Early Years

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CONTENTS

Literacy Learning for All Children

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Introduction

Staff development programs designed to support primary and middle grade elementary teachers need to have two major emphases: strengthen their teaching of reading and writing and align curriculum planning across grade levels. For effective, long-term change, research-based teaching methodologies are organized into a usable framework for classroom instruction. This provides both the good first teaching focus on literacy instruction and the curriculum format for effective communication across the grade levels. A strong program in PreKindergarten–Grade 3 centers around having an instructional emphasis in the primary grades on teaching reading and writing. In Grades 3–6 the focus shifts to using reading and writing in the content areas while recognizing that some children are still struggling readers in the intermediate grades. This paper will view the process of literacy development across the first five years of schooling from the standpoint of three underachieving students. All of the students are in fourth grade and represent a spectrum of issues. One has Spanish as his first language, and he has only been reading in English reading for eighteen months. One has English as his first language and has been in the same school for all of his educational career, but has a very low level of literacy. The third has been in many schools and produces very little effort in writing, but is very accurate in her work; however, her decoding and comprehension are very low.

All three of these students have been in classes in schools that are working on aligning their curricular plan and have a commitment to staff development. Our research project involves two elements. Both California Early Literacy Learning (CELL) and Extended Early Literacy Learning (ExLL) are designed to meet the needs and strengths of each individual child. The model stresses and encourages active participation from each child regardless of his or her current level of literacy acquisition. High progress children are encouraged to continue their rapid growth while low progress children are guided through the process with continuous support and an opportunity to accelerate their learning. The opportunity to try new learning in a risk-free environment and practice new strategies throughout the day are encouraged. Teachers are trained to use a gradual decline of teacher support and a gradual increase in student independence based on demonstrated student capability. This reduction of teacher support is based on observations of individual child growth in understanding the processes of reading and writing. The child's use of a variety of problem-solving strategies is supported through good teacher decision-making about ways to assist each child toward the goal of independence. The elements of the CELL and ExLL frameworks for instruction are designed to help each child and the whole class move together toward that goal. The framework has been designed to structure a classroom that uses literacy activities throughout the school day.

Other curricular areas are delivered in this context using literacy activities as the method of instruction. The CELL and ExLL frameworks include a foundation of oral language, phonics, higher-order thinking skills, and reading and writing activities with an emphasis on cognitive strategic processing. Both projects have been developed with the strong belief that improved classroom instruction and increases in student achievement are best achieved by providing more support and professional development to teachers. Helping teachers become more effective in their work is the primary CELL and ExLL goal. The CELL and ExLL training programs are based on this high level confidence in the ability of classroom teachers to become more powerful given appropriate training and long-term support.

At this point in time in California, and other places in the United States, this is not always the prevailing point of view. The push is for a "teacher proof" curriculum or material that can be implemented in a lock-step sequence, or a "magic bullet." The argument for teacher empowerment is viewed in this paper from the standpoint of the range of students who have not succeeded in the regular instructional program. It is not an argument for or against any approach; it is clearly

an emphasis on the importance of staff development and curricular alignment with strong communication at a school site level, as viewed through the progress of the children at a school site.

The Frameworks

In order to view the progress of children in the projects, some background information on the training and the frameworks used in the training is necessary. The CELL PreK–3 Framework is carefully designed to help the beginning reader develop the necessary skills to master alphabetic principle, phonemic awareness, and concepts about print in a literature-rich environment.

Oral language

- Assists students in language acquisition
- Develops and increases vocabulary
- Promotes the use of accurate language structure.

Phonological skills

- Uses oral language to access reading and writing
- Builds a foundation of phonemic awareness for explicit skills learning
- Teaches systematic phonics through writing, spelling, and reading
- Supports development of accurate spelling.

Reading aloud

- Builds vocabulary
- Introduces good children's literature through a variety of genre
- Increases repertoire of language and its use.

Shared reading

- Promotes the development of early reading strategies
- Encourages cooperative learning and child-to-child support
- Stresses phonemic awareness and phonologic skills.

Guided reading

- Allows observation of strategic reading in selected novel texts
- Provides direct instruction of problem-solving strategies
- Allows for classroom intervention of reading difficulties.

Independent reading

- Allows children to practise strategies being learned
- Develops fluency using familiar texts
- Encourages successful problem solving.

Interactive writing

- Provides an opportunity to jointly plan and construct text
- Develops letter-sound correspondence and spelling
- Teaches phonics.

Independent writing

- Encourages writing for different purposes and different audiences
- Fosters creativity and an ability to compose
- Allows opportunity to practise or attempt new learning.

CELL helps teachers learn how to use the framework activities effectively in their classrooms and how to integrate the individual elements into an overall system of classroom instruction. Oral language is the foundation for all of the elements of early literacy learning. The dialogue, discussion, verbal interaction, and active oral engagement of each child are stressed as each of the framework elements is used. Knowledge of the structure of language is known to increase with communication that occurs surrounding the literature that is read aloud and the themes that are studied across the curriculum of the classroom. The practice of oral language and the development of new vocabulary through discussion and reading from a broad range of genre are reciprocal in nature. Skills development is also emphasized across each of the framework elements. Emergent readers must have the opportunity to develop phonemic awareness and to practice phonological strategies and decoding skills. These skills are best acquired in the context of meaningful activities and should be given extensive practice by reading quality literature and engaging in authentic writing activities.

The elements of the CELL framework provided during the inservice training are reviewed and discussed by both experienced and new teachers in a participating elementary school. School-wide staff development is provided by a specially trained Literacy Coordinator skilled in both the theory and practice of effective literacy learning. Literacy Coordinators also provide peer coaching to assist teachers in taking on the new learning and instructional methodologies used in the CELL framework.

The Extended Literacy Learning (ExLL) Framework is aligned with the PreK-3 Framework to help the wide range of readers in the intermediate grades extend their essential skills while reading and writing in the content areas.

Phonological skills
Directly and systematically teaches essential skills:

‣ Uses oral language to access reading and writing

‣ Builds a foundation of explicit skills learning

‣ Teaches systematic phonics through writing and reading

‣ Supports development of accurate spelling.

Reading aloud
Expands concept development and language structure:

‣ Fluent, expressive reading

‣ New and familiar concepts and context

‣ Language and grammar usage.

Shared reading
Increases fluency and extends phonemic awareness:

‣ Phonological awareness for explicit skills learning

‣ Choral reading

‣ Reader's theatre.

Directed reading
Provides explicit skills and comprehension instruction for readers at various ability levels, integrates reading into the content areas and teaches study and reference skills:

‣ Guided reading

‣ Reciprocal teaching

‣ Literature circles.

Independent reading
Allows for extended practice, increased comprehension, and higher-order thinking skills:

‣ Specific reading strategies and text organization

‣ Content area research/study.

Directed writing
Supports the accurate construction of text and effective spelling strategies:

‣ Phonological skills

‣ Advanced word analysis

‣ Interactive writing and interactive editing

‣ Writer's workshop.

Independent writing
Encourages creativity and the ability to write for different purposes:

‣ Language structure and correct grammar usage

‣ Accurate spelling and punctuation skills.

Oral presentation
Formalizes the process of sharing ideas and reporting information:

‣ Content area oral reports

‣ Oral interpretation of literature

‣ Drama/performance.

ExLL supports teachers in learning how to effectively teach reading and writing to students with a wide range of ability levels in the intermediate grades. It is aligned with the CELL framework and helps teachers learn how to integrate the individual elements into a seamless curriculum of classroom instructional practices. The active engagement of each child is stressed throughout the ExLL framework, with verbal interaction and reading and writing activities taught across the content fields. Knowledge of the structure of the academic language, new vocabulary and concepts are developed through literature and the study of genre across themes in the curriculum. Ongoing skills development at a higher level of phonological analysis is balanced with systematic direct instructions of decoding and comprehension for struggling readers. These skills are acquired in the context of meaningful activities that motivate the gifted and reluctant reader alike. Students are given extensive practice by reading a wide range of fiction and nonfiction books and engaging in authentic writing activities in all content areas.

Key Elements of CELL and ExLL

California Early Literacy Learning and Extended Literacy Leaning share a number of key elements that have been found important to their success and essential to effective implementation. Participants have reported that CELL and ExLL are a unique blend of intensive professional development that matches theory and practice and support of new learning by teachers.

CELL recognizes that the teaching of reading and writing is the foundation for all later academic achievement. Teachers are encouraged to teach all subjects using the framework of literacy activities. ExLL continues this emphasis in the intermediate grades with the additional focus of using reading and writing in the content areas.

CELL and ExLL also restructure how we teach children to read and write. Schools who join the projects have determined the need to change their approach to teaching reading and writing. Schools are committed to providing massive opportunities for children to practise reading and writing. Teachers are encouraged to use literacy activities as their primary teaching method, all day, every day.

National and various state level legislative initiatives emphasize that improving reading and writing in elementary schools is a high priority. California Early Literacy Learning and Extended Literacy Learning help

schools meet this goal by providing staff development that helps teachers be more effective in providing literacy learning. The teaching of phonemic awareness, systematic explicit phonics instruction, sound symbol relationships, decoding, word attack skills, spelling instruction, and diagnosis of reading deficiencies are all emphasised. Training sessions also emphasise a multitude of literature-rich teaching methodologies for use in primary and intermediate classrooms.

The inservice trainings provided also include research on how children learn to read, how proficient readers read, the structure of the English language, and the relationship between reading, writing, and spelling. Teachers are provided a means to plan and deliver appropriate reading instruction based on assessment and evaluation using independent student reading of high quality books. Reading instruction is based on improving reading performance and comprehension.

