# An Analysis of Mathematically Gifted Learners' Environmental Perceptions in Alpha Mathematics Centres in One Province of South Africa

*Milne, A.H. & Mhlolo, M.K*

*Central University of Technology*

## ABSTRACT

Ample evidence shows that authorities are now coming to realise that if South Africa were to transform student potential into the skills that are needed in the 21st century, there is need to put well-structured talent development programmes in place for its gifted students. As part of needs analysis, we must start by understanding the perceived realities of gifted students in the inclusive classrooms in which they are currently placed.

*Keywords:* gifted; differentiated; mathematics; curriculum; environmental perceptions.

*Classification:* DDC Code: 372.72 LCC Code: QA139

*Language:* English

London Journals Press

LJP Copyright ID: 573333
Print ISSN: 2515-5784
Online ISSN: 2515-5792

London Journal of Research in Humanities and Social Sciences

Volume 22 | Issue 7 | Compilation 1.0

# An Analysis of Mathematically Gifted Learners' Environmental Perceptions in Alpha Mathematics Centres in One Province of South Africa.

Milne, A.H.[α] & Mhlolo, M.K[σ]

## ABSTRACT

*Ample evidence shows that authorities are now coming to realise that if South Africa were to transform student potential into the skills that are needed in the 21st century, there is need to put well-structured talent development programmes in place for its gifted students. As part of needs analysis, we must start by understanding the perceived realities of gifted students in the inclusive classrooms in which they are currently placed. In this paper we report the findings of a qualitative study embedded in Gagne's differentiated model of gifts and talents to determine the perceptions of gifted mathematics learners about the education systems and factors influencing their achievement. A total of 50 Gifted mathematics learners, all taking Alpha mathematics, gave their perceptions about the education system, support from their parents and what they want to see change in the education system. The owners of the Alpha maths centres gave permission that their learners can complete anonymous questionnaires. The analysis of these results clearly indicated that the South African Mathematics Curriculum needs to be differentiated in order to give all learners access to mathematics.*

*Keywords:* gifted; differentiated; mathematics; curriculum; environmental perceptions.

*Author* α σ: Central University of Technology. e-mails: annarimilne@gmail.com, mikemhlolo@icloud.com

## I. INTRODUCTION

Since 1994 South Africa's poor performance in mathematics has prompted studies to determine the reasons for as well as to propose what needs to be done to improve the situation. To this end many studies as well as ministerial task teams have been set up over the past two decades and their recommendations have had several implications for both policy and implementation. From these efforts, an important observation that we note is the assimilation of Singapore Mathematics Curriculum [SMC] in more than 80 South African schools to improve learners' mathematics learning outcomes. Despite this process of assimilating SMC into the South African Schools having started way back in 2002, none of the task team reports made specific mention of gifted education as a possible strategy for addressing the country's challenges. Yet there is evidence to show that gifted education is what drives Singapore's success given that the country's vision was to build an inclusive society with many peaks of excellence (Lee, 2006). It was only recently that the evidence gathered by the Mathematics & Science Task team, showed that, often, provincial education departments seemed to focus on under-performing schools, while neglecting gifted learners and learners with MST potential (Department of Basic Education, 2013:48). Based on the findings of the investigation, the task team believes that the first and most critical priority to address is to do with teachers and teaching related issues (DBE, 2013). These findings together with other similar studies (Oswald & de Villiers, 2013; Kokot, 2011; Mhlolo, 2017) all suggest that if South Africa were to transform student potential into the skills that are needed in the 21st century, there is need to put well-structured talent development programmes in place for its gifted students.

London Journal of Research in Humanities and Social Sciences

However, before we can set up well-structured development programs for the gifted or train teachers on how to meet the needs of gifted learners, our view is that in South Africa, we must start by understanding the perceived realities of gifted students in the inclusive classrooms in which they are currently placed. A primary reason for students who are gifted to underachieve is equated to school factors that motivate or demotivate them and previous research has confirmed that the underachievement of cognitively gifted students is closely related to motivational deficits (Barbier, Donche & Verschueren 2019). Their findings suggest that if we aim to shed further light on the role of inhibiting or facilitating factors that influence the motivational development of intellectually gifted students, we need to allow the academically gifted learners a voice in narrating their lived experiences thereby enabling us to identify their support needs in the school context. We need to reveal facilitating or hampering factors for their engagement and achievement as described by the gifted learners themselves. Yet empirical evidence suggests that research in South Africa on giftedness, and specifically on the gifted learners' lived experiences is limited implying that this is a neglected terrain for research (Taylor & Kokot, 2000; Wallace, 2007; Kokot, 2011). So, this paper draws from a study which aimed at understanding the mathematically gifted learners' perceptions of the school environment in terms of how different environmental factors inhibited or supported their academic achievement.

