Counting on Frank: Using bibliotherapy in mathematics teaching to prevent de-geniusing

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Today the understanding of mathematics is critical in an increasingly technological age. Teachers must play an important role to ensure that all students display confidence in their ability to do mathematics. Often gifted students of mathematics can be made to feel bad by their peers just because they know mathematics and things come easily to them. Children's and adolescent literature has now been recognised as a means of teaching mathematics to students through the use of stories to make the mathematics concepts relevant and meaningful. Literature can also be used as a form of therapy to reach students who may be frustrated with children picking on them for being good at mathematics. Story and picture books such as *Counting on Frank*, *Math Curse* and *A Gebra Named Al* are now available to use in the classroom as forms of bibliotherapy in helping students come to terms with issues relating to mathematics that haunt them. In this article we discuss the phenomenon of dumbing down by the gifted population to fit in with their peers. We propose using reading and discussion (bibliotherapy) to aid in preventing de-geniusing of mathematically gifted students.

Introduction

Everyone is born a genius, but the process of living de-geniuses them.

(R. Buckminster Fuller 1855–1983)

Today many young people in our schools who excel in the area of mathematics are often labeled or stigmatised by their peers as being nerds or know-it-alls. Teachers must ensure that all students develop confidence in their ability to do mathematics – and gifted youngsters are no exception. Mathematical understanding is critical in an increasingly technological society. It is critical in our globally competitive world that most countries now produce more workers in the science, technology, engineering and mathematics fields. Teachers must make sure we nurture our strong mathematics, science, and technology students so that they pursue careers in these fields and do not shy away from them due to being worried about being considered 'nerdy'. Gifted students of mathematics are often made to feel bad by their peers because they excel in mathematics and other academic disciplines come easy for them. Young people today are influenced by Hollywood stars, musicians, and professional sports players. 'Being a mathematician' is not always looked upon as being as glamorous or as exciting as being a National Football League player.

Within the past decade or two, children's and adolescent literature has been recognised as a means of teaching mathematics concepts to students through the use of stories to make mathematics ideas relevant and meaningful. Literature can also be used as a form of therapy (bibliotherapy) to reach students who may be frustrated with being taunted or teased for excelling in mathematics. Story and picture books such as *Counting on Frank* (Clement, 1991), *Math Curse* (Scieszka & Smith, 1995) and *A Gebra Named Al* (Isdell, 1993) are available to use in the classroom as forms of bibliotherapy to help students come to terms with issues that haunt them just because they are good at mathematics.

In this article we propose using reading and discussion (bibliotherapy) to aid in preventing the de-genuising of mathematically gifted youngsters. Rozalski, Stewart and Miller (2010) have found that by using carefully selected thematic books teachers can use literature to reach young people who are experiencing difficult situations.

The following dialogue is related by one of the authors as a parent's interaction with her son, since it relates to why a gifted mathematics student may resort to avoiding showing their real knowledge of the subject matter because of peer pressure, and the de-geniusing that occurs amongst our gifted and talented students:

> Whilst in the kitchen preparing dinner early one evening, my 11–year-old son, Kevin came to me with some exciting news. *'Guess what Mom?! Guess what Mr D said today?' 'What?'* I replied enthusiastically. I knew Mr D was Kevin's sixth grade maths teacher who held Kevin in high regard as a talented maths student.

> *'Mr D said I should be in Algebra. He wants me to start working on Algebra.com.' 'That's because you are so smart in maths, Kevin. I think that it is a wonderful idea.' 'Yeah, Mr D says I am so smart in maths I should be in gifted, but my FCAT [Florida Comprehensive Assessment Test] score in fifth grade was off by one point, so I can't. He makes me help all the other kids.' 'When you have a talent or gift, you should always share that with others,'* I said. *'Yeah, but they bug me too much. They're always asking me for the answers and to help them when they don't want to do the work, so now I just pretend I don't know how to do the problems even when I do.'*
>
> I can't tell you the shock and dismay I felt when I heard those words – 'pretend I don't know' – come out the mouth of my child. I have always encouraged my sons to be proud of their talents; to recognise their limitations but give their best in whatever they do. Now I was hearing that my son was deliberately 'dumbing down' to adapt to an uncomfortable situation with his peers. It went against everything I thought I had taught them about self-confidence, pride and acceptance of who they are.
>
> When the shock of his statement wore off and I had some time for thoughtful consideration, I realised that in as much as his high mathematical intellect is a gift that we celebrate, for my son this 'gift' is also a burden. 'Dumbing down' is a coping mechanism that many gifted children use as a way to fit in socially with their peers. They don't want to be seen as different, even in the most positive regard.

