

PEDAGOGY OF FACILITATION: HOW DO WE BEST HELP TEACHERS OF MATHEMATICS WITH NEW PRACTICES?

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Using comparative analysis two orientations to helping teachers implement new practices in mathematics are examined through four characteristics of practice. A design adherence orientation to facilitation emphasizes classroom activity following the guidelines of the teacher manual. By contrast, a contextually responsive orientation using structural elements of a programme emphasizes student understanding. The paper raises questions about attributes of effective facilitation.

PREAMBLE

Since the release of the results of the Third International Mathematics and Science Study (TIMSS) there have been concerns about student achievement in mathematics in many western English-speaking countries, including New Zealand. The TIMSS results for New Zealand (Garden, 1997) prompted a professional development initiative that aimed to improve teachers' classroom practice in mathematics.

One major kind of response in western education systems has been the declaration of "standards" and the increased attention to teachers' content knowledge. The concerns and their implications have continued to intensify with increased attention to new theories of learning. Specifically, the extensive interest in "mediated learning experiences" presented by Vygotsky (1978) and Newman et al. (1989) have created new kinds of dilemmas about the management of the learning environment.

Yet in the mass of reform efforts there has been little attention paid to helping teachers implement new practices in everyday teaching aimed at improved student outcomes. This paper explores what appears to be a vacuum in the support of teachers and examines the "pedagogy of facilitation". In other words, in what ways can teachers be helped to effectively implement new practices in the classroom? Specifically examined is how the help or facilitation is influenced by the orientation of the facilitator's pedagogy to various characteristics of new practice.

This paper posits that ways of helping teachers implement a reform can be usefully shaped by the concepts and strategies that underlie the materials or activities. Following Sewell's (1992) work on structure and agency, the structural elements provide schema and resources for a contextually responsive approach to improving practice. The degree of knowledge of the discipline, progressions in learning and pedagogy are also critical influences on the impact of facilitation on teachers' practice and children's learning.

A COMPARATIVE ANALYSIS: TWO ORIENTATIONS TO FACILITATION

It is generally assumed that for a new practice to be successfully established across a system, such as primary education, teachers need support. This paper compares two approaches to the “pedagogy of facilitation”. It has been common to emphasize material-based experiences for children when helping teachers. This highlights getting students engaged with the mathematical activity defined by the materials’ designers. In this approach the assumption is that the help or guidance is built into the teachers’ handbook and their literal knowledge of the materials-based activities. Facilitators often, in respect to materials’ designers, emphasize the materials’ attraction for children and the need to follow the handbook sequencing.

By contrast, a second approach to facilitation is to emphasize guidance for teachers centering on structural components so that they gain skills needed for flexibility in classroom use.

Four characteristics common to new programmes and practices are examined in terms of the emphasis they are given for helping teachers’ classroom implementation. Each characteristic is examined in terms of two views a facilitator may follow in working with teachers in presenting the new initiative.

The comparison of the two approaches seeks to highlight key differences through examining kinds of emphases for each orientation (see Table 1). The four characteristics of new practice include teachers’ manual or handbook; materials (activities); teaching method; and modelling new practice.

Characteristic of new practice	Orientation of facilitator’s actions A: Facilitation disposed towards design adherence	Orientation of facilitator’s actions B: Facilitation disposed towards contextual responsiveness
Teachers’ manual or handbook	Emphasis is given to adhering to the programme design and the handbook.	Emphasis is given to using structural elements to interpret the handbook.
Materials (activities)	Emphasis is given to engaging students actively with the materials.	Emphasis is given to teachers’ understanding of the mathematical purposes and concepts underlying the materials.
Teaching method	Emphasis is given to the experiential effect of activities.	Emphasis is given to students’ representations of their mathematical understandings.
Modelling new practice	Emphasis is given to students’ “proper” use of the materials.	Emphasis is given to extending concepts in response to students’ actions and explanations.

Table 1: Comparison of orientations of facilitator’s actions towards changing mathematics teaching practice.

Each characteristic is discussed in terms of the kinds of emphasis it is given for classroom teaching practices. The order of the discussion is parallel for each characteristic: that is, first, the emphasis given to “design adherence” facilitation mode; second, emphasis given to a “contextual responsiveness” mode¹.