CELL and ExLL are balanced reading programs that combine skills development with literature and language-rich activities. Children are provided direct instruction using high quality, appropriate materials (CDE, 1995). Teaching methods are used that have substantial support in the research literature. Teaching methods are aligned within and across grade levels. Achievement gains are enhanced when transition from grade to grade is accompanied by teachers who use the same teaching methods. Classroom instruction, early intervention, and special education are also aligned.

CELL and ExLL collect diagnostic information to inform instruction and assessment data to ensure accountability. Teachers are trained in various assessment procedures to improve their observation of children to better inform instruction. Standardized test measures are provided to track both individual student and class achievement.

The training model provides intensive professional development with follow-up. School-Based Planning Team and Literacy Coordinator training are both year long. Follow-up support for the three- to five-year implementation is provided through on-site training, class visits, and monthly guided meetings.

A capacity-building model that ensures long-term support is used. The School-Based Planning Team and the school-based Literacy Coordinator both help establish a system of support that continues year after year. CELL and ExLL also provide long-term support through continuing professional development opportunities during periodic training updates.

High quality teaching materials from a wide variety of sources are used during the training. Professional books and an extensive list of professional readings are provided during training. Recommendations for children's literature books and books for shared and guided reading are available. The effective use of other materials, such as basal reading series, is also included in the training.

CELL and ExLL have been reported as successful with second language learners. Schools report that the framework of activities has been effective in English only classes, Spanish only classes, and classes for second language learners. Book lists used in CELL are available in both English and Spanish.

CELL and ExLL success are measured by student performance. Intensive staff development and ongoing support should be a condition of teacher accountability. Data reported in the research section show various procedures that CELL uses to document its success. In summary, the key elements are:

- Increases the emphasis on reading and writing
- Focuses on the professional development of teachers
- Supports school reform and school restructuring
- Uses a balanced reading program
- Aligns teaching methods within and across grades
- Uses a capacity building model
- Has a strong research base
- Measures success by student achievement gains.

Staff Development Training Models

Staff development can occur at many levels and can proceed from the teachers' initiatives or the administrative leadership. To ensure school-wide support, a School-Based Planning Team participates in a year-long series of planning activities and framework training sessions. The School-Based Planning Team is composed of the school principal, a reading specialist, a special education teacher, and teachers from each grade level.

The teachers from each team receive initial training in the elements of the framework and begin implementation of the framework immediately after the first of five sessions. They receive feedback regarding their efforts at each subsequent session. This format allows a school to begin partial implementation and develop a resource for observation, demonstration, and support of the project.

The role of the School-Based Planning Team (SBPT) includes support for implementation by:

- Beginning to practise the elements of the framework daily in the classroom.
- Learning the theoretical constructs of literacy learning through professional reading.
- Making decisions on how the implementation of literacy instruction can be supported and extended throughout the school.
- Attending and actively participating in all training days.

‣ Helping to coordinate guided meetings of SBPT at school site.

‣ Supporting colleagues on the team as they attempt new learning.

‣ Reflecting on teaching.

Training sessions focus on systematic observation of children's learning and specific instruction in the effective use of elements of the CELL and ExLL frameworks. The School-Based Planning Team also works together during the training days to develop a vision for future literacy instruction in their school. Planning for long-term staff development is done over the next three to five years and teams have guided meetings biweekly to continue their own discussions and learning as teachers/readers/researchers.

The Literacy Coordinator is the school-based staff developer who supports the implementation of the CELL and ExLL frameworks. This individual has no supervisory responsibility, but rather serves as a coach and mentor to colleagues on the instructional team. There is a separate and distinct training for CELL and ExLL Literacy Coordinators because of the varied needs of primary and intermediate teachers.

The Literacy Coordinator-in-training participates in five full-week trainings throughout the traditional school year. This training consists of observations in classrooms, group meetings to reflect on the teaching and learning observed, and seminars that combine theory and practice. Throughout the year, the Literacy Coordinator-in-training teaches a half-day in a classroom using the elements of the framework and attends biweekly guided meetings.

In addition to teaching a half-day in their own classrooms, the Literacy Coordinators support the continued learning of the School-Based Planning Team by observing in classrooms half days, and conducting awareness sessions with the rest of the instructional team. During the training week, Literacy Coordinators participate in a leadership training seminar that focuses on peer coaching and the construction of the staff development model.

One of the major strengths of the training model is the effectiveness of peer coaching. The Literacy Coordinators use their classroom for demonstration opportunities for their colleagues. It is recommended that a Literacy Coordinator have responsibility for supporting approximately twenty teachers. Additional Literacy Coordinators are recommended for larger schools.

Achieving School Change Through Staff Development

CELL and ExLL implementation have three distinct phases. During the first phase, School-Based Planning Teams are trained. This training helps establish the culture for change in the school and provides an initial training for team members. During phase two a Literacy Coordinator is trained to provide support to team members. This position is an important part of the capacity building effort for the school. In the final phase, phase three, teachers who where not part of the School-Based Planning Team are trained. The Literacy Coordinator begins full implementation at the site by providing the five-day training sequence with observations in the classrooms of the School-Based Planning Team and in the classroom taught by the Literacy Coordinator as an additional resource.

The training model is designed to make elementary schools self-sustaining through the training of Literacy Coordinators who can provide staff development and peer coaching to teachers in their own schools. This capacity-building model has been found to support long-term change in participating schools.

Different schedules of training and implementation are used by various schools. Some schools have elected to complete School-Based Planning Team Training in the same year as the training of their Literacy Coordinator. Full implementation using this schedule would begin in year two. Other schools have elected to train teams in year one, a Literacy Coordinator in year two, and begin full implementation in year three. Likewise, participation in CELL and ExLL trainings have also varied across schools. Some schools have elected to train teams and Literacy Coordinators in CELL and ExLL at the same time. Other schools have initiated CELL training and moved into ExLL training in a subsequent year.

Research in Staff Development, School Change and Teacher Decision-Making

California Early Literacy Learning and Extended Literacy Learning are research-based programs. This research is reflected in both the selection of training focus as well as the collection of data from participating schools. All elements of the frameworks were selected because of their substantial support in the research literature. The frameworks represent best practices in literacy learning. Participants assist in the collection of data that are used to document program success and individual student gains. It is a primary focus of CELL and ExLL research to analyze and report data generated by individual participating schools and districts. This research focus is a more reliable predictor of the likely impact of CELL and ExLL training on achievement in a particular school than a set of aggregated data from all CELL and ExLL participants.(All studies cited are from Swartz, S.L., Shook, R.E., & Klein, A.F, 1999).

Specific focus is made on the standardized test scores of each participating school. In addition to the literacy test results, content area scores are also monitored to determine the impact of increased literacy learning on achievement in mathematics and other content areas. In addition, as soon as possible after the opening of school, approximately six children (chosen by random) are individually assessed, using various measures, by teachers and the Literacy Coordinator as a pretest. The posttest for this same group is completed in the last three weeks of school. This procedure is used to monitor specific learning in a group of focus children.

The primary goal of California Early Literacy Learning and Extended Literacy Leaning is to increase the literacy achievement of children. In a longitudinal study of student achievement over a five-year period in Wyoming, standardized tests scores were analyzed. A steady trajectory of growth is seen from the 1994 baseline of no training to the second year of full implementation in 1998 with scores in the average range. This growth was seen in reading and language arts as well as in mathematics.

Using the Observation Survey (Clay, 1993) in Fall and Spring, data on mean scores and grade equivalents in text reading for children in grades K–2 at a fully implemented CELL school were gathered. Kindergarten students began the year as non-readers and reached a level equivalent to mid-first grade by the Spring testing. Achievement of first-graders increased from upper Kindergarten to beginning second, and second-graders began the year just below grade level and scored high fourth grade in the Spring testing.

An additional research focus is the impact of teacher training. A study completed in a small rural school (WELL, Wyoming Early Literacy Learning) where half of the staff participated in training and the other half served as a control group who received no training showed significant increases in text reading scores in each grade level for teachers who participated in training compared to those who received no training.

Many schools who have selected CELL as a staff development program also participate in the Reading Recovery program. Though Reading Recovery, by design, is an intervention program and not expected to impact the cohort, many districts track these data. A fourth study examines standardized test data for first graders over a four-year period in mathematics, reading, and total battery. The three years of data during Reading Recovery participation show scores in the 22–31 national percentile range. Year-end scores following the first year of CELL implementation showed a dramatic increase in all three areas to the 44–50 percentile range. It is interesting to note that the achievement increase was also seen in mathematics. These data help support the primary importance of reading and writing instruction in the elementary grades. It also suggests that even a powerful intervention program like Reading Recovery

improves with the support of effective classroom teaching. The benefits of full CELL implementation are demonstrated in this study as well as the benefits of a school-based staff developer. It is hoped that powerful instruction and access to good first teaching for all children will impact the need for remedial reading and special education services.

A report on special education referrals over a three-year period shows continuing decrease in referrals. Non-Title I schools with neither Reading Recovery nor CELL support showed an increase in percentage of referral from 2.6 to 3.7. Title I schools supported by Reading Recovery showed a referral reduction from 3.0 to 2.8 per cent. The demonstration school supported by Reading Recovery and CELL showed a significant reduction in referrals to special education from 3.2 to 1.5. These data confirm both the effective combination of a balanced program of reading and writing instruction with a powerful early intervention and the cost effectiveness of school-wide staff development in CELL.

An additional special education question was studied in one of the CELL demonstration schools where it was shown that there was twenty-five per cent exit rate for special education students placed in the class of the special education teacher member of the School-Based Planning Team. This exit from a special education resource room placement can be attributed to the use of more powerful teaching strategies and to the fact that special to regular class transition is facilitated by the alignment of teaching strategies used when both regular and special education use the CELL framework.