Both teachers and parents interact with youngsters on a daily basis and see young people 'shut down' due to peer pressure or societal stigmas like being a 'nerd' just because mathematics comes easy for them. Dyer (2004) claims that many people are easily influenced by their peers and society pressures. As humans we allow others' influences to impact our egos and success in life. Hence 'de-geniusing' can happen to anyone, as in the case of Kevin above and many gifted children around the world. It is a real phenomenon that is happening to our youngsters in schools today, who 'dumb down' in order to fit in with their peers and society as a whole.

Renzulli (2008, 2011a, 2011b) has found that teachers need to do more for the gifted to better reach them and foster an atmosphere where they can excel in academics without dumbing down the curriculum or short changing some students who have great potential. This article provides a review of the literature as it relates to both the gifted mathematics student and the use of bibliotherapy, and will make an argument for using bibliotherapy to help in the prevention of de-geniusing of mathematically gifted children. A sample lesson plan employing a children's literature picture book will be shared, as well as how mathematics teachers can work towards emphasising the importance of children being proud of their know-how of mathematics, so as not to dumb down or minimise their true gifts and talents. Floyd and Hébert (2010) contend that using picture book biographies can help to nurture the talents of gifted youngsters.

Mathematically gifted students

Many mathematically gifted students tend to display several characteristics that identify them as talented in this sphere, such as:

- being interested in numerical analysis
- having memory retention for storing main features of problems and solutions
- able to appreciate parsimony, simplicity, or economy in solutions
- reasons effectively and efficiently
- solves problems intuitively using insight
- ability to reverse steps in the mental process
- organises data and experiments to discover patterns and relationships
- exhibits flexibility in solving problems (Johnsen, 2004; VanTassel-Baska & Little, 2011).

Plucker (2008) and Johnsen (2004) synthesised cognitive characteristics that gifted students frequently exhibit, particular to affective characteristics like having a sense of humour, being highly sensitive, taking other perspectives and being empathetic and often perfectionists. Schools need to provide professional development for teachers so that they can establish positive situations for gifts and talents to emerge so that individuals who are proud of their talents do not dumb down their gifts due to societal and peer pressures.

There is a myth that gifted children are better adjusted, more popular and happier than average children. The reality is that more frequently the opposite is true (Renzulli, 2011b). For most gifted youngsters childhood is more pleasurable because they derive joy from challenge and reward from work. At the same time, it is a childhood that is more painful, more isolated and more stressful, because these gifted children often do not fit in with their peers socially and have high expectations for themselves, as do others (Freedman & Jensen, 1999).

Also, since gifted youngsters' intellectual capabilities are so strong, they have less need to develop their emotional intelligence. This underdeveloped emotional intelligence is a major pitfall in social interactions with peers. Parents and teachers need to nurture and guide gifted children to becoming well-balanced individuals, and using bibliotherapy to address de-geniusing is one possibility. VanTassel-Baska and Little (2011) also believe that we need to foster such support for gifted students whilst also providing a strong emphasis on content knowledge, helping students to appreciate their gifts and excel in mathematics.

Renzulli (2011a) and Diezmann and English (2001) believe that enrichment for mathematically gifted students in the elementary school needs to extend beyond puzzles or busy work and should support the development of mathematical power through a differentiated curriculum. Although mathematically gifted children are characterised by the quality of their reasoning abilities, they require appropriate and challenging learning experiences to facilitate their cognitive development.

Enrichment that consists of 'busy work' or irrelevant topics has limited academic value for gifted students. Although a student might be gifted, he or she still needs appropriate

teacher support in dealing with challenging tasks that extend mathematical understanding as well as affective needs like being accepted by their peers in spite of their giftedness. Enrichment programmes play a key role in equipping these students with the foundational knowledge and skills to actively pursue their interests (Renzulli, 2011a, 2011b). In addition, children's self-reflection of their learning can empower them in their work as mathematicians.

