THE SOCIALLY RESPONSE-ABLE MATHEMATICS EDUCATION PROJECT

# It's About Me Project
# Year 9

**Materials developed by Paul McQuade**

## Rationale

I generalise when I say that there is a vast difference in the psyche of Year 9 student compared to that of a Year 8 or Year 10. It is a unique 'inbetweenness' that makes them who they are. These students are self centred whilst they can still be convinced that they don't know it all. They are very used to the Lower School way of learning and they have picked up and trialled many different personalities. These students are impressionable and don't realise it. To me this is an ideal age to hit home with some powerful messages that confront their way of thinking and challenging them to grow beyond their hedonistic mentality.

Self gratification is the first hook in this project. Students love to gloat about what they have got and how much better their stuff is. These students can be easily manipulated by peer and media pressure. They want for everything and some expect to be given it. By feeding this attitude I was able to draw out the ugly greedy nature of "Gotta Have" and set up a basal attitude and document to build the project around.

Developing a financial understanding of assets, income and expenditure is the Numeracy base of the project. These concepts are based in an ability to estimate and forecast. Students soon develop an understanding that they are a drain (investment) of family income. This is a good time to discuss the some aspects of the throw away and upgrade mentality of the family as it relates to expenses. The concept that earning pocket money (income) for doing chores is in fact an expense on the family budget is eye opening and confronting.

The photo study of families around the world and all their possessions or the possessions that they have purchased over the past 7 years is confronting. Series of photographs taken by Peter Menzel in his publication, *"A Hungry Planet"*and "*Material World: A Global Family Portrait*." are the base the study. Using De Bono's 6 hats as a basis of exploring different perspectives is very useful and allows students to explore the world beyond the black and white nature of what you see is what you get. Building the idea that we can infer data based on some fact is appropriate for this age group. The multi perspective attack on the students still developing empathetic nature will give rise to some moments of reflection that need to be acted on quickly.

Reviewing students "Gotta Have" lists is now pivotal in setting a list of needs and wants for themselves. Whilst this review is happening students are made aware of the differing understanding of richness and poorness. The contrast between material wealth and emotive happiness is a valid lesson and having students indicate through a graph the idea of comparing richness and poorness of two different attributes is timely.

By summarising the above understandings with directed questioning, students are pressured to see the bigger world picture and how they fit in it. Students have already had time to reflect on their greed without being forced comment on it, but now through the summary they are asked to consider how they would be seen from other counties (economically different) perspectives. It does make a difference to them.

# Overview of Activities

**Activity 1: Gotta Have it**

Use your favourite method of cooperative learning to engage students in discussing and boasting about the stuff they have. Who's is biggest, best , better, newer, what fashion products are in, out, cool, what goods go with what personalities. Really draw it all out and get students to create a chart of the gotta have items and products for the 14 year old. Remind yourself that this project is built upon the possessive nature of our society, so you want the students to include as many possessions as possible or sensible. This chart is pivotal later in confronting their attitudes.

**Activity 2: Financial Aspects**

Three separate documents have been designed to draw out information about assets, expenditure and income.

Asset ownership is the first sticking point so I have broken them into three categories; what you own, what you claim to co own, and what really is not yours but want to imagine that it is yours. Students will really push you on putting stuff into the lists or they will be reluctant to include stuff. The purpose of the lists is to create a basis for estimating and adding. Estimate the value of all items and total each list. The items of shared ownership can be decreased by percentage or straight division. The stuff that really is not theirs can be omitted. By finding a total asset value students get awareness of how much money has been spent on them and this amount can be partitioned to forecast how much money they can expect their asset wealth to increase in one year.

Expenditure can be intrusive to family life so allow students to use estimates; however families that supply genuine costs to their children draw on more real experiences. The document provided fails to organise this data collection well and needs modification. Students need to establish the cost for all items from food, clothes, power, phone, rental, transport, fees, holidays, upgraded or replacement goods, everything. Students then use simple arithmetic to draw out their own portion of these costs. The total for expenditure is very large and students will internalise this information, of course this is a time that a little dig at the massive portion of the home budget that goes on expenses.