One study completed compares achievement in grades 1–4 on the California Achievement Test (CAT-5) over a four-year period. Schools who had full CELL implementation showed increases of 10, 10, and 11 normal curve equivalents in reading comprehension. Schools with partial implementation of CELL showed increases of 2, 6, and 5. And schools that participated in a district developed CELL clone had normal curve equivalent scores of –2, 1, 3, and 5. These data are a strong indication that program replication is affected by altering standards, procedures, or training.

A recent study in northern California compares the SAT-9 scores in three Title 1 schools in one California district. Schools were in comparable implementation stages of Reading Mastery (Engelman *et al*, 1988), *Success for All* (Slavin *et al*, 1993), and CELL. CELL and ExLL posted higher scores in all categories measured (reading, language arts, spelling, and math).

These studies demonstrate that CELL and ExLL are effective programs of professional development. The most important data are those that show good achievement gains in literacy in CELL and ExLL schools. Schools that have committed to training a Literacy Coordinator show greater gains than those that received only the School-Based Planning Team training. Both level of implementation and adherence to the model are seen as important variables.

Case Studies

Three students from fourth grade were followed over a one-year period. Student A, male, has Spanish as his first language, and he has only been in transition to reading English for eighteen months. Student B, male, has English as his first language and has been in the same school for all of his educational career, but has a very low level of literacy. The third, Student C, female, has been in many schools and produces very little effort in writing, is very accurate in her work; however, her decoding and comprehension are very low. All children are in the same classroom, and the data presented were gathered in one week in January 1999.

While the studies are still in progress, it is important to review their work in terms of the premises of staff development and teacher decision making because they are all having significant difficulty in reading and writing.

In a measure of student writing vocabulary, administered by asking the children to write all of the words they knew in five minutes, no environmental print was in the room to copy. Child A produced 38 words, Child B 35 words, and Child C 25 words. None of the children evidenced any patterns in their writing, not by spelling or sound or analogy. The only associations made were to sports terms, school terms, or friends names. Most of the words were spelled accurately; children stayed in their "safety zone" and took few risks, as would be expected by this type of measure. When the children came toward the end of the list, they started to blur the writing of their letters, mainly the vowels. The word <u>they</u> was written with the <u>a</u> and <u>e</u> on top of each other. This, too, is typical of struggling readers and writers in the intermediate levels who try to disguise their errors.

In a quick write, taken in a half-hour period, all students evidenced poor sentence structure, many spelling errors, and redundant statements. Child C produced the most accurate text, but by far the shortest, at one paragraph less than one half page long, versus a page or more by each of the other students.

The spelling assessment was the most telling measure. The Developmental Spelling Inventory (Gentry, 1985) showed the following:

Child A	Child B	Child C	**Actual Word**
monter	monster	master	**monster**
untied	untide	unaited	**united**
dress	drase	drisw	**dress**
botm	botome	bdam	**bottom**
hite	hit	hist	**hiked**
humen	heman	humen	**human**
egal	egall	egol	**eagle**
colsed	cloosd	closd	**closed**
bumted	bumte	bapt	**bumped**
type	tipe	tip	**type**

When the students were asked to link sounds to symbols, use spelling patterns and analogies, they were unable to evidence these essential skills. The English Language Learner, Child A, showed the most evidence of understanding phonology. Child B over-generalized the silent e spelling rule, but had no evidence of other patterns. Child C, the slowest processor and most accurate writer on other measures, evidenced her very limited repertoire. All of the measures showed serious weaknesses in processing, both in decoding and encoding, and in comprehension as evidenced by expression of ideas.

How do children reach this point in school and evidence such weaknesses? Many researchers prefer to label the child. The labels are acceptable, broad-based categorizing in most cases, but these labels do not inform instruction, nor has significant research been done to show effective remediation at the intermediate level in anything but the most limited cases. The options are few and the needs are many. Based on the data of the CELL and ExLL projects, staff development and teacher decision-making are the key elements in making change for schools.

The bottom line of making change for schools is making change for children. The teacher is the moment to moment literacy decision-maker in the classroom. The task, as large as it is, is to help the teachers make the best decisions possible, for the best literacy learning for all children. ■

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Linking Assessment and Teaching: Building on What Children Know and Can Do

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Two (and a half) Waves in Maths Assessment

In thinking about trends in mathematics assessment in the 80s and 90s in Australia, I often think of two overlapping waves of interest. In the 1980s, an increasing consensus emerged among classroom teachers that traditional forms of assessment were inadequate in meeting all the revised goals which teachers held for assessment. The argument was that if we value genuine understanding, problem solving and group skills, and the ability to use mathematics in "real" situations, then we needed to broaden the repertoire of assessment techniques from the classic pen and paper test, combining "informal" assessment with a greater range of formal methods of assessment.

Consequently, the late 80s saw an increased emphasis on the use of anecdotal records, checklists, portfolios, student self-assessment and so on. These assessment alternatives continue today, with teachers refining them in light of experience.

In the 90s, issues of accountability at classroom, school and system level have brought a greater emphasis on nominating desired outcomes and ways of collecting, documenting and reporting student growth over time.

Irrespective of how these waves are viewed, much has been learned about assessment in the process. Unfortunately for the busy teacher, it remains true that the easier a given form of assessment is to use, the less useful the information it is likely to provide. The challenge remains therefore to make assessment meaningful but at the same time manageable.

In this paper, I describe some of the early experiences of the Early Numeracy Research Project (ENRP) in using information collected during a 30-minute interview with Prep to Year 2 students to inform planning and teaching for individuals, small groups and the whole class. The title of this section refers to an additional "half-wave" because my experience so far with the ENRP encourages the view that the use of the one-to-one interview by classroom teachers with their students may lead to a transformation once more in our mathematics assessment beliefs and practices.

A Brief Overview of the Early Numeracy Research Project (ENRP)

Teachers and children from 35 schools (28 Department of Education schools, 4 Catholic schools and 3 Independent schools) are part of the Early Numeracy Research Project for the three years 1999–2001, in conjunction with Australian Catholic University and Monash University. This project follows the highly successful Early Literacy Research Project. The aims of the project include:

▸ to work with teachers to explore their beliefs and understandings about how students develop their understanding of mathematics, and how this can be supported through the teaching program; and

▸ to evaluate the effect of leadership and coordination, professional learning teams, ongoing assessment and home/school partnerships.

The Early Years Numeracy Coordinator and the teachers of Prep to Year 2 form the "professional learning team" at each school. Such teams meet weekly to share experiences and to plan programs together. Geographical clusters of learning teams from the 35 schools meet monthly, and all teachers in the project (around 230) meet as a large group several times a year. Each team and cluster is supported by one or more university staff and staff from the Early Years of Schooling Branch, who have close and regular involvement in classrooms and cluster meetings.

The project team has used the research literature and the advice of recognised experts to create a "framework" for early years numeracy learning, with a particular emphasis on key "growth points" in children's understanding of mathematics. Growth points have been established in key areas of number and measurement, including Counting, Place Value, Time and so on.

Every child in Years Prep–Year 2 will be interviewed for approximately 30–40 minutes by their regular classroom teacher in March and November each year, in order to determine the level of growth in understanding across the year.

Over the course of the project, the research team will identify those teaching approaches and school and classroom structures which are most effective in supporting maths learning in the early years. This will inform the advice provided to all schools in the state. ENRP school teams, including cluster coordinators, are also working with parents to discuss ways in which families can support the work of the teacher and school in maths, and give children a positive and confident start in their maths learning.

The Power of the One-To-One Interview in Informing Planning and Teaching

Early in 1999, a task-based interview was developed by the research team, piloted and trialled for use in the ENRP. To this point, the mathematical focus of the interview has been on Number and Measurement, with Space and Chance and Data tasks to be added in 2000. The interview takes the form of a "choose-your-own-adventure", in that depending upon children's responses to a particular task, the teacher may choose to skip some of the subsequent tasks, or take a small detour into other tasks which probe further conceptions or misconceptions revealed in the previous task.

Tasks in the interview are tightly linked to the growth points mentioned earlier. Student responses therefore provide the opportunity for teachers to gain a sense of whether children have "reached" particular growth points.

An example is probably helpful here in illustrating the "choose-your-own-adventure" nature of the interview, and its relation to the growth points. In one task, the child is asked to use a plastic cup to take a large scoop (approximately 20) of plastic teddies, the kind of teddies increasingly used for maths tasks in P–4 classrooms. The child is then asked to *estimate*, without counting, how many are in the scoop. They are then asked to *count* the teddies.

If the child can successfully count a collection of 20 or more objects, they can be considered "rational counters", and move into a range of tasks, involving counting forwards and backwards starting from varying points, and then into increasingly complicated skip counting. If they are unable to count the cup of teddies, they take a detour into a different set of tasks, which provide information on ordinal number, one-to-one correspondence, conservation of number, and patterning.

So, as a result of the interview, the teacher builds up a picture of the child's understanding of a range of key mathematical ideas, and is well placed to plan instruction for individuals, small groups and the whole class. Meetings of school professional learning teams, regional cluster meetings, and statewide professional development programs enable these insights to be shared with colleagues, and for the "wisdom of practice" to be shared.

Highlights and Surprises from the Interviews as Identified by ENRP Teachers

Following the completion of the interviews in March, teachers were asked to write about highlights and surprises that had emerged from the interview process. Although many themes emerged, I will focus here on five of particular interest.

1. Surprise at what many children were able to do.

Many of the surprises related to children's capacity to deal confidently with large numbers, and the wide variety of strategies used in solving the problems.

