This is the published version:


Available from Deakin Research Online:

http://hdl.handle.net/10536/DRO/DU:30004973

Reproduced with the kind permissions of the copyright owner.

Copyright : 2003, Mathematics Education Research Group of Australasia
Perceptions of Barriers to Numeracy

Judith A. Mousley
Deakin University
<judym@deakin.edu.au>

This paper reports on one of the initial stage in a project that aims to identify, describe, evaluate, and provide advice on aspects of classroom pedagogy that may act as barriers to the numeracy development of some primary students. The paper describes how focus groups were used and some of the outcomes of this process. Some concerns are discussed, and suggestions for improving the process are made. However, it is concluded that the focus group approach served the research purposes well.

“What do you get when you cross a sheep with a kangaroo?” asked the teacher on the video. Several children put up their hands. One replied, “A woolly jumper”. The teacher nodded and laughed. Some children smiled, making quick comments to each other. The teacher continued her lesson on combinations and permutations. These Year 7 children were about to work out how many “mixed-up animals” could be made with 3 animals, and then 4 animals, each cut into 3 parts.

The group of research participants watching the video pointed out that there would have been children in the class who did not understand it. It was an Australian joke, and children not knowing that jumper means sweater would not be able to appreciate the pun. The class had included quite a few immigrant children. It was also pointed out that some of the students would not have known what it was to “cross a sheep” because their experience of the word “cross” was probably restricted to anger, movement, a multiplication symbol, and a crucifix. Others said the children might manage the mathematics of the lesson, but were concerned about how some children’s confusion might “eat into the next stage of the teaching” and about their starting a lesson with “feelings of confusion and incompetence”.

Some children will feel confused by the incident and will spend some time trying to fathom it out—and in the meantime the teacher has moved on and is explaining the task. Probably half the class are still thinking, “What’s the woolly jumper? I don’t get the joke. (Jenny, Focus group 3)

What followed in the focus group was a discussion about ways that introductions to lessons and “real-world” contexts for problems may add to difficulties that some children have with mathematics lessons, rather than serving to interest them and to make the mathematics more meaningful. As the dialogue progressed, participants gave varied examples from their own experience identified similar examples from the videotapes, and suggested ways that teachers could make expectations more explicit and their teaching of mathematics more inclusive.

The Research Project

This short recount of a research scenario above typifies the activity in the first research stage of the project entitled Overcoming Barriers to Mathematics Learning. The research is based on the assumption that for mainstream students, processes, expectations, and communications are relatively clear, but for students from different socio-cultural backgrounds (such as low socio-economic groups, Indigenous children, and some recent immigrants) expectations may not be clear and consequently children’s participation in mathematics classrooms may suffer. The project will investigate whether making explicit such aspects of classrooms can facilitate learning.

The key research questions for this three-year project are:
What are the implicit pedagogies associated with the use of open-ended approaches to teaching mathematics?

Can strategies be developed that make such pedagogies explicit?

Do these strategies overcome barriers and improve learning outcomes?

The project has two empirical research stages. The first—the subject of this paper—was the use of focus groups to (a) collate people's perceptions of possible barriers to improving numeracy with the use of open ended tasks, and (b) consider how it may be possible to overcome these. The second stage involved trialing the written advice that was constructed by compiling and refining the focus groups’ suggestions, in order to study whether implementing suggested strategies and hence lead to improved student learning.

Focus Group Methodology

With focus groups, participants speak for themselves in open dialogue. It is hoped that the social interaction will raise more varied information than one-to-one interviews. Focus groups are ideal for orienting oneself to a new field, generating hypotheses based on informants’ insights, and for bringing together a range of opinions on a topic, specific research questions, and issues defined by researchers (Morgan, 1988). However, Kitzinger (1994) concluded from a review of focus group studies that “this work has not yet been sophisticatedly developed as a research technique within the social sciences” (p. 104). She recommended that researchers trial the approach and varied techniques, thus developing a richer body of literature on what is often presented in too simplistic a style.

For the first stage of our research, three focus groups with 8 to 10 members in each were organised. Each group had a mix of participants—teachers, mathematics teacher educators, and specialists in aspects of minority-group education (e.g. special education, ESL, Indigenous education). Participants were recommended by our colleagues, the schools they use for student teachers’ practicum experience, and Education Departments.

After a short introduction about our interpretation of the term “open mathematical tasks”, the focus group members were shown short excerpts of video. These represented stages of typical open-task lessons (i.e. introducing the task, small group work, and then whole-class discussion). After each excerpt was played, a prompt was used: “Could you see anything in the teaching style or activity that might make some children feel disenfranchised?” Variations of this question were used after each videotape excerpt had been played. Each of the resulting discussions lasted about two hours. They were audiotaped and transcribed. The data (individual but whole comments) were sorted into initial categories of the complementary groups of norms of activity identified by Cobb & McClain (1999): mathematical norms and pedagogical norms. As later audiotapes were analysed, sub-categories and further divisions of data were constructed. Categories were split or combined as seemed sensible until the resulting categories seemed inclusive of all of the points made by focus group participants. The resulting points and examples were written up as a 40-page booklet (Sullivan, Mousley & Zevenbergen, 2002)—the basic tool for work with teachers in the second stage of the project.

