

CHILDREN TALK ABOUT MATHEMATICS ASSESSMENT

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This paper reports on the second phase of a study in which Year 7 children speak about standardised compulsory state-wide Numeracy Tests. While accepting these tests as an unavoidable part of their schooling, the children developed strategies to cope with the multiple pressures the tests created. Their views reflect their understandings of the test as defining both mathematics, and mathematical competence. They speak of an assessment regime with the power to create anxiety, undermine their mathematical confidence and construct their mathematical identities, and contemplate changes to that might both improve the quality of information gathered, and enhance their wellbeing.

GIVING CHILDREN A VOICE IN MATHEMATICS ASSESSMENT

Children's powerlessness and vulnerability in the face of traumatising situations such as war, poverty, natural disasters, and child labour are well-recognised worldwide. The less dramatic yet nonetheless significant impacts on children's lives of the prosaic and apparently 'everyday' nature of compulsory, standardised assessment practices in their schooling receive far less attention and are not well understood, despite the profound life consequences. Recent developments in mathematics education take little account of children's rights to participate in all matters affecting their lives, as enshrined in Article 12 of the UN Convention on the Rights of the Child. Within the discourse of raising standards in mathematics in many countries and the introduction of increasingly prescriptive mathematics curricula to address perceived shortcomings, the performance of teachers and schools is undergoing intensifying scrutiny, and children's mathematical achievement as measured against clearly-defined and measurable standards is becoming a core focus of the curriculum. In spite of their status as the primary stake-holders in our education systems, children are not considered to be critical partners in deciding what those standards might be. It is assumed that children have nothing to offer debates about what mathematics they must learn, how they might most effectively learn it, and how their learning might best be assessed. Such exclusion positions children as passive and deficient recipients within coercive, adultcentric cultures of expertise.

Assessment is a process with social consequences (Broadfoot, 2002; Morgan, 2000). Annual, compulsory state-wide Year 3, 5 and 7 Numeracy Tests were introduced in Queensland over a decade ago but no research has been undertaken to assess the effects of this policy on the social dimensions of children's learning of mathematics. This method of assessment is poised to become part of a national testing regime which will be extended to include numeracy tests at Years 4, 6 and 9. This paper reports on a research study based on the approach that implementation of any major social policy should be subjected to *social impact assessment*, defined by Taylor et al

(1995) as “a process of research, planning and management of change arising from policies and projects” (p. 1). These authors see social impact assessment as underpinned by critical theory, thus “the ‘enabling’ practice of social assessment becomes an essential part of a more complete response to social change” (p. 57). The introduction of compulsory assessment regimes into schooling constitutes ‘social change’ yet there seems to be no recognition at any level of a need to assess the social outcomes of such change either in its planning or implementation phases, and even less of ‘enablement’ of children as participants in the change process.

Sinclair Taylor (2000) argues, “Empowerment is about shifting the balance of power from service providers and scrutinizers across political, community and institutional levels to recipients... Giving children a say in their schooling, or any matters affecting them, gives them a stake in the process...giving children a voice in decision making makes them visible...” (p. 32). Ernest (2004) also highlights the importance of involving the research subject as a co-researcher. Accordingly, this research seeks to empower a group of children in their learning of mathematics by providing them with a platform from which to speak about how standardised state-wide numeracy assessment impacts upon their lives not only as individual learners, but as social beings - members of families and peer cohorts. The research enables their views to be shared with parents, teachers and the state educational assessment authorities, raising awareness of the social issues for children in high stakes mandatory numeracy testing.

RESEARCH DESIGN

Research Phase One: The research began in 2005 as a school community initiated project focussing on participants’ experiences of the Year 5 Numeracy Test in Queensland, Australia. It was based on the premise that affording key stakeholders in mathematics education - children, parents, teachers and school administrators - a say in standardised state-wide numeracy assessment is an empowering process given the insights gained and communication created. The first phase of the research indicated three distinct negative impacts of the test on children. These were:

(1) *Adverse effects on student and family wellbeing.* Participants’ reports revealed a significant proportion of children experienced mild to severe stress and some suffered severe feelings of disappointment, loss of confidence and decline in mathematical self-belief as a result of the Test process; participants also reported extra pressure on families created by the Test, including managing children’s stress and disparities between siblings’ and friends’ Test performances.

