

# Researching Numeracy Teaching Approaches in Primary Schools

## BEHIND-THE-SCREEN

### Description

The *Behind-the-screen* activity (or BTS as it became known) was adapted from the one used in Reading Recovery training (eg, Clay, 1993). The purpose of the BTS was to involve a small group of teachers in a much more finely-grained, intensive study of numeracy teaching approaches. Specifically, it enabled teachers to engage with a small group of students or an individual in front of their peers (who are literally ‘behind’ a screen or one-way viewing window). Observing teachers were introduced to a range of possible approaches at the outset but were also encouraged to use their own words, labels or metaphors in-the-moment to capture the essence of the observed student/teacher interaction or scaffolding practice. The essential purpose of this technique was to explore the principles of the teaching approaches in more detail and to arrive at ways of describing teachers’ communicative acts in ways that resonated with teachers’ experience. In common with the Reading Recovery training process this was not meant to be a critique of the teacher, but an in-depth, focused exploration of the nature of the specific teaching and learning processes embodied within a particular teaching approach.

Three groups participated in this technique, two school clusters and one relatively remote rural school. One cluster comprised one government and two catholic schools from roughly the same metropolitan area. The other comprised three government school two from a regional centre (one of which was the special school) and one from a metropolitan area. Three teachers from each school participated in the cluster, making a group of nine teachers which was supplemented by two or three members of the research team. As far as possible, teachers were distributed across the lower, middle and upper primary year levels. The group at the remote rural school consisted of one teacher from each year level and the Project Director. The three groups each met on 8 occasions, 7 in 2002 and 1 in February or March in 2003. A total of 46 BTS lessons were observed during the project. At each meeting, two teachers taught a small group in front of their peers.

Sessions were structured in the following way:

1. an orienting briefing session (approximately 30 mins)
2. a Behind-the-screen teaching episode involving one teacher and a small group of his/her students (approximately 30 minutes)
3. a debriefing session which involved a reflective discussion of the preceding teaching episode (approximately 30 minutes)
4. a break (15 minutes)
5. a second Behind-the-screen teaching episode involving another teacher and group of students (approximately 30 minutes)
6. a second debriefing session which involved a discussion of the preceding teaching episode (approximately 30 minutes).

For the two clusters the meetings were held at a Reading Recovery venue fairly close to the schools concerned. In the rural school, the lessons were conducted in the teacher's classroom, video-taped and relayed through the school's intranet to a monitor in the library where the remaining teachers in the group watched and discussed the lesson live with the research facilitator. A second camera recorded the opening discussion and the debriefing sessions that followed the teaching episodes.

A *Behind-the-screen Observation Record* was completed by each observing teacher for each teaching episode. The first version of this record was aimed at noting exemplars of previously identified numeracy teaching approaches or communicative acts in relation to numeracy learning. These comprised the three approaches derived from literacy teaching (*modelling, sharing and guiding*), two derived from the literature (*funnelling and focussing*) and three emergent approaches derived from classroom observations made between November 2001 and March 2002 (*convince me, noticing and excavating*). This version of the form proved problematic for two reasons; it was difficult to track the sequence of events in the teaching episodes for the metropolitan and regional cluster groups as interactions were not necessarily noted in the same order that they were observed, and, as a consequence, it was extremely difficult to piece together the teachers' records of their observations into a coherent summary. A second recording form was developed that allowed for more instances of teaching approaches or communicative acts to be recorded, however this also proved difficult in relation to tracking the sequence of events. While the third version of the form offered even greater flexibility and encouraged teachers to record their observations in sequence it was decided to audio-tape the teaching episodes at the two cluster groups to facilitate the tracking of events in relation to the observed interactions and thereby improve the depth and accuracy of the summary account. Given access to videotape records at the rural site, progressive summaries were not necessary. However, a *BTS Session Summary* was prepared at the conclusion of the *Behind-the-screen* sessions to facilitate the subsequent analysis.

After the second and third sessions of the *Behind-the-screen* activity it became apparent that there were no clear-cut and sustained instances of any one or two approaches in any one teaching episode. That is, unlike literacy, in which a teaching approach broadly characterises a whole teaching session, this did not appear to be the case for numeracy teaching where a number of activities were used in the context of one session to support children's learning. As a consequence of this, it was decided that teachers would be asked to evaluate the relative levels of teacher support and student independence at the end of the debriefing session. That is, to test the applicability and relevance of the two dimensions used to define the literacy teaching approaches.

As indicated above, several recording formats were developed by the research team to support the *Behind-the-screen* activity. The teachers involved used these progressively to record the interactions they observed in the teaching episode and to record what they noticed and what they felt students had learnt in the debriefing session. From the third session, this also included a judgement about the relative levels of teacher support and student independence. Teachers' observations were discussed briefly during the teaching episode and more fully in the debriefing sessions that followed. The BTS Observation Records were collected and analysed to form a synthesis of the group's views, which was reported back for clarification and confirmation the next time each group met.

## Analysis

The *Behind-the-screen* or BTS data was summarised as previously indicated to provide an emergent list of approaches, techniques or tactics and finally scaffolding practices, supported by a range of exemplars. To be included on the list, a particular interaction pattern had to have been observed and reported by at least two of the BTS groups on at least five occasions. A further level of analysis was afforded by the use of audio-tapes for the later *Behind-the-screen* teaching sessions at the Reading Recovery venues and the videotaping of all sessions at the rural site. This was deemed to be necessary after the third or fourth sessions of the metropolitan and regional cluster groups as the BTS Record Sheets were not supporting rich descriptions of the actual interactions observed in the teaching episodes. Access to the audio-tapes of the teaching episodes and video-tapes facilitated a cross-checking or validation procedure ‘after-the-event’ that matched teachers’ observations to particular instances in the teaching episode. It also allowed a more reflective and considered assessment of the evidence for particular scaffolding practices. This additional layer of analysis was used to confirm what had been sensed in the earlier *Behind-the-screen* sessions that there was little evidence for generic teaching approaches of the type described for literacy but there was strong evidence for a range of discernable scaffolding practices. This evidence together with the results of the *Sorting Task* was used to inform the refinement and elaboration of the list of scaffolding practices.

