The analysis of teaching: Constraints on lesson description and critique

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A group of teacher educators watched a videotaped mathematics lesson. Their written critiques demonstrated that six specified components of quality teaching were present in the lesson. However, the written comments of some of the observers were surprisingly contradictory. This paper outlines some issues raised by these contradictions. It argues that we need to find ways of critiquing lessons which stimulate debate about different teaching styles and which acknowledge a variety of intentions and perspectives of classroom teachers.

One component of learning to teach is when practice teaching is critiqued by experienced observers. Generally this is done by supervising teachers, but at times lessons are observed by teacher educators, and often their reports are weighted heavily in the determination of an overall grading for practice teaching. Even with experienced teachers, peer review and the support of a critical friend may involve the observation of teaching and a written reaction.

It is suggested in this paper that it is a very difficult task for an observer to respond in writing to a lesson. The difficulty arises partly from a lack of clear definition of goals in teaching, and partly from the lack of clarity of some of the constructs and terms which we use to communicate with each other about teaching. If the observer is not aware of individual constructs about teaching then critique may be quite counterproductive.

Competing demands

Schooling is a sophisticated and complex endeavour and at all times there are conflicting demands on teachers and students. Indeed some of our goals for schooling conflict. For example, the goal of broad content coverage on one hand competes with an aspiration that most students will master skills, concepts, and understandings which are seen as needed for future study. Likewise, we might hope that students develop positive attitudes to learning as well as learning mathematics well. Yet a review by Bishop and Nickson (1983) suggested that the less empathy and concern for emotional aspects demonstrated by teachers, the greater will be their pupils' success. A more urgent conflict of interests was identified by Doyle (1986) and Desforges and Cockburn (1987). They each found that pupils actively resist higher order thinking and problem solving — aspirations of the teacher — by misbehaving, and respond positively only when the demands of tasks are made more explicit and the risk of failure is lessened.

Each of these conflicting aspirations creates dilemmas for teachers. Such dilemmas are particularly important for researchers who seek to study and describe teaching and are central to the development of effective mechanisms for providing feedback to student teachers after observed lessons.

The study reported here is one component of a larger project which aims to identify the features of quality mathematics teaching. The overall project arose from concern that student teachers did not seem to be aware of aspects of quality teaching which may be observed during the practicum (Mousley, Clements & Sullivan, 1991). A survey of teacher educators identified six major components of quality mathematics teaching (see Sullivan &

438Mousley, 1993, for a full description and justification of the six components). The identified components can be presented schematically as follows:

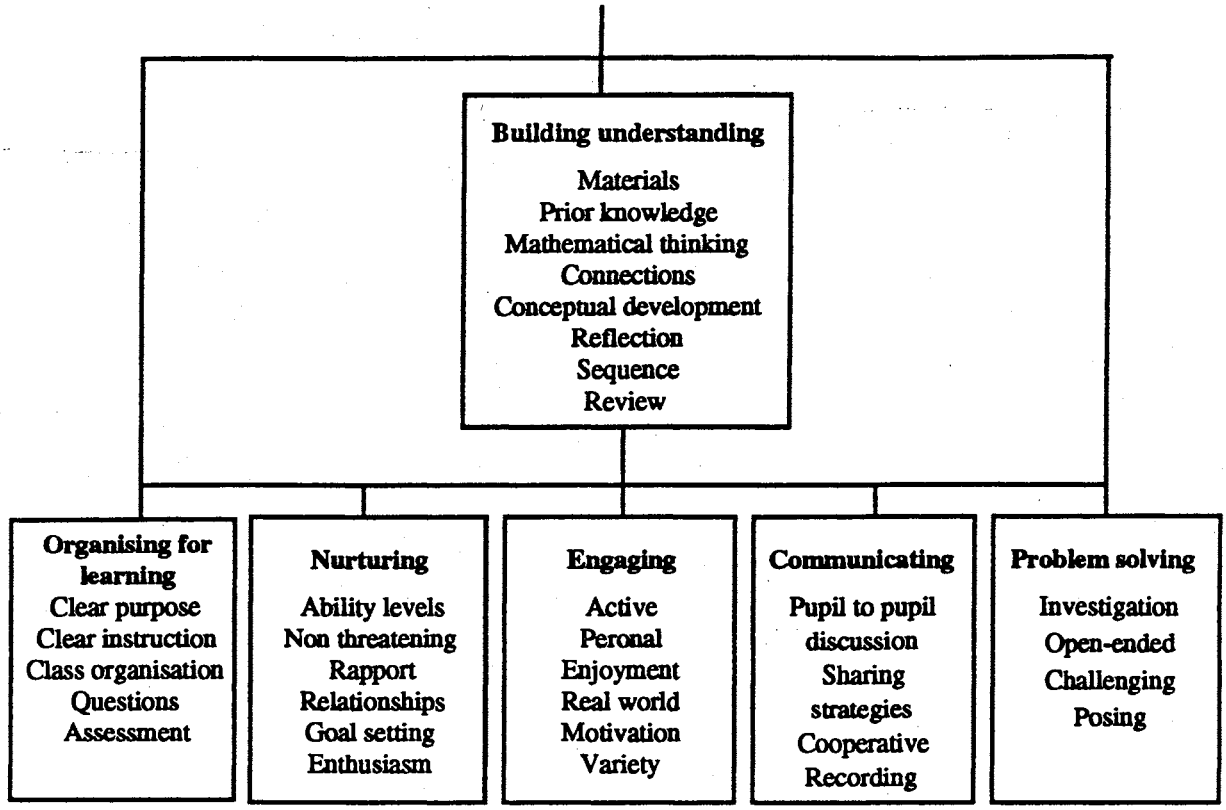

Figure 1: Six components of quality teaching.

In the language of NUD·IST (Richards & Richards, 1990), the program used in qualitative analysis of our questionnaire responses, the six bold headings are called *nodes* and represent categories of behaviour. The minor entries are called *sub-nodes* and represent observable behaviours.

One aim of the overall project has been to prepare an interactive multimedia resource which can be used for learning about and studying teaching. This involved filming a range of classroom lessons which had been constructed to illustrate the six components of teaching as described above, and then storing the videos on CD-ROM discs. In order to validate the existence of these components, the recorded lessons were shown to experienced teacher educators who wrote critiques of the lessons. This is a report on some of the issues arising from the critique of one of the lessons.

Critiquing a lesson

The lesson, on volume, revolved around the open-ended investigation "Design as many different box-shaped buildings made from 24 cubes as you can". The teacher first asked the children to study a single cube and to brainstorm what they knew about it. She then introduced the problem in the context of the theme which the class was using at the time — supermarkets and shares (it being the time of the Woolworths share float). The children worked on the problem first individually and then in groups, choosing their own methods for recording their solutions. After responses of the students were reviewed, the teacher distributed a worksheet of specific problems.

A video of this lesson was shown to 22 teacher educators. Fourteen of these were asked to write an unstructured critique, using any format they wished on a blank sheet of

paper. The other 8 observers recorded their critiques on a structured instrument which was basically a sheet divided into six sections, one for each of the six components above. These respondents were asked to rate the teaching for each component on a linear scale, then to write an unstructured comment on that component. In effect this forced their comments into the six categories.

The critiques were written during viewing of the video of the lesson. As well as watching a video of the lesson itself, the observers were shown a lesson plan, an interview with the teacher prior to the lesson (before viewing the lesson) and an interview with the teacher after the lesson (after viewing the lesson). Data were also gathered on the respondents themselves: their areas of teaching expertise, research interest, and levels of experience at writing lesson critiques.

Through this exercise, we sought to determine:

- whether the reports of the observable features of the videos were consistent with our impressions of the components of teaching presented;
- whether the six components are useful as a way of organising critiques of a lesson;
- whether structured or open format is more informative for presenting critiques.

The qualitative analysis program NUD·IST (Richards & Richards, 1990) was used in the analysis of the written critiques. In summary, each discrete comment was coded to attach it to a sub-node. The comments were then grouped by NUD·IST and examined. Both researchers independently inspected the categorised phrases and sentences and re-coded any which had been placed inappropriately.