(2) *Limitations of information gained from the Test.* Participants all reported that they found the multiple-choice test results yielded little specific or useful information about the children’s mathematical skills and knowledge in the absence of the children’s completed Test papers or the original Test questions. Discrepancies between children’s school and Test results were particularly difficult to explain for all

groups of participants. Given the perceived importance and significance of the Test results, this lack of information caused considerable frustration and consternation, particularly for parents and children.

(3) *Adverse effects of the Test on delivery of Year 5 mathematics programmes.* Teachers and school managers reported that the Test had a significant effect on the content and pedagogy of Year 5 mathematics programmes, and that the school's focus on interdisciplinary teaching and learning of mathematics and the development of the attributes of lifelong learners including creative thinking and innovative problem solving was both undermined and compromised by the Test. Children were aware of the interruption to their everyday mathematics programmes that weeks of practising for the Test caused, and that answering multiple choice questions was not how they were used to being assessed – it was a skill they had to learn.

The Phase 1 research report stated that the Test created significant difficulties for participants which needed to be addressed. Participants suggested a range of possible changes to the Test design, administration, and reporting procedures to better manage these issues. These included: modifying the multiple-choice format to allow for children to demonstrate their mathematical working, thinking, and reasoning; reporting results alongside children's responses to the questions; granting greater choice to schools and children about Test participation; rescheduling the Test to lessen the impact on classroom programmes and maximise the usefulness of the results, and reporting the results to children and parents in a non-comparative format.

Participants' responses pointed to an overall desire for a greater sense of choice and ownership in the Test design and administration process, and better communication about the significance and implications of the Test procedure and results, firstly between Education Queensland, the Queensland Studies Authority, and schools, and secondly between school management, teachers, children, and families. It suggested that further community level research of this nature needed to be undertaken to explore the social impacts of standardised testing in mathematics across a range of school types, children's ages and from a range of geographical regions.

On reading a copy of the report, the Queensland Studies Authority responded:

“There are many myths in school communities about the Years 3, 5 and 7 Tests, and we appreciate your attempt to understand how the Year 5 test effected [sic] a particular school... the nature of standardised testing and the legislation regarding the Years 3, 5 and 7 tests does constrain what we are able to do and your report highlights the need to educate teachers about the whole process, from item demands to standardised testing in general. With this knowledge they may be better able to communicate with students and parents in a more positive way to reduce the ‘adverse effects’ of the test”. [1]

Research Phase Two: Encouraging comments about the value of the research from participants at the PME29 Conference presentation of a paper (Walls, 2006) in which the research was described, prompted the school administrators and the fifteen Year 5

children involved in Phase 1 of the research to suggest an extension of the study to include the 2007 Year 7 Numeracy Test. They wished to investigate whether communicating with students and parents ‘in a more positive way’ at the school level as the Queensland Studies Authority letter suggested might offset some of the adverse impacts of the test.

This paper reports on the outcomes of such intervention by focussing on children’s views of the Year 7 Test[2]. For the Phase 2 of the research, eight of the children from the Year 5 study who had remained at the school agreed to continue. Eleven more Year 7 children opted to participate in the 2007 study. To gather their views about the test, the children were clustered into focus groups. Each group spent thirty minutes talking together with the researcher acting as conversation facilitator. Based on the most frequent topics of conversation in the earlier phase of the research, a list of questions was prepared to guide these semi-structured conversations. The conversations enabled the children to voice their experiences of the Test, their beliefs and opinions about it, and their suggestions for positive change.

FINDINGS

The children revealed the Test’s impacts through their accounts of personal thoughts and feelings, conversations between their peers, conversations with their families, and interactions with their teachers. These revealed that while the children responded in diverse ways, there were common themes in their responses.