## Contents

- Behind-the-Screen in a Nutshell
- Behind-the-Screen Observation Record Version One
- Behind-the-Screen Observation Record Version Two
- Behind-the-Screen Observation Record Version Three
- Behind-the-Screen Session Summary Example One
- Behind-the-Screen Session Summary Example Two

## Researching Numeracy Teaching Approaches in Primary Schools 2002 - 2003

### Behind-the Screens Sessions in a Nutshell

#### Regional Centre

Date	Cluster	Year	Students	Focus	Features
20/3/02 <b>1</b>	Regional Centre	Prep	4, near ability	Moving students from 'count all' strategy to 'count on from larger'	Modeling 'counting on' Hand gestures Many different examples Naming the strategy Color a distracter for students
20/3/02 <b>2</b>	Regional Centre	1/2	4, near ability	Exploring numbers, breaking numbers into parts	Students strongly influenced by color of counters Lesson focus changed from breaking numbers into parts to counting sequences Students given unifix cubes in sticks of 10 all the same color within the ten, but different color sticks when students went to break these up to count by 4's, color was an issue, wouldn't join different colors together to make a four
17/5/02 <b>3</b>	Regional Centre	Senior Pre-level 1 to level 4 CSF	4, 13-15 yr olds, 2 boys 2 girls. 1 conf girl emotional probs, one boy competent but lacks self confidence	Rounding to nearest 1000, purchasing a car form the newspaper, repayment estimates over 1, 2, 3yrs	Teacher patience Age appropriate task Re-questioning skills Importance of recording in scaffolding discussions, referencing of key elements Classroom culture, teacher supportive and students supportive of each other, peer support <i>High level of teacher support BUT students also working independently at times, sometimes support in a prompt, Various approaches</i>
17/5/02 <b>4</b>	Regional Centre	4/5	4, 2 girls yr4, 2 boys yr5, average ability group	Decimals, making models of numbers with, MAB and abacus, understanding the 'tenness' of the system, decimal place value	Excellent use of concrete material Reinforcing predictability of number patterns Good wait time Covering and uncovering concrete materials, drawing students attention to generalizations Lead the students where he wanted them to go, with support by the use of effective teaching strategies <i>High teacher support, High student independence, Interdependent, drawing attention to links, linking</i>

Date	Cluster	Year	Students	Focus	Features
3/6/02 <b>5</b>	Regional Centre	Junior CSF 2	3 boys, 9-10 yrs, mixed ability, one boy may need more help than the rest	Number, computation and application involving money, use of a game	Not much recording, allowing students to focus on task not on recording Ownership of learning by providing tools of independence Deal with money differently, coins are piled, counters gathered Withdrawal of concrete aides at the end to allow the focus to be on the generalization Lesson flowed and built systematically Peer support role instead of discipline Refocus students to correct them not 'don't do that' <i>High level teacher support,</i> <i>Medium to low student independence, peer support, high student involvement, GUIDING the learning, helping students make links</i>
3/6/02 <b>6</b>	Regional Centre	4	4, 2 boys, 2 girls, near ability	Estimating long and short periods of time, describing duration of time	Complexity of using equipment Importance of timing of lesson, can lose students when activity becomes more of the focus than the learning intended Impact of literacy competency on maths achievement Peer tutoring - students looked for conformation from more knowledgeable peer Teacher roved constantly, guiding the students <i>Medium to high level of student independence, Medium level of teacher support, SHARING</i>
12/8/02 <b>7</b>	Regional Centre	3	4, 2 girls, 2 boys, near ability, two girls are good friends	Revisiting addition and subtraction problems, focus to get students to choose correct operation to solve real life problems and explain their reasoning	Well selected problems, authentic problems, ownership of problems being solved Clarification of information and individual problems before the task began Well structured lesson, start simple build to open ended problem solving Very good redirecting of students focus Created opportunities and safe environment for students to clarify difficulties Share time issue - where only person who is sharing is engaged in the session. Share time needs to be a reflective thinking environment, where generalizations are discussed, linking the aims of the lesson, make connections <i>Medium teacher support,</i> <i>Medium student independence, SHARING</i>

Date	Cluster	Year	Students	Focus	Features
12/8/02 <b>8</b>	Regional Centre	5/6	4, Yr5 boy & girl, yr6 boy & girl, near ability, no prior exper, one less'n previously, one std absent for that lesson	Using a protractor to measure angles, focusing on idea of a base line, vertex, use of the correct scale, (angles less than 180°, extend to angles greater than 180°)	Classroom culture, teacher is the 'coach' Lots of direct questioning, reminding, prompting, repetition of procedure, metacognitive narrative Use of errors to make a teaching point, modeling incorrect procedure to point out misunderstanding and see error Most useful things left on board as an aide for students learning Close monitoring at all times, one step at a time so errors were not practiced but eliminated immediately Experience of success Little peer interaction <i>High teacher support,</i> <i>Low student independence, MODELLING, COACHING</i>
4/9/02 <b>9</b>	Regional Centre	Junior CSF 2/3+	4, 12/13 yrs, 2 boys, 2 girls, mix'd ability	Money - counting, spending up to a certain amount, using addition and subtraction ideas	Tight scaffolding High need for individual assistance Tasks specific to individual needs Prompts, coaches Questioning skills Used materials to lead interaction Student self extension Supportive, patient, encouraging, warm interactions <i>High teacher support,</i> <i>Low to high student independence, Various approaches</i>
4/9/02 <b>10</b>	Regional Centre	Prep	4, 2 girls, 2 boys, near ability	Odd and even numbers, identification, identifying patterns that result from the addition of odd and even numbers	Rapid pace, lots of different representations and practice for recognizing odd and even nos. Repeated justification from students for odd or evenness Sequence of lesson from known to a challenge, highly directed lesson Multitude of tasks, variety of materials but all with the same focus Revoicing, valuing, reinforcing <i>High teacher support,</i> <i>Low to high student independence, Directed</i>

Date	Cluster	Year	Students	Focus	Features
11/11/02 <b>11</b>	Regional Centre	JuniorCSF 1-2	9-10 yr olds, 3 boys, mixed ability	Revision of the 100's chart, Recognizing patterns in the whole number system, students are looking at the visual pattern on the number chart rather than the number pattern, want to see what they are thinking	Saw how difficult place value is Tight scaffolding, keeping focus Skill of constant questioning and carefully focused Reminding of key concept Sequencing of tasks <i>High teacher support,</i> <i>Low student independence BUT not regarded as modeling more a STEERING</i>
11/11/02 <b>12</b>	Regional Centre	1/2	4, 2 boys & 1 girl yr2, 1 boy yr 1, near ability	Money – money equivalence, trading, through a game and a problem	Quietly quizzing students on what they were doing Leading questions Valuing recording Peers support each other in the process of the game, students very engaged Reminder of the fine steps in scaffolding With money students count from larger denominations first Difficulty keeping track of the count <i>Low teacher support,</i> <i>Medium to high student independence. Interfering-to find out, refocus, rethink, clarify. Navigating-T has a clear idea where to go, help students get there, maths has multiple pathways, more interested in the journey than the destination</i>
9/12/02 <b>13</b>	Regional Centre	4/5	4, 2 girls, 2 boys, 1yr 4 girl rest yr 5, near ability but all pretty good, one student very good	Wrapping things up at the end of the year. Data collection, graphing data in bar and pie charts, interpretation of data. Data on swimming groups, computer generated graphs, then try to generate own pie charts	Powerful interaction, intensity and density of language Connections to what else was known e.g. number facts (able to do this at the end of the year with a group) Genuinely deals with concepts – intuitive basis for proportion Tutoring – 'My suggestion is.' Humour Manner of lesson is open, students happy to discuss – classroom culture Preparation of material for lesson – scaffolded with high teacher talk <i>Coaching, constant voice (gives a bigger boundary/more choice than modeling Teacher support – high in cognitive support/preparation. Student independence varied – low to medium (would not have arrived at observation without T questioning)</i>

