

# Keeping Going at Country School: Sustaining Numeracy Project Practices

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In this paper, longitudinal data from interviews and videos of classroom practice is used to illustrate the sustainability of Numeracy Development Project (NDP) approaches in a six-teacher rural school. Analysis of interviews with all the teachers in the school reveals a common language and concern about numeracy, which is fostered by ongoing discussions and collegial support. This suggests the emergence of patterns and structures within the school that will allow them to continue to use NDP practices. Consideration of data from 2005 and 2006 reveals the shifts made in both discourse about the NDP and classroom practice. Previously difficult areas have now been internalised, and this has allowed teachers to consider new aspects of their practice. Video data shows the transfer of NDP approaches to strand teaching. Country School continues to embrace, use, and reflect on NDP approaches and students' achievement data, illustrating how a school can develop sustainable practice.

## Background

In 2006, Ell and Irwin (2006) reported on the results of a qualitative study undertaken in two schools – City School and Country School. They found that while the schools had taken different paths to implementation – with City School focusing on policy and school-wide structures, while Country School had focused on classroom practice and resources – both schools showed an ongoing commitment to Numeracy Development Project (NDP) practices. A comparison between two teachers, one from each of the two schools, was presented to illustrate how individual internalisation was a key factor in sustaining NDP approaches (Higgins, 2004).

The results of that study and the one reported in this paper serve to elucidate the results found in large-scale questionnaire studies of sustainability (Thomas, Ward, & Tagg, 2005; Thomas & Ward, 2006). Thomas and Ward reported "... a high degree of utilisation of numeracy practices" (p. 117) among the teachers and lead teachers surveyed when they were evaluating the 2005 Lead Teacher Initiative. These practices include numeracy activities from the resource books or website, student groupings based on strategy stage, and the use of project resources and material masters. They concluded that:

schools appear to be developing numeracy communities of practice, with teachers involved in reflecting on their own teaching practice, collaborating with other teachers, and using student achievement information in numeracy. (Thomas & Ward, 2006, p. 117)

Looking closely at one such "numeracy community of practice" can help us to better understand the nature of sustainability for teachers and to see how the factors identified by Thomas and Ward (2006) play out in a specific school community. Country School is a small rural school that has formed its staff of six into an inquiring and focused group of teachers. Looking in depth at the experiences and practices of Country School's teachers gives us an insight into the everyday difficulties and triumphs of continuing to teach numeracy through NDP approaches.

## Method

### *Participants*

All six teachers from Country School participated in the research. Participants A and B were interviewed in 2005 and 2006. Participants E and F had returned to Country School after a year's leave. Participants C and D were new to Country School. Two teachers (A and B) agreed to be videoed. These two teachers were also videoed in 2005. The teachers' experience, class level, and facilitation history are summarised in Table 1 below.

Table 1  
*Summary of Participants*

Participant	Years of teaching experience	Years since facilitation	Class level
A*	26	2	Yr 6–7–8
B*	24	3	Yr 5–6
C	30	3	Yr 1–2
D	7	4	Yr 6–7–8
E	3	3	Yr 2–3
F	5	1	Yr 3–4

\*Video participant

### *Procedure*

The six teachers were individually interviewed by the researcher. Each interview took approximately 20 minutes. The interviews were semi-structured, with questions about what the teachers found easy/difficult, their views on the most important aspects of the programme, and their experience of teaching in this way over several years. Interviews were audio-recorded and transcribed. Additional notes were also taken at the time of the interviews. Video recordings were made of two class lessons. These lessons were approximately 45 minutes long. The recording was done by the researcher and focused on the teacher and the children they were working with. The interviews were analysed to extract key themes and factors relating to sustaining NDP practices. The videos were analysed alongside the videos from the previous year's lessons to establish elements that had remained part of these teachers' practice.

## Findings

### *Themes from the 2006 Interviews*

The six interviews revealed commonalities across the school. Despite the fact that numeracy was not a current professional development focus, it was clearly still a matter for discussion by the staff. The teachers often used "we" to explain certain features or developments in their mathematics programmes.

We have revised our policy at the school here to ensure we get coverage of the strands. (Teacher B)

We did a pre-test because K and I work together like that. (Teacher F)

That's what I find here. We can talk to each other about it as well; there are two of us at this level for starters. (Teacher D)

In describing their current mathematics programmes, the teachers all mentioned key features of NDP practice.

