Using a Video Link to Engage Numeracy Facilitators in Professional Development in Mathematics

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This evaluation report attempts to answer the question: Is a course in mathematics content for teaching, delivered via a video link, an effective way to engage facilitators in diverse locations in productive professional development? The results, from a small number of facilitators, suggest that while discussion is highly valued and issues relating to mathematics knowledge for teaching are viewed as highly relevant, the video-link presentation was insufficiently flexible to meet the needs of all facilitators. Facilitators in different locations reported very different experiences of the course. These differences seem to be due to an array of factors, including practical aspects such as timing and location and group factors such as interaction patterns and perceived relevance.

In 2007, the Ministry of Education offered numeracy facilitators throughout New Zealand the opportunity to participate in a course in pedagogical content knowledge (PCK) for teaching mathematics, delivered via a live video link. Numeracy facilitators work in schools with groups of teachers, introducing them to the Numeracy Development Projects (NDP) principles, approaches, and materials. In addition, they provide ongoing support to schools to help them sustain the implementation of the NDP. This is done on a school-by-school basis and through a network of lead teachers. In their work, facilitators need to address with teachers issues relating to pedagogy and issues relating to mathematics. The Ministry of Education wanted to offer facilitators a course that would cover key concepts underpinning numeracy, such as place value, fractions, and decimals, with which teachers often have difficulty, in order that facilitators would gain robust knowledge about the mathematical concepts and gather ideas as to how they could tackle these with teachers.

Professional development for numeracy facilitators may have some commonalities with professional development for any teacher of mathematics, but it is potentially made more complex because facilitators need knowledge not only of mathematics and of children's learning, but also of adult learning. However, the dearth of research focused directly on people working with teachers, rather than on the teachers themselves, means that we must look to the literature on teachers' professional development for clues about how facilitators may respond and what they might need in professional development opportunities.

Timperley, Wilson, Barrar, and Fung (2008) reviewed teachers' professional learning and development as part of the Best Evidence Synthesis (BES) programme. When eleven core studies were considered together in order to look for commonalities, many factors were found to be present in both effective and ineffective interventions. It was necessary to look more deeply to find the factors that differentiated between them. Volunteering to participate, for example, was not necessary for success, but engaging with the intervention at some point was. The common thread in successful interventions, however, was a focus on teachers' mathematical content knowledge. All the successful interventions looked at teachers' content knowledge in mathematics, whereas unsuccessful interventions looked at pedagogy rather than mathematics. For facilitators, who need to be able to address gaps in content knowledge with teachers, being confident with mathematics content would seem to be essential for success.

The nature of the content knowledge of mathematics required by teachers and facilitators has been the subject of much recent research and discussion. Beginning with Shulman's (1986) concept of pedagogical content knowledge, researchers have tried to tease out what the key components of such

knowledge might be. Hill and colleagues (Hill, Schilling, & Ball, 2004; Hill, Rowan, & Ball, 2005) have focused on mathematics knowledge for teaching (MKT) as part of PCK. MKT is knowledge of mathematics that goes beyond what is needed for everyday use of mathematics. It includes an in-depth knowledge of seemingly simple concepts such as place value so that teachers can build mathematically robust understandings in their students. Again, in order to help teachers develop MKT, facilitators need a sound personal knowledge of MKT and knowledge of how to grow MKT in others.

Professional development focused on MKT and aimed at facilitators could thus be seen to have two purposes: firstly, to improve the facilitators' personal MKT and, secondly, to show them ways to develop MKT in the teachers they are working with. Facilitators are selected for their role through an application process and might therefore be expected to be more knowledgeable, confident, and enthusiastic about teaching mathematics than classroom teachers in general. However, it may not necessarily follow that they hold MKT in such a way that they can share it with others. Hill et al. (2005) have demonstrated that MKT is specialist knowledge, and while facilitators may be good mathematicians, there may be aspects of mathematics learning that they have not considered through the lens of the learner and the underlying concepts.

Evaluation

How was the Evaluation Conducted?

