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Research Article

Identifying mathematics underachieving gifted in classroom

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Abstract

Underachievement in Mathematics among gifted children has been a serious concern of most parents, teachers, school administrators and government. The first step towards appropriate intervention in an inclusive classroom is the identification of the vulnerable children from the population. The identification of gifted child's underachievement in Mathematics has generated a debate which is why a position is needed to elaborate on this issue in the context of classroom management. This paper thus viewed the cause of mathematics underachievement among gifted children from two perspectives: environmental and personality factors. The environmental factors are from two areas namely; school and peer influences. A school that does not support ability or anti-Mathematics ability peer influence contributes greatly to mathematics underachievement. Similarly, personality factors such as Mathematics self-concept and achievement motivation are considered critical to mathematics achievement of gifted children. This paper therefore, revealed characteristics to observe, screen, test as well as procedure to be taken in the appropriate identification of the children who have high potential but underachieve in mathematics. It was therefore recommended that schools should adopt the procedure elucidated in this paper so as to plan for early intervention.

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Introduction

Underachievement is an unimaginable problem of large number of gifted learners (Bélanger, & Gagné, 2006)) that is frustrating to learners, teachers and parents. There can be evidence of high academic potential, but with low actual performance (Shaw & McCuen, 1960). The problem of mathematics underachievement is growing at a fast rate even among gifted children. Seeley in Ufford (2008) estimated that 15% to 40% of high ability children experience significant Mathematics underachievement while Van Tassel-Baska (2000) reported about 63% who underachieve among academically gifted children.

It is possible to understand and discover underachievement through the behaviour of child over time. Davis and Rimm (2004) pointed out that, poor teacher motivation in Mathematics; negative child's attitudes toward Mathematics teachers, or use of poor learning style that does not challenge child's knowledge level sufficiently, may block current test scores from detecting Mathematics underachievement in a gifted child. The implication is that, there is need to check back to see if a child's old tests results show higher scores, indicating early potential, and if gone now, is an evidence of Mathematics underachievement in that child.

Using less comprehensive criteria would create an unmanageable number of Mathematics underachievers and would likely include most of the gifted population who are rarely challenged to use their abilities. As early as 1980, Whitmore reported that, if the scores of children on Mathematics aptitude tests were compared with their level of performance in Mathematics as many as 70% would probably be underachieving. Gifted child complicate identification by being aggressive and act out their frustration sometime in seeking attention negatively, or they may

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withdraw and quietly allow their potential to waste away. Generally, every one of us is underachieving because we continue to use only a small percentage of our potentials; this is surely more so gifted children than for typical children.

Procedures for Identifying Gifted Child in Classroom

Certain procedures must be followed in identifying gifted children. Considering some initial recommendations and answering the following questions will help in developing the recommendations:

- What resources (material and personnel) are available in school or community for identification exercises for advanced learners?
- Are the resources adequate to provide for Mathematics ability to be identified?
- If not, which areas should be included in programmes?

Intellectual ability should always be included; areas of general and specific academic abilities should also be included to any meaningful school programme for the gifted children (Gynnild, Tyssedal & Lorentzen, 2005). Creative ability should be included as ability in these areas support the cognitive, intellectual functions and are not totally sub component in which the learner could choose to participate. Appropriate identification process of gifted children has been viewed to involve three steps that should be consecutive. The steps are searching, screening and identifying (Clark, 2008).

The first procedural step in the search procedures is nomination. Nomination should be obtained from teachers, principals, psychologist, parents, peers and self for gifted attributes (Coleman, Gallagher and Foster, 1994). Peers have been extremely helpful in identifying potentially able children for screening. Children' information that has be found to indicate Mathematics ability includes evidence of high potential, levels of abstract reasoning ability, advanced vocabulary, advanced academic performance and honour or recognition of outstanding performance or accomplishments (Smith et al. 1990). The nomination of the teachers is of high significant to the identification search. The place of self-nomination should not be over-emphasized also. All these will constitute a poll of likely children who are gifted in Mathematics or exhibit high ability in mathematics.

Most literature posited that teachers are most familiar with the child and best qualified to make such an identification. One teacher may however work with 35 to 45 children during the day in most secondary schools. The number can be four folds greater in some schools. This is a serious impediment to the accurate nomination by the teachers because, the teacher does not have the closeness to know the children well. The attitude of the teacher is another critical issue, whatever the teacher values will be the criterion for selection. Often, the quiet, well behaved and well-dressed youngster who gets good grades is a prime target on teacher's selection. Unfortunately, teachers in High School in the study conducted by Pegnato and Birch (1959) were found to nominate the children whose behaviours were related to their own behaviours. This problem will exist even to a greater extent in primary schools where behaviours are expressed without caution. So, lack of teacher's knowledge is a serious impediment to accurate nomination

Teachers must be both effective (correctly nominating a high percentage of children who have high ability), and efficient (having a high percentage of those they nominated identified to really fit gifted programme. A way to improve teacher's nomination is to conduct training programme to increase effectiveness without loss in efficient (Clark, 2008). The teachers' concept about gifted should also be made positive, because Siegle and Powell (2004) reported that some teachers have of the opinion that when a child is sent to a special programme, the teacher of such child is incapable to teach.

