

Researching Numeracy Teaching Approaches in Primary Schools

SORTING TASK

Description

To test the robustness and applicability of the scaffolding practices identified as a result of the BTS activity, all research school teachers completed a *Sorting Task*, at State-wide Action Research Meeting (SWARM) 4 in March 2003. This task required teachers to work with the scaffolding practices as a set of sticky-labels to discuss with at least 4 to 5 others where each practice best belonged in relation to some given categories. Three different categorisations were considered. The first was framed in terms of *Lesson Structure* (or *Lesson Stages*) that is, beginning, middle and end. The second was framed in terms of the three key *Components of Teaching Approaches* identified by the **Behind-the screen** (BTS) sessions, that is, (a) identifying student learning needs and understanding learning trajectories, (b) task selection or mathematical focus and (c) classroom culture. The third was categorised in terms of the *major levels of schooling (Year Levels)*, that is, Prep-2, 3&4 and 5&6. Each of the categories had an additional section labelled *rubbish* in which groups could place scaffolding practice that they felt did not fit within any of the sections for their task. Having attached their sticky labels, each group was asked to justify their selection on the *scribe sheet* provided. These scribe notes assisted the interpretation of the data.

Analysis

The *Sorting Task* undertaken at SWARM 4 was analysed by a frequency count to give the proportion allocating particular practices to particular categories. The justifications and/or explanations offered were categorised and recorded.

Contents

- Sorting Task Instrument: Scaffolding Practices and Year Levels
- Sorting Task Instrument: Scaffolding Practices and Lesson Stages
- Sorting Task Instrument: Scaffolding Practices and Components of Teaching Approaches
- Sorting Task Propositional Analysis

Researching Numeracy Teaching Approaches in Primary Schools

SCAFFOLDING PRACTICES

Year Levels

The words on the sticky labels have been used by teachers in this research project to describe their numeracy scaffolding practices.

We would like to find out what scaffolding practices your group believes to be most appropriate to use when teaching numeracy.

We would also like to capture the rich conversations that your group will have while doing this activity.

Step One

Appoint one member of your group as a *scribe*.

The job of the scribe is to record the conversations of the group on the *Scribe Sheet* as they discuss, decide and sort the labels.

Try to record the discussion/dialogue in as much detail as possible without disrupting its flow.

Step Two

As a group *sort* the scaffolding practices listed on the sticky labels according to those that your group believe to be **MOST APPROPRIATE** to use when teaching numeracy in the Year Levels:

Prep → Year 2

Year 3 → Year 4

Year 5 → Year 6

We have deliberately provided one label for each scaffolding practice to force your group to make choices and to encourage dialogue and discussion.

Step Three

Stick the labels in the categories on the A3 sheet provided.

Researching Numeracy Teaching Approaches in Primary Schools
SCRIBE SHEET

Name of School:

Group Members:



The job of the scribe is to record the conversations of the group on the *Scribe Sheet* as they discuss, decide and sort the labels.

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Excavating

Drawing out, digging, probing, uncovering what is known, making it transparent

Collaborating

sharing, acting as an accomplice, co-learner/problem-solver, conspirator, connecting, linking

Convince Me

seeking explanation, justification, evidence; probing, connecting, linking

Focussing

coaching, tutoring, mentoring, filling in, flagging, highlighting

Orienting

setting the scene, contextualising, reminding, alerting, probing

Extending

challenging, spring-boarding

Modelling

demonstrating, directing, redirecting, instructing, showing, telling, coaching, leading, funnelling, steering, naming, labelling, renaming, flagging, pointing to, valuing,

Guiding

cuing, prompting, hinting, monitoring, navigating, shepherding, encouraging, nudging, challenging, extending

Noticing

highlighting, drawing attention to, spotlighting, revoicing, valuing, pointing to, flagging

Probing

clarifying, refocussing, drawing out, negotiating, excavating, interfering

Reflecting/Reviewing

sharing, reflecting, recounting, summarising, capturing, reinforcing, reflecting, rehearsing

Apprenticing

Inviting peer assistance, peer teaching, peer mentoring

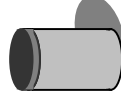
P → 2

3 → 4

5 → 6

Name of School:

Group Members:



RUBBISH

Researching Numeracy Teaching Approaches in Primary Schools

SCAFFOLDING PRACTICES

Lesson Stages

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Step Two

As a group *sort* the scaffolding practices listed on the sticky labels according to those that your group believe to be **MOST APPROPRIATE** to use when teaching numeracy in the Year Levels:

- BEGINNING
- MIDDLE

OR

- END

of a numeracy lesson.

