessment processes, since gifted children will be provided with opportunities not accessible to others.

A second issue concerns lack of technically sound screening instruments in gifted identification. There are few screening instruments available to complement the popular IQ test in providing a comprehensive picture of a student's abilities. The ubiquitous IQ test continues to be routinely used irrespective of expert opinion on how to define giftedness to determine whether a student qualifies for gifted placement. All these factors contribute to how society then normalises the education of the mathematically gifted learners.

Mathematical discourse

From a purely mathematical perspective, the biggest question has been "What does it mean to be mathematically gifted?" There seems to be no single definition of mathematical giftedness. The literature suggests that mathematically gifted students could be thought of as those who have special mathematical abilities or those who engage in qualitatively different mathematical thinking. Most studies on students who are gifted in mathematics draw on the work of a Russian psychologist Krutetski who originally published his findings in 1968. For example, Krutetski's (1976) work revealed a number of characteristics and abilities that mathematically able children possess: ability for logical thought with respect to quantitative and spatial relationships, number and letter symbols; the ability for rapid and broad generalization of mathematical relations and operations, flexibility of mental processes and mathematical memory. These abilities have usually been summarised under three categories: (1) **Analytical -** Analytically gifted maths students tend to think abstractedly with ease. They solve problems using logic and reasoning, (2) **Geometric -** Geometrically gifted maths students prefer using diagrams and visual aids to solve problems and (3) **Harmonic -** Harmonically gifted maths students can use both geometric and analytic methods of thinking with ease.

Besides those attributed to Krutetski, a number of characteristics of mathematical giftedness have also been proposed by several other researchers and these include inter-alia high spatial ability, the ability to develop unique relations, producing original, insightful solutions or formulating imaginative questions and the ability to organise data in such a way to consider patterns or relationships. All these conceptualisations add to the complexities of defining mathematical giftedness and they are further compounded by an observation that not every mathematically gifted student will display all these characteristics, or they may emerge at different times depending on the student's development. Much of identifying mathematically gifted students therefore relies on on-going assessments and teacher observations but is this happening in African countries.

Cultural discourse

From a cultural perspective, research shows that if gifted students are to be accurately identified and provided for, teachers must have a clear understanding of the influence of culture when they formulate their school definition of giftedness. Although people from different cultural groups may identify the same areas of giftedness, it is highly likely that differing priorities are placed on these areas. Bevan-Brown (2009) then provided a summary (Figure 2) of how these cultural lenses influences the way giftedness is normalised.

<insert figure 2 here>

This multiplicity of discourses and the way images of the mathematically gifted are shaped thereof then provided lenses through which to search for alternative views of 'best practice'.

METHODOLOGY

The study was a survey aimed at gathering data on the efforts of different African countries in identifying and supporting talented mathematics students in the 10 – 18 years age group. While the survey from which this paper draws raised a number of other issues related to mathematics education in general, the focus of this paper is on the responses received on issues to do with:

(a) how countries identified mathematical talent among students

(b) tracking of the mathematically talented

(c) teacher programmes for talented students

(d) provision of a differential curriculum for the talented students

(e) gross enrolment ratios and teacher pupil ratios across the selected countries

The responses are not discussed in the specific order in which they are presented here.

Given the extent of the continent, data were collected from selected countries in North, South, Central, East and West Africa. The selected countries included Burkina Faso, Democratic Republic of the Congo, Ghana, Kenya, Lesotho, Malawi, Mozambique, Nigeria, Rwanda, South Africa, Swaziland, Tanzania, Tunisia, Uganda, Zambia, and Zimbabwe. These selections were based on two criteria (a) an attempt to have representation across all the distinct regions of the African continent and (b) countries where direct contact was possible.

The data were collected by seven PhD Fellows based at one South African University. Their countries of origin are one each from Lesotho, Malawi, Nigeria, South Africa and Zambia while two were from Zimbabwe. Each of these fellows was a high ranking mathematics/science educator in their respective countries of origin. Through their personal contacts the researchers were able to collect and then corroborate information from mathematics teacher educators, administrators, education officers, websites and other organisations in their respective countries as well as their neighbouring countries. The respondents completed a questionnaire sent through their e-mail addresses. In many instances, the e-mail approaches were followed up telephonically or personally where possible with the aim of either corroborating, confirming or clarifying information provided.