Teachers must be part of the selection, the limitation notwithstanding. Clark (2008) outlined reasons why teacher must be involved in the screening for gifted children to include;

- They have data to provide, that are not available to other members of the identification team
- They need to become aware of, understand, and support the programme for gifted learners if it is to succeed.
- Without involvement in the selection process teachers will be less likely to cooperate in contributing to any further planning or implementation.

It should be realized that, the significance of identification is for appropriate placement and provision for the development of a children' potential. It is very important to identify children who can be served by a particular programme that the society is willing to offer. A child who is mathematically able will be frustrated by a programme that is limited to the study of advanced books only. Hence, opportunity provided to the children must match the needs that were identified.

Smith et al. (1990) suggested a multi-dimesional model that will encopass the following:

- Proof of exceptional performace when compare with grade-level mates;
- Proof of the children's array of potentials and needs;
- Process that measures potential as well as achievement
- Methods that seek out children from varying linguistics, economics and cultural background from special population
- Implication for educational planning

In summary, effective screening should be multidimensional and pluralistic. The following section gives the description of various criteria that should inform appropriate identification

Nomination forms

Designed for use by the teacher, principal, school counsellor, psychologist, parents, peers, the child in question, or any others who work with the children;

Teacher Comment of child performance

This includes intellectual, physical, social and emotional functioning; learning style; and motivation;

Family history and child background

This set of information should be provided by parents, and should–include historical and developmental data on the child, the health and medical records of the child and the family, the educational and occupational backgrounds of the parents, a description of the family unit, anecdotes of the child in the home that indicate unusual capacity and early development, family activities and interest, and children' extra curriculum activities and interest;

- **Peer identification;**
- **A child personality inventory-**of self-concept, values, interests, and attitudes toward school and out-of-school activities;
- **The child's work and achievements;** and
- **Multidimensional testing-**both traditional and non-traditional including aptitude and achievement.

For best result, none of these data should be used alone; instead, all should be used in combination as part of the data bank for the identification process.

Identification Indices of Gifted Child with Mathematics Underachievement in Classroom

It is necessary at this point to highlight some of the possible characteristics that are observable in gifted child who underachieve in Mathematics. Teachers in the inclusive classroom should observe a number of traits in the identified gifted child. Potential children including those with Mathematics potential but who underachieve are identified with one or more of the following characteristics (Davis and Rimm, 1994; Frey, 1989; Janos and Robinson, 1985; Karnes and Pearce, 1981; Laffon, Jenkins-Friedman and Tollefson, 1989; Redding, 1990; Rimm, 1986; Whitmore, 1980; Dada & Fagbemi, 2018).

- Have low Mathematics self-concept: negative evaluations of self; feelings of inferiority demonstrated by distrust, indifference, lack of concern, and or hostility toward those doing well in Mathematics.
- Are socially more immature than achievers; lack self-disciple, procrastinate, refuse Mathematics tasks deemed unpleasant; highly distractible; highly impulsive; unwilling to face realities and consequences.
- Have feelings of rejection; believe no one likes them; feel that parents are dissatisfied with their Mathematics achievement.
- Have feeling of helplessness in Mathematics; may externalize conflict and problems, avoid Mathematics challenges.
- Do not see the relationship between their efforts and subsequent Mathematics achievement outcomes; negate personal responsibility for Mathematics failure.
- Are irresponsible, rebellious, feelings of being victimized; have poor personal adjustment to calculation.
- Have poor interest in Mathematics
- Are unpopular with peers. Hold lower status in class, have few friends.
- Are hostile toward adult authority figures, distrust adult in general.
- Are resistant to influence from Mathematics teachers or parents.
- Have lower aspirations for future; lack future plans or career goals; resist Mathematics goals that have been set for them

- May withdraw in Mathematics class and be less persistent, less assertive.
- Lack study skills and academic curiosity; have weak motivation for Mathematics tasks.
- Dislike school and teachers; choose companions who also have negative attitudes toward Mathematics.
- Often leave Mathematics work incomplete; frequently nap during Mathematics time; often test Mathematics phobic.
- Perform at higher levels on tests that require synthesizing than on or convergent problem-solving tasks that require precise and analytic Mathematics processing

Behaviuor of mathematics gifted underachievers comes in diverse patterns, although no one child would be expected to have all or even more than a few of the traits outlined. The most prevaleent predictors of mathematics underachievement poor self-efficacy, negative attitudes toward mathematics and or teachers, low motivation regarding Mathematics achievement, classroom Mathematics exercises and assignments, and Mathematics goal evaluation (McCoach & Seigle, 2003). Other attributes often found are poor self-regulation, including the use of cognitive and metacognitive strategies and self-management are areas often minimally developed in underachievers.