Income is interesting as this is for some part a hidden expense. Pocket money is an income for the child but an expense for the family. Gifts are incomes. Work and employment are incomes and many students will have jobs and should be encouraged to get jobs. Forecasting prospected incomes for the year is for some students a chance to feel good about the impact they have on the family. (Again the document provided poorly achieves this goal and needs reworking)

**Activity: 3 Photo Study**

Using a range of photographs taken by Peter Menzel in his publications "*Hungry Planet"* and "*Material World: A Global Family Portrait"* .are excellent resources that highlight the disparity in wealth and possession around the world. Using the 6 hats by deBono will force students to look at information from varying perspectives. Students will naturally want to share and compare, so let them as it is important. The data collected from this task is useful to the English department so advice from them and data for them is important.

**Activity 4: Needs and Wants Review**
Now is the perfect time to encourage students to dig out their Gotta Have lists and use them as a basis for listing needs and wants. At this point many students are internalising the values point of this project whilst others will want to argue that the mobile phone is a need and they can't live without it. (Like Yeah, Really!)

**Activity 5: Comparing Rich and Poor**
The concept of rich and poor is for most is purely about financial wealth. The idea that richness and poorness are two directions on a non-graduated scale that is used to compare subjective, qualitative judgements of an attribute so that they can be assessed and analysed is very abstractive, so don't describe that way. Students understand that food can be rich in flavour and soils can be rich or poor in nutrients. They quickly assimilate the knowledge that rich and poor are the describers of something. Ask the students to assess the richness or poorness of the family relationships or happiness of the people and they can rank them. Get them to create a scatter graph comparing wealth to happiness and interpret it. (Now that is real life application of the Mathematics)

**Activity 6: Summation**
Writing a report throughout this project would be something that I would normally do, but this time I focused on the review and set some directed questions that I posed to lead the student's way of thinking. Whilst I explain the questions students start to write their responses. I review key discussion points and observations made by the students as they went through the project. I explain the inner voices that they heard that pointed out some of the greed and 'selffulness' of the attitude of Gotta Have through to the awareness and empathy from the photo study to the understanding of where we fit in the world. Asking the question about how would others see them is ground breaking as they look from differing perspectives and try to justify their own positions. Having a chance to reflect on the learning they took from this and recommendations gave the students a chance to express how this project affected them and made the point of writing that change down. It is very self affirming.

# Activity Details

Each set of activities has it own assessable aspects and I have highlighted just some of the outcomes that **can be** demonstrated by students completing these tasks. It is up to individual teachers to choose the method of assessment that suits their purposes and or educational perspectives.

**Activity 1 Gotta Have**

| Teaching Points | Student Activities |
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| This project is designed to be high impact while not being large on time. Your ability to draw out the key learning points will depend on student engagement. The above introduction is just that. It alone is not the hook, Lead the students in through discussion. The opening data (Gotta Have) needs to be collated and used to refer to towards the end. | Discuss the costs of living in general terms. The types of things that 14 YO's like to spend money on or on things that they need. Whiteboard, Group work or individual task a brief chart highlighting the essential stuff that a Year 9 has "Gotta Have." This may lead to gender type and stereo types arguments students may be critical about saying you can't have typical teenager. GOOD |

Possible Student Outcomes taken from The Outcomes and Standards Framework WA

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| | • Evaluate the level of participation and the usefulness that the chart or list has to later parts of the project. Make a subjective assessment. |