The course was delivered to facilitators at five sites via live video link, with a sixth site where the video was generated. A researcher visited two of the sites to observe the experience of the facilitators and then to conduct a group interview evaluating the course experience. Numeracy facilitators at the other sites were invited to complete an electronic questionnaire at the end of the course. The questionnaire was sent to area co-ordinators for distribution to their teams. Four questionnaires from two sites were returned. A further site responded via a phone interview, in which questions were asked that were similar to those posed in the questionnaire and group interviews. The questions asked can be found in Appendix N (p. 221).

Table 1
Respondents and Type of Information Collected

Site	Information Type	Number of Respondents
A	None received	0
B	Telephone interview	1
C	Electronic questionnaire	2
D	Group interview	3
E	Group interview	12
F	Electronic questionnaire	2

What Was the Nature of the Course?

The facilitator course was adapted from a course that was simultaneously being delivered to teachers. The facilitator course consisted of 12 sessions, each two hours in length, that were sent live to five university-based sites between 8–10 a.m. on Monday mornings, spread over a calendar year. Participants in distance locations saw a course lecturer work with a group of facilitators at one

university site. The distance facilitators had been sent homework materials and an overview of each session prior to the video link. The sequence of activities was outlined on the overview, which included space for notes and working. Any materials that would be needed, such as digit cards or hundreds arrays, had also been sent by email prior to the session date. The lecturer worked with a group of about eight facilitators, and the facilitators at other sites could see and hear the presentation. When the activity called for discussion in a group, the screens at the distance locations ceased to show the lecturer's group and went mute, allowing for discussion at each local site. The course was structured around the basic concepts of place value, fractions, and decimals, with each session focusing on a sequence of activities that could be used with teachers or students to highlight particular ideas that learners often struggle with. Participants were requested to complete homework tasks, and reviewing the homework comprised the first part of each session.

Who Participated in the Course?

The number of facilitators who participated in the course varied from site to site. The video link could have been available at additional sites by using local school connections that are provided by the Ministry of Education. However, this option proved difficult for facilitators to organise, so the delivery sites were at the universities with which the facilitators were associated. Many facilitators had already organised their visiting schedules by the time the dates were advertised. Facilitators who work in schools that are a long way from their base often travel the night before, which made attendance difficult. For some groups, the video link site was at a different part of the university campus from their workplace, leading to travel and parking issues. For other groups, the link was provided in an adjacent office, making attendance easier.

Participants in the course were therefore those who could arrange their visiting schedules so that they could get to the video link site for the required time. Participation fluctuated at some sites as the year progressed, whereas at others, it remained stable. At site B, only one person was able to attend and their attendance was infrequent. At site E, the majority of the team were able to attend most sessions. In the telephone interview, site B reported that the new and less confident facilitators who might have benefited more from the material tended to be based at outposts and had not accessed the material.

Overall, only a small percentage of the facilitators nationally attended the whole course. Others may have participated for one or two sessions. Many did not attend at all. Of those who attended, only 20 provided data for this study. The discussion presented here must therefore be interpreted with caution.

Was MKT a Useful Focus for the Facilitators?

The literature suggests that effective professional development for teachers in mathematics focuses on mathematics content in the same way that this facilitator course did. However, the effect on this group of facilitators was more varied. One facilitator reported in an interview that he felt he was a good mathematician, but that the course had felt like "lifting up the rocks in what seems to be a solid river bed and finding all the silt underneath". For him, MKT, presented with links to students' thinking, had been a very worthwhile focus. Colleagues in the same interview reported that for sustainability, teachers need to have a deep understanding of the mathematics they are teaching and they felt that they (the facilitators) "needed to go there too". Others regarded it as "a reminder" or a "revision of ideas we are familiar with". These facilitators felt that the MKT component of the course was unnecessary for them, with comments such "We don't need 20 examples to get one concept" and "The level of the material was wrong, it wasn't mathematics that we needed".