Date	Cluster	Year	Students	Focus	Features
9/12/02 <b>14</b>	Regional Centre	4	3, 2 girls, 1 boy, near ability (diff with getting stds to travel)	Chance and Data - Recognise that some events involve chance, recognize that different results are possible when the same event is repeated, 2 games, 'heads and tails' and 'what's in my bag?' sampling and chance ideas	High level of engagement, involvement of children in tossing and recording (did not discuss why HT came up more often although recognized by student) Opportunity to build on tallying not taken up T said had only just started to do this Predictions of students, distinction between estimating and guessing <i>Teacher Support - high (in game cognitive thinking/connections/generalization would not have been possible without T)</i> <i>Student Independence - medium to low (some responsibility but fairly dependent)</i>
7/3/03 <b>15</b>	Regional Centre	14 year olds	2 girls, 2 boys, stds from previous years class now in 'transition'	Chance and Probability - focus on the language of probability and chance. Game of Acey-Deucey. Chart assessing probability of statements Never - Always	High level of engagement of students Culture of group - took responsibility for group and each other Teacher noticed N's behaviour but did not highlight it, so focus is maintained ('Tribes' PD) Good examples, excellent balance of activities Review at end to check understanding (informal assessment), wait time for std to realize error in his thinking Power of visual scaffold/reference Assumptions we make about what stds see/read eg cards or computer screen Questioning very focused/probing 2 levels of support - remaining focused, attending, taking risk - linking, connecting, reflecting, seeking explanation <i>Teacher support - low for girls, high for boys</i> <i>Student independence - high for girls, low for boys</i>
7/3/03 <b>16</b>	Regional Centre	4	2 girls, 2 boys, 3 near ability, one not so good	Number - working with large numbers, starting with 5 digit numbers moving on to 6 digit numbers. Ordering activity, house prices	Great discussion re: use of commas and spaces when reading large numbers, different ways of writing reading made explicit (kids will

## Metropolitan Centre

Date	Cluster	Year	Students	Focus	Features
25/3/02 <b>17</b>	Metro-politan Centre	6	3 girls, near ability	Decimal Place value, tenths, hundredths going into 'thousandths', use of MAB, linking thousandths to measurement	Plugging into students knowledge Repetition of 'renaming' Encourages students to speak Too much recording which was confusing for students to follow
25/3/02 <b>18</b>	Metro-politan Centre	3	4 girls, like ability, highly motivated	Subtraction, decomposition method with two zeros	Constantly gets students to verbalize their thinking Recording dictates the conversation, sets the interaction Use of hand gestures to indicate wait time Strong classroom culture, power of structured routine, set expectations Teacher monitors students while explaining and working
15/5/02 <b>19</b>	Metro-politan Centre	2	3 boys, near top level	Counting money, beginning to give change, counting over \$2, adding small amounts	Excellent wait time Encouraged students to explain how they arrived at their answer Clear implementation of APPA Encouraging of mental strategies and then use of concrete material to verify Recording used as a way of reinforcement Use of examples that are relevant to children help to exemplify the significance of learning maths
15/5/02 <b>20</b>	Metro-politan Centre	3	4, 2 girls, 2 boys, mixed ability, 1 girl very articulate will assist others	Fractions, representing fractions by dividing an object or collection into any number of equal parts, beginning to recognize equivalent fractions, start with review, review halves, fifths, tenths, introduce thirds, sixths and twelfths	Acknowledgement of 'bit tricky' T revoices suggestion and encourages whole group to take part in discussion/solution Use of fraction board helped students record what they were doing Prediction or importance of knowing what to look for Valuing/encouraging students responses Good wait time Good questioning, at the level of understanding Benefits of having a mixed ability group

Date	Cluster	Year	Students	Focus	Features
5/6/02 <b>21</b>	Metro-politan Centre	6	3 girls, mixed ability frm 3 diff classes, top std and 2 fairly capable std's	Fractions - exploring students' understanding of $\frac{3}{4}$ through a poster activity. Seeking knowledge about students understanding of fractions in general, rules, processes, relationships with decimals/percentages. "Show/tell me everything you know about $\frac{3}{4}$ "	Students valued process Questioning provided room for students response Prompts to previous lesson to make links Rulers a distracter, negative stimulus (one give tried to measure twelfths on a circular piece of paper with a ruler) Use of more knowledgeable peer, girls help one another Use of mathematical language Values ideas, affirming students' input Teacher recognized the potential of an unproductive discussion and intervened Interesting, students perception of accuracy (measure with a ruler rather than fold which would have been more accurate) <i>Teacher support - medium, GUIDING</i> <i>Mixed levels of student independence at times, students, SHARING</i>
5/6/02 <b>22</b>	Metro-politan Centre	3/4	3 girls, 1 yr 3, 2 yr 4, mixed ability, one girl having diff with mental computat'n	Practicing skills to work more confidently with mental addition, naming describing strategies, strategies to make to 100. Part 1 - dice game (make to 100) with a partner Part 2 - Open ended question (house problem), independent work	Expectations made clear to students Positive reinforcement of strategies Valuing/ naming strategies, valuing student responses Role of 'accomplice' gives permission to interrupt/ offer counter strategies (classroom culture) non threatening/ community of learners / safe environment Reads problem twice, tries to draw a picture to visualize the problem Taking control - "Let's slow down" Lots of 'convince me', revoicing T very responsible for direction of conversation but not dictating Activity modified so all individuals involved in the same activity <i>High level of teacher support, mediating high presence, teacher highly available, SHARING, ACCOMPLICE (stirring the pot) guiding, high level of questioning</i> <i>Medium level of student independence</i>
16/8/02 <b>23</b>	Metro-politan Centre	3/4	2, 1 yr 3 girl, 1 yr 4 girl. near ability group	Shapes - regular and irregular polygons investigation, steering students to attributes, move on to solids - faces, edges, vertices then onto nets to see if students can match the nets with the solids	Clear structure of lesson Introduction of multiple representations and then the linking of them Pace of lesson, not in a hurry Personal interjection, very engaging "My favourite..." Modeling systematic organization of representations Adding constraints to scaffold student understanding (hiding the 3D solid, unable to fold nets) Good use of non example High teacher involvement <i>Medium student independence</i> <i>MODELLING with a roving style</i>