Diezmann and Watters (2000) contend that mathematical tasks that facilitate learning should be commensurate with the capability of the learner. For gifted students this requires flexibility in the nature of tasks and appropriate support from others. Tasks of sufficient difficulty need to be carefully chosen or existing classroom tasks need to be adapted, that is, 'problematised'. Once the task is appropriately challenging, the teacher needs to provide support for the student. The need for support should be viewed positively rather than negatively, because the more complex task provides an opportunity for mathematical learning not provided by an easier task. Furthermore, the teacher provides feedback to the student, highlights successful strategies and acknowledges the student's capability. Gifted peers may also provide support and feedback in a positive way for young gifted students to be accepting of their true mathematical gifts, whereas other peers may make fun of their mathematical knowledge.

Appropriate time allocation for tasks is also an important consideration. Mathematically gifted students achieve mastery faster and generally have more lengthy concentration spans than non-gifted students. However, engaging in challenging tasks is time-consuming. Time is also required for the incubation of ideas, which is associated with insight into challenging problems. Thus, an effective goal should be that gifted students do fewer and more complex tasks over a longer period of time (Diezmann & Watters, 2000). This may also be why many advocate gifted mathematics students being placed in ability groupings.

It is important that schools and parents help to raise well-rounded gifted young people who accept their gifts and do not minimise them. Parents can impart valuable lessons to their gifted children whilst helping them achieve a balanced life. It is fine for gifted children to spend a lot of time pursuing their interests, but even the most advanced children should participate in family life, chores, playing with siblings and community involvement. A well-balanced life equals a well-rounded, happy young person.

The 'dumbing down' phenomenon of the gifted and talented

Under-achievement in exceptionally gifted students has been documented in the literature. Fears of envy or retaliation and peer pressure can lead precocious intellects to resort to various forms of disengagement and withdrawal to avoid the emotional pain of such conflict (Grobman, 2006). Most students want to fit in, as do the gifted, and they may mask their talents in order to do so. Hoover-Schultz (2005) contends that at first glance 'gifted under-achievement' seems like an oxymoron; it can also be an educational enigma. The loss to society can be tragic when students do not achieve their full potential due to peer pressure; minor neurological problems may also make under-achievers behave this way.

We must support all students – also, or especially, the gifted – so that they elevate themselves to their full potential. Cross (1997) raised this issue repeatedly in her research about under-achieving gifted students, students who know that they are different, that they show intelligence and are outspoken, and then people tend to isolate them and put labels or expectations on them. Dumbing down can actually be thought of as a 'coping' strategy for these students in order to fit in (Cross, 1997, 2002). Cross believes that one of the most detrimental coping mechanisms academically gifted students employ is under-achievement. According to Cross (1997) we must provide effective guidance to the gifted students so that they can chart a new course for not lowering their achievement just to fit in, whether with peers, society or competitive occurrences.

Teachers need to teach their gifted students strategies so that they will not employ these severe patterns of coping behaviours that include trying to blend in with non-gifted students, under-achievement, and even suicidal behaviour (Cross, 1997). Gifted programmes certainly have many benefits. For example, a study by Cross, Stewart and Coleman (2003) showed that co-participants in the study described feeling more accepted in the gifted magnet school than in previous non-magnet schools, as they did not have to change who they were or dumb down their intellect to fit in. Whilst it my not be possible for all gifted student to attend a gifted magnet school, there are certainly benefits to this so that students do not have to become de-geniused. Plucker (2008) and Cross (2002) believe that we must challenge many of the myths about the social and emotional developmental of gifted students, provide appropriate counselling and create learning environments where students with gifts and talents can thrive. In this article we suggest the use of bibliotherapy as a form of counselling to reach these gifted students, so that they will not dumb down to fit in with classmates and society.

Bain, Choate and Bliss (2006) found in their empirical study that 77% of their participants felt that gifted students are more likely to have problems with social relationships compared to the general population. This leads to them behaving in a way to fit in better with all their peers at school. Young people who are gifted are often placed front and centre in their school and community domains, as examples of the best individuals society can offer. Doing this adds erroneous pressure upon these youngsters, which is often unfair and leads to problems later on in life.

Many gifted students are often de-geniused. We must help gifted students to create plans that develop their talents to

an optimal level. We must talk to them and work with them; they need to know that using coping strategies to dumb down their intelligence is really hurtful to them and ultimately to our society.

Using bibliotherapy in the classroom

Affective factors play an important role in learning (McLeod, 1992), and teachers need practical classroom strategies to address the feelings of their students who are suffering from mathematics anxiety.