As practising teacher educators in their own countries, the fellows were also interviewed so that they could draw on their own experiences to clarify certain issues related to mathematics education either in their own countries or in other neighbouring countries they had been assigned to collect data from. The decision to employ various approaches for collecting data was born out of the realisation that, for a variety of reasons, educational information is generally not readily available in quite a number of African countries. Some of the contacts were unable to provide all the necessary data due to some unique peculiarities of different countries. However, multiple sources of data made it possible for the research team to reduce some gaps to a bare minimum. All these efforts were meant to enhance validity and reliability of data.

RESULTS AND DISCUSSION

A central issue of the study was how mathematically talented learners were identified in different African countries. Responses on screening and tracking students were viewed as the major source that could provide reliable data on how different countries were identifying and nurturing talented students. In the absence of screening mechanisms, some indicators of quality education are also analysed in order to assess the extent to which talented students are academically stretched to their optimal levels. Results from each of these strategies are briefly presented and discussed below.

Screening and tracking exceptionally talented mathematics students

From the responses on the questionnaire and interviews the method of identifying/screening mathematically talented learners which is commonly used by most countries is through participation in Mathematics Olympiads. Pan African Mathematics Olympiad (PAMO) for example is one such annual event organised by the African Mathematical Union (AMU) to encourage youthful talent in Mathematics and to exchange information on curricula and teaching methods in mathematics across the African continent.

<insert table 1 here>

Of the 16 countries that were surveyed 11 had participated at PAMO at least once since its inception in 1988. Besides participation at PAMO these 11 countries also had localised national Olympiads. However, only 2 countries had localised national Olympiads giving a total of 13 (81%) that had such a system of identifying talent. The reports from 4 countries were silent on their participation either at PAMO or at national Olympiads.

Consistent with the recommendations put forward by Miller (1990) that a number of test batteries should be used to identify true mathematical talent this paper argues that participation at either national mathematics Olympiads or international Olympiads would be insufficient in identifying mathematical talent. Therefore it could also be argued that these African countries lacked an organised means of identifying talented students of mathematics. This argument was further reinforced when corroborated with responses to a related question which focused on what purpose such Olympiads served were analysed. The respondents said that Olympiads were meant mainly to recognise and reward mathematical achievement but not much was done to track and nurture this mathematical talent thereafter.

The survey also intended to find out where in the school system such talented mathematics students were placed. While it is acknowledged that there were some responses which indicated that some schools in different countries had homogeneous groupings of talented learners; it was however noted that in all the countries surveyed such arrangements were an exception rather than the norm. As national policy the majority of talented students were placed in the normal classrooms. However, in both cases where students were placed in either homogeneous or heterogeneous groupings the talented students were taught by non-specialist teachers. Renzulli as cited in Knobel and Shaughnessey (2002) argued that talented students could only be served in regular classrooms containing students of varying ability if certain conditions were met. One of the conditions was that these regular classroom teachers needed either special training in teaching talented students or access to specialists who could then come into the classroom to provide assistance. Feldhusen (1989) made similar observations in several of his studies and argued that talented students needed teachers who understand both the nature and the needs of talented youth and are deeply knowledgeable in the content they teach. In the interviews held with some teacher educators the study was interested to find out whether teachers in these countries received pre-service training on talented education. The responses indicated that with the exception of 1 country pre-service mathematics teachers did not receive training on talentedness. Even in the case of those who received training as special needs teachers the responses indicated that there was no special course on talentedness in general and on mathematical talentedness in particular. Talentedness was included in their curriculum only as a minor topic. Rogers (2002) analysed the research on various grouping options for talented learners and found out that full-time (homogeneous) talented education programs demonstrate the strongest benefits followed by cluster grouping within heterogeneous classes. In both cases there had to be a classroom teacher who had received special training in talented education.