COMPARISON OF ORIENTATIONS TOWARDS CHANGING MATHEMATICS TEACHING

Teachers’ Manual or Handbook: Orientation A

Historically it has been presumed that the provision of curriculum materials (such as a handbook), including teaching activities, was sufficient to shift teachers’ practice. By following the manual it was assumed that teachers would adopt new practices. For instance, in an initiative of the 1980s teachers were directed to start all students at the same point on a programme of work rather than decide a starting point based on a student’s prior knowledge (Young-Loveridge, 1987). The quotes that follow contrast a step-by-step approach in following a manual with that of working from the manual’s inherent structural elements.

This is not something *you start from A and go to Z and work your way through*. This is not telling you to throw out everything you know about teaching. You already did good things in your teaching. This is adding to your tool-box of information and adding to your knowledge as a professional. (Kay, Facilitator, ANP 2001)

That’s what we’re doing, we’re giving teachers a structure without giving them “*You will do page this or that*”. ... I’m in favour of resources ... whatever you might be using, [but] it’s which bit are you going to choose. (Emma, Facilitator, ANP 2001)

Underlying adherence to following the programme from beginning to end is reassurance for teachers that important aspects necessary for building student understanding are not omitted.

Teachers’ Manual or Handbook: Orientation B

Mathematical principles and practices such as stages of students’ mathematical thinking and ways of advancing these can be displayed for teachers in a manual through frameworks and/or models (Ministry of Education, 2004). The important thing is how explicitly a framework is presented to teachers; that is, the actions taken by facilitators in presenting the structural elements of a programme.

I think it’s really important that they get to know the framework ... to me it’s one of the key things. ... I am constantly bringing them back to the framework. (Nancy, Facilitator, ANP 2003)

It’s about giving simple, understandable, credible, reasonable structures for teachers to use. (Roger, Facilitator, ANP 2003)

¹ For the comparison data will be drawn from Advanced Numeracy Project (ANP) research reports (Higgins 2002, 2003, 2004). Details of the methodology used are described in these reports. This paper raises theoretical issues about the pedagogy of facilitation.

These facilitators' comments highlight their orientation to presenting the framework as a useful structure for guiding teacher decisions in implementing the programme in their classrooms. It is clear from their comments that they are explicit in their reference to the structures during the process of the teachers becoming familiar with the detail of the programme and internalising the new practice.

Materials (Activities): Orientation A

Engaging students in activity has been an idea with a long history in education in New Zealand (Nuthall, 2000). Many initiatives in mathematics education have provided teachers with resources to use in their classrooms. This orientation assumes that once teachers become familiar with new resources and incorporate them into their classroom programmes, practice will improve and student learning will be enhanced. Helping teachers from a "design adherence" orientation is expressed in the following views of teachers, especially those who might be expecting this orientation from their facilitator.

[We need] more resources – resources/games with better instructions. (Teacher, ANP 2001)

[We need] more activities/resources that could be just picked up and used. (Teacher, ANP 2001)

The comments reflect some teachers' focus on the surface features of activities. These teachers appear to be concerned with keeping their students active without attention to the underlying mathematics for which the activity is designed. This often leads to a desire for a never-ending supply of easily implemented activities for students to use.

Materials (Activities): Orientation B

The orientation towards materials where facilitation is contextually responsive suggests that the effectiveness of an activity or materials is judged against a framework of stages of mathematical thinking. The choice of activity now incorporates an underlying rationale with the usefulness of an activity or manipulative to teach a particular concept as paramount. It also enables a teacher to ensure an activity's mathematical integrity is retained when adapting it for the context within which they are working.

If you keep your sights on the framework [you have] a clear sense of those progressions embedded in your head. It doesn't matter what resources you particularly have in front of you or don't [have]. (Kay, Facilitator, ANP 2001)

You are able to talk with the teacher ... not just show what the activity is, but talk about underlying concepts because we still have a lot of teachers teaching an activity without any concept. (Emma, Facilitator, ANP 2001)

A contextually responsive orientation assumes teachers use materials to guide, not prescribe, student activities in terms of the mathematical needs of the students being taught. This orientation suggests that teachers are able to internalize the new practice

through observing and interpreting children's language and representations examining the efficacy of various activities in teaching mathematical concepts.

Teaching Method: Orientation A

It has been generally accepted in a child-centred approach that it is important to present learners with a range of experiences. The rationale underlying this assumption is that this is a way to address individual learner needs.