Teachers need to create supportive environments in which their students feel comfortable in expressing how they feel about their mathematical experiences. One approach in helping young people to express themselves comfortably is through bibliotherapy. Bibliotherapy is reading of selected literature to produce affective change and promote personality growth and development (Abdullah, 2002; Betzalel & Shechtman, 2010; Doll & Doll, 1997; Forgan, 2002, 2003; Furner, 2004; Jeon, 1992; Heath, Sheen, Leavy, Young & Money, 2005; Jack & Ronan, 2008; Lenkowsky, 1987; Reis & Renzulli, 2004; Rozalski, Stewart & Miller, 2010; Sridhar & Vaughn, 2000; Sullivan & Strang, 2003). Bibliotherapy can be used to help young people understand themselves and cope with problems by providing literature relevant to their personal situations and developmental needs (Betzalel & Shechtman, 2010). Hébert and Kent (2000) advocate the use of young adult literature for gifted teenagers to address social and emotional concerns. Teachers using this approach hold a fundamental belief that reading will influence thinking and behaviour, and that through guided discussions selected readings can be focused on the specific needs of students.

The bibliotherapy process is fairly easy to understand and implement. The therapeutic experience whilst reading a book happens each time we pick up a good book and say 'This character is very much like me. I can relate to this person'. This interaction is known as identification, and the more we have in common with people we meet in our reading, the closer the identification process will be. That identification produces a sense of tension relief, or 'catharsis', an emotional feeling that tells us we are not alone in facing our problems. As we enjoy the book, we learn vicariously through the characters in the book. We gain new ways of looking at troublesome issues we face and insight evolves. With this new insight, changed behaviour may occur as real-life situations similar to those experienced in the books are confronted (Furner, 2004).

This may be the case with Kevin, presented in our case scenario earlier. When reading *Counting on Frank* he may relate to the character and emulate his attitudes or methods for coping with his feelings as well as using the strategies presented for being proud of his mathematic prowess. The three most recognised stages of bibliotherapy are identification, catharsis, and insight (Forgan, 2002; Halsted, 1994; Jack & Ronan, 2008); however, another that is less mentioned in the literature yet especially interesting for teachers working with mathematics-anxious students is the concept of universalisation (Slavson, 1950), or the recognition that our problems are not unique. Through universalisation we realise that we, as sensitive individuals, 'are in this together'. Thatcher and Fletcher (2008) have found that not all teachers realise or see the value in using literature or bibliotherapy for addressing students' problems, nor how to use such a process.

Books can help teachers guide the emotional development of their students far more than intellectual discussion, because stories directly affect human emotions (Forgan, 2002, 2003; Furner, 2004; Rozalski, Stewart & Miller, 2010). A skillful author can help young people connect with others who have similar problems. If books or short stories can touch young people emotionally, these students may be much more receptive to ideas presented by the author than if they are presented to them in a lecture by a concerned teacher. Students who are unable to talk about their anxieties often can identify with characters in books strongly enough to experience the catharsis and acquire some important insights (Halsted, 1994; Heath, Moulton, Dyches, Prater & Brown, 2011).

For bibliotherapy to be successful, a meaningful follow-up discussion is required (Forgan, 2002; Furner, 2004). To simply read a good book with an entire class is not bibliotherapy. It is very important that young people not only read books, but also become involved in discussions, counselling and follow-up techniques such as role-playing, creative problem solving, relaxation with music, art activities and journal writing (Furner, 2004; Forgan, 2002, 2003; Hébert, 1991, 1995; Hébert & Furner, 1997). When presented in this way, bibliotherapy can be enjoyable whilst providing a time for solid introspection for young people.

It is important that sensitive mathematics teachers help students recognise that their abilities may differ from those of their peers, acknowledge that they may also have areas of weakness and assist them in developing self-esteem by becoming satisfied with who they are as individuals (Ableser, 2008). Teachers using bibliotherapy may be successful in doing so by making connections to the students' attitudes and feelings with the characters in story books (Regan & Page, 2008). Leininger, Dyches, Prater and Heath (2010), Burke (2009), and Kurtts and Gavigan (2008) have all found that there are a wide range of literature and picture books useful in conducting bibliotherapy to address a wide range of conditions and societal factors impacting young people today.