### *1.1 Theoretical framework - Gagné's Differentiated Model of Giftedness and Talent*

The importance of utilizing a theoretical framework in research cannot be stressed enough because it is one of the most important aspects in the research process which must be identified at the inception of the study. Grant & Osanloo (2014) posit that the theoretical framework should resonate with every aspect of the research process from the definition of the problem, literature survey, methodology, presentation, and discussion of the findings as well as the conclusions that are drawn. So, what theoretical framework guided our study?

Admittedly there are several influential theories and models in the field of gifted education, however, Gagné's model and its theory of development is among the top six that have been considered dominant in affecting international classroom practice. The model has received worldwide recognition because it is generally viewed as resolving the controversies that the gifted field has struggled with for years (Pfeiffer 2013). In 1985 Gagné first conceptualized his theory of talent development which he first named as the Differentiated Model of Giftedness and Talent (DMGT). Although over three decades since its inception Gagné made further refinements to the model resulting in what he now calls the Comprehensive Model of Talent Development (CMTD), our view in this paper is that the DMGT model as depicted in Fig. 1 would suffice.

Briefly the model brings together six components that can be grouped in two trios (Gagne, 2011): the first trio expresses the talent development and consists in gifts (G), talents (T) and talent development processes (D); the second trio expresses the supportive trio and describes interpersonal catalysts (I), environmental catalysts (E) and chance (C). It is the framework that was considered suitable for this study and *Figure 1* illustrates the thinking behind the DMGT.