Date	Cluster	Year	Students	Focus	Features
16/8/02 <b>24</b>	Metro-politan Centre	6	4 girls, 3 roughly the same, 4 <sup>th</sup> girl unknown new to the school	Chance and Data activity - Predicting outcomes of dice throws. Unseen dice, trend analysis...predictions after 10, 20 rolls. View to use these students to inform group work in class in following lesson	Valuing students strategy for recording tally Injecting self as a co-learner Appropriate pace Requesting justifications and expectations of the same Involving students in peer teaching, giving students responsibility and ownership and purpose Cueing students into lesson "where have we used predictions before?" Use of data to make the predictions with constraints reaffirmed Partnership/ co-learner, the use of 'we' not 'I' Restating instructions continually (coaching) <i>Medium teacher support,</i> <i>Medium to high student independence, GUIDING</i>
6/9/02 <b>25</b>	Metro-politan Centre	5	4 yr 5 students from a composite 5/6, 2 girls, 2 boys, near ability group, 1 very able girl but laid back	Fractions - revision of partitioning and equivalent fractions. Bingo game to warm up. Number line 0 - 2, partition to show mixed fractions. Think board; write a fraction problem so the sum of the fractions is greater than one. New learning - putting fractions together to get a sum total greater than one	Well sequenced structure of lesson Excavating before each activity Redirecting student when focus was being lost Extending with questioning Well organized number line Springboarding, taking ideas on, gave impetus to more general observation Clarification of 3/6..6/12...9/24 to 12/24 Responsive to individuals Hinting/ prompting Making responses explicit/ modeling language Explanation of difference between discrete and continuous fraction Use of open number line <i>High teacher involvement, varying support</i> <i>Medium student independence</i>
8/11/02 <b>26</b>	Metro-politan Centre	3	4 girls, near ability able students	Problem solving activity - focus on strategies, use of objects to work out problems, acting out problems. Whole group problem to start, then pairs work on different problems, then sharing to explain results to rest of group	Lots of clarification, kept students on track Drew students attention to the possibility of more solutions Classroom culture Valuing students explanations Clear focus Use of materials to model solutions Clarification of student communication Questioning skills Supportive role Clear set up of problem Wait time / listening skills



Date	Cluster	Year	Students	Focus	Features
28/11/02 <b>28</b>	Metro-politan Centre	2	4, 2 boys, 2 girls, all capable and near ability	Number facts and strategies, constructing simple statements of equality, addition equations, number facts to 16, problem solving, construct own equations	Lesson tightly focused, kept focus on matching pairs Scaffold via teaching aide of balance with boxes Systematic check Pausing, wait time to allow students to self correct "oh let's just have another look", guiding self correction Good use of drop downs Good use of thinking strings Invites peer assistance "A needs some help there" Systematic recording - modeling recording Focus on maths writing Relaxed style <i>Teacher support - Medium, parts were high</i> <i>Student independence - medium, but varied at times</i>
28/11/02 <b>29</b>	Metro-politan Centre	6	4 girls, part of a mixed ability group but upper end of group and similar	Transformation of shapes - review of work done, exploring - rotation, translation, reflection and looking at symmetry	High level of student engagement, with little interference from teacher The use of manipulatives for space topic Students comfortable with language Predicting out comes of game, extending game to make it fairer Reflection time at end "What understanding have you developed?" All talking the same language, language well developed Gentle reminders / revoicing "is this what you mean?" Definitions on board as a prompt Knowing when to stand back and listen Cueing to reconsider, prompt to check/reconsider definition <i>Teacher support - low</i> <i>Student independence - high</i> <i>GUIDING - conditions for this shared knowledge, emphasis on applying/using (springboarding), teachers role to lay out opportunities, invite noticings, generalizing, challenging, nudging (not just practice)</i>

Date	Cluster	Year	Students	Focus	Features
14/3/03 <b>30</b>	Metro-politan Centre	4	2 girls, 2 boys, girls fairly clever, quite good, boys enjoy working together	Exploring Area - size of shape, using informal units progress to formal units, may move on to perimeter. Purpose of the lesson to give information, explore what the students know and explore concepts	Engagement of students by well-pitched tasks, story-shells, real life purposeful challenges. Accomplicing, connects lesson to self story and engages by sharing a problem, values student assistance Teacher as a co-learner Cuing/coaching/running commentary, drops self in and out of the students discussion Models shared thinking: inefficient strategies or dead ends, modeling that trial and error is ok, multiple ways, not just one answer Student discussion amongst themselves, peer teaching Wait time, allowed students plenty of time to think, make connections, come to understanding Language use was highly contextualised, out of context it didn't make sense "that one and that one make one" Wrapping task-high scaffold for area, connecting concept of covering/area by connecting it to 2D wrapping paper <i>Teacher support - varied, high cognitive support provided in low key way, lots of scaffolding</i> <i>Student Independence - medium</i>
14/3/03 <b>31</b>	Metro-politan Centre	4/5	2 girls, 2 boys, 1 boy Yr 4, rest Yr 5. All capable students	Place Value - consolidating place value ideas. Reading, writing and ordering whole numbers and decimals. Then putting in zeros to see if students can generalize ideas	Connecting, drew on past experience of students Constant guiding, probing, excavating High level of noticing and revoicing of student answers as a affirmation/confirmation Balance of probing and coaching Kept students on task Explicit discussion of text Orienting, context of learning established first and purpose and expectations made clear Lesson focus and purpose maintained over all lesson Range of open-ended activities Expectation of students structuring their learning The value of shared language Modelling of correct maths language and terminology <i>Teacher Support - mix of high and low</i> <i>Student independence - medium</i>

Date	Cluster	Year	Students	Focus	Features
17/4/02 <b>32</b>	Remote Rural	Prep	Near ability	Introducing concept/strategy of 'counting on'	Well prepared, lots of concrete materials within easy access Slowed down the counting during the teens "loved the way you said the ending" Peer assistance called upon when student had difficulty Clarifying / articulating- "what are we doing?", "what are we practicing?" Convince me - "what did you do to work that out?" Reinforcing / valuing - "yes, I saw you...", "I like the way you did that" Used tone of voice to discourage count all strategy Uses reading recovery language to reinforce and scaffold the learning Excavating - "could we do it another way?" Length of activity is important, students become restless after about 10 min Being explicit - "this is the learning bit" Using hand gestures, covering the number so the student is forced to count on not count all Acknowledge the preferred strategy
17/4/02 <b>33</b>	Remote Rural	6	Near ability	Further develop the concept of fraction as related to length. Develop estimation skills in measurement	Visualizing / guiding- "I want you to do it with your eyes" "I want you to..." Modeling with hands Is the concept of fractions (part) lost in the activity? Reinforcing - ".that was really clever, how did you do that so quickly?" Giving students ownership - "Someone help me..." Utilizing knowledge of students to develop skills as a group Noticing - "Oh, that's what you did..."
31/5/02 <b>34</b>	Remote Rural	3	Near ability	Reinforcement/extensions of place value concepts, link place value and counting, specifically bridging 100's	Excavating - "how do you know there are no tens in the tens place?" Drawing attention to - "what's this no. made up of?" Convince me Revoicing Revisiting Modeled confusion - "I don't understand?" Recalling prior knowledge - "Remember when we..." Prediction - "What do you think will change?" Questioning - specific to placement of no. but not as to why <i>High teacher support</i> <i>Medium to low student independence</i>