Besides special training for teachers the study was also interested to find out whether the talented learners followed a different curriculum from their peers who were not so talented. With specific reference to the education of the mathematically talented learners, Diezmann and Watters (2002) argued that talented students should receive a differential curriculum specifically responsive to their faster pace of learning and higher level skills. Mathematically talented learners thrive best in environments that are a good fit for their level and pace of their development which provides opportunities for the joy and satisfaction that comes from mastering challenges, alongside companions who share their interests, curiosity, depth of understanding and sense of humour (Reis and Hebert 1995). Feldhusen (1989) made similar recommendations based on extensive research analysis that grouping of talented students in special classes with a differentiated curriculum, or as a cluster group in a regular heterogeneous classroom, but again with differentiated curriculum and instruction, leads to higher academic achievement and better academic attitudes for the talented. Contrary to these benefits of a differentiated curriculum for talented learners, the responses from participants of this study showed that only 1 country has special schools for the talented learners and the rest of the countries had none.

Some indicators of quality gifted education

Given that talented mathematics students were considered and treated just as normal students within normal classrooms, the study was also interested in understanding the abilities of such countries' educational systems to support mathematical talent development within such normal classrooms. Some of the indicators that were looked for were teacher pupil ratios and gross enrolment ratios. The countries surveyed had different pupil ratios at different levels of their education system, so instead of considering teacher pupil ratio by country, it was considered more informative to consider ratios by level. There were 20 such levels and Table 2 displays these class sizes for countries surveyed.

<insert table 2 here>

Most of the countries have teacher-pupil ratios that are high with one country reporting a teacher pupil ratio of 1:233, and another one 1: 309. Such high teacher pupil ratios run counter to the aim of providing for gifted learners in the normal classrooms. In South Africa for example, there has been considerable criticism of various aspects of curriculum implementation manifesting in teacher overload as cited in the report by the task team for the review of implementation of the new curriculum (Department of Education 2009). Such concerns seem to be a general feature of African Education as a World Bank Report made similar observations (Ottenvanger, van de Akker and de Feiter, 2007). These high ratios also run counter to the aim of equitable provision of education and that of learner-centred education as teachers become constrained from giving individual attention especially to gifted learners. Hence this paper argues that it was highly unlikely that the educational needs of mathematically talented students would be sufficiently met in such large classes. Even where this individual attention was given evidence shows that the most common focus has been on the underachievers. Harlem and Malcolm (1997) for example, observed that in a heterogeneous class teachers aim their lessons at the middle of the ability range. Winebrenner (2001) made similar observations that when teachers teach a class, they plan content, pacing, amount and activities based on what they know about the 68% typical/average students in the class. She observed that when teachers try to adjust teaching for the not so average many such adjustments are for the benefit of the 16% below-average learners and not the 16% above average. Her conclusion was that if learning were to be defined as forward progress from what students don't know to what they know then it would be undeniable that of all the children educators teach in heterogeneous classes, those at most risk of learning the least are the talented students.

Besides the teacher pupil ratios, the study was also interested to understand the gross enrolment ratios for these countries. Table 3 shows that of the 14 countries that responded to this question, 11 (79%) have gross enrolment ratios of less than 40%. A UNESCO global education digest for 2011 indicated that in Sub-Saharan Africa, more than 21.6 million children of lower secondary school age in the region remain excluded from school and many are expected never to enter school.

<insert table 3 here>

Low gross enrolment ratios, higher teacher pupil ratios and large class sizes have been cited as some of the major causes of inefficiency in the secondary mathematics education in African countries (Ottenvanger, van de Akker and de Feiter, 2007). Consistent with such observations some researchers have concluded that talented and talented learners are, in fact, disadvantaged and handicapped in the normal school situation (Fiedler, Lange and Winebrenner 2002)..

CONCLUSION

This study aimed at exploring how mathematically talented students are identified and natured in some selected African countries. One trend that is clear is that efforts are being made, although insufficient, to identify talent in mathematics through the Olympiads. However very little seems to be done to track and support exceptionally talented mathematics learners. The general picture from all the African countries which participated in this survey is that there are no structured systems for nurturing highly talented mathematics students. Only one country from the 16 that were surveyed has special schools for the talented learners. Failure to nurture highly talented learners could result in opportunity losses for the children themselves and lack of scientific and technological development for society at large. Such are the potential students who could become tomorrow's scientists and artists, whose creativity would open doors to better tomorrow for all.