- Working with a gifted Prep who actually worked out the answers quicker than I did. Reading 24,746,154 on the calculator. Amazing!

- Biggest surprise was a little boy who was repeating Prep for reasons of age/literacy and maturity, showed extreme verbal understanding on the interview and in fact progressed further than any other child I assessed!

- I have one Grade 2 student in my P/1/2 class whom I know loves maths – number in particular. He worked out the answer for 134 and 689 in his head. This child was able to articulate all the strategies he used.

- My greatest surprise was that most children performed significantly better than I anticipated. Their thinking skills and strategies were more sophisticated than I expected.

- Some of the children who have a "lesser" understanding of numbers (and often literacy) were often more astute in the measurement activities.

- The strong understanding of an ESL girl that can barely speak English.

- The fact that nearly all the Preps used a "counting-on" strategy; most said "because that's how the Grade 1's do it!"

2. Surprise at the difficulties which some children had with certain tasks.

Tasks involving multiplicative reasoning (e.g., putting two teddies in each car or sharing teddies between "teddy mats") surprised teachers with the difficulty children displayed, as did some of the tasks relating to concepts of time.

- A child of great potential, perhaps gifted, completed nearly the entire interview in all areas, but we found out he couldn't tell the time!

- Difficulty in counting backwards for some children was a surprise.

- I was amazed that many of my students had no logical system when naming the days of the week,

or the months of the year. They just randomly stated days with no way of checking.

▸ One child in Grade 2 who was mathematically skilled with numbers and very aware of them, was completely floored when he had to share the teddies evenly on the teddy mats. He tried every possible way and could not work it out.

▸ Some children assessed could not explain their process of working "things" out and yet these children appeared to be very "able" in usual classroom activities.

▸ The greatest surprise from the assessment interview process was discovering that the children who you thought had specific concepts, in fact couldn't use these/didn't have them in a one-to-one situation – that they were good at "hiding" within the group.

▸ The other surprise was how few children had the ideas of early division.

3. The emergence of the quiet achievers, particularly girls.

Several teachers commented that the interview with individual children "painted" a different picture from that which emerged during whole class and small group classroom activities.

▸ Finding out the ability of some of my quieter students amazed me. Being given a chance to answer a question they knew without another student interrupting them was very rewarding for them. But it was also exciting for me to see what ability they had.

▸ Quiet achievers (especially girls).

▸ In every class there is that quiet child you feel that you never really "know" – the one that some days you're never really sure that you have spoken to. To interact one-on-one and really "talk" to them showed great insight into what kind of child they are and how they think.

4. The power of the interview data in informing teaching.

Many teachers indicated that the information provided by the interview suggested "starting points" for instruction.

▸ The greatest highlight of all is to be able to clearly see where the child is at and what maths work needs to be worked on to further enhance his skills.

▸ I was very surprised with how much many of the children knew and how many different, complex strategies were being utilised in order to work out the answers to the open ended problems. It has been an eye-opener and I have since based a lot of my own teaching on the results gained.

▸ My greatest surprise(s) was the wealth of information gained from the assessment interview – how confident the children were in responding to a never ending supply of questions … and how I've been able to "use" (adapt) some of the ideas into my classroom practice.

▸ The greatest highlight for me was to confirm what I already felt I knew about the children. I have had the Grade 2's since Prep.

▸ The greatest highlight from the assessment interviews was having the one-to-one contact with my children which really enabled me to focus and see what they really knew and what I have to work on for them to enrich their learning.

5. The level of enjoyment and confidence displayed by the children during the interview.

We can sometimes be preoccupied with children's cognitive growth, with insufficient attention paid to affective aspects. The enjoyment showed by almost all children during the interview, whether their mathematical understanding was high or not so high was important. It emphasises that children appreciate the opportunity to show their understanding, particularly when they have the teacher all to themselves.

▸ How enjoyable for both teacher and child. It gave the children the opportunity to spend individual time with the teacher and the children responded positively. Many couldn't wait for their turn and chatted away during the interview.

▸ How adaptable/patient and flexible young children can be when working under difficult conditions, and how resilient teachers are after sitting on a small chair for two days!

▸ I have a child with cerebral palsy who is in a wheelchair and has limited motor skills. He was determined to do all the tasks without help from his aide and he did. The look on his face when he completed each task was amazing.

▸ My highlight was when the children tried to explain how they worked out their answer. Several said "my brain told me". The best one was "my mum told me the answer would be that".

▸ [teacher in Specialist school] Staying power! Each child stuck it out without running away. Some children have a concentration span of two seconds, yet they sat quietly and really seemed to listen.

▸ The greatest highlight was that no matter at what level the children were operating mathematically, all children displayed a huge amount of confidence in what they were doing. They absolutely relished the individual time they had with you; the personal

feel, and the chance to have you to themselves. They loved to show what they can do.

On a humorous note, a favourite anecdote from the interviews was the following comment from a Prep teacher:

Children had been asked to "draw a clock", for use as a basis of discussion of their understanding of how time and clocks work. The teacher takes up the story:

"I asked the child 'What are the numbers on the clock doing?' The child looked strangely at me and said 'the numbers are doing nothing, they are waiting for the arrows to come around. Don't you know that? Are you stupid or something?'"

Linking Assessment and Teaching

Since the interview period in March, ENRP teachers have been using what they found to plan classroom activities which help children move towards the growth points. Some examples from teachers at Anglesea, Echuca South, Mandama and Ocean Grove Primary Schools illustrate the purposeful choice of activities, with clear links to important maths ideas.

Ordering numbers

One teacher noticed from the interviews that many of her Year 2 children could read, write and interpret two and three digit numbers, but they had considerable difficulty when it came to ordering them. She asked children to cut out numbers from a variety of catalogues, and to order them, thus focusing on this important idea.
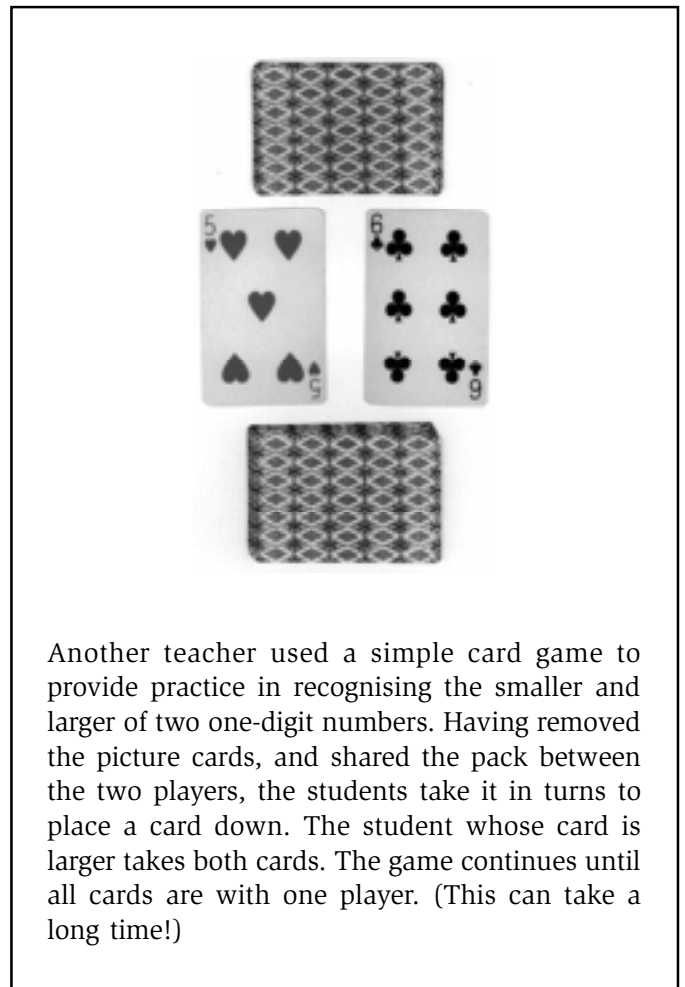
Another teacher used a simple card game to provide practice in recognising the smaller and larger of two one-digit numbers. Having removed the picture cards, and shared the pack between the two players, the students take it in turns to place a card down. The student whose card is larger takes both cards. The game continues until all cards are with one player. (This can take a long time!)

Using the constant function on the calculator to explore number patterns

Many teachers have found that the constant function enables children to explore and understand important patterns (such as adding ten, subtracting ten, adding nine, and so on). Stephanie wrote about patterns that she found as she used the calculator to add nine.
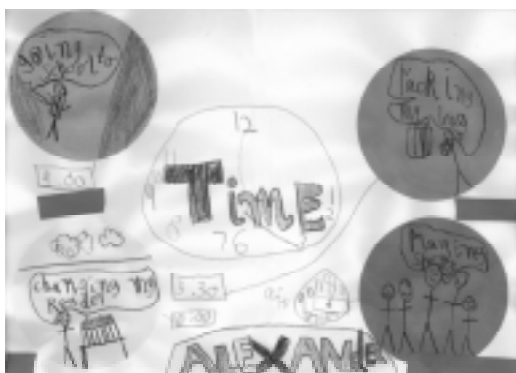
Relating times of the day to key events

Some Prep teachers noticed that children needed more practice with linking times of the day to regular events. Children were asked to think of things that they did at different times of the day, and to draw pictures, illustrating these. The teacher then encouraged them to link length measurement with time, by placing a strip of paper beside each drawing, with its length chosen to reflect the relative time needed for each activity.

Adding to ten

In developing strategies for solving addition and subtraction problems, one key growth point includes a confident understanding of combinations which add to 10. Many ENRP teachers are using "tens frames" to help children develop this understanding.