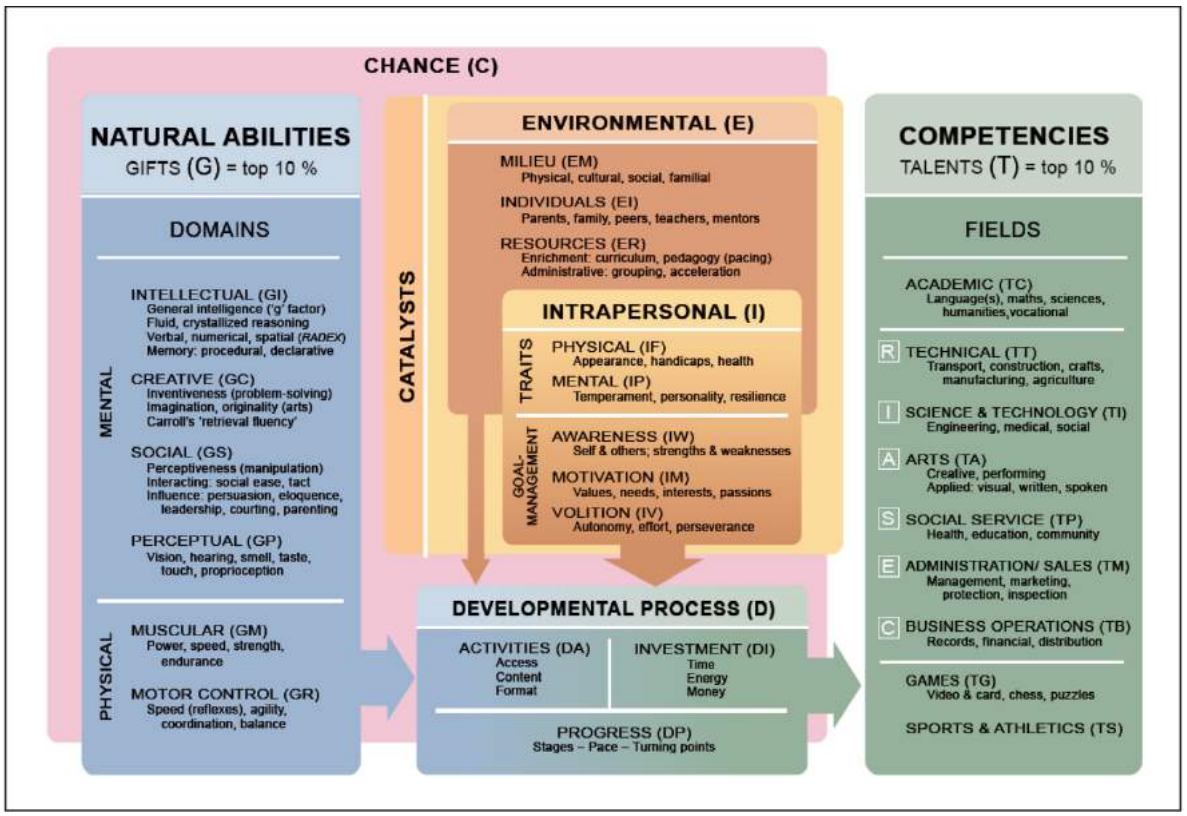


*Figure 1:* Gagné's Differentiating Model of Giftedness and talent (DMGT) – reproduced with written permission

Essentially, Gagné has been dissatisfied with the frequent, all-encompassing, and interchangeable use of the terms *gifted* and *talented*. He argued that the 'one term fits all' use of gifts and talents was inaccurate, misleading, and detrimental to all efforts to identify and nurture talent, because it suggests that talents are inborn hence there is no place for systematic training, learning, or practicing. Yet there is ample evidence from elite sport and performing arts programs that have combined identification of ability with honing of this potential into talents. Gagné therefore argued that there is, and should be, a clear distinction between these two most basic concepts— 'gifts' and 'talents'. In his model Gagné's (2015) view is that giftedness designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers. On the other hand, talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of 'learning peers' (those who have accumulated a similar amount of learning time from either current or past training). The DMTD model then depicts the progressive development of gifts into talents in a potential-performance continuum where on one end 'gifts/natural abilities' represent the raw material and on the other end 'talents/competencies' represent the outcome of the talent development process. This developmental process is continually modulated by two large sets of catalysts which are critical in activating the translation of giftedness into talent.

Talent development is formally defined as the systematic pursuit by talentees, over a significant and continuous period, of a structured program of activities leading to a specific excellence goal (Gagné 2010). This process is facilitated (or hindered) by the action of two types of catalysts: intrapersonal (IC) and environmental (EC). The intrapersonal catalysts are subdivided into physical and psychological factors, all of them under the partial influence of the genetic

endowment. Among the psychological catalysts, motivation and volition play a crucial role in initiating the process of talent development, guiding it, and sustaining it through obstacles, boredom, and occasional failure. Self-management gives structure and efficiency to the talent development process, and to other daily activities. Hereditary predispositions to behave in certain ways (temperament), as well as acquired styles of behaviour (e.g., traits and disorders), also contribute significantly to support and stimulate, or slow down and even block, talent development.

The concept of environmental input brings to mind spontaneously significant *persons*, be they parents, siblings, the extended family, friends, educators, mentors, idols and so on. The significant impact of persons on other persons is probably easier to imagine than that of any other source of influence within the environment. Many different persons, not only parents and teachers but also siblings and peers, may exert positive or negative influence on the process of talent development. Thus, it is not surprising that a good percentage of the professional literature on talent development, not only in academia, but also in arts, business, or sports, examines the potential influence of significant individuals in the immediate environment of gifted or talented youngsters.

### *1.2 Relevance of the DMGT to our study*

It is one thing to identify an appropriate theoretical framework for a study, but it is another thing to show the connections between the theory and the study. Given that a theoretical framework is the researcher's lens with which to view the world, the researcher has the responsibility to show the criteria for selecting and applying the theory to a study and that criteria must be appropriate, logically interpreted, well understood, and align with the question at hand.

The DMGT model adds coherence to our paper in many ways. An underlying principle of Gagné's view is that while high ability (talent) has some genetic basis (giftedness), learning, practice, and environmental factors are necessary for the emergence and development of such talent. The developmental process can be influenced through the way catalysts are managed either directly or indirectly implying that a student's potential can either be developed or hindered by environmental and intrapersonal catalysts. This conceptualisation of the gifts-talent continuum through the catalysts enables any interested research to investigate (1) the physical, cultural, or social environment, (2) the teachers, parents, peers as individuals who manage the other non-human catalysts and then (3) the gifted students themselves in terms of their temperament, personality and motivation. This framework therefore enabled us to argue that learners' perceptions of their own experiences of school, their parents' influence, their teachers' practices and what they want to see change, can positively contribute to the enhancement of the gifted education in South Africa. Consistent with this view we then raised the following three research questions:

- What are learner perceptions about their general mathematics curriculum as well as the Alpha Mathematics curriculum?
- How do gifted learners perceive the teachers who teach them?
- To what extent do gifted learners perceive their parents as supportive?