**Activity 2 Financial Aspects**

| Teaching Points | Student Activities |
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| This session is about Possessions. What do you own? Or partially own or just claim ownership that really is the families? Identifying the concept of ownership can be tricky and well worth discussing. It may be useful to think of it as if you moved out what could you take with you. The point here is to build the idea of what possessions students already have and that they have come at a cost. This cost will be looked at in Expenditure. | Students discuss possession and partial possession or even Claiming rights over possessions as being part of what they see as being theirs, or at least partially theirs. Good discussion can occur when mates dob on each other about certain stuff to be included. This list can be quite large and take some time. Expand on ideas of clothes, sport, games, books, music, anything goes. |
| Income is easy and helps to work out what input they have. Remember to explain that if they earn pocket money then that is an expense on the family and needs to be added as another expense as well as an income. | Complete the income sheet to show what input you could add to the family if you chose to. |

Possible Student Outcomes taken from The Outcomes and Standards Framework WA

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| **N 7.4 b** | **Students plan the sequence of calculations needed for familiar** |

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| | **situations**: for example, they can facilitate a calculation using the memory function of a calculator.<br>• They can use brackets to assist in such tasks and for 'missing number' questions, such as (19 + 6) x□□□= 50. |
| **N 8.4 c** | **Students use calculators to carry out computational tasks, including writing fractions as decimals**.<br>• They plan sequences of calculations using a calculator memory facility and/or brackets when they enter complex expressions such as (2.75 x 35) + (0.54 x □27).<br>• They interpret remainders when using calculators for division and use the context of the division to decide how to round answers, and whether an answer makes sense: for example, if three children in a family share $37, they can interpret what the calculator display of 12.33333… means, how much each child will get and how much will be left over. |
| **N 7.5 a** | **Students use the inverse relationship between division and multiplication when dealing with situations involving scales, familiar rates, areas and combinations**: for example, given a rate of one tablet, three times a day, they can determine how many days a packet of 25 tablets will last.<br>• They use multiplication for combination problems, such as given four cups and five saucers, they can determine the number of ways a cup and saucer can be paired. .<br>• They can use division in situations in which the divisors are decimal and fractional numbers and may be bigger than the number being divided into.<br>• They know that multiplying and dividing can have the effect of increasing or reducing the original quantity, depending on the size of the multiplier or divisor, such as dividing by one-third triples the amount |
| **N 7.5 b** | **Students apply the rule of order when simplifying complex expressions**.<br>• They can find a number or numbers that satisfy constraints such as 'What number am I if half of me add 1 is 41 ?' and 'A square has an area of more than 100. What can you say about the length of its sides?' |
| **N 8.5 a** | **Students are skilled in mental computation with integers, unit fractions, decimals and money.**<br>• They calculate unit fractions of whole numbers and decimals and simple percentages of amounts, usually by changing the percentage to a common decimal and then performing the calculation: for example, 20% of $420 is 0.2 x $420 = $84.<br>• They calculate mentally with easily-visualised fractions and record the stages in adding and subtracting fractions that they cannot calculate mentally. |
| **N 8.5 b** | **Students use a range of efficient, although not necessarily standard, written methods to add, subtract, multiply and divide integer numbers and common and decimal fractions.**<br>• For multipliers and divisors with more than one digit, they may use a calculator. |

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| | • They use calculators efficiently, dealing with integers, fractions, percentages and decimals to suit the conventions of their own calculator: for example, when squaring a negative number, they know that brackets should be around the number before it is squared on many calculators $(-7)^2$.<br>• They can also input a sequence of calculations to evaluate an expression and convert flexibly between fractions, decimals and percentages using their calculators.<br>• They estimate when it is sensible to do so rather than making exact calculations unnecessarily: for example, asked whether $30 is enough to purchase six items, each of which costs $4.85, they make a rough calculation by rounding $4.85 up to $5.<br>• They also experiment with short cuts for doing calculations: for example, in the previous example, they may notice that six lots of $5 are exactly $30, but that each $5 is 15c more than the item cost, so the change is 90c. |