We have deliberately provided one label for each scaffolding practice to force your group to make choices and to encourage dialogue and discussion.

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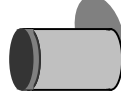
Beginning

Middle

End

Name of School:

Group Members:



RUBBISH

SCAFFOLDING PRACTICES

Components of Teaching Approaches

The words on the sticky labels have been used by teachers in this research project to describe their numeracy scaffolding practices.

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Try to record the discussion/dialogue in as much detail as possible without disrupting its flow.

Step Two

As a group *sort* the scaffolding practices listed on the sticky labels according to those that your group believe to be **MOST APPROPRIATE** to use when teaching numeracy in the Year Levels:

- Identifying learning needs, relevant prior knowledge
- Classroom culture, expectations and values - how we work together
- Tasks, materials, representations -what is the object of attention

We have deliberately provided one label for each scaffolding practice to force your group to make choices and to encourage dialogue and discussion.

Step Three

Stick the labels in the categories on the A3 sheet provided.

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SCRIBE SHEET

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Group Members:



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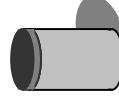
**Identifying
learning needs,
relevant prior
knowledge**

**Classroom culture,
expectations and
values – how we
work together**

**Task, materials,
representations –
the mathematical
focus**

Name of School:

Group Members:



RUBBISH

Researching Numeracy Teaching Approaches in Primary Schools

SORTING TASK PROPOSITIONAL ANALYSIS

Prepared by Jo Virgona

To test the robustness and applicability of the scaffolding practices identified as a result of the BTS activity, all research school teachers completed a *Sorting Task*, at SWARM 4 in March 2003. This task required teachers to work with the scaffolding practices as a set of sticky-labels to discuss with at least 4 to 5 others where each practice best belonged in relation to some given categories. Three different categorisations were considered. The first was framed in terms of *Lesson Structure* (or *Lesson Stages*) that is, beginning, middle and end. The second was framed in terms of the three key *Components of Teaching Approaches* identified by the BTS sessions, that is, (a) identifying student learning needs and understanding learning trajectories, (b) task selection or mathematical focus and (c) classroom culture. The third was categorised in terms of the *major levels of schooling* (*Year Levels*), that is, Prep-2, 3&4 and 5&6. Each of categories had an additional section labelled *rubbish* in which groups could place scaffolding practice that they felt did not fit within any of the sections for their task. Having attached their sticky labels, each group was asked to justify their selection on the *scribe sheet* provided. These scribe notes assisted the interpretation of the data.

The first task, *Lesson Stages* was completed by 19 groups of teachers. *The Key Components of Teaching Approaches* was sorted by 18 groups of teachers while the *Year Levels* task was completed by 16 groups of teachers.

It was specified to all groups that they were required to place scaffolding practices in *only one* section of each of the three categories. As was intended, this caused much discussion within groups, but it also made the task problematic.

A frequency count of where each scaffolding practice was placed within the sections of each of the three main categories was completed along with a propositional analysis of the justifications for choices. It should be noted that despite the specifications, some groups placed scaffolding practices in more than one section under the given category. Where this occurred, a relative proportion was calculated to support comparison across categories and tasks (hence proportions within categories sum to 100%).

Lesson Stages

Generally the groups found it problematic to discretely categorise scaffolding practices into the beginning, middle or end of a lesson. It was felt that most of the scaffolding practices could be used in any part the lesson depending on the students and/or the lesson itself. The scribe notes indicated that teachers feel that most of the scaffolding practices are used throughout the lesson. Where groups had difficulty interpreting the meaning of a scaffolding

practice, they tended to rely on the additional key words describing each scaffolding practice to assist placement. Some groups noted that the key words describing some of the scaffolding practices seemed contradictory or confusing, making placement in relation to the beginning middle or end of the lesson difficult.

Total number of groups - 19	Beginning %	Middle %	End %	Rubbish No. of groups
Excavating	64	27	9	0
Collaborating	9	77	14	0
Convince Me	0	25	75	0
Focussing	20	75	5	0
Orienting	100	0	0	0
Extending	13	48	39	0
Modelling	59	33	8	0
Guiding	5	86	9	0
Noticing	13	39	48	0
Probing	14	52	34	1
Reflecting/Reviewing	0	0	100	0
Apprenticing	15	85	0	0

Table 1: Percentages of Scaffolding Practices allocated to different Lesson Stages

The table above shows that only two scaffolding practices, *Orienting* and *Reviewing/Reflecting*, could be clearly placed in one phase of the lesson. All groups placed orienting at the beginning phase of the lesson and reviewing/reflecting at the end phase of the lesson. From scribe comments orienting was taken to mean ‘setting the scene’ and hence groups placed this practice clearly at the beginning of a lesson. Several scribe comments for reflecting/reviewing made the point that although this practice is a major focus at the end of a lesson, it can also be used in other phases of the lesson, for example, reviewing the previous days work or previous learning at the beginning of a lesson.