## II. METHODOLOGY

### *2.1 Context of the research sites*

Alpha Mathematics centres extend math beyond the walls of the classroom. The work done here provides a real-world context that engages the mind of the global learner while fulfilling international educational standards. The benefits are long term. The investment in these sites is primarily in the intellect and the thinking ability of the students, while it cultivates independence. The students attending these centres are performing mathematics students that want to enrich their knowledge and grow in their abilities to tackle mathematics in their further studies and careers.

### 2.2 Research Design

The definition of gifted learners by the National Association for Gifted Children (NAGC, 2010) reads as follows:" Gifted *individuals are those who demonstrate outstanding levels of aptitude (defined as an exceptional ability to reason and learn) or competence (documented performance or achievement in top 10% or rarer) in one or more domains.*"

Because there is no formal identification method of gifted learners used in South Africa, the researcher, in line with the above definition, made use of the performance of these learners on a level 7 in both mathematics and alpha maths. The level 7 national code from the CAPS document (2013) relates to performance at a level of 80 - 100% and is described as outstanding. Alpha mathematics is an extra-curricular subject based on problem-solving in a comprehensive calculus and algebraic curriculum. The curriculum draws upon Singapore Maths, which aims to develop mathematical concepts of mastery. The curriculum also look at matrices, vectors, and complex numbers and power sequences among others. It is giving learners access to advanced maths and help them develop higher order thinking and reasoning skills in preparation for further studies.

This was a qualitative descriptive study in which we used open ended questionnaires to capture learners' perceptions.

### 2.3 Participants

Gifted maths learners from Gr 10– 12 took part in this study.

All 50 participating learners also take ALPHA maths as an extra subject at two Alpha Maths centres in the Free State, one in the Northern Free State and one in the Eastern Free State.

The subject is offered as an extra subject (after hours), implying extra effort from the students' side. The choice of taking it, is thus purely that of the high performing student who are willing to walk the extra mile to enhance his/her opportunities for further studies. In this regard these learners are seen as being gifted because their performance in both Mathematics and Alpha Mathematics are on level 7.

The distribution of learners as well as the average performance in both mathematics and alpha mathematics is as follows:

*Table 1:* Distribution of participants ($n$ = 50)

| | Grade 12 | Grade 11 | Grade 10 |
|---|---|---|---|
| Number of participants | 20 | 16 | 14 |
| Average % in NCS | 91.4 | 86.4 | 85 |
| Average % in Alpha Mathematics | 88.87 | 83 | 80 |

### 2.4 Data collection procedures

Data were collected using open ended questionnaires which were filled by participants anonymously. The questionnaires measured learners' perceptions of their own experiences of the NCS as well as the Alpha Mathematics, their parents influence, their teachers' practices and what they wanted to see change.

### 2.5 Ethical Statement

Approval to carry out this study was obtained from the authors' institution, from the Department of Basic Education in the Free Statement as well as from the Alpha Mathematics Centers in the Free State province. Participants' parents signed consent forms before taking part on this study. All the ethics clearance certificates were uploaded with this submission.

### 2.6 Data Analysis procedure

Consistent with the qualitative approach, the questions in the questionnaire had a certain degree of embedded openness. The learners were not limited to only a single answer, thus scores per sub-question will not necessarily add up to only 50. Results with a choice bigger than 10 out of 50 was recorded and taken as significant contributors.

## III. RESULTS

*Research Question 1*

In the first part of our first research question, we wanted learners to describe their experiences of the NCS meant for all learners. Table 2 summarises their responses.

*Table 2:* Learner experiences of the NCS ($n$ = 50)

| Comment | Boring | Repetitive | Very easy |
|---|---|---|---|
| Freq. | 19 | 19 | 20 |

*Specific learner responses included:*

Learner 15: "boring, no challenges",

Learner 24: "every time just more of the same",

Learner 32: "the work could be finished in a short time and then we had to sit and wait for everyone",

Learner 37: "I always finished the work fast and then I had to wait."

In the second part of our first research question our interest was in capturing learner perceptions about Alpha Mathematics.