Results

Observers' comments (both structured and unstructured) on the lesson fitted very easily into the six components. Both formats produced similar comments, with the unstructured format producing a wider range of comments and suggestions. The ease with which the written reports on the lessons were able to be categorised suggests that the six nodes and the various sub-nodes are a useful way to categorise comments made in teaching critiques. Each comment made by the observers was able to be associated uniquely with one of the above sub-nodes.

Seven of the sub-nodes were used by more than 40% of the respondents. These were

Clear purpose
Clear instruction
Class organisation
Conceptual (understanding)
Real world
Non-threatening
Relationships.

Only three of the sub-nodes were used infrequently. These were

Connections
Pupil to pupil discussion
Assessment.

The structured form of responses did seem to direct the respondents to use the language and form implied by the categories. In that sense, assuming that the categories are appropriate, it seems that the structure would be a useful way of directing the attention of observers (and subsequently of student teachers) to these aspects of quality teaching. However, those observers who completed the structured form expressed considerable dissatisfaction with the constraints which the structure placed on the way they would have preferred to respond.

Issues arising from the analysis

A feature of the sub-nodes was that they were suitable for storing both positive and negative comments. For instance, the sub-node "clear purpose" was used both for comments applauding the clarity of purpose and for suggestions that the purpose should have been made clearer. However, we did not anticipate the diversity of the responses in many of the sub-nodes.

The following is a discussion of the significant issues which arose from the contrasting responses.

Demonstrating a clear purpose

There were comments by 70% of the observers categorised within this node. A similar node, "clear instruction", had a further 14 comments. This dimension of teaching featured high in the consciousness of the observers.

Even though "clarity of purpose" was the most frequently used category, there was considerable contention on whether the purpose of the lesson was clear to the observers or not. The issue here is how observers can identify and comment on the purpose of a lesson if they do not accept or understand the orientation of the teacher. (This, of course, is relevant both for observers and for pupils.)

The interpretations of the clarity exhibited in the lessons included positive comments on the purpose:

Well organised, clear on purpose of what was intended ...

Teacher exhibited a clear focus for lesson ...

along with comments which articulated what was seen as the focus of the lesson:

She included easily the concept of length, width and depth when assisting a student to describe the shape designed. Of further interest was Anne's ability to actually push them to describe, draw or construct an idea in 3 dimensions and allow them time to think of how they could describe abstractly what was in concrete terms before their eyes.

On the other hand, there were observers who were critical of an apparent lack of purpose:

A clearer focus on the learning outcome and conclusion is necessary. This could be aided by writing a clearer aim and distinguishing this from the learning strategy.

The objective was too indefinite. The lack of clarity allowed the lesson to be bogged down in the difficult task of converting a 3D into a 2D drawing.

...actual enactment of the exploratory phase was diffused by the lack of clarity of lesson focus and student purpose ...

Our interpretation of the lesson was that the teacher had a very strong orientation to the processes of open-ended mathematical problem-solving, but did not emphasise formal mathematical content. Observers who are pre-disposed to formalist teaching styles, with emphasis on teacher explanations of mathematical concepts, rules, and procedures may well have interpreted their absence as a lack of clarity in the lesson's focus.

It is interesting here that in no case was the tension between process and product acknowledged. Considering that the observers had all seen the pre-lesson interview in which the process orientation of the teacher was clearly flagged, the critical observers did not acknowledge the style of the lesson and then criticise the style itself. They appear to have interpreted the lack of directed product as requiring critical comment despite the fact that a defined product was not amongst the teacher's aims.

Distributing interactions

The teacher did not seek to distribute questions and other interactions evenly, but rather allowed students the freedom to contribute publicly as they wished; many observers were quite critical of this style of teaching. The issue here is that in a view of teaching which sees learning as arising from students' explorations, it is logical that interactions will not be evenly distributed.

Some observers commented favourably on the breadth of participation:

I was also pleased you encouraged all children to participate

and others acknowledged the mode of interaction with the children:

Teacher directed learning sufficiently but enabled children to contribute according to their potential.