Through this counselling approach students come to understand that their avoidance or dumbing down was a learned behaviour; they were not born with this feeling, and they can be taught to overcome it by consistently implementing their self-monitoring strategies to overcome the social stigmas that peers put on them about being good at mathematics. Since bibliotherapy is one avenue

for students to discuss feelings about problems with others who share similar issues, the use of guided reading (Forgan, 2002) could naturally become one component of systematic desensitisation proposed by educational and psychological experts.

The book *Counting on Frank* by Rod Clement (1991) depicts the story of a middle school boy's gift of mathematics. He goes through life knowing many things, counting, comparing and knowing many number facts that all come easily to him. The book portrays him as somewhat of a nerd or geek. The book presents the reader with a variety of mathematics problems in a humorous yet realistic fashion as they relate to numbers, counting, and mathematics facts. The lesson plan (see Appendix) designed for teachers at the middle and high school levels provides a variety of follow-up activities for use during or after reading *Counting on Frank.* These activities are appropriate for infusing affective teaching into a mathematics curriculum over the course of a semester or even an entire academic year. The activities were designed with the realisation that teachers are often under pressure to teach many mathematical concepts and skills in an academic year. Forgan (2003), in his book entitled *Teaching Problem Solving Through Children's Literature,* offers many children's books to use in bibliotherapy sessions to help students overcome a variety of problems confronting them.

Integrating activities like bibliotherapy and discussion whilst teaching the content consistently throughout a semester or an academic year would allow a teacher to address the feelings of their students as they learn mathematics. Such activities become an affective strand incorporated throughout the mathematics curriculum. Teachers may consider working with the school counsellor and use such an activity at least once a month, or whenever they detect that their gifted students are avoiding showing their true expertise in mathematics with their peers. It is important for teachers to do these recommended activities with their mathematically gifted youngsters, to help them gain the mathematics confidence whilst preventing de-geniusing.

Summary

There are many students in schools around the world like Kevin or the boy in the book *Counting on Frank,* who are made to feel like geeks or who dumb down their mathematics excellence in an effort to be accepted by their peers. 'De-geniusing' is a common phenomenon amongst gifted and talented students. Teachers need to take the time in their teaching to address the affective needs of these students, since many may be made to feel like nerds just because they are good at mathematics. This may also be relevant in other disciplines like the sciences and technologies. To address this issue, teachers need to be trained in how to use bibliotherapy to assist students in accepting their giftedness in mathematics. Such strategies involve teachers taking time to discuss with their students how they are feeling about learning mathematics. Reading children's or adolescent literature may be one approach that mathematics teachers can use to reach students who may feel bad due to peers making fun of them because of their mathematical knowledge.

Bibliotherapy is a therapeutic discussion-generating technique which offers caring teachers appropriate affective strategies for dealing with preventing 'de-geniusing' of the mathematically gifted in classrooms, so that students achieve success truly reflective of their true aptitude. It is important to note that as part of the National Council of Teachers of Mathematics standards (1989, 2000), teachers are responsible for assessing students' disposition toward mathematics. During the bibliotherapy session teachers should also do the mathematics with the students as discussed in the adolescent literature book.

Bibliotherapy is not just a 'warm and fuzzy' approach. It is a serious form of psychological counselling and should be done to help students so to prevent this form of 'de-geniusing' in mathematics or any other academic discipline. Bibliotherapy then can serve as a sensitive and non-intrusive way to help students solve problems and cope with issues in their personal life, so that they will not affect their academic potential. Teachers need to take the time to discuss problems with students and employ techniques for students to share and discuss concerns which are often not brought out due to shame, fear, guilt or worries about fitting in.

Kevin, like many of our young gifted kids today, dumbed down his true aptitude for mathematics so that their peers would not make fun of him or use him to get the 'answers'. Our mathematically gifted students should be proud of their giftedness in mathematics, and need to learn coping strategies for dealing with the peer pressures that come with a discipline that is not as glamorous as being a movie or rock star or a professional sports player. We need to help young people to be proud of their mathematical giftedness.

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Authors' contributions

J.F. was the project leader, and C.K. made conceptual contributions and researched relevant literature. J.F. and C.K. prepared the sample student narrative based on C.K.'s personal interactions. J.F. wrote the manuscript with edits and contributions from C.K.

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Appendix starts on next page →

Appendix

A sample bibliotherapy lesson plan featuring *Counting on Frank*

Counting on Frank by Rod Clement depicts the story of a middle school boy's gift of mathematics. He goes through life knowing many things, counting, comparing, and knowing many number facts that all come easily to him. This lesson plan provides a variety of follow-up activities for use during or after reading *Counting on Frank*. Integrating such activities into teaching allows a teacher to address the feelings of their students as they learn mathematics. The book offers a series of questions at the end of the book called *Here's a Chance to Use YOUR Brain!* which many young gifted students may enjoy investigating.