All other scaffolding practices were placed throughout the lesson phases with many being placed in more than one section by many groups.

Excavating was placed at the beginning phase of the lesson by 64% of the groups. The related scribe notes indicated that excavating was viewed by these teachers as ‘seeking to find out students prior knowledge or what they know’ hence it was placed in the beginning of the lesson, but it was also noted by these groups that excavating may be used throughout the lesson. The main reason given by the 27% of groups for placing excavating in the middle phase of the lesson was that ‘during the middle phase there is an opportunity to delve further into students understanding’. Nine percent (9%) of teachers placed excavating at the end phase of the lesson ‘to draw out the learning that had occurred’.

Collaborating was placed by 77% of the groups in the middle phase of the lesson. It was seen in these cases as 'the students and teacher working together through a task' or 'students working with each other on a task'.

Convince Me was only placed at the end and middle phases of the lesson. Seventy-five percent (75%) placed convince me at the end phase and 25% in the middle phase. Many of the scribe notes for the end phase placement indicated it could easily be used in the middle phase as well. Convince Me was seen as a good way of assessing student learning or as a way for students to provide evidence of their understanding or justification of the processes they used in a task.

Focussing was placed in the middle phase of the lesson 75% of the time. From the scribe notes focussing was seen as 'a form of coaching to move students on while they are working' or 'to make an aspect of the learning explicit'. Again the scribe notes identified that focussing could be used in all phases of a lesson.

Forty-eight (48%) of placements for extending were in the middle phase of the lesson and 39% were at the end. Most of the comments indicated that in the middle phase of the lesson, extending was interpreted to mean 'challenging students with open-ended tasks' while at the end phase of a lesson, it was seen in relation to 'setting a new challenge for future learning'.

Modelling was placed at the beginning phase of the lesson by 59% of groups, with 33% placing it in the middle phase and 8% at the end phase of the lesson. Most comments indicate that modelling is 'an act the teacher does either at the beginning of a lesson or the beginning of a small group session', hence the reason for the middle phase of the lesson. It is seen as 'where the teacher provides structured methods/procedures on how to do something'.

Eight-six percent (86%) of groups placed *Guiding* in the middle of the lesson. Groups saw guiding as 'supporting students when they are working on tasks by encouraging, cuing and prompting'.

Noticing was placed by 39% of groups in the middle and 48% in the end phases of the lesson. Scribe notes indicate that this scaffolding practice can be used either 'when students are working on a task to draw attention to a point' or at the end of a lesson 'to highlight what has been done'. The groups that placed noticing at the beginning were using it in terms of 'setting the scene'.

Placing the *Probing* scaffolding practice seemed to be difficult for groups as many of the key words within the practice were also to describe other scaffolding practices or were themselves scaffolding practices. It was placed 52% in the middle and 34% at the end phases of the lesson respectively. It was also placed in the section labeled 'rubbish' once due to the negative connotations of the key word 'interfering'.

Apprenticing was placed in the middle of the lesson by 85% groups and by 15% at the beginning. Overwhelmingly groups indicated that it was used in the middle of the lesson 'while students were working on a task as a peer assistance tactic'. Those that placed it at the

beginning of the lesson were using apprenticing as ‘peers demonstrating or modelling to the larger group’ in ‘a mentor role’.

Components of Numeracy Teaching Approach

From the general comments made by groups sorting scaffolding practices into the *Components of Numeracy Approach*, many teachers felt that there were ‘too many key words to sort through’ and that ‘many of the key words overlapped within scaffolding practices’ which made the task difficult. As in the ‘Year Levels’ sorting task, groups felt that many of the scaffolding practices could be used in all the sections, however only *reflecting/reviewing*, *focusing* and *convince me* were placed in more than one category. Teachers found the section labelled *Task, materials, representations – what is the object of attention* very confusing to interpret. Again the term *interfering* was mentioned as having negative connotations and was not well received by some teachers. All groups placed *apprenticing* and *collaborating* in the *classroom culture* section. Related comments drew attention to the nature of the classroom and how students and teachers work together.