*Table 3:* Perceptions of learners about taking Alpha Mathematics ($n$ = 50)

| Comment | Making way forward easier | Doing a variety of methods | Develop problem solving skills | Challenging questions developing my mind | Enriching knowledge |
|---|---|---|---|---|---|
| Freq. | 23 | 15 | 36 | 24 | 18 |

*Here are some selected learner responses to the question:*

Learner 5: "I like the challenge of Alpha maths. It forces me to think out of the box."

Learner 30: "Quick, fast thinking. I was able to think of more than one possible way to tackle a problem."

Learner 39: "My knowledge is growing so my future studies as an engineer will become easier."

Besides this general description of their experiences of the Alpha Mathematics and the NCS, we wanted learners to specifically describe the influence of Alpha Mathematics on their understanding of the NCS. Table 4 summarises the responses.

*Table 4:* Influence of Alpha Mathematics on the NCS ($n$ = 50)

| Comment | Answering higher order questions easier | Read maths with better understanding | Improved ability to immediately start with questions | Understanding faster and better | Ability to see different solutions |
|---|---|---|---|---|---|
| Feq. | 15 | 26 | 19 | 36 | 34 |

*Some of the learner responses included:*

Learner 12: "The level 4 questions in school maths was easy now, because in alpha maths we are learning to combine different skills in order to solve a problem."

Learner 36: "We are constantly challenged, so you learn to read faster with understanding and to look at problems from different points, thus one learned to work faster and more effectively,"

*Research Question 2*

In the second research question, our interest was in learner perceptions about their teachers. This research question was broken down into learners' experiences of their teachers when teaching the NCS as well as when they are teaching Alpha Mathematics. Table 5 summarises the responses when teachers are teaching the NCS.

*Table 5:* Perceptions of learners as teachers teach the NCS ($n$ = 50)

| Comment | Sitting in a class > 40 | Pace of slower learners followed | Not being challenged | Textbooks and papers on different levels | Not enough time for maths | No real applications in textbooks |
|---|---|---|---|---|---|---|
| Freq | 35 | 38 | 25 | 19 | 20 | 33 |

*Some of the learners' actual statements included:*

Learner 7: "Teachers do not give us enough time to do Mathematics"

Learner 37: "Maths time is not enough, there are too many other irrelevant things taking time"

Learner 41: "Always following routine procedures for doing maths"

Learner 42: "Why we can't work at our own pace or get more challenging questions, I do not understand"

Learner 48: "Long methods taking for ever doing Maths stuff that is simple"

Learner 50: "Over and over the same silly things instead of interesting new questions"

*Table 6:* Perceptions of learners about teachers when teaching Alpha Mathematics ($n$ = 50)

| Comment | Sitting in small class < 15 | Individual pace of learners followed | Different Representations helping to overcome maths anxiety | Passionate teachers demonstrating good content understanding | Teachers allow learners to explore different approaches |
|---|---|---|---|---|---|
| Freq | 43 | 38 | 29 | 40 | 39 |

Learner 24: "Because my teacher cared, she helped me not to be scared anymore. So, I started to enjoy Mathematics."

Learner 45: "My teacher loves Mathematics, and she tries to make it fun for us."

Learner 33: "My teacher is passionate and knowledgeable about Mathematics."

Besides these descriptions of their perceptions about teachers, we were also interested to know what changes learners would like to see. Table 7 summarises the responses.

*Table 7:* Learner suggested changes ($n$ = 50)

| Comment | Combine same ability for better pace | Real maths topics must grow over the years | Levels of textbooks and papers must correspond | Overload of same things | More time allocated for maths |
|---|---|---|---|---|---|
| Freq. | 38 | 15 | 19 | 25 | 26 |

*Some of the learners' suggestions are given below:*

Learner 14: "I believe it will be better if the stronger students are together in class because then we can work together and move at a faster pace and not wait for slower students to finish first"

Learner 26: "Give us real problems, like the ones in papers, not the straightforward textbook ones."

Learner 35: "We have so many subjects with lots of repeating homework, so I want to see more time given to maths."

Learner 39: "Give us challenging sums, not the same thing over and over again."

*Research Question 3*

In the third research question, we were interested in understanding the extent to which learners perceived their parents as supportive. Table 8 summarises the responses

*Table 8:* Learner perceptions about parental support ($n$ = 50)

| Comments | Nothing | Motivated | Freedom of choice | Supportive | Doing maths challenges with me |
|---|---|---|---|---|---|
| Freq. | 11 | 30 | 12 | 34 | 14 |

*Some of the learner responses include:*

Learner 19: "My parents say that it is my choice to work extra, they will support me."