Although a number of the children reported feeling less nervous about the Year 7 Test than they had about the Year 5 Test, feelings of anxiety and apprehension were still a common feature of their conversations. The build-up to the Test was a particularly anxious time for most of the children as these comments illustrate.

Teagan: I was nervous...probably because it’s so important. And I worry about doing well and that.

Bella: The night before the test I was kinda shaky because I hadn’t done one before...I didn’t know what to expect. (Bella had moved to Queensland)

Simon: I was a bit nervous coming into the test. I didn’t know how I was going to go because you don’t know what’s in the Test and you don’t get given a second study of it or anything.

Some were less agitated about the test.

Talia: During the test I felt relaxed and a bit excited.

Cheyenne: Lots of kids get really worried. There’s a couple of kids around school that do really care about the mark and stuff. If they don’t get a decent mark they get really upset. I just genuinely don’t care. There’s no point in doing this, it doesn’t count on your report card or anything.

These comments indicate that (un)familiarity with the test, knowing what to expect, the perceived importance of the test results, and ‘caring’ about personal achievement were key factors in children’s comfort levels. The children’s talk about how their teachers had prepared them for the Test demonstrated tensions that were created.

Teagan: [The teacher] said “It’s for High School. If you do well you’ll have a good mark, this is for the future” and stuff...She said “Take your time, check your work over and over”, and stuff.

Ari: Miss Bartell said “Don’t get tricked up with the questions – think them through.”

Talia: I was a bit nervous, but I was alright because we got told a couple of weeks before so it gave me time...it’s a big thing and you’re always going to try to do your best

Some children reported additional pressure exerted by parents’ or siblings’ expectations, illustrating the ways in which sitting the Test was a ‘social’ event.

Perry: My Dad said, “Do well or I’ll bash you”... If I get a bad mark then my [younger] brother will think, “Well, that’s cool”... Mum pays me to do it. [If] I don’t get a good mark she’d probably get at me.

Cheyenne: I’ve got an older brother and he does really well at everything. It’s like, “How come you can’t do this?”

Teagan: On the way to school in the car Mum said “Don’t forget to check your work” the whole way. “Just make sure of your answers, take your time, there’s no prize for finishing first.” ...We got in the car and Mum’s like, “How did you go? Do you think you did well?” and I’m like, “I don’t know. I never know.” I hope I do well.

Talia: Mum was having a joke, “If you don’t do well, you’re not coming home”.

The following exchange showed that for some children, the Test created intense feelings of disempowerment, resentment and anger which they expressed amongst their peers.

Perry: Kids said they were going to rip the test up when they get it back...Some kids came up to me and said, “Are you doing the Test? Do you hate the teachers?”

Chas: Yeah, blowing up the buildings.

These alarming responses illustrate the capacity of assessments such as the Test to coerce, expose, exclude and alienate. The children talked of the strategies they used to contend with this potentially threatening event in their lives.

Cheyenne: Some kids try to get suspended or something so they won’t have to sit the test.

Chas: Zac said, “I’m just going to guess everything.”

Teagan: I tried to pretend it was normal work so I didn't have a brain overload sort of thing.

Such comments illustrate typical social responses to potentially disempowering situations: avoidance (getting suspended), subversion (I'm just going to guess everything) and resignation (pretending it is normal work).

In response to the findings of Phase 1 of the research, the teachers had attempted to explain the purpose of the test to the children, hoping this might allay their fears. This message was not consistently received by the children, however, as these very different explanations illustrate:

Teagan: The Year 7 Tests are for the government so they know how well people are achieving at different schools and so they can help with the funding and give extra money to the schools that need extra help.

Britta: They test us to see if our brains are functioning properly.

Ari: Like when you get older, like you go on to have a job, your boss will have a look and if you did well he'll probably accept you more than other people.

This confusion, exacerbated by peer discussion about what the results of the test really meant, clearly created apprehension for children where popular beliefs about the import of the test had outweighed the school's message.