However, there were many observers who were critical of what was seen as an inappropriate distribution of interactions with the teacher and the class:

Mainly E. etc were nurtured, but most others were left out of the class, so the problems of understanding by the majority of the class were not addressed. The range of abilities was not catered for all.

By the half way mark of the class (few students) had been asked questions or had asked questions. Note how a few students seem to dominate. Do not rely on volunteers only.... Be aware of who is being involved and who is passive.

The teacher restricted communication etc with her star pupils only, so what learning was achieved by the rest of the class is unknown.

Only a handful of children talking ...M., L., E. and O., were about the only children engaged.

Control of student contributions to lessons presents a dilemma for teachers. One approach is to distribute interactions with the teacher as evenly as possible. This can often be done by directing questions to students who have not contributed recently. Such a teaching style is marked by stating a student's name along with the question. It provides the teacher with some sense of the progress of individuals as well as being a way of maintaining attention. This is compatible with the technique identified by Tobin (1984), who suggested that teachers use particular target students to direct lesson flow. For example, if a target student of average ability can not answer a question, this may indicate a need to revise the most recent point.

Such direct approaches to question distribution however have the disadvantage of increasing the level of anxiety associated with class discussions. Compelling students to contribute when they may be shy, may not have the necessary information, may not feel they can make a worthwhile contribution, or may even be temporarily inattentive, can be counterproductive — especially if any students are nervous about the subject in the first place.

An alternate approach is to allow students to volunteer to speak. Some may be the reporters of group discussions or have questions about the progress of an activity. This approach is compatible with a view of teaching which sees the activity of students as central, and their reports of their findings as the main stimulus of the students' learning. In this case, the questions asked would be of the form "Who can tell me about .....?" and it would be appropriate to privilege the students who indicate an intention to contribute. It would therefore not be a problem if the distribution of interactions within a single lesson is uneven.

Encouraging students

Another issue arises from the way that the teacher responded to the students. For example, over 50% of the observers made comments which were categorised under the sub node "non-threatening atmosphere". These included:

You encouraged the child with positive feedback rather than put him down - an excellent strategy.

At no time in the lesson did A... not encourage the best efforts towards completing the tasks from each of her students.

Teacher ... showed respect for individuals... praised questions of all levels of ability.

Very affirmative of the trier - teacher obviously knew level of children and spent time to help them.

She allowed the children to explore the object and each of their ideas was given credence and respect

However, there were others who were critical of the teacher's responses to the children:

The only criticism I would give of the lesson was the dismissal of the designs which, in my view, were creative... could have been handled with a little more sensitivity

It highlights the need for us on one hand to clarify types of behaviours we see as supportive, and on the other hand perhaps to be more circumspect in our criticisms.

Co-operative group work

Another issue which provoked opposing comments was that of cooperation and collaboration between the children. There were positive interpretations:

Children are a community of learners, justifying, explaining, questioning, etc.

Good for students to ... work in cooperative groups

Teacher encouraged co-operative learning

Children worked co-operatively remaining on task maintaining motivation.

but there were also negative views:

Democratic exchange of views/solutions between pupils and teacher - but communication was co-operative at best but seldom collaborative in intent.

Partner work may well have been individual as no? little? collaboration took place.

It was an individual effort largely.

and one each-way bet:

Watch the group/pair/discussion groups. Worked well today in this lesson but could be a problem with larger grades.

Perhaps we need to define more closely what we mean by collaboration, to clarify its purpose, and to articulate some behaviours which are indicative of what we mean by the term.

Directing the lesson

Comments on the level of direction shown by the teachers were diverse, and indicative of the tensions summarised by Berlak and Berlak (1981) in their 16 "control dilemmas". Issues of control that are raised by contrasting interpretations of classroom interaction include the giving of directions, sequencing of components of the lesson, stating a context for the given problem, and provision of a review during closure of the lesson.

While some observers commented on the teacher's clear directions and positive sense of control, others criticised her for exerting too much control:

... If this had happened there would have been fewer instructional questions and children would have done more processing. There was still a deal of teacher direction here.