Results and Discussion

The focus groups produced a volume of potentially problematic aspects of mathematics lessons. The videotaped teachers, classroom interactions, tasks, and children’s engagement had all been considered by us to be exemplary. The most commonly mentioned areas of concern about the lessons were language comprehension factors, the selection and use of particular everyday contexts and teaching aids, and the need to make the purpose of each
stage of the lesson clear. As an example of these factors, under the subheading "Patterns of action and interaction in classrooms", we included possible socio-cultural differences in:

- understanding of the purpose, nature and requirements of particular learning activities;
- knowledge of traditional behaviours in schools and classrooms;
- differences between expectations of teachers and parents as well as home and school communities;
- everyday situations used to set mathematical concepts and procedures in relatively familiar contexts;
- use of expression/s allowing for greater or lesser comprehension;
- comprehension of words in mathematics that have different meanings out of school contexts;
- capacity to deal with the speed at which content is delivered and/or or organised into levels;
- registers of spoken language and norms for children’s participation in classroom discourse;
- expectations regarding the management of seating and movement;
- purposes of and arrangements for the use of pairs, groups, or the whole class activity;
- arrangements made for availability and use of printed, electronic, pictorial, and other resources;
- the structural set up of the schools and arrangement of classrooms and resources; and
- children’s records (not necessarily in books) of their learning experiences. (Node 2: Issues)

In each of the focus groups, comments about such issues were intermingled with and followed up by discussions about practical ways of building a more inclusive pedagogical context. Many of the suggestions were simple, such as the writing of key mathematical words on the board and checking children’s understanding of them. Other concerns, such as the need for teachers to learn more about the norms and expectations of Indigenous communities, required much more complex solutions. Nevertheless, the result was a wealth of suggestions worthy of trialing in practical contexts. For example, under the same heading, “Patterns of action and interaction in classrooms”, we grouped advice such as:

(2 1) /Practices/Mathematical
Students and parents need to see purposes of what is not in their experience of school mathematics activity, such as getting students to estimate and predict.
Display problem-solving procedures around the room and ask children to report on ones they used.
Be prepared for new teaching strategies such as the use of problems with more than one answer to take time to become embedded and accepted, as well as time to influence learning outcomes.

(2 2) /Practices/Socio cultural
Some types of activity are more likely to be used or understood by particular socio-cultural groups.
Consider socio-cultural groups’ ability to handle various levels of complexity in explicitness, language, abstraction, independence, competition, etc.
Make traditions in questioning, control, and management of classrooms explicit.
Be accepting of different patterns of body language, communication, and social interaction.

Thus teachers, academics and Department personnel who were not specifically trained in principles of inclusive teaching were able to identify factors that may provide barriers to full participation and optimal learning in mathematics classrooms. Focus group participants with knowledge of minority cultures contributed to construction of advice.

However, we also experienced some difficulties with the use of focus groups. First, teachers did not participate equally with academics or Department representatives, and often waited for an academic’s comment before agreeing and then offering supporting advice. It was discernible, too, that in both groups people took on typical roles of their occupations, with academics being more analytical and critical, and teachers more supportive of the teachers on the videotapes. Discussion here often focused on the activities set for the children to complete rather than the nature of the classroom interaction:

Participant 1: Now that’s a nice activity.
Researcher: Yes, it is. Do you think some groups of children might not take to it readily?
Would it suit all children?
Similarly, some academics wanted to suggest alternative research approaches:

I’d like to take the reverse course, in a way, and suggest … that by presenting us with a video of the small bit of interaction we maybe missing much more important questions that relate to your research.

Participants’ frustration here was understandable. The agenda and limited data did not allow experts to make the rich, well-informed contributions that they are used to making. A further difficulty was that some participants focused on specific examples rather than general principles. For example, when we asked groups to focus on the teacher’s language, we had expected responses about suitability in terms of genre, syntax, or other structural features. However, comments about language generally had a narrower pedagogical focus.

To address these problems, next time we would use smaller groups with more uniform membership, and give potential participants our aims in writing and a summary of the planned procedure. We would structure the interaction so that individual members could have an independent say, and build in means of probing their thinking more. Showing two or three shorter snippets of videotape, with different activities and teachers, before discussion takes place (and then revisiting these or the transcripts as needed) could encourage participants to focus on more general aspects of the teaching. It would also be worth trialing the effects of preparing questions on each video-excerpt to focus the discussion on various aspects of the teachers’ work, although this would constrain the potential outcomes.

Conclusion

The approach also suited our aim, which was to gather other professionals’ ideas about features of the teaching and learning that might not suit all children. We found that bringing interviewees together ensured rich conversations and useful information. The amount of data gathered from the focus groups was surprising, given that the lessons seemed to be effective and inclusive. The data gathered formed a detailed, extensive foundation for the task of preparing a booklet of advice for teachers and then for the implementation stage of the research. Our key finding from this stage of the project was that that many of the “good” mathematics lessons that we teach, observe, and perhaps videotape as exemplary material for teacher education, contain many examples of teacher actions that may be perceived as likely to disenfranchise some individual children or specific groups of learners.

References