Bella: The teacher was stressed out because people kept saying that if you don't get good marks you won't get into High School.

Talia: Kids were just trying to make other kids nervous.

Bart: To make everyone else feel bad about it.

When asked whether they would have liked more information about the test, there was general agreement.

Sally: I can imagine every kid would. Because it's a mystery and you kind of want to know more about it.

An important consideration for many of the children was the nature and difficulty of the Test questions. The Year 7 teachers said that they had found some of the questions very difficult and were not sure of the correct answers themselves.

Cheyenne: We need questions that we understand... I didn't even understand most of them. The first question was about flags. Is it a rhombus or trapezium? I didn't know what a rhombus was.

Bart: Some of the questions I didn't get how they were.

Ari: Some of them were really tricky...with the flags, they were talking about "parallel" and that tricked me.

Eric: There was the silhouette one. That was a killer.

Perry: I hated the one with the square and with the area. That really sucked.

As these comments illustrate, for many of the children the Test was an alienating experience for its inaccessibility and incomprehensibility. In speaking of “tricky”, “killer”, “sucked” and “hated” the children were describing the Test as something which violates. Lack of mathematical vocabulary as much as lack of mathematical understanding seemed to be a barrier for some of these children. For others, perceived lack of preparation for the questions was an issue.

Lim: In our class we hadn’t started to you use the 360 degree protractor yet, so it was hard just getting used to that.

Mark: Some [questions] were just plain weird, like we hadn’t done it before.

When asked about the kinds of questions that they would prefer, the children made useful suggestions as the following examples show:

Perry: Adding up the points on your video game.

Teagan: I would probably put questions that you use in real life, like how to use your money and make good deals.

‘Real’ questions for the children were clearly what they would have preferred, for their familiarity, relevance and authenticity. The children talked about whether they thought the test was an effective method of finding out what they knew and could do in mathematics. The fact that they could not show how they had reached their answers was concerning for some children.

Lim: [In class mathematics assessments] When you figure out the shapes and you use the formula, you get three marks for the formula. [In the Test] You just gotta have the right answer, ‘cause it’s not about the work.

Teagan: Sometimes you had gone to a lot of trouble to get that answer and the computer or whatever marks it, can’t see that.

The children made suggestions for improvements in the way the Test worked.

Talia: Maybe they should have a box under each question for how you did it.

Cheyenne: I think the best way is to do it [mathematics assessment] in class when the teacher is there and everyone is sort of laid back, because we normally perform our best then.

These comments speak of the children’s wish to increase the chances of their mathematical thinking being understood, and of their need for greater comfort by making the test a more ‘natural’ (less pressured) part of everyday classroom life.

For some children, there was satisfaction in sitting the Test. This seemed to be derived not from gaining a greater understanding of their mathematical learning but from the assurance of feeling *prepared*, and *knowing where they ‘stood’* compared with others, as captured in these comments:

Dante: Didn’t really feel anything different ‘cause we were pretty much prepared... Pretty easy to me. I do well on those Maths and English tests.

Mark: It makes you feel better when you know you are good and other kids aren't so good at it.

DISCUSSION

The Test was a socially embedded event with social consequences. The processes by which each child constructed meaning from the Test were individual and complex, yet commonality can be found within the sample group. Where the children believed the Test to be personally significant, that is, that it might affect their future chances or show up their inadequacies, their stress levels about the Test were increased. Those who said they enjoyed the Test were those who were usually comfortable with mathematics in class, were able to finish within the given time, and felt confident they would score highly. The competitive aspects of the Test seemed to appeal to them. Those who were less sure of their mathematical capabilities, who were not able to understand or complete questions in the given time, or who were not confident that they would score highly reported feeling either resigned to their 'fate' or very negative about the test. The Test was seen as a "mystery" and the children wanted more information. Significantly, none of the children's comments suggested that the Test was a powerful tool in enhancing their *learning* of mathematics.