Learner 23: "We are always doing soduko together and once a week we give each other a mathematical challenge to answer."

Learner 34: "We have logic problem books in the car, so when we travel, we can keep busy with this,"

Learner 41: "My parents both love maths, so they keep on motivating me and helping me. They will never give me the answers, just help me to figure it out."

Learner 49: "My mom told me it is my choice if I want to take extra maths, she will drive me,"

## IV. DISCUSSION

In the first part of research question 1, we were interested in learner perceptions about the National Curriculum Statement (NCS) which is the standard curriculum meant for all learners in South Africa.

The results show that learners generally perceived this curriculum as boring, lacking challenge and repetitive. Respondents complained about lessons which were too slow for them and that they preferred to work independently. Respondents preferred to research things for themselves and preferred tasks which required them to think, something which is rare in the standard curriculum that is followed in inclusive classrooms. These results are similar to those from a study done by Barbier et al (2019) where the majority of the respondents spoke about the hampering effect of the lack of challenge and the

lack of interesting tasks at school. In a similar study Csikszentmihalyi (1993) also found out that when tasks were too simple the students disengaged because tasks that are too easy cause boredom. Similarly, Chessman (2007) noted that an important consideration in the process of teaching and learning is the match between task complexity and the level of student skill – a concept referred to as "flow" or optimal engagement.

In their Achievement Orientation Model (AOM), Siegle & McCoach (2005) also point to the importance of task complexity under goal valuation – which refers to the extent to which students consider certain tasks as worthwhile. This aspect of goal valuation is divided into three factors: the intrinsic value (student's interest in a task), the utility value (the meaningfulness of a task) and the attainment value (the importance students attach to the task as it relates to their conception of their identity and ideals). According to the AOM, students can be motivated by one or more of these factors. In Barbier et al. (2019) study, both well and underperforming students spoke of the hampering effect of the lack of interesting tasks at school. The respondents defined interesting tasks as those that address higher order thinking skills and those that allow students to learn.

In the second part of the first research question, we were interested in learners' perceptions about the Alpha Mathematics – a curriculum meant for the students who want to enrich their knowledge.

Respondents described this curriculum as challenging, as enabling them to think out of the box and prepared them well for problem solving as well as for careers in science such as engineering. Another respondent in this study noted: *I believe it will be better if the stronger students are together in class because then we can work together and move at a faster pace and not wait for slower students to finish first.* In a similar study, Prior (2011) noted that students who are intellectually gifted say they need independent learning and time with like-minded peers. This preference for gifted students to work with like-minded peers is closely associated with a practice where in mixed ability grouping, they are usually used as tutors for the less able students. There is a myth that gifted students can be viewed according to the harmony hypothesis in which they are seen as leaders, role models, and humanitarians which in turn is closely related to the belief that gifted students will succeed on their own, regardless of their school experiences. The danger with this misconception is that it might increase the use of gifted students as teachers' assistants, viewing them as a teacher's helping resource [Laine & Tirri, 2016]. Similar studies have shown that highly able students may suffer from this "sucker effect", where they feel exploited as tutors of the less able, held back and less productive (Robison, 1990).

In the second research question, our interest was in learner perceptions about their teachers when teaching the standard curriculum as well as the Alpha Mathematics.

With reference to teachers practices when teaching the standard curriculum, a common theme that runs through learners' responses was that teachers provided teacher-directed teaching which emphasised routine procedures which offered learners neither challenge nor a chance to move at their own pace. Participants complained about teachers: "Always following routine procedures for doing maths, not being allowed to work at their own pace, not getting more challenging tasks, long methods doing simple stuff. " In similar studies, challenge and choice were concerns listed by students in the Gentry et al., (2002) study. Our view in this paper is that such practices cannot be attributed to teachers not having been trained in gifted education. We argue that a standard curriculum comes with its own pressures on teachers which inhibit differentiation and flexibility.

There is a good deal of evidence that high stakes summative assessment, which is a common feature of the standard curriculum, makes demands on teachers and students that conflict with the goals and practice of assessment for learning. Teachers under pressure to reach goals expressed in terms of increase in test scores tend to focus their teaching on what is required in the

tests, spend time on practice tests and, often unconsciously, value test performance rather than genuine learning. Thus, curriculum and percentage achievement is at the centre and not learners; consequently individual difference are ignored and every learner is treated as exactly the same. According to Carroll (2000) this is a huge contributing factor to gifted learners 'feelings of alienation' in the regular classroom. The needs of individual gifted learners are often downplayed in the implementation of standard programs resulting in gifted learners complaining that school is boring and irrelevant.