Having separate teams in different locations meant that during the discussion sections, each team could talk about their concerns and ideas. In some cases, this centred on the mathematics being presented; in others, it focused on issues relating to teachers and students in classrooms. The focus in the latter case became how the information could be useful in facilitators' daily work rather than being a personal engagement with the mathematics under consideration. This led to different perceptions of the course's relevance and usefulness between the groups.

Facilitators from all the sites reported using some of the ideas in their work with teachers and students, particularly those associated with fractions and decimals. Again, there was a wide variety of opinions, with the same course content being considered very positively and very negatively by different groups of facilitators. There are too few responses to discern patterns and draw conclusions from this, except to note that while Timperley et al. emphasis the programme content over structure in determining the effectiveness of professional development, in a distance-learning situation the way that content is received and perceived can differ significantly between groups.

Was a Video Link a Good Way to Deliver Material to Facilitators?

The video link was a frustration to all participants in the course. Every respondent mentioned practical difficulties with the video link as one of the key issues with the course. Issues with the location of the links, the unreliability of the links, late starts, lack of sound or picture, and not being able to see/hear what was going on were concerns for facilitators. In some cases, frustration with the technology led to facilitators not attending further sessions.

> What I got from the course was limited because of the times that the video link didn't work properly. (Site C)
>
> It was unfortunate that punctuality and reliability of the link compromised live time available in each session. (Site F)

Discussion with colleagues was seen as one of the benefits of the course by all respondents:

> Collegial discussion is helping us learn; it focuses are ongoing discussions in this area. (Site D)
>
> Formalised local conversations – made us put aside time to do this. (Site E)
>
> Discussion is invaluable. (Site F)

However, discussion as promoted by the video link also caused problems. The format of the sessions did not allow for conversation between sites. Sites such as B and C, which had few attendees, were keen to hear the discussion at the video base rather than have a pause for their own discussion. Respondents from sites D and E reported frustration with the length of the pauses, which seemed to either cut off discussion or leave them with too long to discuss. Pacing a course for participants in distance locations is very difficult, which made the "live link" technology less than ideal for this purpose.

The facilitators from site D strongly suggested that discussion amongst sites would have been valuable, and this is reinforced by a respondent from site C, who listed as suggested key features of any future professional development initiatives "small group discussion, focus topics decided by the facilitators, and sharing of best practice".

What were the Barriers to Engaging with the Course?

It would appear from the low response rate, and, at some sites, the low attendance rate, that facilitators experienced barriers to engaging with this course. This evaluation contains the voices of very few of the facilitators and therefore cannot identify all the barriers that may have been present, especially for those who did not attend at all. The barriers identified by those who did respond were:

- frustration with the technology
- issues with timing and attendance, particularly for those who travel long distances to their schools
- the nature of the content – some saw the content as too easy, whereas others wanted to know more about how to teach the material to teachers rather than explore it themselves
- not being able to share their own ideas and experiences with each other.

What Elements Does this Evaluation Suggest that Effective Professional Development for Numeracy Facilitators Might Include?

The responses from the facilitators suggest that they have professional development needs that are distinct from those of teachers. Identifying these needs at a regional or national level could lead to the provision of targeted professional development that would reduce the facilitators' feeling that they have been given a "one size fits all" offering. Comments from sites B, C, and D suggest that facilitators could readily suggest suitable topics for such professional development.

Flexibility in format and timing would improve the effectiveness of professional development for facilitators. All sites mentioned that a DVD version of the course would have been useful and easier for all facilitators to access. At site E, some facilitators had used DVDs of the sessions in pairs during quieter school visiting times and extracts had been used with teachers to support facilitators who were unsure of explaining some concepts in sufficient depth. A DVD that included the course leader working with teachers rather than facilitators was seen as very valuable so that facilitators could see how teachers might react to the material.

Facilitators reported that they would gain from a regular forum where experiences and ideas could be shared between regions. As noted above, discussion with colleagues was a highly valued aspect of the professional development experience. Facilitators at sites D, E, and F thought that being able to share experiences and ideas between regional teams would be very beneficial.

References

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