**Activity 3 Photo Study**

| Teaching Points | Student Activities |
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| Photo Study<br>Using photos taken of peoples possessions students are to use the "6 hats' as a critical way to interpret and discuss the possessions of others. | Photo Study<br>"6 Hats" Summary Sheet |
| Photo study of possession from around the world. Hand out the photos and encourage open discussion. Create lists of goods. Identify likely owner if any. Is possession as big an issue for the families. Does it make you rethink what your values are and what you think you really need. | How would youth of other nations rate the Needs and Wants of their lives? Can you place a dollar value on possession and relate that to happiness? Compare and contrast the idea of possession for families around the world. Do the concepts or global inequalities have an impact on your Gotta Have list of needs and wants?<br>What is privilege?<br>Would you now review your list of needs and wants?<br>What impact has this Maths Project had on your understanding of the world and how you fit in it? |

Possible Student Outcomes taken from The Outcomes and Standards Framework WA

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| Level 3 Reading UT3.1a | *Students interpret and discuss some relationships among ideas, information and events, and draw inferences from these in texts with familiar content that include some unfamiliar words, language structures and features, such as figurative language.* |
| Level 3 Reading CU3.2a | *Students interpret simple symbolic meanings and identify stereotypes in texts and discuss their purpose and meaning: for example, a star may symbolise religion, Christmas, magic, being dazed, dreaming or merit.* |
| Level 3 Reading CU3.2b | *They use stated information together with their background knowledge to make inferences: for example, they infer motives of story characters from their actions using knowledge of stereotypes and real experience.* |

**Activity 4 Needs and Wants**

| Teaching Point | Student Activity |
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| Needs and Wants. The classic S&E session of needs and wants for a Year 9 teenager become heavily influenced by media and peer pressure. The "Gotta Have" list from session one is invaluable here and should be used for classifying. | How are you and other 14 Y.O. affected by media and peer pressure? Classify your Gotta Have list into needs and wants. Be aware of social pressures and the importance you place on them. Be prepared to justify your choice. |

Possible Student Outcomes taken from The Outcomes and Standards Framework WA

| *S&E Resources All Levels* |
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| **The student understands that resources are limited and so choices need to be made about how they will be used.** |

**Activity 5 Comparing Richness and Poorness**

| Teaching Point | Student Activity |
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| Internet search activities. Get plenty of catalogues from the local supermarkets. Request students bring dockets from the weekly shopping but it is easier if you save a few yourself and bring them in. | Locate suitable accommodation for about $150 per week.<br>Be prepared to look interstate and consider the size and locations of the towns you might end up in.<br>Being a deckhand in Mount Isa is not clever.<br>Be prepared to drop your standards as you may need to.<br>Create a list of food and hygiene products used in a week.<br>Use Excel or calculate the cost of the week. (Hint if you are close to $120 you won't have to do it again) |

Possible Student Outcomes taken from The Outcomes and Standards Framework WA

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| **A 17.4 d** | **Students recognise and describe informally some of the variables in their own lives that change with time**, such as height, daylight hours in a typical day, speed of a car; and recognise that other things that variation can also occur in quantities that are not easily measured or quantified, such as mood or hunger. |
| **A 17B.5 d** | **Students sketch graphs which 'give a feel for' relationships in situations familiar to them without recourse to careful data collection or point plotting**: for example, they may draw qualitative graphs of mood swings during a Grand Final football match from different points of view or they may sketch a graph from a verbal account of the noise level during a party. |

**Activity 6 Summary**

| Teaching Point | Student Activity |
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| Summary<br>Students need to express an understanding of rich and poor to cause some internal conflict in the task. Positioning themselves and | How would youth of other nations rate the Needs and Wants of their lives? Can you place a dollar value on possession and relate that to happiness? Compare and contrast the idea of possession for families around |

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| looking from others viewpoints is necessary.<br>The Photo study of possession from around the world should encourage open discussion. Is possession as big an issue for these families? Does it make you rethink what your values are and what you think you really need? | the world. Do the concepts or global inequalities have an impact on your Gotta Have list of needs and wants?<br>What is privilege?<br>Would you now review your list of needs and wants?<br>What impact has this Maths Project had on your understanding of the world and how you fit in it? |