With reference to teacher practices when teaching the Alpha Mathematics we note learners responses describing their teachers as "*passionate and knowledgeable about Mathematics*", teachers who "*love Mathematics and who try to make it fun for us,*" teachers who cared and helped learners not to be scared anymore. Let us remember that these are the very same teachers who taught these learners in the regular classroom following the standard curriculum - the very same teachers who were blamed for being insensitive to the needs of gifted students. This dichotomy where on one hand teachers are said to be insensitive to the needs of learners (when following the standard curriculum) while on the other hand they are passionate about teaching (when following the Alpha Mathematics program), confirms two important observations in gifted education i.e. (i) an assessment driven curriculum such as the NCS does not allow teacher flexibility or differentiation in their teaching no matter how good they may be and (ii) highly qualified ordinary teachers are capable of teaching all children including gifted children suggesting that gifted children require 'just' good all-round teaching (Mitchell 2014).

Let us remember that the teachers at the Alpha Mathematics Centres never received any special training in gifted education but they are being described as passionate and knowledgeable because Alpha Mathematics Centres select the best students as well as the best teachers. The question that has always been posed is: What kind of teaching is best for gifted students? Research found that gifted students believe that the ideal teacher will possess broad knowledge in their area of expertise, a love for their chosen field, and a great enjoyment of teaching. They will be able to adjust the curriculum and instructional methods to meet the unique needs of their students' diverse learning and thinking styles as a result of having a deep understanding of the cognitive, social, and emotional psychology and development of their students. These are the same qualities that the general student population perceives as being necessary in a "good" teacher, confirming observations that the general teaching strategies in widespread use in mainstream education can well be adapted to support gifted students' needs with good results. Haug (2017) concluded that the notion about a dichotomy in teaching between ordinary education and special education (e.g., gifted education) seems not to be relevant for most students. Instead, there is a continuum where the common general strategies in teaching are dominant but adapted to the students' abilities.

Our third research question was interested in understanding students' perceptions about parental support.

The responses from the participating gifted students are unanimous in that parents care for and support their gifted students. In a similar study Al-Shabatat, Abbas, & Ismail (2011) investigated how giftedness is nurtured in children in Malaysia, with a special focus on the effect of environmental factors such as family, peers, resources, teachers, schools, and society on gifted and talented students. The researchers found that parents significantly affect the intellectual giftedness of their children as student participants reported that their parents paid a lot of attention to supporting the development of their talents. In fact, these parents were described as willing to work extra hours to earn more money to pay for lessons related to supporting their children's talents or to allowing their children to live closer to places that offered better training and support activities. In a similar study, Vialle (2017) also reported on several types of engagement parents use to support their gifted children.

Economic resources were one such factor influencing the level of support parents could provide to their gifted children. Such economic-related support included paying for private schools or extracurricular activities that might support their children's giftedness. Another important role that parents play in terms of supporting their gifted students is the identification of such gifted students. For example when studies that compare the effectiveness of preschool children's parents and teachers in identifying gifted students are analyzed, teachers' effectiveness was found to be lower than that of parents' (Louis & Lewis, 1992). Results from these studies indicate that teachers can make healthy selections 40-73% of the time, while it has been found that parents are better observers of their children's talents and can make accurate decisions 50-90% of the time (Smuthy, 2000) confirming that parents are more successful than teachers in identifying gifted children. These researchers concluded that the role of parents is critical, along with other factors such as school and teacher, in developing talents and nurturing giftedness in these students.

## V. CONCLUSION

This paper analysed gifted students' perceptions about the National Curriculum Statement for Mathematics, the Alpha Mathematics curriculum as well as teachers and parents for these students. Our view was that before we can set up appropriate schools for the gifted or train teachers on how to meet the needs of gifted learners, we must start by understanding school factors that motivate or demotivate them. Results show that the standard curriculum inhibits growth of gifted students because it does not promote individual growth. Implication for practice is that there is need for a more challenging curriculum that would meet the needs of gifted students.

Singapore would be a good example to emulate. Their system has a curriculum for learners falling behind, a curriculum for the average and a curriculum for the gifted. Although teachers might not have been trained specifically in gifted education, results show that gifted students still perceived them as passionate and knowledgeable when teaching Alpha Mathematics. This suggests that a good teacher generally will be considered good by gifted students. In terms of parental support, gifted students perceived them as supportive suggesting to us that in setting up schools for the gifted students, parents have a critical role to play.