Total number of groups - 18	Learning Needs, relevant prior knowledge %	Classroom Culture, expectations and values – how we work together %	Task, materials, representations – what is the object of attention %	Rubbish No. of groups
Excavating	94	0	6	0
Collaborating	0	100	0	0
Convince Me	11	47	42	0
Focussing	16	42	42	0
Orienting	89	6	5	0
Extending	29	35	35	1
Modelling	0	22	78	0
Guiding	16	28	56	0
Noticing	18	6	76	1
Probing	44	31	25	2
Reflecting/Reviewing	5	55	40	0
Apprenticing	0	100	0	0

Table 2: Percentages of Scaffolding Practices allocated to different Components of the Numeracy Teaching Approach

All groups clearly used *Excavating* in terms of identifying learning needs and finding out the prior knowledge of students with 94% (all groups but one) placing excavating in this section. The group placing excavating in the Task, Materials and Representations section explained that it would be used to ‘draw student responses to a specific goal’.

Eighty-nine percent (89%) of teachers felt *Orienting* belonged in the Identifying Learning Needs section, with 5.5% of teachers placing it in each of the other sections. Scribe notes indicated teachers associated orienting with learning needs because of its relationship to ‘prior knowledge and establishing a context to set the scene’.

Around half of placements for *Convince Me* were in the Classroom Culture section (47%) and half in the Task, Materials and Representations section (42%). Scribe notes indicate that convince me is an expectation in certain classrooms and hence is best placed in the Classroom Culture section. Few scribe notes explaining the reason for the placement of this scaffolding practice in the Task, Materials and Representations section except that ‘it can be used as a tactic to keep students on task’.

Focussing was evenly distributed between Classroom Culture and Task, Materials and Representations, with a little less than half (42%) of placements in each. Scribe notes suggest that it could be in either of these two sections. In the Task, materials section, focussing is seen as the teacher ‘highlighting the object of attention’, while the main reason for placement in classroom culture section seemed to be related to the use of the key word *mentoring*.

Extending was evenly distributed throughout all sections of Components of a Teaching Approach, however one group was unable to place it under any of the sections. Scribe notes indicate that it can quite easily fit in all sections.

Seventy-eight percent (78%) of the *modelling* placements were in the Task, Materials and Representations section. The main reason for this choice was that modeling was used when ‘demonstrating materials or modelling tasks’. Although 22% of placements were in the Classroom Culture section, no reasons were given.

Fifty-six percent (56%) of placements for *guiding* were in the Task, Materials and Representations section with scribe notes explaining that the teacher would be ‘drawing the students back to the task or guiding them through it’. There were very few scribe notes explaining the other placements except for one comment saying that ‘it should be in all three sections and that the definition was too broad’.

Noticing was placed by 76% of groups in the Task, Materials and Representations section because by using this scaffolding practice you were ‘drawing attention to particular features of a task or material’. Eighteen percent (18%) of placements were in Learning Needs, and 6% in the Classroom Culture section. One group placed noticing in the Rubbish section.

Probing was relatively evenly distributed throughout all sections, with 44%, 31% and 25% in Understanding Learning Needs, Classroom Culture and Task, Materials and Representations respectively.

Reflecting/Reviewing was placed 55% in the Classroom Culture section as ‘an expectation for a classroom’ and 40% in the Task, Materials and Representations section because ‘a review or reflection would focus on the object of attention’.

Year Levels

Overwhelmingly the general comments for this task indicate that all scaffolding practices can be used at any level “they just need to be made simpler for lower levels”. Scribe notes indicate that groups were not happy with having to make choices between levels for the scaffolding practices.

Total number of groups - 16	P – 2 %	3 – 4 %	5 – 6 %	Rubbish No of groups
Excavating	38	50	12	0
Collaborating	19	56	25	0
Convince Me	6	31	63	0
Focussing	56	25	19	0
Orienting	37	44	19	0
Extending	25	15	60	0
Modelling	94	6	0	0
Guiding	53	35	12	0
Noticing	81	19	0	0
Probing	6	44	50	0
Reflecting/Reviewing	25	37	38	0
Apprenticing	17	24	59	0

Table 3: Percentages of Scaffolding Practices allocated to different Year Levels

Modelling seems to be the only clear placement with 94% in the P-2 level. Scribe notes indicate that ‘at this level there is more teacher directed learning’.

Noticing was also placed by most groups in the P-2 level (81%).