Possible Student Outcomes taken from The Outcomes and Standards Framework WA

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| Working Mathematically | **Level 3**<br>**Mathematical strategies**<br>The student poses mathematical questions prompted by a specific stimulus or familiar context and uses problem-solving strategies that include those based on representing key information in models, diagrams and lists.<br>**Apply and verify**<br>The student uses alternative ways, when prompted, to check working and choice of method.<br>**Reason mathematically**<br>The student understands mathematical conjectures as being more than simply a guess, makes straightforward tests of conjectures and discards those that fail the test. |
| | **Level 4**<br>**Mathematical strategies**<br>**The student asks questions to clarify the essential mathematical features of a problem and uses problem-solving strategies that include those based on identifying and organising key information.**<br>**Apply and verify**<br>**The student checks, when prompted, that answers are roughly as expected and that methods and answers make sense.**<br>**Reason mathematically**<br>**The student uses examples to support or refute mathematical conjectures and attempts to make simple modifications of conjectures on the basis of examples**. |
| | **Level 5**<br>**Mathematical strategies**<br>**The student extends tasks by asking further mathematical questions and uses problem-solving strategies that include those based on developing systematic approaches.**<br>**Apply and verify**<br>**The student checks working and reasoning and whether answers fit specifications and make sense in the original situation.**<br>**Reason mathematically**<br>**The student draws on mathematical knowledge to give reasons for conjectures before testing them, and refines and modifies conjectures as a result of testing.** |

Also in the summary you may notice these.

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| **Apprecia ting** | **In the early adolescence years**, students focus on learning mathematics that will help them outside the mathematics lesson. |
| | They are confident in their own ability to solve problems in familiar mathematical contexts and apply problem solving strategies in non- |

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| | mathematical situations. |
| | They use a variety of strategies to solve or follow up problems, and reflect on their solutions. |
| | They refine their solutions and are comfortable with applying their refinement to subsequent problems. |
| | They present solutions to problems confidently in oral and written reports, and share willingly their knowledge with others. |
| **Contextualising mathematics** | **In the early adolescence years**,<br>Students understand that mathematical ideas can be used to represent their view of the world. |
| | They can describe a non-mathematical object or activity from a mathematical perspective. |
| | They appreciate the mathematics in some visual representations of physical aspects of our world. |

# Teachers notes from running the project

I started this project late in term 3. I have a class of a relatively comfortable size with a huge variation in understanding and ability. The students are cohesive but have very different likes and dislikes they are homogenous by age only. I encourage students to work independently and cooperatively, I call it cooperative independence and it is achieved when the students feel free enough to share views and ideas and work but when they put pen to paper it is in their own words and it is their own work. These students don't copy and do display cooperative independence.

**Activity 1**

This activity went really well and the students got right into the sharing of items that they have got to have. The variety of backgrounds stood out as some of the girls were into fashion whilst others were sporty or the boys were into bikes or surf culture or computers. Complete contrasts and valuable contributions as students explain why they think the stuff they say you gotta have is stuff that you gotta have. Each student took from the activity what they needed and they could easily create their own lists.

The whole activity went very well wit lots of discussion and loads of stereotyping. Very interestingly, I had to deliver this lesson in a common area where some Year 11 and 12 students were working. They privately chipped in and stated just how wrong the Year 9's were about what is important. The Senior School students realised the amount of change in themselves over that short period of time between Year 9 and Year 11.

I printed out the Excel documents and gave each student booklet. The cover page had Gotta Have in the centre as a place to write down their thoughts. Students chose differing ways of presenting the Gotta Have stuff and it was attached to the booklet instead of my page.

**Activity 2**

Students had varying degrees of difficulty with this task and varying levels of attachment to the project. The documents did not enhance students with lower abilities to carry out the task and I would suggest remaking them.

