Maths, Sex and Rock ‘n’ Roll.

How Can We Engage the Millennial Student?

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Published in:
Australian Journal of Middle Schooling

Published: 01/01/2005

Document Version
Publisher's PDF, also known as Version of record

Maths, sex and rock 'n' roll – how can we engage the Millennial student?

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Abstract

In this paper we discuss the reasons for young people opting out of the study of school mathematics and the implications for education, particularly in the context of the middle years of schooling. Drawing on the current literature on intergenerational differences, we propose that young people, Millennials, have grown up in particular social, cultural and economic conditions which have shaped them in particular ways that, in turn, shape their thinking, beliefs and actions. In particular, we focus on two key constructs, the impact of technology and marketing on youth and how this creates particular views of the world. This has implications for education, particularly in the middle years.

Introduction

With the continual decline of students undertaking mathematics in the senior years of schooling and even fewer continuing with further study beyond school, there is a real concern about the future of mathematics – nationally and internationally. If there are not enough people moving into mathematics, there are even fewer who will undertake further studies in the teaching of mathematics. This situation has been acknowledged by various departments of education, such as New South Wales where the move to introduce scholarships, retraining programs and other initiatives has been required to avert a staffing crisis (NSWDET, 2005). This situation has also been recognised by professional organisations such as the Australian Association of Mathematics Teachers and Mathematics Education Research Group of Australasia (Thomas, 2000). Many reasons can be hypothesised as to why young people are not taking up the study of mathematics.

In this paper we draw on the reflections of students in a middle school preservice award to understand some of the reasons why this situation is occurring. Rather than frame the work within the formats that have been undertaken in the past, we are locating it in a very contemporary approach to understanding youth. Similarly, in writing the paper, we have opted for a format that centres around issues as identified by the participants and informed by literature.

Adolescent identity

Generally speaking, the behaviours, relationships and thinking of young people during the adolescent period are a culmination of factors influenced by variables such as class, culture, sexual identity, ethnicity and sexual orientation, the impacts of which can sometimes be underestimated by those who are closest to young people. As young people move through the adolescent years, therefore, teachers need to be mindful of these factors particularly as the typical age of reaching puberty in western countries has, over the past decades, been declining, with the average age now approximately 10 – 12 years and some students beginning the main phase of puberty as young as 8 years of age (Santrock, 2005). Schools really need to be proactive in establishing policies and practices which acknowledge the significance of adolescent development for young people and creating school and classroom environments which foster positive relationships between students and teachers. While subject content and its delivery are crucial components to enhanced learning outcomes, it would appear that this is difficult to achieve when classroom culture has subject content as its priority.

... I was never a great Maths student but I could work through it and understood the concepts most of the time. I did get a great sense of accomplishment out of it. You knew you were going to be stuck in that classroom for 2 periods and you knew it was going to be boring because it was just out of the textbook, and there's no time for talking about it. (Darren)

Compounding factors affecting the pubescent years are a range of social, information and communication technologies along with global developments; external factors which require young people to develop a range of skills enabling them to meet these challenges. At the same time the importance of relationships and community is a significantly central theme which needs to be an integral component of a young person's overall development. As young people are now expected to remain at school, or in some form of education or training for most of their adolescent and early adult years, teachers and educators need to consider the total education journey now required.

... You have to think about how they are learning that concept and then create activities which will fit in with it. They (school students) are social beings so you have to create situations that enhance that social aspect. (Rebecca)

Young people who have come through the early years of schooling and have not developed strong mathematical skills may need a different approach to their school education. It is crucial, therefore, to keep them engaged through the middle years. This is not the time to go back to basics again, but to move into age-appropriate areas of learning which do not focus on mathematics per se, but rather personal development and growth, depth of understanding and relevance to the world through meaningful learning tasks. At this stage of a student's schooling, teachers need to tap in to some other aspect of their maturity and draw on the student's own experiences. From this approach, mathematics will develop and students will be drawn back to numerate tasks.

Millennial ways of working and being

Millennials have grown up in a time where computer technology is an integral component of home, society and work. Computer technology is embedded in appliances from microwaves and television through to watches and games. Young people have grown up in a world where the internet has been commonplace, where music and videos can be downloaded and where communication technology is part of their social life. Technology has impacted on how they talk, communicate and interact. Similarly, they have grown up in times where, through technologies, they have been provided with almost instant feedback, where they are constantly entertained through various media (television, games on telephones, computers, internet) so that they are used to (and have come to expect) high degrees of entertainment.