The children's conversations reveal that while some children reported feeling *relaxed* about the Test, for most the Test was an unpleasant and unwelcome intrusion in their lives. Their teachers' attempts to offset the adverse effects of the Test were largely unsuccessful; many of the issues revealed in the Year 5 Test research had remained and for some had been intensified as the children grew older and had become more aware of the sense of disempowerment the test engendered.

Cotton (2004) discusses the ways in which assessment in mathematics education acts to produce self-evidential truths enshrined in practice. We can see from the children's accounts that they view the Test as an event with clearly-defined rules of engagement: Participation is compulsory for all children in Queensland; each child must complete the Test in silence and without help from others; answers' only (mostly multiple choice) must be produced in response to 'questions'; the same questions are used for all children assuming 'one size fits all'; an unknown and invisible external authority designs (and marks) the questions; the questions are quiz-like - they are usually disconnected from one another and presented at random, and the questions have to be answered within a very limited time. These rules created *pressure* for children in six distinct ways: (i) forcing each child to participate whether s/he wanted to or not (compulsion/coercion) (ii) pushing individual children to perform beyond their natural and comfortable pace (too fast) (iii) pushing individual children to perform beyond their current state of skill and knowledge (cognitive inaccessibility) (iv) calling for only one 'correct' response (creating a high risk situation through the chance of being 'wrong') (v) exposing the child to public scrutiny with potential for being labelled a 'failure' or 'success' by parent, teacher, siblings, classmates or self or any combination of these (creating the chance of being

shown up and/or ridiculed and/or excluded from high school), and (vi) banning or discouraging the use of materials other than those designated by the rules of the Test, peer discussion, and checking of answers with others (reducing support and increasing likelihood of error).

These multiple sources of pressure can have a cumulative effect. For some children, this pressure seemed to contribute to their dislike and fear of the Test, and for others, excitement. The kinds of pressure exerted by the Test have been found to be deeply embedded in mathematics pedagogical practices in many classrooms around the world, (TIMSS Video Mathematics Research Group, 2003) and form either an explicit or implicit part of everyday classroom routines. The Test therefore defines, mirrors and reinforces accepted cultural practices in mathematics education.

CONCLUSION

There is universality in these children's responses. While each child speaks of his or her unique experiences of one particular Test, as Pollard and Filer note, "the stories of children are likely to resonate with the experiences of others because they provide examples of fundamental processes in human experience, through which individuals develop and act in society" (p. 267). In showing how the Test acted as an invisible powerful moral authority that compelled them to participate in an activity whose results they variously perceived to be *important* yet potentially damaging, the children's accounts remind us of what it is to be a child making sense of a complex world of schooling, mathematics, family, peers and 'self'. Within their testimonies, mathematics classrooms in general, and the Test in particular are never presented as spaces where children become active architects of their own mathematical learning.

The research alerts us to some *social* consequences of leaving children out of decision-making about their education, but this exclusion may also have *educational* effects. Munns & Woodward for example demonstrate significant connections between children's self-assessment and their engagement in learning. It can be argued that we have entered a renewed era of Authoritarianism in education (Law, 2007) in which control is being exercised over children through increasingly prescriptive assessment regimes that seek to *judge, classify, rank* and *differentiate* them. Law asks "to what extent should children be encouraged to think for themselves and make their own judgements?" (p. 15) noting the connections between freedom of speech, democracy, and Liberal views of educating. He argues that while more research needs to be done, a growing body of evidence suggests that *thinking for themselves* is good for children academically, socially and emotionally (p. 39).

This study concludes that if mathematics education in general and its assessment practices such as the Year 7 Numeracy Test in particular are to serve our children's best interests, mathematics educators need to actively solicit and take into account children's views. Further research is needed.

NOTES

1. Year 7 in Australia is the final year of primary schooling. Children in Year 7 are aged twelve or thirteen years.
2. Personal Communication: Letter from Anna van Hoof, Assistant Director Testing and Analysis, Queensland Studies Authority, 3 Feb, 2006.

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