A new student of a diametrically opposite nature was introduced to the class. This student caused the class dynamics to be altered and negative behaviour became a class issue. With the transient nature of this group too much time was spent on getting some students ready to get on with work rather than teaching the majority how to estimate and complete each section. I lost the opportunity to teach the application of Excel for this task.

My main focus at this stage was to speed up the tail section of the class and for those who had kept up and were focused on the task, they were enjoying the research and found it interesting. Those students who were distracted from learning by the new student got back on board and were following the task and doing the work only because they had to or face the consequences. (Engagement at this stage of the project was difficult to determine as many students had played up to the new

student and were trying to impress him. Group dynamics are real and the project stood a real chance of being derailed at this point.)

**Activity 3**
The students from Year 9 went to compete in Perth at country week this backed up by the term holiday meant that I needed to review the project and expectations of what work should have been completed during their own time. Unfortunately I could not wait for the disaffected students to complete work in class or the project would stall, (60% on task, 20% not ready and 20% still absent) I decided that I needed to introduce the critical thinking activity with 6 hats and help make observations with the photos. Fortunately the extremely disruptive student had moved on during the term break.

Many students discussed the photos (and the quality of pictures) the note taking was good and while the better able writers understood how to present the written description the lower ability English students found the writing difficult.

**Activity 4**
This was a thought provoking activity that caused a lot of discussion but I allowed students to verbally justify their choices. Some students could not take the phone or shoes out of the needs list. They tried to justify their reasons but were left copping some flak from other students.

**Activity 5**
I included this task in the project as it was important in the Year 8 task and showed up as being a difficult concept. It took some time but eventually all of the students worked through the difference between rich and poor and using this as a means to use non graduated scales and mood graphs (Alg L5).

**Activity 6**
The project at this stage had gone overtime and I used the summary to hone in on key pertinent questions to assess the impact the project had on student values. I believe the summary was well focused and achieved many thoughtful insights.

In assessing the work I felt that the participation of the class was fractured and poor. Continual student attendance is a major problem with long term projects. Students that miss the directed lessons lose attachment to the project and reluctantly complete work. We had a transient student come through that totally disrupted the class dynamics whilst getting involved with the project, then, as transients do, moved on. The death of a staff member who was a huge part of the students lives caused much grief and soul searching. The project seemed less important as we moved on.

Evaluating the work showed that just over 50% completed all work and handed it in on time, of those students the work was graded at a value of 71%. One student just handed in whatever on the due date receiving a fail. The remaining students were given more time to compile and hand in work. All students completed the task and one student resubmitted work to gain a pass.

Student Mathematical outcomes were assessed and seemed to show a minimal gain in outcome demonstration for the time put in. However the values and insights picked up by some of the students were maximal and could not have been achieved through normal class discourse. I am left in a quandary about the results. I believe we need to teach students to be enriched in the whole of earth understandings yet I am also the only teacher in a small school with the responsibility of improving Mathematical understandings and outcomes. I feel I spent too much time on the project and this affected my ability to cover the massive content in an overloaded curriculum. Yet I was providing these students an excellent life engaging learning activity.

I asked myself could this learning have happened in another subject area.
Yes it could.
Could the supporting Mathematics have been delivered in another Learning Area?
Yes it could.
Would the same or similar results have been achieved if the project was delivered through a different Learning Area?
This is highly probable.
Should the project have been delivered through another Learning Area?
No, the study of Mathematics is not divorced from the world and it should reflect in its curriculum a proper attachment to it. The problem does not lie in the question of should we be teaching social equity. The real problem lies in the overcrowded curriculum and the expectations placed on achieving targets by age based norms.

I was prepared to admit that this project failed to reach my desired goals and that I had perhaps wasted many students time, until I read the comments that were written in the summaries about other people's perceptions of how they live and through the comments by the students about what they liked about the project. It is true that the Year 9 student is a very different student from any other and they do not like to let on that you have been making an impact on them. After marking all of the projects I now feel that I would have almost been negligent to not have done the project. Gee they keep you on your toes.