Going forward we recommend further studies on factors that motivate or demotivate gifted students so that results can feed into the planning and implementation of gifted education in South Africa.

## REFERENCES


1. Al-Shabatat A, Abbas M & Ismail H. (2011) The direct and indirect effects of environmental factors on nurturing intellectual giftedness. International Journal of special education 26(2): 15 - 25
2. Barbier K, Donche, V. & Verschueren, K. (2019) Academic (Under)achievement of Intellectually Gifted Students in the Transition Between Primary and Secondary Education: An Individual Learner Perspective. *Frontiers in Psychology*. 10:2533. doi: 10.3389/fpsyg.2019.02533
3. Csikszentmihalyi M. (1993). Does overinclusiveness equal creativity? Psychological Inquiry Vol 4(3): p188-189
4. Department of Education: Curriculum and Assessment Policy Statement (CAPS) 2013:http://www.education.gov.za
5. Gagné F. (2015). From genes to talent: the DMGT/CMTD perspective. *Revlsta de Education, 368: 12 - 37.*
6. Gagné, F. (2011). Academic talent development and the equity issue in gifted education. *Talent Development and Excellence,* 3, 3-22.
7. Gagné, F. (2010). Motivation within the DMGT 2.0 framework. *High Ability Studies*, 21, 81 – 99.
8. Gentry M. (2002) Students' perceptions of classroom activities. Journal of Educational Physcology 94(3), 539 - 544
9. Grant C & Osanloe A 2014. Understanding, selecting and integrating a theoretical framework in dissertation research:









London Journal of Research in Humanities and Social Sciences

Developing a 'blueprint' for your house. Administrative Issues Journal Education Practice and Research 4(2) DOI: 10.5929/2014.4.2.9
10. Haug P. (2017) Understanding inclusive education: ideals and reality. Scandinavian Journal of Disability Research, 19(3) p206 - 217
11. Kokot SJ 2011. Addressing Giftedness. In E Landsberg, D Kruger & N Nel(eds).
12. *Addressing Barriers to Learning: A South African Perspective*. Pretoria: Van Schaik Publishers.
13. Laine S & Tirri K (2016). Finnish Teachers' conceptions of giftedness. Journal for the Education of the Gifted https://doi.org/10.1177/0162353216640936
14. Lee P 2006. Understanding and critiquing qualitative research papers. NIH Jul 18 – 24.
15. Louis B & Lewis M. (1992) Parental beliefs about giftedness in young children and their relation to actual ability level. Gifted Child Quarterly https://doi.org/10.1177/001698629220360010 7
16. Mhlolo MK 2017. Regular classroom teachers' recognition and support of the creative potential of mildly gifted mathematics learners. *ZDM Mathematics Education* 49, 81 - 94
17. Ministerial Task team (MTT) 2013. Investigation into the implementation of maths, science and technology. Febr 2013
18. National Association for Gifted Children 2010. *Redefining giftedness for a new century: shifting the paradigm*. Retrieved on 18 March 2020 http://www.nagc.org/index
19. NPC 2012. *National Development Plan 2030: Our Future - Make It Work*. Pretoria: National Planning Commission, Presidency.
20. Oswald M & de Villiers J 2013. Including the gifted learner: perceptions of South African teachers and principals. *South African Journal of Education; 33(1)*
21. Pfeifer SI 2013. *Serving the gifted: Evidence based clinical and Psychoeducational practices*. New York: Routledge.
22. Prior S 2011. Student Voice: What do students who are intellectually gifted say they experience and need in the inclusive classroom? *Gifted and Talented International, 26(1&2), 121-129.*
23. Robinson G. (1990) Synthesis of research on the effect of class size. Educational Leadership, v47 n7 p 80 - 90
24. Siegle D & Mccoach B. (2005) Making a difference: Motivating gifted students who are not achieving. Teaching Exeptional children, vol 38 no 1 pp 22 – 27P
25. Taylor CA & Kokot SJ 2000. The status of gifted child education in Africa. In KA Heller, FJ Monks, R Sternberg & R Subotnik (eds). *International Handbook of Giftedness and Talent*. Oxford, UK: Pergamon Press.
26. Wallace B 2007. A reflective Conversation with Prof JG Maree. *Gifted Education International,* 23:193 – 198.