Underachieving children are reported to attribute success to innate ability and do not believe that achievement is related to effort. Anger, frustration, hostility, and rebelliousness may be present. Poor study habits, lack of persistence, dependency and impulsiveness will probably be part of the profile. The key features found to distinguish achievers from underachievers are the goals set for themselves and the effort they make to achieve those goals (Clark, 2008). In addition to the larger group of consistent underachievers, there is another group of children with different characteristic who underachieve with some regularity and are at risk academically. Delisel (2004) calls them "Selective Consumers" or "Non producers" and Coil (2004) calls them "Hidden Underachievers". These are children who get fairly high grades most of the time, but do very little, just enough to get by. They see themselves as academically competent and expect a good grade, but are reticent to put forth much effort, especially when "busywork" is assigned. The level of performance or evaluation that is the outcome of their work does not bother them. They look for the easiest problems and by avoiding challenges; they do not build their potential or find the excitement of intellectual pursuits.

The Role of Intelligence and Aptitude in Giftedness

Intellectual ability is a measure of knowledge or skill a learners has developed through training or self-discovery McBee, (2010). These are the potentials intelligence test sought to measure but does not explain the whole attribute of a gifted child (Dada & Ogundare, 2017). Aptitudes are those inclinations, tendencies, talents, and potentials that are part of the child's character or uniqueness and often show themselves in intense interests during learning. The work of Feuerstein (1978) was focused on assessment of learning potential and has produced instruments aimed at finding aptitude rather than skills or abilities that have been developed. So, assessment of a gifted child is not complete without the IQ and aptitude scores in addition to various other formal and informal assessment.

The measurement of intellectual abilities has often depended on the results of IQ tests, although the limited tasks on such tests narrowly reflect the possibilities for the growth of human intellectual abilities. Researchers in the 1970s and 1980s (Hunt & Kirk, 1971; Sternberg, 1985; Rigby, 2005) perceived a need for a different way of assessing intellectual development. They felt that our reliance on tests comparing people against a standard or norm (decided by taking the average of what many people can do and assigning a score to it) prevented us from developing more useful measures. They believed that we must discover which activities and skills include both cognitive and motivational ability and in what sequence these activities or skills usually appear. From that information, criterion measures could be established that would indicate not only what the present level of a children' achievement is, but also which experiences would best create the challenge for further achievement growth.

Sternberg (1981) believes that the weakness of these tests is not the kind of items they contain, but rather their lack of viable theory base. For this reason, Sternberg and others have focused their work on developing a theoretical base for intelligence in an information-processing framework. These researchers believe that such a theory base will prove more useful than has the factor analytic, psychometric base previously used for measuring, understanding, and nurturing intelligence. It can be asserted that the conventional standardized tests currently in use measure analytic abilities fairly well, but fail to measure synthetic abilities-those allowing for invention, creativity and personal contribution to achievement in academic areas like Mathematics. It has been reported that, no single test can measure the entire universe of intellectual abilities, the most commonly used individually administered tests of linear, rational cognitive ability are the Stanford-Binet Intelligence Scale and the Wechsler Intelligence Scale for Children (WISC).

The choice of any IQ test should consider the adaptation to cultural and language factors that may undermine the giftedness in a child.

Aptitude in Identification of Mathematics Underachievement in Gifted Child

Aptitude tests are used to measure specific abilities and more specifically, can predict how well children will do on particular school subject like mathematics or career related disciplines. Generally, the best predictor of optimum academic achievement in a particular subject is the potential ability. However, for a present academic or subject matter mastery like in mathematics, achievement tests are used. Cautions should be taken in the use of achievement tests to identify ability or academic placement particularly for the gifted. Too often such tests do not reflect the extent of the knowledge or skill the children have developed. As with some of the intelligence tests, children may reach the ceiling of the test without reaching the extent of their mathematics achievement (Dada & Akpan, 2019).

The mathematics underachieving gifted child is however identified as one who has shown high performance on standardized Mathematics Aptitude and Intelligence Tests, but who, nevertheless show poor Mathematics performance in school as evidenced in grades, teacher reports and scores less than 70% in Mathematics Achievement Test. Once a child scores at the 85th percentile or higher in either aptitude or intelligence score in a class, any testing in mathematics achievement is expected to produce equivalently the same score, if significant growth has occurred (Dada & Dada, 2014). This could be easily handled the problem of identifying mathematics underachievement in the classroom. Classroom teachers or school psychometric testers therefore need to modify the testing procedure to allow more accurate result in using aptitude, intelligent and mathematics achievement scores in the identification of gifted underachievers in mathematics.

Conclusion

Mathematics underachievement among gifted children is a reality that can be termed brain waste or underdevelopment of potentials. It has generated great concern to parents and teachers consequently demands urgent attention and intervention. The paper conceived that identification of Mathematics underachieving child with high potential is overlooked by majority of teachers in the regular classroom. The negligence was as a result of lack of skill and procedure for identification apart from ignorance of the existence of the problem among the children hence, there is need for the knowledge of the identification as the first step towards reversing the problem of mathematics underachievement among gifted.

Recommendations

- School guarding counsellors should collaborate with teachers to conduct school-wide assessment to discover potential students who underachieve in mathematics and update the record yearly.
- Schools should explore the feasibility of adopting the procedure and techniques appraised in this paper in identifying the mathematics underachieving gifted child.
- Teachers should be trained and retrained on evolving characteristics and behaviour of gifted children for accurate recognition of such child in classroom.

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