One teacher used a card game to help children to recognise combinations of cards which add to ten. All non-picture cards are spread out in an array, face up, and children in turns take a selection of cards (two or more) which add to ten, where possible. The game continues until no more such combinations remain. On the same mathematical point, another teacher posed the

following problem: "The Principal has told me that ten new Preps are coming soon, but he forgot to ask how many girls and how many boys. How many of each could there be?" The children took this question, and developed a range of different strategies for determining and representing the possibilities. It was a nice example of a task which links different content areas – in this case, Number and Chance and Data.

Given the wide range of understanding revealed in the interviews, many teachers have used open questions to enable children to respond at their own level of understanding. The card task above is just one example of this.

All of the examples discussed exemplify focused teaching, where teachers have identified areas for attention, and planned activities which pinpoint these areas.

Conclusion

I have often used two related quotes to illustrate that assessment divorced from subsequent action is unlikely to lead to improved learning:

> "*Nobody ever got taller by being measured*"
> (Professor Wilfred Cockroft, UK)

> "*You don't fatten a pig by weighing it*"
> (American equivalent)

While my views haven't changed greatly on this point, it could be argued that the children involved in these interviews "grew" in the process. They grew in their own confidence in themselves as learners of mathematics, and in their understanding of some mathematics concepts which they were meeting for the first time, in a supportive and enjoyable environment.

I have also claimed for a long time that teachers build up a very clear and accurate picture of children's understanding of mathematics through watching and listening to them, as they engage in everyday classroom activity. The experience of ENRP teachers seems to indicate that this picture can be greatly "sharpened" through focused time with individuals.

Although the Early Numeracy Research Project is still in its early stages, we can confidently claim that the time and cost involved in giving teachers one-to-one time with children around a range of rich mathematical tasks provides a powerful opportunity for children to show what they know and can do, and creates a great starting point for teachers in providing meaningful and challenging experiences for all their students. ∎

A2 Bridges

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Assistant Principal
Shepparton High School

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Benalla East Primary School

"My mum's proud of me now because I did some good reading last night."

Jamie is a year one pupil at a large regional primary school in north east Victoria. He is one of twenty-five students taught in a lively and rich classroom learning environment. The school provides Reading Recovery for grade 1 students. A vibrant reading program operates from the school library. Parents form an integral component of the wider school program. Under the school's Early Years program Jamie was receiving two hours of intensive language instruction on a daily basis. He participated in guided reading groups twice per week.

And yet, in spite of all this good work, Jamie was still struggling. After one and a quarter years at school, Jamie was still operating at text level 1. His Observation Survey (Clay, 1993) results were disturbing. Following a meeting with Jamie's class teacher, parent and the Early Years coordinator, Jamie was chosen to participate in the *BRIDGES* program as part of the school's one-to-one Additional Assistance. Jamie's delighted comment: "My mum's proud of me now because I did some good reading last night," shows his growing confidence in reading and improved self esteem; changes we believe are attributable to *BRIDGES*.

Students like Jamie are the reason we developed *BRIDGES*. Jamie is like so many of our students whose self-esteem has been impaired by a lack of proficiency in reading and writing. The *Early Years* Literacy Program is a welcome development in government policy for struggling readers and writers like Jamie.

We felt there was a place for a supplement to this ambitious program. All students learn at different rates and all require different levels of support in their language acquisition journey. Some may require a few weeks intervention whilst others may require much longer. Reading Recovery successfully meets the needs of students in their second year of schooling. However, we believe that some students would also benefit from intervention in their first or third year of schooling.

The authors Margot Sherwill and Lesley Lamb have collaborated before to produce the highly successful *Bridging the Gap*. *Bridging the Gap* has been implemented extensively in Victoria and across New South Wales and South Australia. *Bridging the Gap* is a literacy intervention program utilising trained community volunteers for years 5–8 students. Following much positive feedback the Language Testing Research Centre from the University of Melbourne was engaged to undertake a proper statistical study.

> *"The statistical analysis of the test scores on the BURT and Peters Dictation tests indicated that the post score on the Burt and Peters test improved significantly. Further statistical analysis indicated that this improvement was independent of the factors of region and gender."* [1]

Having proved its effectiveness, the study then asked the important questions of "how" and "why".

> *"The main reason given for the program's effectiveness was the one-to-one relationship established between the students and the community volunteer."* [2]

The documented success of *Bridging the Gap* indicated that a structured, intensive volunteer program could be equally effective in the first three years of schooling. Hence *BRIDGES* was born.

Features of the Program

Integral component of the school's Early Literacy plan
The school's early literacy plan would naturally include features such as a daily, two-hour literacy instruction period, home-school partnerships, ongoing professional development and additional assistance. In a well-resourced school, some staff would be Reading Recovery trained as this has proven to be the most highly effective intervention tool currently available. *BRIDGES* is not a substitute for Reading Recovery but rather a supplement, thus allowing for a variety of program delivery.

1. Ward, Sheryl Bridging the Gap Evaluation Report, Language Testing Research Centre, University of Melbourne, February 1999.
2. ibid

One-to-one intervention

Additional assistance is an integral component of the *Early Years* Literacy Program. Schools are required to identify 'students at risk' following formal assessment. A Home–School Support Group is formed along with an Individual Learning Improvement Plan, which is established for each identified individual. A one-to-one intervention program is then implemented for some of these children.

Delivered by trained Literacy Assistants

Many schools already recognise the value and input of volunteers in their delivery of quality programs. *BRIDGES* can provide positive role models for those students who may not see reading as valued as it should be in their community. Further it establishes close and meaningful relationships between students and Literacy Assistants.

Schools may choose to train and utilise volunteers, or employ them as Literacy Assistants, to implement a regular *BRIDGES* program within their school. For example, Benalla East Primary School employs three Literacy Assistants for four days per week. The Literacy Assistants are contracted to provide three hours of individual instruction per day. Thus, an extra eighteen students are catered for. The *BRIDGES* program complements the Reading Recovery program which is conducted by two trained teachers.

Participation in a full-day training course delivered by *BRIDGES* consultants equips the Literacy Assistants to immediately implement the *BRIDGES* program. Support may be given by the Early Years Coordinator.

Unlike the train-the-trainer model of *Bridging the Gap*, *BRIDGES* conducts the needed training for each volunteer. In this way, the volunteers are confident in their training and the strength of the program is not diluted.

Comprehensive package

The user-friendly manual contains relevant and important information detailing financial, legal and staffing implication of the *Early Years* Literacy Program for the Principal. The manual outlines program delivery in full. The appendices provide practical supplementary materials such as templates, newsletter articles, promotional speeches, games, etc. An instructional video clearly demonstrates all facets of the program. A computer disk is included to allow schools to customise proformas.

Daily program

The Literacy Assistants conduct the one-to-one program daily (with a minimum of three sessions per week) in a session lasting for approximately thirty minutes.

Flexible program lasting for 3–30 weeks

Targets set under the Individual Learning Improvement Plans will determine the length of the program.

Emphasis on reading development and word discovery

The sharing of high quality, rich literature is a feature of the daily program. Teachers are aware of a significant number of students who have an impoverished language background. These students are particularly in need of immersion in rich book language. Similarly the enjoyment of participating in language games is a regular component of the program.

Supported by Early Years Coordinator

The Early Years Coordinator convenes the Home–School Support Group meetings and ensures that an Individual Learning Improvement Plan is devised by all the stakeholders. The coordinator will oversee the implementation of the plan and provide any necessary coaching for the Literacy Assistants.

Lesson Components

Each lesson is designed to stimulate the interest of the children with a variety of activities. All facets of language acquisition and use are covered in a structured program. Enjoyment is the common thread within each activity.

Component	Aim
Vocabulary	Build a bank of words that the student is able to recognise instantly by sight.
Familiar Reading	Set a positive, enjoyable tone to the lesson. Develop confidence and fluency in reading.
Reading Together	Practise reading at instructional level.
Latching onto Literature	Experience the joy of hearing quality literature read to the student in an intimate atmosphere.
Oral Language	Engage the student in a two-way dialogue based on the experiences gained during the Latching onto Literature component.
Hats Off to Comprehension	Challenge the student's thinking.
Writing Together	Share writing of a sentence based on the text read to the student.
Language Games	Enjoy interacting whilst reinforcing a visual interest in print.

Summary

The *BRIDGES* program has been designed to provide an effective, practical and financially accessible one-to-one support program for students in the first three years of schooling who require additional assistance.