Her necessity to re-state the problem is a result of her owning the problem not the children.

There was clearly a problem to solve, but the teacher was constantly returned to and took the role of "judge" of acceptable responses, ...she became the "telling teacher"...

Teacher is still appropriating student learning through summarising and re-phrasing.

Another source of tension was control over the lesson's flow. Examples of positive comments related to the sequencing of the components of the lesson included:

Generally well sequenced

You led children through a series of organised steps developing their thinking processes. This was a good learning time for the children.

Other observers, however, would have preferred more attention to the sequence of activities

The poor description of the 3D models from the introduction became practically insurmountable when children came to putting blocks into the design required...

There were several opportunities for teacher to follow up an issue raised by a child. This did not always happen.

I'm not sure where she is planning to go next, or how this class fits in with the rest of the space/shape strand.

In the lesson the teacher had chosen a context into which the investigation was placed. Again this attracted both supportive and critical comment. While this was generally supported:

The concept of asking the children to be architects was very creative and getting them to go from the concrete - use of blocks-... to the abstract - drawing the design is a strategy I applaud.. Well done

Good inclusive strategy to mention child's mother as an architect and reinforce notion of girls being able to aspire to professions.

the support was not universal:

Theme of architects distracting to the purpose of the lesson

and there was even comment on the political implications of the choice of context:

Why (choose a) capitalist model instead of government funded hostel, hospital, school etc.?

Even within a lesson structure which is low on teacher direction, a teacher-led review can be significant. Some respondents were critical of the lack of review:

The teacher didn't do a review

I would have liked clearer... pulling together at the end.

Pathetic ending and conclusion to activity. What about those who didn't get close to 26 different designs but for example, only 16.

Yet others considered there to be an effective summary:

Good tying together at end.

When observers were critical of an apparent lack of direction in the lesson, this seemed to be a result of the teacher relinquishing some of the control of the lesson to the students. The issue here is similar to that of having a "clear purpose", in that the level of direction is a function of the approach to teaching. As before, this raises the question of how we can comment on the level of teacher direction in the absence of an acknowledgment of the orientation and intentions of the teacher.

Teaching as problematic

It would have been remarkable if there had there been agreement amongst the observers on all components of the lesson; but the diversity of responses was unanticipated. What is most worrying here is not differing perceptions of the lesson, but that not one person who criticised the teacher's actions acknowledged that there are competing perspectives operating in all classrooms.

Our view is that the teacher emphasised the process of doing mathematics and did not attempt to teach directly mathematical procedures or concepts to the students. She used an open-ended investigation as the basis of the lesson and set the lesson in a context meaningful to the children. She emphasised the activity of the children and was generally non-judgemental in her responses to the comments and questions of the children. These components fit with a style of teaching that puts students at the centre of the learning process. Of course this is not a style favoured by every teacher educator, but critics of the lesson neither made their own perspective explicit nor acknowledged the legitimacy of the perspective of the teacher. Their critique was presented as criticism of personal action, rather than as a recognition of the existence of differing perspectives on teaching and learning. The majority of suggestions were presented as definitive statements rather than as comments with the potential to open up discussions about tensions in pedagogy.

Uninformed student teachers may not have the background to interpret such comments into an appropriate broader framework of ideas about teaching and learning, so may feel that they are the subject of confusing, conflicting advice from various observers. If we are to avoid doing students considerable damage in their formation as teachers, it would seem necessary to:

- prepare student teachers for a variety of points of view by making them aware of the many dilemmas teachers face in planning different components of lessons;
- prepare observers for the variety of quite legitimate pedagogical approaches that they are likely to witness;
- find ways of critiquing lessons which open up debates about the strengths and limitations of different components and assumptions inherent in different teaching styles; and
- follow up practicum periods with discussions about the different styles of teaching observed and/or trialed by students teachers as well as the reactions of observers.

These actions would open up opportunities for discussing the strengths and limitations of different teaching actions, the intentions and assumptions of student teachers, and the perspectives of observers. Most importantly, they would serve to make more overt the creative but problematic nature of teaching and learning mathematics.

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