

Catering to Mathematically Gifted Students in Primary Classrooms

Who are 'gifted' students, and why do they need differentiation?

There is a stigma attached to being a gifted student, and “teachers of regular classes, education administrators, community leaders, and the lay public all showed unfavourable attitudes towards gifted learners” (Clark 2002, p.196) There are many detrimental myths about gifted students that are held by many teachers, as well as the general public.

Some believe the myth that every child is gifted.

Some people ...accept a pseudoscientific belief that...each human being must have...at least one superior aptitude. Sadly...this is not so. God was not a democrat when She distributed abilities. (Tanenbaum cited in Gross 2004, p.29)

Every child does have strengths, but not necessarily gifts.

Gifted individuals are those who have developed high levels of intelligence and therefore operate or perform, or show promise of operating or performing, at high levels (Clark 2002, p.26, italics in original)

Experts in the field of gifted education vary in their definition of giftedness. Some put more weight on intelligence tests, some more on gifted behaviour. Some say the top 1-2% are gifted, some say 15%. Many believe in multiple areas of intelligence. Although the experts disagree on the exact definition of giftedness, none say all children are gifted.

Many believe the myth that gifted children will do well without extra help, so we should direct help to other children who really need it. Unfortunately, “moderately gifted children waste nearly half of their time in a regular classroom and exceptionally gifted children waste almost all of their time” (Hollingworth cited in Clark 2002, p.64). This can lead to boredom, misbehaviour, underachievement and sometimes outright academic failure.

More than 80% of highly gifted children studied by Gross (1993) reported intense social isolation in the inclusive classroom...along with unchallenging and repetitive curriculum, resulted in extreme and continuous intellectual and emotional frustration. (Clark 2002, p.201).

In an American study 18-25% of gifted students drop out of high school (Robertson cited in Clark 2002, p.541). Even some children who 'are doing well' when compared to their peers are often underachieving compared to their potential. “Van Tassel-Baska (2000) reported that at least 63% of students with an IQ of 130 and above are seriously underachieving” (Clark 2002, p.6). If there are not

“realistic expectations based on the assessed needs and abilities of the child...[then they]...put forth small amounts of effort to achieve success...learn poor study habits, develop disrespect for the efforts of others, and bluff their way through educational experiences (Clark 2002, p.185).

Alas, “gifted students are among the most poorly served in the school population” (Clark 2002, p.7).

There is a myth that one gifted program can meet the needs of all gifted students. Although many gifted students are gifted in multiple subject areas, assuming all gifted children are gifted in all areas is unrealistic. There are also different levels of giftedness. Clark found that the

highly gifted persons are as different from [the moderately gifted] as the moderately gifted are from average learners... modifications to their educational programs need to be more comprehensive and developed to a much higher degree to meet their needs than is necessary for less gifted learners (Clark 2002, p.63)

Moreover,

exceptionally gifted learners...differ even from the highly gifted learners...schools offer these children little...The higher the expressed intellectual ability, the more difficult...finding a match between school program and the child. (Clark 2002, p.63)

There is a related myth, that learning disabled children cannot be gifted. Baum and Owen (2004) have found gifted children can also have a wide variety of learning difficulties including memory problems, disruptive behaviour, dyslexia and organisational difficulties. These children may not appear gifted, as their academic achievement may not be above that of their same-age peers. It is important when identifying gifted children to include learning disabled children because, if they are “offered the same remedial menu as their average-ability learning-disabled peers” (p.11) they become frustrated and bored. “Such youngsters appear to need both remediation and enrichment as well as special counselling” (p.12).

Baum & Owen (2004) discovered that some highly active gifted children have been falsely diagnosed with ADHD. “In stressful times, behaviour of gifted and creative students may resemble that of a smaller number of people who truly suffer from ADHD” (p.69). A non-challenging academic program can lead to stress, which exasperates the ADHD symptoms.

How can we differentiate?

It depends on the level of giftedness and the flexibility of the school system. Exceptionally and highly gifted students should have access to single subject and whole grade acceleration. They should also have opportunities to work with other gifted students doing challenging work.

Differentiating within a classroom.

It is advisable to pre-test the students, so that you “teach what is not known” (Clark 2002, p.54). If students demonstrate in the pre-test that they already know the material to be covered, they can complete enrichment work, while the rest of the class are learning the new material. Pre-topic testing allows for short-term and fluid ability grouping. Long-term groupings may be based on inaccurate assessment, especially in lower primary where parenting skills can heavily influence student’s performance on tests. Most primary schools already use a level system for reading, so the child is reading books in their zone of proximal development. Something similar should be happening for maths, rather than the whole class “completing page 53”.

Finding material for the ‘top’ group can be challenging. If the school system has flexibility for subject acceleration, using next year’s material may be an option. This can lead to problems when the student is in the last year of primary school.

Some text books (e.g. iMaths) have extra problem solving pages and/or activities that consolidate learning across multiple topics. iMaths also has online access to differentiated worksheets for all topics. These would help the moderately gifted, but don’t offer enough challenge for the highly gifted.