Yet, community literacy programs such as *BRIDGES* have the capacity to do so much more than merely improve the learning outcomes of the students in our care. *BRIDGES* enables schools to meaningfully engage their local communities in the education of our children.
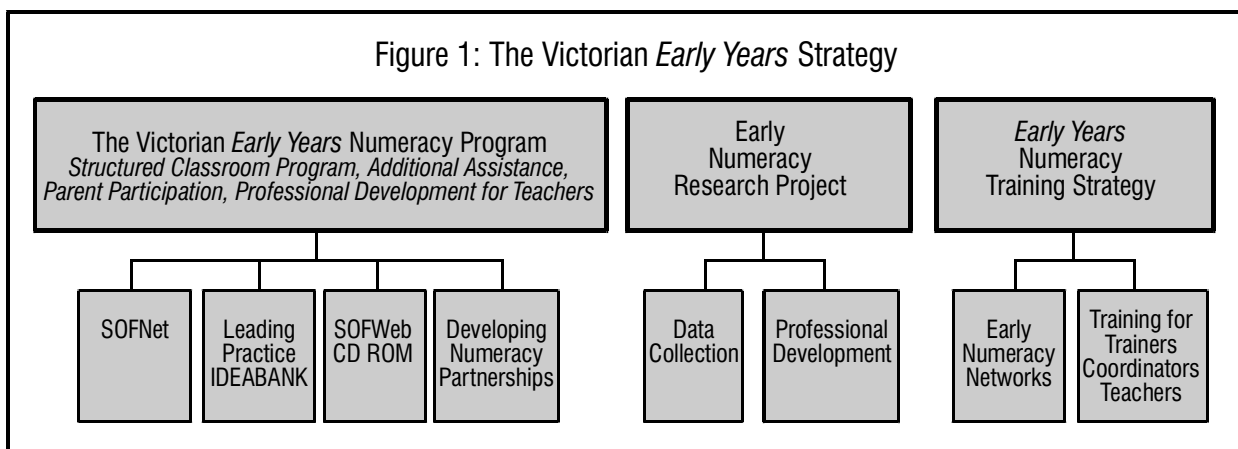
One measure of civilisation is said to be the way in which society treats its children. The measure of an enlightened educational practice is its capacity and willingness to cater for the diverse needs of individual students. *BRIDGES* provides one means of meeting those needs. ∎

The Early Years Numeracy Strategy

Early Years of Schooling Branch

The focus of the Early Years of Schooling Branch (P–4) is the implementation of the Victorian *Early Years* Strategy. This strategy places the highest priority on improving literacy and numeracy achievements of students in the early years of schooling and is based on a model of whole school improvement developed by Professor Peter Hill and Carmel Crévola (Early Literacy Research Project 1997). The *Early Years* Numeracy Strategy has three major components: the *Early Years* Numeracy Program, the Early Numeracy Research Project (ENRP) and an *Early Years* Numeracy Training Strategy *(Figure 1)*.

Figure 1: The Victorian *Early Years* Strategy

The Victorian *Early Years* Numeracy Program *Structured Classroom Program, Additional Assistance, Parent Participation, Professional Development for Teachers*	Early Numeracy Research Project	*Early Years* Numeracy Training Strategy
SOFNet / Leading Practice IDEABANK / SOFWeb CD ROM / Developing Numeracy Partnerships	Data Collection / Professional Development	Early Numeracy Networks / Training for Trainers Coordinators Teachers

The *Early Years* Numeracy Program is based on the model of the *Early Years* Literacy Program. As with literacy there are four major elements: The Structured Classroom Program, Additional Assistance, Parent Participation, and Professional Development for Teachers.

The Structured Classroom Program

This element will include advice on:

▸ a program outline for the one-hour numeracy block

▸ whole class, small group and whole class teaching approaches for numeracy

▸ developmental stages for numeracy (P–4)

▸ continuous monitoring and assessment of students

▸ grouping students for effective instruction.

Additional Assistance

The *Early Years* Numeracy Program will provide support for students who may require Additional Assistance, within the structured classroom program or an intervention program. Early identification of students who may require Additional Assistance is crucial. The Additional Assistance Pathway will provide a comprehensive approach through identification, home-school support group, individual learning improvement plan and review.

Parent Participation

An integral element of the *Early Years* Numeracy Program, Parent Participation will be based on the advice in the *Early Years* Literacy Program. Through communication, education and involvement, a variety of strategies for parent participation in the numeracy education of their children will be identified. Emphasis

will be given to the enhancement of positive attitudes toward mathematics that impact on early numeracy learning. Current successful education and training programs such as Family Maths, *Classroom Helpers*, *Developing Literacy Partnerships* and existing successful school parent programs will also inform the development of these materials.

Professional Development

A structured multi-layered *Early Years* Numeracy Training Strategy will support the implementation of the *Early Years* Numeracy Program. Early Numeracy Networks have been the initial phase of professional development within this strategy. The intensive eight-day professional development program has created a key group of people across the state who will support the implementation of the *Early Years* Numeracy Program.

A range of resources are being developed to support the implementation of the *Early Years* Numeracy Program *(See Figure 1)*.

Early Numeracy Research Project (ENRP)

This exciting three year project focuses on the implementation of the Design Elements of a General Model of Whole School Improvement (Hill and Crévola 1997) as it applies to early numeracy. This model includes a structured classroom program, leadership and coordination, monitoring and assessment, intervention and special assistance, professional learning teams, standards and targets and home-school partnerships. The ENRP is a collaborative project between the Department of Education and the Australian Catholic University and key personnel from Monash University. Associate Professor Dr Doug Clarke is the Director of the ENRP project. Data on student understanding in Prep, Year One and Year Two in 35 trial and reference schools across Victoria will be collected in March and November each year. The project includes intensive professional development to support teachers in researching and implementing effective approaches to the teaching and learning of early numeracy. This research project will inform the development of the *Early Years* Numeracy Program.

Conclusion

The Early Years Numeracy Strategy will provide a comprehensive and strategic approach to early numeracy achievement in the early years, P–4. Information on these projects is available on the SOFWeb site:

http://sofweb.vic.gov.au/eys/num.htm

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Selecting Texts in Years 3 and 4

A4

Early Years of Schooling Branch

Considerations when selecting texts

Within the structured classroom environment of the *Early Years* Literacy Program, the selection of appropriate texts for use in focused teaching sessions is crucial. Matching texts to meet learners' needs is essential to support and challenge the reader. *Teaching Readers in Years 3 and 4* describes aspects to be considered when selecting texts for readers in Years 3 and 4.

The key elements involved in determining the most appropriate text for an instructional session include:

‣ **teacher's professional knowledge** of the learners

‣ **focus** of the teaching session

‣ **support and challenges** found in the characteristics of the text.

Ongoing monitoring and assessment informs teacher professional judgement in determining the **developmental stage** of the reader. This provides the teacher with knowledge of what the students can already do as readers and what they need to learn to extend their reading abilities. The developmental stage provides the basis for selecting an appropriate text to support and challenge the reader.

Teachers also need to consider the **students' knowledge and understanding** of a particular topic. Teachers draw on their understandings of **social and cultural experiences** students bring to a session when considering the selection of an appropriate text. The **interests** of the students should also be considered to further ensure students are engaged in learning.

Knowledge of students' familiarity with a **text type** also assists in the selection of an appropriate text. Teachers will determine how much support students need with a particular text type and when to extend students' reading experiences by introducing a more complex example of a particular text type.

Texts need to be selected to suit the particular **teaching focus of the session** to provide a clear example of what is being taught. The text selected also needs to suit the instructional approach being used. A text for use in reading to students in the whole class session for example, will be different from one selected for use during a small group, guided reading–reciprocal teaching session.

Teachers will assess the challenges a text presents and determine levels of support needed by students when working with various texts.

Consideration of the supports and challenges provided by texts can be thought of in terms of:

language	vocabulary
	sentence structure
	balance between natural language and book language
layout	spacing
	print size
	illustrations
	paragraphs
	organisational structure and text features
content	sequence of events
	links in main ideas
	complexity of characters
	complexity of concepts

In the early years of schooling, a **continuum of broadbanded groups of texts,** provide a structure from which to select texts to match students' needs. These broadbanded groups display a gradient of characteristics supporting the reader yet challenging them to use and extend their knowledge, skills and understandings as the texts gradually increase in complexity.

Irene Fountas and Gay Su Pinnell describe such a gradient:

> "*A gradient of text reflects a defined continuum of characteristics related to the level of support and challenge the reader is offered. To create a leveled collection of books, teachers evaluate texts against the characteristics for each level.*"

As each student's reading ability develops, the characteristics of the texts selected for teaching purposes need to become increasingly more complex.

In *Teaching Readers* for the first three years of schooling, text Groups A–F are described in detail accompanied by examples, to assist teachers to create a text gradient supporting readers as they progress to become fluent readers.

The broadbanded groups of texts are continued in *Teaching Readers in Years 3 and 4*, assisting teacher judgement as they select instructional texts for students as fluent, fluent-developing and fluent-extending readers. The characteristics of text Group G through to Group K+ are described and accompanied by examples of a variety of text types. This is a guide for teachers to determine the gradient of text difficulty.

The characteristics for each broadbanded text group are described in terms of the supports and challenges outlined previously:

▸ **language** – from simple vocabulary, and sentence structure in Group G through to subject specific vocabulary and extended sentences in Group K+

▸ **layout** – from well defined paragraphs with two or three related sentences in Group G through to complex, longer paragraphs with detailed, descriptive language in Group K+

▸ **content** – from one or two main characters represented simply in Group G through to characters in Group K+ who become quite complex with many different ways of relating to one another.

Conclusion

Through selecting appropriate texts to match students' needs, teachers will provide opportunities for students to gain meaning in a wide range of contexts, build on their strategies to problem solve, extend their ability to comprehend and think critically about the message the author is communicating. Increasingly complex texts are selected by teachers to move students forward as effective readers. ■

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Children Learning Number

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Introduction

Children begin to learn number concepts and skills as they interact with their families and explore their environments. Before beginning school, most children know the names of many numbers, can recite sequences of number names and attach a numerical value to a group. Many children have acquired a degree of *number sense* which allows them to solve intuitively the problems they encounter as part of daily living and learning. However, this is not the case for all children. One important challenge for teachers is to provoke the number learning of all children.

In order to meet this challenge, we need to plan learning opportunities for children based on a clear understanding of: (1) children's mathematical thinking; (2) the possible course of children's mathematical learning and the major growth points that describe children's number learning, (3) instructional sequences that provoke and support mathematical learning; and (4) the difficulties that some children experience when working with numerical situations.