I group kids by strategy stage. I have got two at the stage where they have to count every object, which would be stage 2, and then I've got a handful of stage 3, and then five stage 4, so there is quite a range. (Teacher E)

The useful aspect is those books. They are fantastic and they have great ideas. (Teacher C)

Having a list of the different stages you can go through once you have taught them a strategy ... having an order ... I find it on the Internet, on their website ... until they can do this, this, and this, don't go any further. (Teacher F)

All the teachers reported that there were no elements of the programme that they had consciously dismissed or dropped.

I would carry on like this unless somebody comes up with another fantastic plan that we all have to follow. I do really like the numeracy project. I think in my classroom there is a real enthusiasm for maths and I don't think it used to be there ... Having the parents saying, "Oh, they're always talking about maths" – that's exciting too. (Teacher D)

There's nothing I have changed. I've gone totally that way. (Teacher C)

I took on everything because I found it fantastic. I was quite inspired. There are probably things I don't use, but just because I haven't been introduced to them. (Teacher F)

No, I haven't stopped anything. I think basically I've kept it pretty routine. (Teacher B)

There were concerns expressed about planning for mathematics. This seemed to go beyond the basic act of planning – the teachers were describing the consequences of knowing what children's needs were. Their awareness of the children's strategies and knowledge had led them to devise programmes that were tailored to meet these needs. This had resulted in an increased planning and preparation burden.

At least half an hour a day just thinking about yes, we are doing this and how am I going to teach it and what activity am I going to have to support that for that group, then the next group ... this is their activity and that game – that's going to help them support what they have learned and then the third group. I mean really, you plan six sessions at once and I find that really hard. (Teacher B)

Every day you have to think: where are we at today and where are we going tomorrow, and it's just huge and I expect it to get less but it's not. You know, you think, well, what is the right one to use. There are just so many options. I mean, even the "Figure It Outs". There are so many things there to cater for the one objective and you think, well, what is the best one, and have I got the best one, and that's all your time taken. I mean, when I get down to the Figure It Outs, I just stand there for half an hour and that's it ... it's choosing the right one, the right activity and the right strategy. (Teacher A)

I'm not sure whether planning is the right word either. It's just knowing where to go from here to there. (Teacher D)

The planning is enormous. I find it hard to cater for everybody. I sit down half an hour before school and I have to get it ready – I can't leave it till the last minute ... I think the planning and actual work involved is massive if you want to do a good job. (Teacher E)

This concern was linked to a desire to become more fluent in their numeracy teaching. For some teachers, this was about mastering new levels they were teaching; for others, it was about having additional resources. When asked about how they hoped their mathematics teaching would look in three years' time, all the teachers said that they thought it would be very similar to their current practice but "better". Suggestions for what would constitute "better" focused on the teacher feeling more secure in their knowledge of NDP approaches and resources so that it came more easily to them and the ability to "be creative" within the programme. This creativity revolved around providing variety for the students and for themselves.

I guess I'd like a book that has extensions of the activities, supplementary activity books published every two years ... maybe some teaching ideas about how we can do this activity or variations of because I just think kids must be bored out of their brains some days seeing the same thing every day. (Teacher B)

I would like to see more books added because I think that three years down the track we are doing the same old, same old ... You think, gosh, this is getting boring, I wish I had something else ... We get resources all the time, but it's knowing what's there ... I would like to think that in time I would be more creative, but we need to keep things revitalised. (Teacher C)

I think the numeracy books are fantastic, but they are quite limited – you know, you have done that and that's it, so how can I teach the same thing in a different way that's still the same? In the juniors, you can do "today we are using cars and tomorrow we'll use teddy bears" and the kids don't know they are learning the same thing, but with the seniors, you can't do that. (Teacher D)

A school-wide concern that the staff had considered together was the role of other strands in the mathematics curriculum and how these should be addressed. In 2005, the school had decided to just master the numeracy approaches and did not systematically address strands. Achievement data collected through Progressive Achievement Test (PAT) testing at the beginning of 2006 showed that the children of Country School were achieving above expectation in number but below expectation in other areas. This had led to a discussion of how to redress this, with the staff deciding to teach blocks of work on the other strands each term. This was tackled in different ways by staff in different areas of the school. Some continued with evidence-based grouping, while others went to a whole-class format. This seemed to be related to whether they saw the mathematics of the strand work as linked to numeracy or not. Teacher F and teacher B express this contrast:

We just stopped and did a four-week block on measurement, and I find now I have to get back into the numeracy project all of a sudden. They don't blend in. They could blend in because you know measurement is all counting, doing things like that, but it's quite separate. (Teacher F)