Date	Cluster	Year	Students	Focus	Features
31/5/02  <b>35</b>	Remote Rural	1	Mixed ability, work well together	Number stories - looking at changing size of collections, going from oral to written, from dependence to greater independence, building from known, being clear about what is intended	<p>Reviewing - "remember when we had...?"</p> <p>Valuing student work - "I like the way you..."</p> <p>Didn't plan on some of the responses of students</p> <p>Cards given according to ability</p> <p>Checking student understanding/convince me - "Tell me what you did?" "Do it again for me"</p> <p>Drawing attention to correct mathematical language</p> <p>Inviting peers to articulate strategy - "what did she do?"</p> <p>Peer support &amp; supportive reassurance - "how can we help L? It is quite hard"</p> <p>Visual aides - giving paper to help visualize part, part whole</p> <p><i>Teacher support - medium</i></p> <p><i>Student independence - Medium to low (varied some more so than others) T doing a lot of checking</i></p>

Date	Cluster	Year	Students	Focus	Features
20/6/02 <b>36</b>	Remote Rural	1	6, 2 boys, 4 girls Mixed ability	Counting large collections using grouping, systematic counting methods (The Famous Paper Plate Lesson)	Careful attention to equal groups Need to make skip counting concrete Lots of teacher questioning Importance of creating situations that emphasize equal groups - perceptual/visual models Oracy not enough, need physical reminder of the count Interaction scaffolded shift from 2s to 5s to 10s Paper plates assisted with developing the concept of groups and the organization needed to skip count, they were also a physical reminder of the count Effective teacher questioning is a powerful tool Lots of support required to keep momentum in student learning <i>Teacher support - high (through questioning)</i> <i>Student Independence - varied</i>
20/6/02 <b>37</b>	Remote Rural	3/4	Mixed ability, 1 boy autistic, 1 boy ADHD	Focus on sharing in relation to fractions - of a whole then if understood move on to fraction of collection, students to explore using individual cards. T wants to take a back seat	Students engaged T provided support when needed using students ideas/egs/using students texts Time to spend with individual students, good demeanor/ tone Lesson flexible enough to allow varied level of support (students working independently) Variety of approaches Drew out the learning at the end of each problem Teacher support can take a variety of roles - questioning, guiding, clarifying, roving Questioning is the key to excellent lesson Connections were made to equivalent fractions when the chance presented itself Review of lesson enhanced by pinning up students work for discussion Building on from known better than demonstrating <i>High level of teacher support (in terms of scaffolding/monitoring/questioning/hovering)</i> <i>Need to consider this in terms of who and how many getting support. High refers to all, low refers to some, also related to what is being done</i>

Date	Cluster	Year	Students	Focus	Features
30/8/02 <b>38</b>	Remote Rural	Prep	Mixed ability, Students groupd on basis of ENRP length I'view	Comparing and ordering length using appropriate language, have been playing around with fraction language, T unsure of what language they have, focus on comparing and ordering, string, streamers, invite language	Value of mixed ability - avoids T modeling, students learn from each other. Allows for 1 on 1 teaching, meeting of individual needs Focusing questions - re-oriented students to task and what was required, not much telling nearly all questioning Excellent teacher language showing the progression of the language used in measurement <i>Teacher support - high but not modeling</i> <i>Student independence-varied, low to high depending on the student</i>
30/8 <b>39</b>	Remote Rural	5	Near ability, higher achievers	Chance and data - been doing integrated topic on countries. Tourist attractions in Australia data. Previously worked on various types of graphs. Want students to do a pie graph, change whole numbers to %, % to degrees. Open-ended task use of protractors and calculators.	T may have confused students with 3.6 multiplier Very procedural Importance of waiting, allowing time to try different strategies, lengthy discussion, variety of interactions Students worked on their own, helped each other High level of mathematical discussion Valuing/endorsing student strategies <i>Teacher support - medium to low</i> <i>Student Independence - high, lot of peer modeling</i>
13/9/02 <b>40</b>	Remote Rural	1	Near ability, one student ADHD on medication	Looking at addition, what mental strategies are used. 1. Sorting dominoes, 2. order on basis of total, 3. Game (Are they attending to sum?)	Different abilities Introduction really set scene well Modeling game in middle drew attention to difficulties Game, options on how to do it Invited students to share their thinking/retell/report Good summary at end, metacognitive "What did we use? What were we practicing? What do we remember? What don't we use" Possibility of getting students to make correction <i>Teacher Support - medium (high with girls)</i> <i>Student Independence - mixed (low while game was explained) (student independence was encouraged)</i>

Date	Cluster	Year	Students	Focus	Features
13/9/02 <b>41</b>	Remote Rural	2	Mixed ability, 2 top end boys, 2 boys with good written skills, 2 girls lower group	Open activity to show what they know/feel about maths. Find the maths in the biscuit box of tiny teddies, working in mixed pairs	Importance of valuing/encouraging/reaffirming Handing over to students Questioning to excavate Intrigue in teachers voice Refocusing/maintaining Fun, lots of time for explanation Very engaged, lots of compliments, enthusiasm by all The box can now form the foundation of many future investigations <i>Teacher support - High to medium (directed but with lots of flexibility)</i> <i>Student Independence - Medium to high</i>
2/11/02 <b>42</b>	Remote Rural	6	Near ability, fairly bright group	Revise understanding of volume, students to discover a strategy to work out volume. Construction of lidless boxes. Investigate ways of filling boxes with $cm^3$	Engagement level very high Structure of lesson very effective, particularly timing of review session (T felt confident that he'd been round to every group & seen strategies he wanted) Exploration of students Students secure and safe to offer things without worries Questioning excellent - probing/restating/clarifying and digging/excavating, developing language in words Shared strategies at end Early finishers had something constructive to do Used student responses well Activity supporting scaffolding from filling to calculating Set up of lesson allowed for independent work but with teacher intervention <i>Teacher support - high to medium, powerful (not interfering) Instruction - low, support- high</i> <i>Student Independence - High/medium</i>
20/11 <b>43</b>	Remote Rural	3/4	11, mixed ability, brighter group	Graphing - Chance and Data activity, focus is on predicting, tallying, graphing (hoping some will use excel)	Intent to find out how tallying/graphing would be done Sharing of different ways of tallying, valued both Excavating, probing Difficulty students have with recording / reading and writing mathematical texts, good discussion re this After initially being unsettled, students became engaged with task Direct modeling with one student at computer and another student at table Questioning at end Maybe too much in one lesson <i>Teacher support - high/medium, varied/localized</i> <i>Student independence - high, whatever they did was acceptable</i>