The development of children's number sense is of paramount importance in the first years of schooling. Number sense is about being comfortable and 'at home' with numbers. It is also about being effectively and efficiently able to work with numbers to solve the problems encountered as part of daily living. Initially, children use counting strategies to solve numerical problems. Counting forwards in ones, or even in twos, fives and other multiples, are strategies that may be used to solve addition problems. Backwards counting may be used to solve subtraction problems. However, learning to count in English is fraught with difficulty.

The Challenge of Learning to Count in English

Counting becomes a powerful tool for children to solve problems when they can both accurately count a collection, and can count-on and count back from any number by ones, twos, fives and other multiples. Prior to reaching these growth points, children learn to count by rote. In English, this is a difficult task as there is no easily generalisable pattern to follow.

In contrast to English, a feature of Asian languages is the fact that the place value of number names is transparent. For example, an English translation of counting in Vietnamese beyond ten is: ten one, ten two … ten nine, two tens, two ten one and so forth. Counting in Asian languages follows a generalisable pattern that is easy to learn, and the value of the number is easy to interpret from the number name. Counting from zero to one hundred in English requires combinations of twenty-nine words, as opposed to eleven words in Vietnamese and other Asian languages. European languages such as English and Italian, use new words beyond ten, such as eleven, twelve, thirteen, fourteen, twenty and thirty. These number names make it difficult for children to establish a generalisable counting pattern and interpret the value of these number words.

The Challenge of Learning to Read, Write and Interpret Numerals

It is fascinating to observe children as they begin to read, write and interpret numerals. Here again, the English language makes this a challenging task. Many young children initially write fourteen as 41 or sixteen as 61. Perhaps these children are over-generalising spelling strategies. In attempting to write fourteen they say the word and hear the sound four at the beginning. These children know the symbol for four and so begin with 4 when writing the numeral for fourteen. These children, however, do not yet recognise that place value conventions are used to write and read numerals, not spelling conventions. Similar observations are made when young children write larger numbers such as one hundred and twenty-four. It is common to see children write this numeral as 100204. These children know that the symbol for one hundred is 100, the symbol for twenty is 20 and the symbol for four is 4. So when they hear one hundred and twenty-four, they write the known symbols for the sounds they hear, just as they do when spelling words. Again, this is a sign that these children have not yet learnt the place value conventions of our number system.

A similar situation occurs when children begin to read two and three digit numbers. A number such as 41

may be read as fourteen, 57 may be read as five and seven, or 326 as three and twenty-six. Such observations indicate that a child does not yet understand the place value conventions of reading numbers. Exploring the conventions of reading, writing and interpreting numbers is an important activity in early years classrooms.

Developing Number Concepts

Number is a concept that we construct from our experiences. In coming to interpret a number, we have to bring together three pieces of information: a known collection; the word that represents the numerical value of the collection; and the symbol used to record this number word. These three ideas can be conceptualised as a triad comprising six relationships. For example, for the number five children learn to relate: a collection of five objects to the number name for five; the number name for five to the collection; the number word for five to the symbol for five; the symbol to the number word; the symbol for five to a collection of five; and a collection of five to the symbol for five. These six relationships are developed for each new number a child learns. Many classroom experiences are geared towards helping children understand these relationships.

Figure 1: Number triad comprising six relationships

Collection

1 - 9

Number word — Symbol
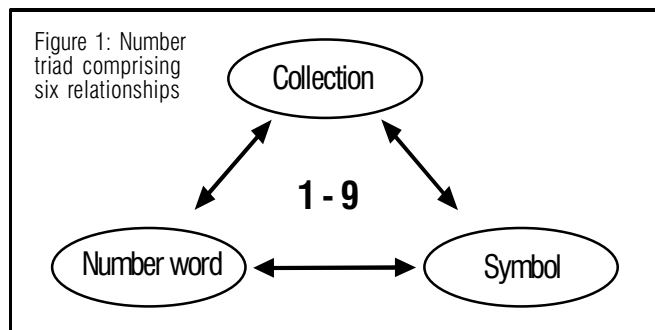
Some examples follow:

1. Here are some counters (pile of 5-10 or 20-30). How many do you think there might be? Check to find out. Type this number on a calculator.

2. Get sixteen counters from a container. Write this number.

3. Name this number (show the numeral 6). Clip this many pegs to the card.

4. How many stickers are on this sheet? How did you work that out? Can you write that number?

If I added another row of stickers, how many would there be? Type this number on a calculator.

Cover two rows of stickers. How many stickers have I covered?

Learning the Conventions of Our Number System

Initially when children work with collections of objects greater than ten, they establish the numerical value of the collection through counting. The collection is perceived as a collection of single objects. Thus a pile of thirty-six blocks is perceived as 36 individual blocks, not as a collection of 3 tens and six ones. However, to write the numeral for a collection of thirty-six, we follow place value conventions which focus on the number of tens and ones in the collection. This culturally-based convention must be explicitly pointed out to most children. In learning to read, write and interpret numerals, children learn the following characteristics of our number system: combinations of only ten digits (0-9) are used to represent all numbers; the value of a digit depends on its place in the numeral; zero performs the function of holding a place when it has no value; and the value of each digit in a numeral is added to determine the numeral's total value.

Developing Place Value Ideas

One way to help children learn about these characteristics is to play a game such as Race Past 100. This game requires one die or spinner and a large tub of materials such as lima beans, counters, blocks or icy-pole sticks. The child rolls the die, takes the number of objects from the tub represented by the dots on the die and forms a pile. This process is repeated until a large pile is produced or a certain period of time has elapsed, such as three minutes. The child is then asked to determine as quickly as possible the number of objects that are in the pile. Children generally determine this through counting by ones. Once this activity is repeated several times, children begin to develop more powerful strategies. They may group the objects in their pile and use skip counting to determine the number in the collection. Some children may group their pile into tens. Highlighting this strategy during class mathematical discussions following this game allows the teacher to point out that determining the number of hundreds, tens and ones in a collection helps us to write the numeral to represent the collection.

Similarly, when we read numerals, the different digits tell us about the number of hundreds, tens and ones this numeral represents. Thus children can be encouraged to play Race Past 100 using grouping by ten strategies. Counters or beans can be placed on ten frames, blocks can be joined to make sticks of ten, and icy-pole sticks can be bundled into tens using rubber bands. When one hundred is reached, the 10 tens may be placed into a hundreds sack.

Sometimes children invent other ways to represent ten or one hundred. For example, they may use different coloured counters to represent the tens or hundreds. Such non-proportional modeling is also used in an

abacus and is a more abstract way of representing tens and hundreds. The reasoning behind using this strategy highlights an important mathematical idea which can be a focus of class discussions. It may also be useful for the teacher to provide place value mats to help children organise their materials when playing Race Past 100. Having determined the value of the pile produced, the children can be challenged to place numeral cards on the Place Value Chart (see Figure 2) to indicate how many hundreds, tens and ones they have collected, thus creating the numeral to represent the collection.
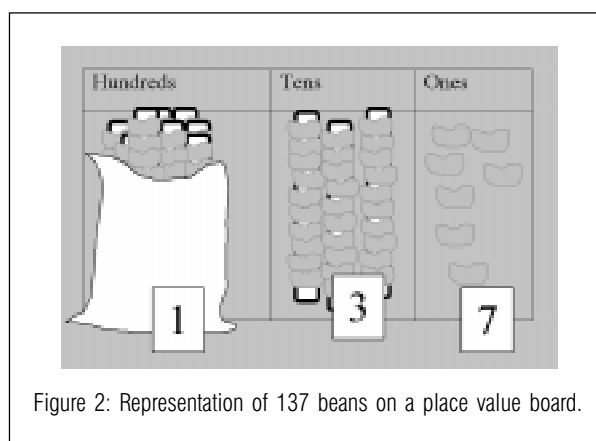

Figure 2: Representation of 137 beans on a place value board.

The Place Value Chart, numeral cards and materials can also be used to practise making collections to represent numerals. One child could place two or three numerals on the place value chart and then challenge a partner to place on the chart a collection of objects to represent the numeral.

Numeral cards may be used in many ways to help children learn to read, write and interpret numerals. For example, children may be challenged to draw three numeral cards from a pack and then arrange the cards to form numerals to represent the largest or smallest possible numbers.

The Phases of Early Arithmetic Strategies ('Counting Stages')

Traditionally, children have been taught to identify the numerical value of a group through counting by ones. An emphasis on such counting means that many children remain dependent on less powerful and inefficient counting strategies to solve the most basic problems.

Provoking children to move beyond counting by ones is an important aspect of junior school mathematics programs. More powerful strategies for solving mathematical problems include: counting on, counting back, counting down from, counting up to, counting down to, skip counting, using known facts, using doubles facts, using near doubles, building to five, compensation, subitising (recognising visual patterns), using addition to solve subtraction and commuting an addition.

In order to provoke children to develop more powerful number strategies, teachers firstly need to understand the mathematical thinking and strategies children use to solve problems. The strategies used by children indicate their current understanding of number. Many children fail to develop an increasing power in working with number through a dependence on immature and inefficient methods, such as rote counting. However, children will not always use the most powerful strategy in their repertoire for solving a problem. It is therefore important to give children the opportunity to solve problems at a level of difficulty that challenges their current understanding and provokes them to use more complex strategies. Children should also explain their reasoning for using a particular strategy to solve the problem being explored.

The 'phases of early arithmetic strategies' which are based on the stages in children's construction of the number sequence (Steffe, Cobb, von Glasersfeld and Richards, 1983, 1988), provide teachers with a useful framework for evaluating the strategies a child uses to solve numerical problems. This information can be used as a starting point in planning future instructional activities that meet the learning needs of each child.