The Australian Maths Trust produces books designed for years 5 and up, that can also be used with highly gifted year 4 students.

The “Scaffolding Numeracy in the Middle Years” Project has a range of both assessments and learning activities to target learning for all ability groups. This is an excellent program with proven results, but can be time-consuming to implement.

Groupings outside the regular classroom

Ability groups are not detrimental to gifted students, nor non-gifted students. The myth that heterogeneous ability grouping by age is best for all students, was fuelled by Slavin's research, which apparently showed that gifted children were no worse off, when placed in heterogeneous cooperative learning groups. What is less well known is that his studies excluded the top 5% of the student population, so his "studies never actually included gifted students!" (Winebrenner 1993, p.122). Also, the remaining

students placed appropriately in regular classes do not suffer socially or emotionally when students identified as ... gifted are served in separate, homogenous classes (Clark 2002, p.267)

Not only do the achievement levels for gifted children fall dramatically with mixed-ability age-specific groups (Kulik cited in Clark 2002, p.268), the students also suffer socially. "Gifted children tend to seek out, for companionship, older children or children of their own age who are similar stages of intellectual development." (Gross 1989, p.192) If they can't find suitable companions, they may have to choose between underachieving to fit in, or social isolation (Gross 2005, p.7). Highly and exceptionally gifted children need a combination of enrichment and acceleration. They often need to move outside their age group to find a suitable ability group. Grouping by age rather than ability "leads to unnecessary loss of ability, especially amongst girls and minority students, and regression toward a more average ability level"(Clark 2002, p.15). To promote belonging needs, the gifted need to

spend time with their intellectual peer group...[but there is] resistance to such placement, especially when it means leaving the age-alike group, a study of Colangelo and Kelly (1983) advised schools to place less concern on age-peer rejection...and more focus on acceptance by intellectual peers (Clark 2002, p.188)

Most primary schools do not have the numbers to have a full-time gifted class for every year level. Schools should investigate the possibility of gifted multi-age classes, although this is difficult with the Australia Curriculum, which has set topics for year groups for SOSE and Science. Alternatively different year levels could run maths at the same time, and gifted students be allowed to join older pupils. Another option is for a once a week maths enrichment class, with students completing work in their regular classes during the week. A minimal approach would be for gifted students to be able to work in multi-age groups for special projects, like the engineering games, or training for chess competitions.

Where possible, group gifted students together. Clark (2002) found more learning, less cliquishness, less frictions, more trusting relationships, increase in interest in subject matter and "more high achievers and fewer underachievers in ability grouped classes"(p.270).

Acceleration

Enrichment and grouping alone are not enough for some students. Highly and exceptionally gifted students must have access to acceleration programs offering continuous progress, flexible pacing, creative and innovative methods and products, independent study, mentors and counselling. (Clark 2002, p.67-68)

Coleman and Cross found that:

Research indicates that acceleration is beneficial to children in that it has positive academic and social effects and shows little evidence of maladjustment (Coleman & Cross 2005, p.156)

Rogers (cited in Davis & Rimm 2004) also states that acceleration does not decrease academic or social well-being, and there were “positive academic effects for most forms of acceleration.” (p.121). Clark (2002) found that many teachers and administrators have negative attitudes towards acceleration stemming from “ignorance of research; [and] belief in social maladjustment, now largely discredited” (p.265).

If students are being selected for a long term group, like a gifted class, or being accelerated, it is important that selection is done carefully. Clark (2002) recommends that the “Identification procedures be based on a broad and well-defined conception of giftedness.”(p.324) It is “best done by a group of professionals...principal, a teacher, a counsellor...the program co-ordinator”(p.335). Identification must take into account that a gifted child could be under-performing in a regular class, either out of boredom, to fit in socially or because they have a learning disability or behaviour problem. Identification should be appropriate for the programs you are offering. It is futile to select a gifted student, with normal science aptitude, for a science enrichment program.

Competitions

Many gifted students enjoy competitions. The Australian Mathematics Competition (year 3 and up), and the ICAS Mathematics competition (year 2 and up) are both run once a year. Students can work through old papers for these competitions during lessons when the rest of the class is covering material they know. The Australian Mathematics Trust sells books with worked solutions, as well as other problem solving books.

The Australian Problem Solving Mathematical Olympiad, has a primary division aimed at year 5 and 6 students. There are 5 papers, each sat about a month apart. Each paper has 5 challenging questions. The team mark is the sum of the top ten students who entered from that school. The time between papers allows teams to train. Books are available with worked solutions of previous papers.

Conclusion

In conclusion, teaching mathematically gifted students depends on their level of giftedness, and availability of support at the school. All students benefit from pre-topic testing leading to alternate activities if the topic is already known. Highly and exceptionally gifted students benefit socially and academically from being grouped together to work on challenging material, such as the Australian Mathematics Trust programs. Highly and exceptionally gifted students may also benefit from single subject or whole grade acceleration. Some people see a social stigma being associated with giftedness, and as a teacher it is important to counteract this with knowledge of and respect for the gifted learner.

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