Menu of themes or key concepts

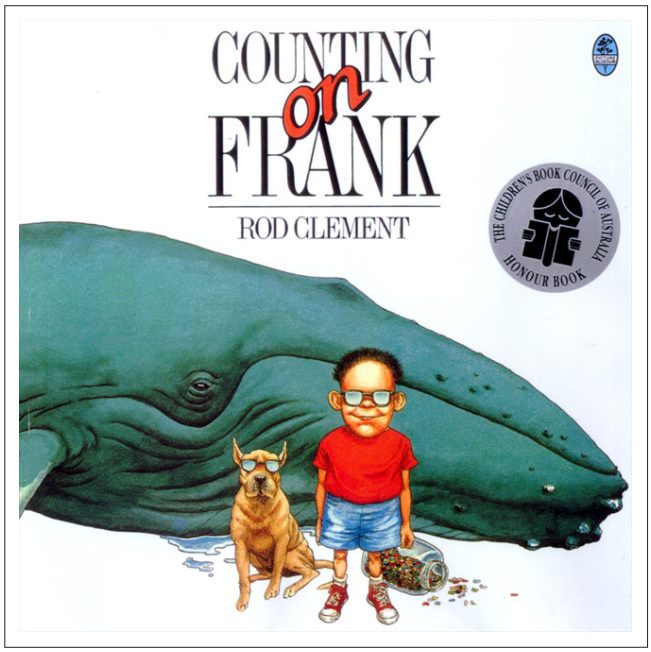
- Everyone has a unique way of looking at the world.
- The mathematically gifted should not be embarrassed because they are good at mathematics.
- Mathematics is used in everyday life events.
- Some gifted and talented students are embarrassed by their mathematics abilities and tend to diminish their skills or talents.
- Mathematics can be easy, fun and rewarding.
- There are many misconceptions about mathematics.

Discussion questions

- Some people say that mathematics is used in everyday life. Can you give some examples?
- How do you feel when adults say mathematics surrounds us?
- Do you think people learn mathematics in different ways? Why? How?
- How do you learn mathematics best?
- How do you feel when an adult tells you to use your brain? Why?
- What do you think is the most frightening thing about mathematics? What is the best thing about mathematics?
- Describe how your mathematics teacher helps you to use your brain. How can you do this on your own?
- Do you share your feelings about mathematics with other people?
- Most people think that the ability to do mathematics in a necessary life skill. How does that belief make you feel about your mathematics ability? Do you agree or disagree?
- Should all smart students be expected to love mathematics? Why or why not?
- What advice would you give to younger students about learning and enjoying mathematics?
- What are some ways you can be proud of your mathematics skills?

Possible activities

- The book concludes with four pages of mathematics problems directly related to the story that give students a chance to use mathematics and numbers in fun ways. The teacher can encourage the students to explore and solve these problems.
- Students can write their own word problems relating to everyday life events for classmates to solve.
- Students can write a reflective essay about the importance of mathematics in everyday life and how this affects their own beliefs about their mathematics skills and abilities.
- Have students write a poem about their mathematical ability and allow time to share with the class.
- Have students create a picture collage of examples of mathematics use in everyday life.
- Have students keep a mathematics journal to record their feelings about mathematics and share times when others made them feel like a nerd or bad for being good at it.
- Have students create a 'counting' mathematics song and allow them to perform in front of classmates.
- Group students into teams to play Maths Jeopardy. Students have to work collaboratively to solve word problems.
- Invite professional community members to come in to discuss how they use mathematics in their business.
- Allow students to investigate mathematicians through time and identify some who may have been gifted and have them report back their contributions to mathematics.
- Student may want to review the book and notice the character and how he is dressed and portrayed. Does the book portray him as a 'nerd'? How would you change this portrayal?



Source: http://www.harpercollins.com.au/books/Counting-Frank-Rod-Clement/?isbn=9780207173226

FIGURE 1: Book cover of *Counting on Frank* by Rod Clement.

Interactive mathematics websites that may appeal to the mathematically gifted

www.funbrain.com
www.coolmath4kids.com
www.math.com
www.brainpop.com
http://nrich.maths.org