Similarly, the technologies to which they have been exposed often work simultaneously. One only has to consider contemporary youth and the ways in which they multitask with objects. They play X-Box, listen to the stereo, watch TV and carry on a phone conversation with friends. No other generation has had this saturation of media and technology. Concomitant with these changes in technology is the exposure to highly organised marketing. No other generation has had the exposure to goods and consumption as this generation. Their consumption habits exceed those of the Baby Boomers. From the time they were toddlers, this generation has been the target of advertising – one only has to consider the success of groups such as the Wiggles and High 5 to see how this generation has been the target of marketing unlike any other generation. As a consequence of this saturation, this generation is also seen to be the one that is most centred on themselves and most concerned about image.

A summary of intergenerational differences can be observed in Table 1 (Zevenbergen, 2004) where the context of the environments can be seen to create particular opportunities for the construction of particular habitus within social members. While the table is useful in demonstrating the differences in social conditions and outcomes, it is limited by its generic nature. It would hardly be possible to suppose that all Australians would have similar experiences and thus be circumscribed with particular attributes. Such a view is deterministic. However, what is possible to interpret from Table 1 are the general trends that are observable across time and brought about through particular social conditions. The Table has some credibility in terms of documenting trends rather than being seen as a fixed representation of generations.

	Baby Boomers	Gen X	Millennials
Era	1945 – 65 (Howe & Strauss) 1943 – 1960 (Zemke)	1965 – 85 1960 – 80	1985 – present 1980 – present
Names	Baby boomers	Generation X	Generation Y Generation Why Echo boomers Nexters
Core values	Optimism Team work Personal gratification Health and wellness Personal growth Work	Thinking globally Balance Technoliteracy Fun Informality Reliance Pragmatism	Confidence Civic duty Achievement Morality Diversity Street smart
Personality	Driven Soul searchers Love-hate relationship with authority	Risk takers Family-orientated Sceptical Focused on job not work hours	Optimistic Prefer collective action Tenacious
Defining events	Prosperity Television Suburbia Assassinations Vietnam War, Cold War Women's Lib	Latchkey kids Single parents MTV AIDS Challenger Fall of Berlin Wall	Internet chat lines School violence War on Iraq Sept 11 Bali bombings Terrorism Kosovo
Toys	Pinball machines Barbie dolls	Space Invaders Cabbage Patch Kids	Nintendo Pokemon
Food	Home made	Microwave	Delivered
Technology	Room fans Television 78s and LPs 8 mm film Mainframes Slide rules	Air Conditioning Cable TV Cassettes and CDs VCRs Transistors Calculators	Climate control Interactive TV Streaming and MP3s DVDs Microchips Personal computers
Infrastructure	Test satellites B-52s Highways/Freeways	Moon launches ICBMs Telcom satellites	Space shuttles Stealth and smart bombs Internet

Table 1: Generated differences and Contexts (Source: Zevenbergen, 2004)

If one thinks of the ways in which many young people work, there is a sense that unlike previous generations, where texts were linear, where teaching was predominantly teacher talk and small group interactions over a period time and where single forms of media at any one given time were commonplace, young people have grown up in substantially different environments. Tools such as mobile phones are multifunctional – they are telephones, calculators, GPS navigation systems, cameras, and text machines for SMS texts as well as a facility to receive and send email. A young person is multiskilled in terms of multiple forms of information processing. Environments are qualitatively different from those of the past and those found in modern classrooms. The impact of these environments on how young people process information may be substantially different from those of their parents and other generations. Furthermore, how these environments differ from classrooms is also called into question. The speed at which youth receive, process and transmit information is very different from that found in most classrooms. As such, questions about the learning environments in mathematics classrooms need to be posed as to how well they meet the needs of the Millennial student.

Issues raised by Millennial middle years teachers

In the following sections we discuss a few of these issues as they arose from our work with Millennial students and interview data with a group of second year preservice teachers undertaking studies in a middle years teacher education degree. Two groups of students were interviewed; the first group are studying high school mathematics as the secondary component of their degree and the second group are not secondary mathematics specialists, but have completed subjects in primary mathematics, as part of the primary component of their course.

Mathematics as a field of study

The comments offered by the middle years preservice teachers reinforced many of the other studies that have been conducted about students' perceptions and accounts of mathematics teaching (Boaler, 1997; Zevenbergen, 2005). Two examples of such comments are listed below and highlight their perceptions of their (recent) experiences in school mathematics classrooms:

... I always found Maths pretty good, I found it easy. But if you asked other people in the class what subject they didn't like the most, most of them would say Maths. That's because all we did was textbook work, even I found it a bludge because I only did what I had to do I didn't try to challenge myself. Behaviour was always the worst in Maths classrooms even though the teacher tried to be strict. It's because most people didn't understand what we were supposed to be doing. (Mark)

... Maths is just maths. When you hear maths you think of sitting at a desk – its predictable. (Mel and Darren)

As we will show in other comments, preservice teachers commented on other aspects of mathematics that have been reported elsewhere. In particular, practices such as the use of textbooks and ability grouping were themes that emerged consistently in their reflections.