RECOMMENDATIONS

Failing to nurture mathematical talent by African countries does not augur well with the notion of trying to promote economic development. The situation could be surmised by the irony of 'suffering in the land of plenty' as Africa fails to utilise its local resources. If Africa is to survive in this technological era, she must adopt a concept similar to that of the green revolution by encouraging youths to achieve excellence in their areas of talent and by nurturing a deep moral, social and civic community. Mathematics education can play a pivotal role in economic development and so it is recommended that nurturing talent would be one way of ensuring that the educational needs of mathematically talented students are identified and efforts are made to get them develop to their maximum potential for the benefit of all.

In societies that care about their children as evidenced by the setting up of special schools for students with mild and severe disabilities, students with learning and behavioural difficulties, it is difficult to justify continued neglect of those for whom the ordinary school programme appears to be a poor fit like the mathematically talented students. To adequately cater for the mathematically talented learners there is need for African countries to draw upon and extend research that informs professionals, curriculum developers and policy makers about educational practices that address the assumptions underpinning the education of the mathematically talented. Empirical evidence has shown that talented mathematics learners do not develop to their maximum potential in the normal school. Their programs should therefore differ just like those for schools for the visually impaired, for the hearing impaired and for those who are mentally or physically retarded. Their teachers should also be adequately trained to be able to address the needs of the gifted learners. Yet such programs for the mathematically talented students seem to be conspicuously absent from the educational systems of the countries surveyed.

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FIGURES

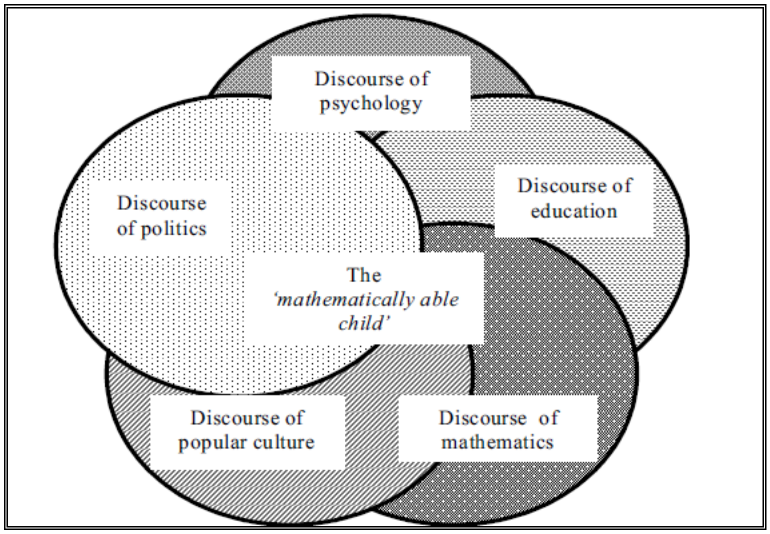

Figure 1 Possible elements of the discursive complex in which statements about the 'mathematically able child' may be produced (Walls, 2004)

Figure 2 Cultural influences on giftedness (Bevan-Brown, 2009)

TABLES

Table 1 Screening and tracking of gifted students (n = 16)

PAMO Participation	Localized Olympiads	No response	Public Schools for the gifted	Teacher Training for the gifted
11	13	4	0	0
69%	81%	25%	0%	0%

Table 2 Teacher pupil ratios at different levels (n = 20)

Range	$x \leq 20$	$20 < x \leq 50$	$50 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$
No.	1	9	6	2	2
%	5	45	30	10	10

Table 3 Gross Enrolment ratios in the selected countries (n = 14)

%Range	$0 < x \leq 20$	$20 < x \leq 40$	$40 < x \leq 60$	$60 < x \leq 80$	$80 < x \leq 100$
No.	5	6	2	0	1