For the purposes of the kids going on to intermediate [school] now we have another issue because if they are going on to a school where they will be presented with [algorithms] in textbooks and they are going to be streamed on the basis of a test on vertical algorithms for number, then I think we have got a responsibility to those kids to teach them how to do it that way as well. (Emma, Facilitator, ANP 2001)

I have changed my style of teaching maths. ... Just trying to bring out more language from them whereas before it was a lot of bookwork but now I find that we hardly do a lot of things in the books. (Teacher, ANP 2002)

The perceived needs of the students are often age-bound. For younger students experiences with practical activities are promoted. For older students of mathematics more abstract exercises better suited to teacher explanation followed by pencil and paper exercises are typically followed.

Teaching Method: Orientation B

A contextually responsive approach to helping teachers with a method of teaching uses a model of representations based on the work of Pirie and Kieren's (1989) model of development of students' understanding of mathematical ideas.

I had never thought about the middle section [imaging] before ... I think I always understood that kids had to manipulate materials first ... to get the concept and then when you have done that part and you can do that problem. (Teacher, ANP, 2002)

I now encourage children to share their strategies with the class - the focus in teaching maths has changed to "how did you find out the answer?" not, "what was the answer?" (Teacher, ANP, 2001)

The structure of the model provides an important anchor point for teachers when learning new practices in teaching mathematics. The frames provide teachers with a range of professional choices based on the mathematical understanding of the students.

Modelling New Practice: Orientation A

According to this orientation the facilitator's role tends to emphasize adherence to the procedures of activities usually explained in detail in the teachers' handbook. Teachers often expect and request clear demonstration of the procedures as they then feel reassured about what they are expected to do and they feel they can be accountable to the procedures.

Practical demonstrations are much easier to follow than the manual. (Teacher, ANP 2001)

Observing the facilitator - it is much easier to watch someone than to try to interpret the instructions. (Teacher, ANP 2001)

The notion of delivery and demonstration suggest a programme that deliberately limits opportunities for variations.

Modelling New Practice: Orientation B

From a contextually responsive orientation a facilitator's modelling of practice includes highlighting the subtleties of questioning techniques to advance student understanding. The choice of pedagogy arises from the structural elements of the number framework as well as the teaching model (Ministry of Education, 2004).

I've been watching Emma take lessons ... Like they give her an answer but she'll always come back and ask them that extra step ... you then start realising what your own kids are capable of. ... We were stopping children because I think we were afraid that our own knowledge wouldn't go that far. (Teacher, ANP, 2001)

... to model the pedagogy ... a teacher gives me a group ... I will raise [the activity] up or down depending on where the children are at ... (Emma, Facilitator, ANP 2001)

In essence modelling from a contextually responsive orientation places facilitators in the role of mediating viewpoints, encouraging discussion, and inviting multiple perspectives.

DISCUSSION

The emphasis of the design adherence orientation is focused on procedural classroom practices. The expected procedures are usually unambiguously stated in the teachers' handbook. In essence, the activity is viewed as paramount.

In contrast, the emphasis of the contextually responsive orientation is focused on students' strategies, meaningful activities and multiple representations. In essence, the students' understanding and thoughtful investigation is paramount.

This analysis has given a focus on the pedagogy of facilitation. Having created this perspective, key points need to be investigated. In general, we need to know more about the attributes of contextually responsive facilitation through asking the question, What knowledge do we have of the pedagogy of facilitation and how can we best employ this knowledge to improve teachers' classroom practice in numeracy? Further research needs to be conducted to investigate the reasons for the confusion around the attributes of effective facilitation.

Specific questions are:

1. What dimensions of structure support a contextually responsive orientation to facilitation and enable teachers to internalize new practice for their own working context?

2. What actions of facilitators best enable an evolutionary dynamic to develop in a school that leads to new practices being sustained?
3. How are facilitators best prepared for a contextually responsive orientation?

This paper examined the notion of pedagogy of facilitation using a comparative structure to contrast two views of facilitation. Typically educators have viewed effective facilitation as that which seeks adherence to the design features of a programme of work. A new view of facilitation, that has evolved through the implementation of the Numeracy Project (Ministry of Education, 2004), suggests that through introducing a framework of ideas teachers are able to internalize the changes to their practice and sustain the programme in terms of the context within which they work.

It's about confidence and a change in their articulating from "What do I do next with this bit?" to the kinds of things that they say about why they had done the things ... about why they have changed, why they have chosen particular activities, about why they abandoned particular activities. (Emma, Facilitator, ANP 2001)

I think we were stopping before at the talking the talk and the teachers' intellectual knowledge and we were hoping it translated into practice. (Neil, Principal, ANP 2003)

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