I think strand teaching is basically teaching vocab ... I did a test on children, they had to measure the perimeter of something. Because they didn't know the [word] perimeter, they got it wrong. Teach them the word "perimeter" and they can add the numbers together or multiply them, so they still have to have their number knowledge. I think it's just getting them to transfer what they know into aspects of their daily lives. (Teacher B)

All of the teachers mentioned the importance of external input into their practice. They had all appreciated the role of the facilitator in their classes, and although they had an active lead teacher, they expressed a desire for ongoing input into their mathematics teaching. The junior part of the school had employed a consultant in 2006 to come and share some ideas with them. There was a call for an informal "question and answer" and sharing time between colleagues, where teachers could feel they had been updated with changes to resources or approaches. Two desires seemed to drive this – firstly, to be "revitalised" and secondly, to make sure they were "doing it right". They found keeping up with their daily programmes and keeping abreast of changes and developments challenging.

In order to understand how these feelings and actions have changed over time, two case-study descriptions are presented. Teacher A and Teacher B both gave interviews and allowed lessons to be videoed in 2005 and 2006. This longitudinal data permits consideration of the elements of practice that have been sustained over this two-year period.

### *Teacher A: 2005 and 2006*

Teacher A described a revolutionary shift in practice in 2005. He was inspired by the results of testing his students to engage fully with the programme approaches. He also attributed his continuing with NDP practices to the lead teacher's enthusiasm and the push for the approach from other staff.

And the assumptions you make about some kids – and you are wrong, you know, and that was interesting. That was the really strong thing, the real analysing of the way kids are thinking and the stages ... It was just so exciting and it was a big shift, I have to say, for me personally. I had two teachers pushing me too – they were very vocal about it ... If I didn't have the push from the bottom of the school and a push from L, I may have gone back. (Teacher A, 2005)

As Principal in 2005, he had made a decision to allow classroom practice to “bed in” before altering school policies. By 2006, new policy was in place and he reported that the staff felt there was alignment between the policy and their practices.

In 2005, his only concern with the programme was preparing his year 8 students for secondary school, particularly in the other strands of the mathematics curriculum.

I would hate to feel that they went to college not knowing as much as they did before. I am more relaxed about it this year than I was last year, sending these kids to high school. I will do this until term 3, and then term 4, teach them what they need. (Teacher A, 2005)

In 2006, Teacher A reported continuing to use the NDP approaches with his class. His concerns about teaching other strands had been confirmed by PAT data, and he had sought to add more of this to his programme. He remained enthusiastic and committed to the approach because he believed it was producing excellent results for children.

### *Teacher: 2005 and 2006*

Teacher B's 2005 interview responses focused on the process of implementing the NDP approaches in her classroom. When asked to discuss the most useful part of the NDP, she responded:

That would be the resource book, it's very good ... just the process of teach, follow up, and activity again, those three and making those go round. Before I did work, teach, work, teach ... Now I think it has more purpose. (Teacher B, 2005)

Her feelings about the most difficult part of the NDP also reflected organisational practices.

When they have done their mat session, when they have done their activities that I want them to do, then they have a game ... I try and be quite specific with what I want them to do to ensure they get the most out of the game. That's the hardest thing ... to make them get the objective and be learning when they're away from you. (Teacher B, 2005)

In terms of sustaining what she was doing, Teacher B had concerns about resources.

When you get a child at stage 6 at year 5, which I have, where do I go for resources? (Teacher B, 2005)

In 2006, Teacher B felt that she had moved to something that fitted in with her teaching rather than trying to master an external structure.

Being off the contract, the contract said A, B, C, do this, this, and this, and now we are off the contract, I have found something that suits me – still working within the philosophy of the numeracy project, but something that fits my classroom teaching. There is more flexibility within the grouping, I'm more inclined to move children between groups and not work three groups. Sometimes I use the whole class, and sometimes I work with two groups depending on the needs. (Teacher B, 2006)

This shift away from adhering to a perceived formula had made her more comfortable with her teaching and less concerned about organisational aspects of the mathematics lesson. Her responses in 2006 focused more on student learning and on the nature of her interaction with the children.

I think a lot of the peer sharing. I find that quite good because that makes every child think and it is expected that they will give an answer. Children ask many questions and I answer them with a question back rather than me giving them an answer, whereas I think probably two years ago I would have given them the answer. (Teacher B, 2006)

In 2005, Teacher B used the NDP resource books thoroughly and carefully and felt reliant on them. In 2006, she reported less reliance on the books and more confidence with the approach.