Date	Cluster	Year	Students	Focus	Features
13/12/02 <b>44</b>	Remote Rural	3,4,5	Mixed ability.	Reasoning & Strategies - Language/strategies used by students in a buddy situation to enhance learning. Warm up game using dice/counter and board - 3 in a row. Open ended problem, look for conversations of 5 with 3. Collaborative problem involving Xmas presents, will extend to design own task	Year 3's more familiar with game Boys wanted blue presents without bows Took time, didn't need additional work Focus on importance of information/ number of possibilities Problem motivating, remained engaged Not so phased about having one answer, remained open to possibilities Language quite focused "Our conclusion" Child centered- child intro game Materials for the problem were produced by a student - ownership Giving clues one at a time created a lot of discussion - good strategy Valuing student strategies <i>Teacher support - medium (guiding, sharing, highlighting), fluctuated</i> <i>Student independence - pretty high</i>
21/2/03 <b>45</b>	Remote Rural	Prep	7 stds, near ability	Number - 'Count all' moving on to 'Count on' ENI revealed, stds can count verbally to 20, stds can subitize to 5. Can count collections. Task - to join two collections using count all strategies or count on strategies. Anticipates high teacher involvement.	Nice pace and variety Good questioning - 'Convince me' and 'Excavating' Lot of work with dots/subitizing seems to have paid off 'New Family' drawing attention to place value Valuing and naming of different strategies "that's one way, how else can you do it?" Obvious that approach is familiar to stds Task was rewarded Emphasis on doing the task rather than getting a direct answer Students actively contributed Slowing down the count was important Good summarizing reviewing - reviewed all strategies at the end of the session 'Can I show you another way' - modeling <i>Teacher Support - high</i> <i>Student Independence - medium to low</i>

Date	Cluster	Year	Students	Focus	Features
21/2/03  <b>46</b>	Remote Rural	1/2	Some stds Yr1 some Yr 2 Mixed ability group	<p>Measurement - to develop the language of measurement</p> <p>To compare containers using different attributes for measuring and finding the most appropriate</p> <p>Using different size lunch boxes, find most appropriate attribute to measure, order lunch boxes and explain the reason for the selection</p> <p>Make a chart of words, finish with a description of own lunch box</p>	<p>Apprenticing - 'Let's all help V'</p> <p>Continually comes back to measurement terms, reinforcing and focusing on terminology</p> <p>Good intro of capacity</p> <p>Classroom Culture - nice manner with stds, stds feel very safe and comfortable</p> <p>Nice review at end of session</p> <p>Invitation to write a report on information about lunchbox</p> <p>Stds can compare 1 or 2 things comfortably</p> <p>So much subtlety in the steps to be learnt, scaffolding is so much more important than we realize - baby steps</p> <p>Response of stds-"You were thinking of height and length, I was.."</p> <p>Limit choices when stds experiencing difficulty</p> <p>Questioning to draw out information from students excellent</p> <p><i>Teacher Support - High (med/high)</i></p> <p><i>Student Independence - some variation, medium to low</i></p>

# Researching Numeracy Teaching Approaches in Primary Schools


## BTS OBSERVATION RECORD

Name	Year level
School	Date

OBSERVATION 1

OBSERVATION 2


### BEGINNING OF THE LESSON

Actual interaction	Evidence
Choose ONE statement that best characterizes what <b><u>YOU</u></b> did.	
<input type="checkbox"/> Instructed students what to do	
<input type="checkbox"/> Showed students how to do something	
<input type="checkbox"/> Made links and connections	
<input type="checkbox"/> Reviewed previous work	
<input type="checkbox"/> Answered questions	
<input type="checkbox"/> Listened to students' suggestions	
<input type="checkbox"/> Facilitated student to student interactions	
<input type="checkbox"/> Posed a problem	
<input type="checkbox"/> Found out what students knew	
<input type="checkbox"/> Other:	
Actual interaction	
Choose ONE statement that best characterizes what the <b><u>STUDENTS</u></b> did	
<input type="checkbox"/> Listened to instructions	
<input type="checkbox"/> Listened to explanations	
<input type="checkbox"/> Suggested directions for investigation	
<input type="checkbox"/> Asked me questions	
<input type="checkbox"/> Let me know what they know	
<input type="checkbox"/> Shared their ideas on what to do	
<input type="checkbox"/> Showed the rest of the class something	
<input type="checkbox"/> Other:	
Circle the mark that best represents the relative involvement	
	
Students <span style="margin-left: 150px;">You</span>	
<b>TEACHING APPROACHES</b>	
<input type="checkbox"/> Modeling	<input type="checkbox"/> Guiding
<input type="checkbox"/> Sharing	<input type="checkbox"/> Focusing
<input type="checkbox"/> Noticing	<input type="checkbox"/> Convince Me
<input type="checkbox"/> Funneling	<input type="checkbox"/> Excavating
OTHER	OTHER



**Researching Numeracy Teaching Approaches in Primary Schools**  
**BTS OBSERVATION RECORD**

**END OF THE LESSON**

Actual interaction	Evidence
Choose ONE statement that best characterizes what <b><u>YOU</u></b> did.	
<input type="checkbox"/> Corrected students work	
<input type="checkbox"/> Summarised what was learnt	
<input type="checkbox"/> Commented on explanations by students	
<input type="checkbox"/> Used student responses to build understanding	
<input type="checkbox"/> Helped students understand the maths	
<input type="checkbox"/> Made links and connections	
<input type="checkbox"/> Other:	
<b>Actual interaction</b> Choose ONE statement that best characterizes what the <b><u>STUDENTS</u></b> did	
<input type="checkbox"/> Listened to explanations by other students	
<input type="checkbox"/> Listened to explanations by you	
<input type="checkbox"/> Talked or showed others what they've done	
<input type="checkbox"/> Other:	
<b>Circle the mark that best represents the relative involvement</b>   Students <span style="margin-left: 150px;">You</span>	
<b>TEACHING APPROACHES</b>	
<input type="checkbox"/> Modelling	<input type="checkbox"/> Guiding
<input type="checkbox"/> Sharing	<input type="checkbox"/> Focusing
<input type="checkbox"/> Noticing	<input type="checkbox"/> Convince Me
<input type="checkbox"/> Funnelling	<input type="checkbox"/> Excavating
<input type="checkbox"/> OTHER	<input type="checkbox"/> OTHER

Comments

---



---



---



---











# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

<b>Presenting Teacher</b>	<b>School:</b>	<b>Year Level:</b> 6	<b>Presentation:</b> 2	<b>Date:</b> 16/8/02
<b>General Notes:</b> 4 girls, 3 roughly the same ability, 4 <sup>th</sup> girl unknown, new to the school. Chance and Data activity. Predicting outcomes of dice throws. Unseen dice, trend analysis...predictions after 10 and 20 rolls of the dice. View to use these students to inform group work in class next week.				
<b>OBSERVED INTERACTION</b>				
Excavating / exploring what students know / prior knowledge	T Can you think of a time in the last couple of weeks that we might have had to predict or take a bit of a chance...S When you got the two numbers and you had to sit down if you thought the next number was going to be a 2.			
Probing	T Did you think it was hard? S It's not hard, it's a chance. T A bit of a risk			
Confirming students opinions	T It is a bit of a risk or a chance. There was another one you did recently...S the football one... T Yeah I'd forgotten that one (discussion continues...)			
Seeking explanation	T Did it get easier at any stage, when did it get easier? S When you've done it a few times...			
Setting the Scene	T OK in here, I have a die, with 3 different colours, I've covered the numbers, I've used red green and yellow...there is working paper in front of you...can you predict when I roll the die			
Posing the problem	10 times, how many times do you think each colour might come up (students write response..)			
Sharing	(Students share their predictions with the rest of the group... students tend towards an fair distribution)			
<b>Focusing</b>	T I'm going to roll it now...can you keep a tally of the results...(teacher calls the rolls, die is unseen)			
Valuing a more efficient method	T Did it get close to your predictions? M have a look at how R has recorded her results, what have you done R? (R explains...) What did you do M that R didn't have to do?			
Posing new problem	T OK we've made a prediction after ten rolls, I'm going to roll it another 20 times, can you make a second prediction on how many times you think, red, yellow and green will come up?			
Prompt	T Is anything going to influence your decision this time... S How many times a colour has come up ...			
Sharing	(Students share their predictions with the rest of the group...)			

# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

OBSERVED INTERACTION	EVIDENCE
Maintaining focus	(Teacher again rolls the die...) What do you think it's going to be M? M Red T It was green
Seeking assistance / accomplice	T How many times did red come up? S 13 How many times did green? S 3 T And yellow S 4
Seeking a solution	T Some where on your paper can you either draw or write down what you think this die looks like...you already know something about it...What do you know about it? S It's got 6 sides, and the colours are red, green and yellow.
Student seeking assistance	S Can this be really easy, like 2 red, 2 green and 2 yellow?
	T Not necessarily, look at the information in front of you, do you think you can draw or write down what it looks like?
Sharing of ideas	T What do you think, what's your prediction? (Students share their predictions...)
Convince me	T Can you tell me why you thought that? S Red came up the most (4 sides) green had more but it could just have been chance (yellow and green one side each)
Seeking explanation / connecting to prior knowledge	T You started to draw it...and stopped why...S Cos I realised I couldn't see all the sides T How else could you have drawn it? S I could have done it as a net. T Yes you could have.. ( Actual die is shown as 3 red, 2 yellow and 1 green...one student had predicted correctly)
	T OK now you need to design your own die, for a partner...(Teacher distributes materials and instructions)
Explaining what to do	(Teacher explains how this part of the lesson will proceed... same format as the teachers trials with the students working in pairs, students will swap over at the end the 20 roll
Restating	sequence... teacher takes an active roll in one of the pairs of students trials)
Accomplice / co learner	T How did they go with their predictions? (Students share predictions and accuracy of their predictions)
Sharing predictions / Inviting peer involvement	
Review	T Doing this, this morning what's something you've noticed? S If there's 3 like colours and one continues to come up, either it's a very lucky colour or there's lots of it, lots more chance of it coming up, rather than the others.
	T OK is there anything else that some one has noticed (student mentions number of tosses)



# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

<b>WHAT WAS LEARNT?</b>	
10 is too small a sample size	
Inform prediction by using previous results, need for evidence	
Efficient tallying tactics	
Correspondence with opportunities and outcomes	
<b>WHAT DID WE NOTICE?</b>	
Valuing student's strategy for recording tally	
Injecting self as a co learner	
Appropriate pace	
Requesting justifications and expectation of the same	
Involving students in peer teaching, giving responsibility and ownership	
Cueing of students into the lesson 'where have we used predictions before?'	
Use of data to make predictions with the constraints reaffirmed	
Partnership / co-learners	
Restating instructions continually	
The use of "we" not "I"	
<b>OVERALL TEACHING APPROACH</b>	<b>RELATIVE INVOLVEMENT</b>
Guiding	Medium teacher support
	Medium to high student independence

# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

<b>Presenting Teacher</b>	<b>School:</b>	<b>Year Level:</b> 4/5	<b>Presentation:</b> 1	<b>Date:</b> 9/12/02
<b>General Notes:</b> 4 students, 2 girls, 2 boys, 1 yr4 girl, rest yr 5. Near ability, all pretty good, one student very good. Wrapping things up at the end of the year. Data collection, graphing data in bar and pie charts, interpretation of data. Data on swimming groups, Computer generated graphs, attempt to generate own pie charts.				
<b>OBSERVED INTERACTION</b>				
Reviewing recent work	T All we have to do first of all is go back on the work we were doing on Friday, remember the graphing work we were doing on the swimming groups? Now, when you make your own graph, the first thing you need is? S Scissors. T If your going to cut it out you will, but the first thing you need before you can construct any graph? S Paper T you've got a piece of paper, you can't do anything till you have some? S groups or something T Some groups of information! You need some, what do we call it? Starts with 'D'? S Data T yep, data, if you've got some data, you can start to create a graph.			
	T I've got some data here, very different to the data we had the other day. Even though it's still to do with swimming groups. Because I think you remember what we had the other day was to do with 2001, this is actually 2002. I made these ones up on the computer, so it saves us all that hard work of measuring and colouring in. Now there is one here for everybody, lets grab a pair of scissors... as soon as you've got yours, have a look at it, ...quick study of it and tell me anything you can about the data that you started with, exactly what information you were using to create the graph. Can you figure it out? S's Series 1...series 2			
Inviting investigation / excavating	T Where it says series do you think that might just be a computer thing? ...means level 1, Level 2...Level 5. The other one we had was up to level 7, ... I guess that just means we don't have anyone in level 6 and 7. ...the scale up the side of the axis is determined by? S Tens			
Funnelling	T Now luckily there is a way of figuring out exactly how....this one here is six...goes right up the top ...(inaudible) I show you this when we go back to school, you can actually create these graphs fairly easily, you done that? S Not with... T you've seen it done though? OK			
Interaction from student, prior	S Mr S used to do them on computer, used to do these ones, using seventy or sixty and he			
<b>EVIDENCE</b>				

# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

OBSERVED INTERACTION	EVIDENCE
experience	used to do ;like what you eat and all that, he used to put it on the computer and save it ...
Drawing attention too	T Now you know if we have these numbers here, these figures...if we didn't have them we could still work it out, for the third one if the 15 wasn't there it'd be a bit tricky, cos we don't have the mark between the 10 and the 20. S that's easy to remember, cos it should be there, cos half way between them two which is there...
Excavating	T Ok M that's fair enough, what about if it was closer, 16 kids in that level 3, that 'd be still close to the centre, would we be able to check S Yeah T Remember the ones that you drew the other day, some people used one millimetre, some were using two millimetres for each person, and remember when you were bringing them to me for checking, I sent a few people back and I said you have to be more careful in your measuring, will you have that that problem here? S No. T The ones we draw all on our own, we have to be really careful, these ones make it a bit easier. OK!
Tutoring/focussing	T What do you think would have been the table of information in the first place, you know how we usually start, with some sort of grouping...what do you think would have been the data in the table? A? S1 Level 1 you'd have 10, (teacher draws a table) S2 Level 2, 60 S3 Level 3 you'd have 15. S4 Level 4 you'd have 30 T M finish us off? S4 Level 5, 5. T OK, you think that means there are no people in level 6 and level 7?...I actually think there are no people this week but maybe next week. We might ask on Friday after the testing... (discussion goes on about who is in which group) T So that's what we usually start with and that's what we usually end up with, but there is one other way that we can show some of this information, other type of chart? S A tally T Well, Ok let's do it as a tally, you probably wouldn't do a tally this way unless you'd gone Round to the grades and done a survey, you'd probably end up with a tally, who can show me how Level One would look as a tally? (student goes to the board and does tally marks for the data, explaining what he is doing, counting by fives etc). T While your doing that how many 5's are you going to end up with? S 12 T Why? S Cos
Use of more knowledgeable peer	
Incidental teaching / practice /review	

# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

OBSERVED INTERACTION	EVIDENCE
Connecting	you've got 60. T The good thing about knowing that 12 fives are sixty is that you know that 60 divided by 5 is 12! What about 60 divided by 12? S 5 T All those associated number Facts are really handy, once you know one, you get '3 for free!' (T gets other students to complete tally marks for the rest of the data)
Drawing attention to	T Of the information we have here on the board, which is the type of information we are likely to come up with first? S The tally. T The tally, yeah, you wouldn't always do the tally, sometimes you'd just write the number straight out, but if you were doing something where you had to make a quick count of something, car counts etc...(discussion) When I want to count how many animals there are in a paddock, I count all the legs and divide by 4...
Use of humour	And then from that we can get, your normal information and from that we make our other
Summarising	Graphs. Now tally, table and information, are chart what's another sort of chart we use?
Seeking / reviewing	S Pie T Pie chart, now we've done a pie chart before but it's been a little while since we did it. Who can remember how we can turn this into a pretty simple sort of pie chart? Any bells ringing? M? S Well you'd cut these out and you put them together and you put them together and put sticky tape on them and then you make a circle. T Ok, when you cut them out what do you do with them then? What do you do with each individual bar? S Well you sorta get...Do they have to be in order? T Yeah they probably should be in order. How do you put them together, can you explain that, they're already together! S You get them top and bottom T OK top and bottom, in other words you could...? S Stack T Stack them, put them end to end, there is actually a type of graph, you may have seen them where you have the information here like we have in the bar chart but you have extra information stacked on top. You might have two or three bits of information stacked on top... depends on the information, this isn't necessarily the time we'd do that but it is a good example of one we could use for a pie chart. So to make it easier I've got another sheet that we can have on here... it's always the hardest getting the circle right so I've got one of those for everybody I'll get those ready for you while you cut out the individual bars (T provided circles with

# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

OBSERVED INTERACTION	EVIDENCE
Coaching/monitoring	centres marked. Students do activity.) T Leave that one there so you can see where to start the other end.
Modelling	T You can start putting them together, my suggestion is to make it really simple, tear off some thin strips of tape and put them on the back, kind of like, that...be a bit careful...if you want to cut yourself of a long piece of tape, slice it into smaller bits...like that there you go. (Banter between students and teacher while this work is done)
	T You can join it, now the question is are we going to make it with the colours on the inside, or the outside? S The outside... T You reckon, I've tried it both ways and I've never decided which is better. (S explains why it is better one way or the other)
Make it explicit/focusing	T The important thing is knowing where the joins are... Do you know what to do next? S No
	T I've got some textas here, who can tell M what to do next? S Can you just go like that?
Direct teaching	T No you have to do some marking around the edges, to show where the colours join up.
Modelling	T Now you've got to be really careful that you don't move as you go around. The circles are about the same size as the rings you have made... S This doesn't seem right ...
Coaching	T My suggestion is make all the marks outside the edge first....It's not going to be as perfect as if we did it on the computer but it's one we can make ourselves which is good...
Encouraging	(T monitors all students progress to make sure they are Ok with the process of what they are doing) T The test will be when we compare them all and see how accurate we have been.
Constant dialogue of encouragement	T Colouring isn't that important, you may like to cross hatch them rather than colour them.
Guiding	T Is it easy to tell when you are looking at what you have made that there are 60 in that big section? It's easy on here (bar chart) cos you can count up 10, 20, 30...60, but when you look at the pie chart can you sort of look at it and say oh yeah there are 60 in there.
Drawing attention to/ focussing	S You can just tell there is more! T Yeah you can just tell there is more S Than something else. T yeah others, but as for actually saying, yep there's 60 in that group...
Making a point	T They all look pretty similar....Ok nearly done, this is the slowest bit, most fun...
Reassuring/confirming	T Whilst you are finishing, have a look at this, this is one I made (computer) the colours are

# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

OBSERVED INTERACTION	EVIDENCE
	different. S That bits bigger than mine. T No, don't compare the colours you can't do that!
	T What we are going to do is try and find out which sections of the pie chart are actually which levels?
Student revelation / light bulb moment	S I actually learnt something just then, you know how you were saying you could work out, the thirty, like you can tell how much of the fraction was 60 and all that, it's like half of it seems to be 60. T Does that make sense A, half of it is 60? A Yeah S Like instead of doing the table thing and trying to work it out, you can just use it like this. T Yeah, can you tell Here just looking at the table that half of everything is 60. Level 2 is half of all the people. S yeah I could. T How would you do it? S You could add all the others up. T OK add all the others up. (T and S add all the others up) T So if you add all the others up they are 60.
Investigating	Exactly right just look and colour half of your whole group. It doesn't tell you what level they're in though... Can you tell what the other ones are? Might be easier to go with the next biggest...
	(Comparison discussion continues in order to label the different levels by comparing graphs and charts)
Interrogating (the data)	S I believe its 15, four of these would do that but not four of them. T who thinks 4 of these would make the same as that? S Yeah me, S yep...
Funnelling	... T So a quarter of all people are in? Ss Level 4 ...
	T I should have made two of these so we could cut them out. When we go back to school I'll do another of these so we can do some cutting and comparing. Excellent. OK right ...
Focussing	Lets look at our original data, when you looked at that you knew that level 2 was the biggest group. Can you do the same here? Ss Yes T You have a bit more trouble with the smaller groups though, it took us a little while to figure out which one was which.
Reinforcing	S The double pattern really helps a bit. T I think the doubling pattern is really important and of course the opposite of doubling is? S minus, take away T Opposite of doubling A?
	S Take away T No, if you double something...? S You halve it.



# Researching Numeracy Teaching Approaches in Primary Schools

## BTS SESSION SUMMARY

<b>WHAT WAS LEARNT?</b>	
Idea that data can be represented differently for different purposes.	
Sense of proportionality (comparing groups)	
How to construct a pie graph (one technique for doing so)	
<b>WHAT DID WE NOTICE?</b>	
Powerful interaction, intensity and density of language	
Connections to what else was known eg no. facts (able to do this at the end of the year with a group)	
Genuinely deals with concepts - intuitive basis for proportion	
Tutoring - 'My suggestion is...'	
Humour	
Manner of lesson is open, students happy to discuss - classroom culture	
Preparation of material for lesson - scaffolded with high teacher talk	
Coaching, constant voice (gives bigger boundary/more choice than modelling)	
<b>OVERALL TEACHING APPROACH</b>	<b>RELATIVE INVOLVEMENT</b>
	Teacher Support - High in cognitive/preparation.
	Student independence varied - low to medium (would not have arrived at observation
	Without T questioning)