Millennials, technology and working mathematically

... I think the thing you have to teach kids is the processes then you use IT as a tool. (Rebecca)

... It's just giving them other examples of how it works how you can use technology to solve an equation or create graphs. (Kate)

Increasingly, educators recognise the power of various technologies that offer considerable potential for learning mathematics. These have been well documented, albeit as case studies of exemplary practice. Millennials, having grown up in a technology-rich world, are a generation like no other. To them, technology is an integral component of their everyday lives—so much so, it is often invisible to them. This generation is the one whose fear of technology is non-existent. When there is a match between teachers' knowledge and use of technology and that of the students, there is considerable potential for learning in technologically enhanced ways. For the middle years students, they were able to see, use and value technology in their teaching..

... I think with technology you need to know maths if you want to program a computer but to do basic things like play games, you don't need maths. Kids these days, like our grade 1 class on placement did a PowerPoint presentation. You don't need to know a great deal of maths to use a computer. (Melanie)

This is in stark contrast to other experiences we have had working with some teachers, particularly those who are less familiar and at ease with technology. In one school where there was an attempt to reform the mathematics department, there was a strong backlash against the use of technology. A number of teachers would not use technology (even at the level of spreadsheets) as they reported that 'technology had no place in mathematics classrooms'. This view is at loggerheads with the Millennials' dispositions towards technology and particularly in opposition to how the Millennial teachers perceive the use and significance of Information and Communication Technology (ICT) and mathematics.

... Computers are always changing and advancing and its always going to impact on Maths because Maths and IT go hand in hand. With advances with Excel and Maple [maths] is solved instantly you just put in the equation – a lot of the process is gone. (Andrew)

Importance of self and perception of others

Millennials have reported to be the most self-centred generation – even more so than the Baby Boomers (Howe & Strauss, 2000). They have also been reported to be the generation most concerned about image (Zemke, 2001). This is hardly surprising given the mass media saturation experienced by this generation. They have been the target of substantial market research to identify their consumption patterns and desires which has then been used in marketing strategies. As such, it is hardly surprising that this generation is very concerned with their image and the image of others (including mathematics teachers). This is evident in the comments offered below:

... I don't know if he was a great teacher or not but he was so good looking and that changed the whole class. They paid attention to him he fitted socially into their world. It was the Billabong clothes, the sunnies on the head – he looked cool and he was what 15 year-old girls wanted to see and even for the guys he looked sporty, he was always out kicking the footy. (Bette)

... the other guy (maths teacher) was older in the eyes of 16 year olds. He was a nerd. He wasn't someone students wanted to go and see or meet unless you really had to. He was always in his office. He wore his socks pulled up, he was old, he didn't know anything about us or the footy scores where as this good looking teacher always was saying something to the guys in the class. (Melanie)

As Millennials are the generation most concerned about image, in part through the onslaught of media campaigns, this generation can be quite harsh in how they judge others. If this is then applied to their everyday experiences in the classroom, it becomes possible to think about ways in which students identify (or not) with mathematics. In working with the middle years preservice teachers, they were asked what they liked (or not) about their maths teachers.

... If they're not hiding their personal life they can talk about what they did on the weekend, or something like that, it makes them seem like more of a person to the students and there's a bit more respect there, you can be seen as more of a friend. (Ben)

Also ...

...They like quite strict classrooms they don't generally have very good teacher skills. They generally know a great deal about maths but they don't know much about general life that affects teenagers. [However] I had a teacher in Years 11 and 12 who was a very positive person who had a great knowledge of maths but he also had great people skills. He was able to explain maths in an interesting way and make it meaningful so we would learn it. (Ken)

These comments suggest a number of emergent themes in the response. Ken articulates the lack of empathy of his teachers to the lives of their students. As the interview progressed it became clear that what is meant in this comment is that his teachers did not understand the lives of young people. Some participants went so far as to say that their teachers did not want to understand the lives of their students and this was incomprehensible to the emerging teachers. Given the emphasis in teacher education on the need for educators to understand where their students are coming from in terms of their experiences and backgrounds and where the task of education is to build bridges between existing knowledges that students bring to the learning situation and where learning is to traverse, these experiences did not resonate well with the preservice teachers.

The final comment offered by Ken reinforced the Millennials' dispositions towards meaningful and authentic learning – a theme to be discussed in later sections of this paper.

Values

Howe and Strauss (2001) argue that Millennials are a very moralistic generation and that they hold strong values about particular aspects of their worlds. Some of these values centre on being true to oneself and self-expression/ self-worth. There is evidence in our work with the emerging middle years teachers of these values and their importance to teaching.