I still use it as a guide, and yes I am still looking back at it, I try to head to those activities, so yes I still use them. (Teacher B, 2006)

### *Video lessons 2005 and 2006*

The lessons that were videoed in 2005 showed that Teacher A and Teacher B both used organisational patterns and materials that could readily be associated with NDP approaches. These lesson features, such as using the resource books, using the recommended equipment and materials, grouping the class by strategy stage, sharing learning intentions, and using modelling books to record, were observed in both lessons. While each teacher had a preferred way to structure group discussion, both used peer-sharing before feeding into larger group discussion, seeking reasoning, and expecting explanations. During the sharing of strategies in group work, the interaction was between the teacher and the students in turn. Apart from one-to-one sharing in pairs, which was not heard by the group altogether, there was little discussion among the students.

The 2006-videoed lessons provided interesting insight into the effects of the NDP on practice in mathematics across the strands. As noted above, a key concern for Country School was the achievement data for their students in strands other than number. The lessons observed in 2006 reflected this because they were measurement lessons. However, these lessons included both the superficial features and interaction patterns of the numeracy lessons seen in 2005. Both Teacher A and Teacher B had transferred elements of their number teaching to the measurement material. They sought strategies from the students, using measurement as a context to consider number concepts. The students were grouped on the basis of evidence about their knowledge of measurement and their strategy stage. In the interviews, the teachers described how their approach to teaching the strand material had changed since undertaking NDP facilitation.

It has changed what I do. I am more focused on little bits and steps, not trying to get full coverage. I think I relate it back all the time, and they are finding they are getting back to multiplication again. I think it's bringing numeracy back into our strands. (Teacher B, 2006)

I am sort of in the habit now ... We wouldn't have grouped them like this in the past, we would have grouped them at the beginning of the year. It's all very flexible, the task books and the baskets we carry over. (Teacher A, 2006)

Teacher A and Teacher B appear to have internalised some principles of NDP approaches and have generalised these to teaching "non-project" material. Elements of this way of approaching mathematics teaching and learning appeared to have become "second nature".

## **Discussion**

This case study is necessarily limited. It tells the story of sustained practice within a particular context. Findings within this context may or may not be applicable to other schools and other locations. The particular features of this school – its size, location, supportive community, strong leadership, and collegiality – support the practice of the classroom teachers in ways that other schools may not be able to. The willingness of the school to participate for a second year implies that the staff is eager to engage and to talk about practice.

The data does allow us to consider three key themes that add to the picture of sustainability provided by the larger-scale quantitative studies (Thomas, Ward, & Tagg, 2005; Thomas & Ward, 2006).

Firstly, schools that have been focusing on the number aspects of numeracy as they grapple with implementing the NDP may then turn their attention to the role of the other strands in the curriculum. The introduction of the new curriculum may also impact on this as teachers try to work out what is and is not in the new document and try to teach from it. In the case of Teachers A and B, the techniques, interaction patterns, and organisational approaches they had learned through the NDP had been adapted to work with objectives in measurement. This transfer suggests the internalisation of principles that could guide effective practice across the curriculum.

Secondly, the teachers articulated the effects of knowing what the children need and how that affects planning for learning. The issues raised about planning focused not so much on the act of planning as on the thinking required to meet needs and to provide an adequate programme. The teachers were concerned about choosing the right activities, making sure children were engaged with worthwhile materials, and targeting instruction for “where to next”. This had placed an increased burden on them in terms of preparation, but they had not taken short cuts. The recognition of the children’s needs was leading to more carefully planned instruction.

Thirdly, this case study casts some light on the role of the resource books in sustaining NDP practices. The teachers value the books highly and want more books and resources to alleviate perceived boredom and to add variety. The extent to which “the books” are seen to equal “the project” can be seen in some of the teachers’ responses, where, when asked to discuss the NDP, they discuss the books (for example, Teacher B in 2005). However, it might be considered that sustained practice has been achieved when the books play less of a role in practice that is driven by a deep understanding of the children’s needs and the mathematics to be taught. Teacher B in 2006 illustrates the beginnings of this shift. From a professed reliance on the books in 2005, she now feels they are more of a guide from which she selects and adapts activities. To the extent that she is able to do this in line with NDP goals, it signals the development of increasingly internalised practice.

The NDP has had a profound effect on Country School. The impetus provided by the facilitation has led to ongoing engagement with issues in numeracy learning and a commitment by the whole staff to pursue NDP teaching approaches. The benefits of this can be seen by the staff and community in improved performance in number on measures such as the mathematics PAT. Present in the school are the three factors noted by Higgins (2004): personal internalisation, collegial support, and school-wide commitment. Within this community of practice, the issues of strand coverage, planning, and resources are challenges to be discussed and worked through rather than reasons for abandoning the NDP programme.

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