Dress codes

... We had this one teacher who was a bit of a hippy, she wore hippy clothes. We didn't have to appreciate the same style of clothing but she was like really cool because she is doing what she wants to do she was wearing what she wants to wear. (Rebecca)

The Millennial is also very moralistic. In our interviews with the preservice teachers, they reflected on their teachers and offered considerable insights into what they thought made some teachers stand out. In most cases, regardless of how they looked, they felt that it was most critical that teachers were true to themselves. They commented on 'daggy' teachers who may have dressed a bit oddly but could still gain the respect of their students because they were as they appeared. In contrast, they were highly critical of the teachers who dressed in ways that were beyond their years, or wore 'FMBs and short skirts as if they were going clubbing' or the (older) male teachers who wore surfing gear but were not surfers. These attires were not seen to reflect the teachers.

Respecting students

This was identified by most of the students as being a critical variable in how teachers were able to relate to their students. The cohort reported this as being critical when they were students as well as in their own observations as preservice teachers.

You have to respect the students. They know if teachers are genuine or not. If teachers don't have respect for their students, it shows. The students do not have to respect teachers if they do not respect them. Some teachers clearly don't even like students and you know that. You can see it and you can feel it.

Having recently completed professional experiences in schools as teachers, a considerable number of the students have commented in their on-campus work on the ways in which respect was generated or not in their classrooms. Some students have come back from these experiences very disillusioned by the lack of respect in classrooms. As the experience of school is still fresh in their minds (as students), the preservice teachers expressed considerable empathy for school students, as indicated by the following comment:

... I think you have to be a teacher who wants to be in the classroom and not there just to get a pay packet every week. They actually want to be in the classroom working with adolescents and actually want to develop their learning. (Glen)

Pedagogy: Throw away the textbook!

While there was a lot of commentary on the themes identified in the previous section, the most permeating theme throughout these interviews and supported by a vast wealth of research is the use of textbooks in the teaching of mathematics (Ewing, 2004). The cohorts consistently identified the use of textbooks in the middle years as an issue. Not only was it boring for the students, it did not create authentic learning situations for them. It failed to make connections for them as learners, as indicated by the following comments.

... A lot of the teaching that has to take place just corresponds with the textbook. A lot of the maths work I did at school you just went from chapter 1 to chapter 12 over the year and that would be it. It takes a lot of effort to do something creative and change the type of work that is being done. (Josh)

... The majority of work we did was straight out of the textbook. We are taught [in this degree] to do maths in a hands-on practical, that is, almost project-based in the way that it's taught. But it's a bit scary because we can't envisage it actually happening in Maths classrooms. (Rebecca)

... In maths classrooms we haven't seen how to do it [teach maths] in a different way because its still being taught the same way as when we were there, which is only a little while ago. One good thing about this course is that we can see where the kids are coming from in primary school and we know where they are going to in high school. (Ken)

The preservice middle years teachers have identified dichotomies which exist between their university studies and teaching practices in maths classrooms as well as between primary school classrooms and secondary school classrooms. From their comments it is evident that, while they see the need to approach the teaching of mathematics from a different perspective, the teaching practices they are witnessing in schools confirm for them that very little has altered from when they were at school. They do not see any approaches to the teaching of mathematics in a way which can inspire them to do it differently in order to address the learning needs of contemporary adolescents.

Millennials, as a generation, need to have authentic learning experiences. While all generations of teenagers have sought to question, this attribute is particularly pronounced with Millennials. While we have chosen to use the term Millennial in this paper, they are also known as Generation Y (for following Generation X) or Generation Why (playing on the Gen Y terminology) for their capacity to question like no other generation. While there have always been echoes of 'why do we have to learn this?' in mathematics classrooms, this is far more poignant with this generation. Thus, the use of text book teaching with its failure to create authentic learning situations is even less relevant for this generation.

Conclusion

In a recent report into the educational performance of 15-year-olds from various countries, the OECD (2004) has found that strong performance in mathematics was characterised by strong teacher – student relations, students who were ready to invest effort and who showed interest in the discipline, with lower levels of anxiety. One of the concerns identified in the report was that girls consistently report lower interest in, and enjoyment of, mathematics, lower levels of self-confidence and higher levels of anxiety with mathematics. Further, student interest in mathematics is far lower across countries than in reading. Within a middle school context these findings would support the research around successful middle school programs which acknowledge the importance of school practices in addressing individual difference, adolescent development as crucial in the decision-making process regarding school practices and policies, establishing supportive learning environments which are positive for adolescent development and school organisation needs to enhance the student – teacher relationship. If Mathematics is to stop the disengagement of students and ignite adolescent interests this discipline needs a new approach,

especially in the middle years. It may be that the image of mathematics as a discipline needs to be approached from a different perspective and that application and engagement become the priority to a more successful learning experience for young adolescents.

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