In order to identify the strategies a child uses, consider the following scenario. A child playing Snakes and Ladders wants to move a counter the number of places represented by the dice below.
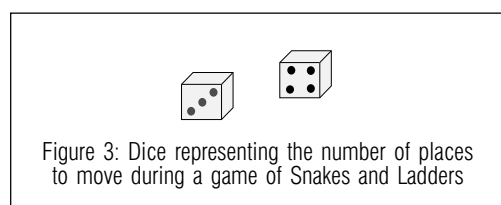
Figure 3: Dice representing the number of places to move during a game of Snakes and Ladders

The number of places to move on the board may be determined in a variety of ways. One way of evaluating the strategies used is to consider them in relation to the *phases of early arithmetic strategies.* Each of these phases, described below, represents an increasing power in working with number and a new growth point in children's development.

Phase 0: Rote counting
Children are learning the sequence of number names, both the forward number name sequence and the backward name sequence. Children do not conserve number or count with one to one correspondence.

Phase 1 Strategies: Perceptual counting
Children are limited to counting those items they can see, feel, hear, etc. Therefore, in order to solve the dice problem they may point in turn to each dot on the dice to count the total. This count may or may not be accurate. Having looked at the dice, if one die was then covered, he / she would be unable to work out how many places to move.

Phase 2 Strategies: *Counting by re-presenting*

Children are no longer dependent on direct sensory input to count items in a group, but typically need to re-present a sensory experience when counting. For example, if a child sees four dots on a die which is then covered and three dots on another die which is then also covered, to find the total on the two dice the child may: represent the situation with counters; use fingers to represent the dots; visualise the blocks and count the visual image; use movements to represent the blocks and count each movement. At this stage, the child counts *all* the dots and does not 'count on.' Counting will always begin from one.

Phase 3 Strategies – *Count on/count back*

Children are now able to 'count on' to solve addition and missing addend problems involving 'screened' collections. This counting is an abstract one since the counting takes place without reference to actual objects. If a child sees the die shown above and the die displaying four dots is covered, in order to find the total on the two dice, the child is able to *count on* from four. Additionally, children are able to use *count down from* strategies to solve subtraction tasks, such as: 8 - 5 = _. Such tasks are achieved through counting along a number sequence in the required direction, from an appropriate starting point.

Phase 4 Strategies – *Counting part of the number sequence*

Children are able to *count on*, *count down from*, and *count down to*, choosing the most appropriate strategy to solve problems. Children can conceive of a number sequence being broken into two parts. Hence, if a child knows that the total of two die is 7 and that one die displays 4 dots, the child can think of the sequence being broken at 4, and count backwards from 7 to 4 to determine the unknown number of dots on the remaining die. The children may also count forward from 4 to 7, which is easier.

Phase 5 Strategies – *Using basic strategies*

Children are no longer dependent on counting by ones to solve arithmetic problems. Children are aware of two number sequences and understand that addition and subtraction are inverse operations. Children use a range of strategies, such as compensation, subitising (recognising visual patterns) using addition to work out subtraction, using 5 and 10 as a bridge, and using known facts such as doubles and number facts for ten.

These phases describe a possible trajectory for children's learning. Matching the growth point or phase the child has reached to the conjectured learning trajectory, guides the teacher's development of instructional activities to assist the child to reach the next growth point in their learning.

Building Visual and Physical Representations of Numbers.

One strategy to assist children develop *number sense* is provoking the development of powerful visual images of numbers. In solving the dice problem above, most people look at the visual patterns shown on the dice and instantly recognise the patterns as 'four' and 'three' without having to count. This ability to *subitise* is an important skill to develop. Teachers need to spend time helping children become efficient at instantly recognising the numerical value of a range of visual patterns. Flash cards are useful, as are card games that require children to match visual patterns with numerals or number words. Games using the visual patterns on dice are also invaluable. During such activities, children must be encouraged to state the numerical value of the visual pattern without reverting to less efficient strategies, such as counting by ones.

Using *Ten Frames* to Build Visual and Physical Representations of Numbers

Another effective tool to help children develop both visual images and physical representations of numbers is the *ten frame*. The physical representation of numbers on *ten frames* become powerful visual images to assist children in solving problems. Figure 4 shows how numbers can be represented on a *ten frame*. Children may physically represent the number using a *ten frame* mat and objects, or they may represent numbers on *ten frame* templates through drawing. *Ten frames* can be made into place mats to rest on tables or the floor. Large *ten frames* big enough for children to sit or stand in can be made from fabric, or marked out on the floor with masking tape.

Use of the *ten frame* assists children develop a visual image of a number which can become automatically recognised. The automatic recognition of numbers represented by visual patterns such as on dice, cards and dominoes is a useful skill to develop. Using *ten frames* to represent numbers also assists children to think about numbers in reference to *ten*. This supports children both learn and derive number facts.
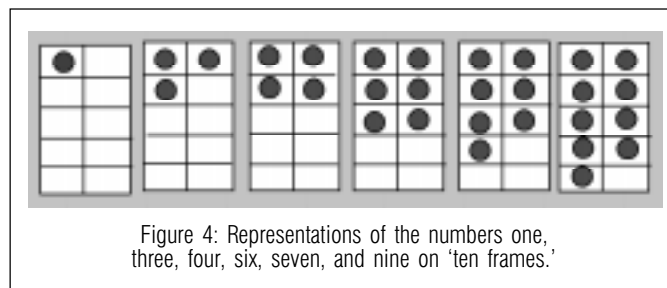

Figure 4: Representations of the numbers one, three, four, six, seven, and nine on 'ten frames.'

When exploring the representation of particular numbers on a *ten frame*, children can represent numbers in as many ways as possible. They can also be challenged to identify which representation of the number is the easiest to automatically recognise. Figure 5 shows different

representations of the number four. Some representations are instantly recognisable as four and others require strategies such as counting or grouping in order to work out the total number in the collection.
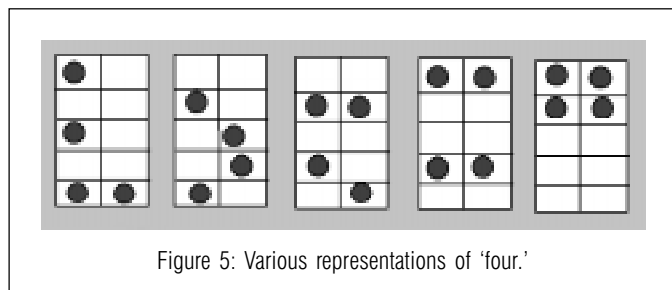

Figure 5: Various representations of 'four.'

Building Numerical Part/Whole Relations

The *ten frame* is useful for developing images of numbers which support the development of numerical part/whole relations. Children can use a *ten frame* to explore the many ways a number may be partitioned and the parts re-combined to make the whole (see Figure 6). The use of colour can facilitate the representation of the parts.
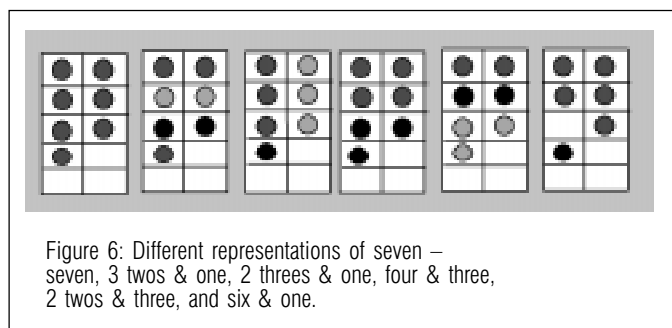

Figure 6: Different representations of seven – seven, 3 twos & one, 2 threes & one, four & three, 2 twos & three, and six & one.

Ten frames may also be used effectively to help children develop visual images for counting on and counting back, for modeling doubles and near doubles facts, for adding and subtracting, and for modeling *build to ten* strategies.

Herrington Think Board

The *Herrington Think Board* is a useful way to cater for the different learning and thinking styles of children. It assists children make connections between the language that is used to describe a numerical situation, a physical representation of the situation, a visual representation and the way the situation may be represented symbolically. The *Think Board* is partitioned into four sections; one for each of the language, physical, visual and symbolic representations of the situation being explored. Versions of the *Think Board* may be large enough for children to gather around on the floor, or small enough to place on work tables.

Figure 7 is an example of how the Herrington Think Board may be used: *Nga built a tower that was three blocks higher than Clare's tower. How many blocks high might the two towers be?* In the *real situation* segment of the Think Board, a written description of the situation

is recorded or discussed. Placed in the *materials* segment are two block towers that differ in height by three blocks. This solution shows that one tower is nine blocks high and the other tower is twelve blocks high. The *picture* segment shows how a drawing may be used to visually represent the two towers and helps children develop a mental image of the situation. Finally, the *symbolic* segment shows how written symbols may be used to describe the situation. The Think Board allows children to use and make links between four different ways of representing number situations.
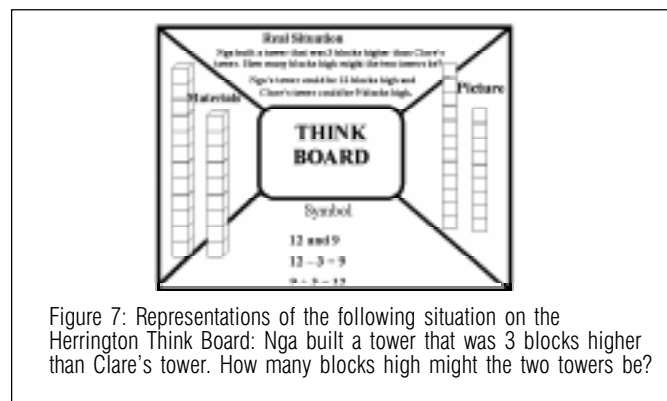
Figure 7: Representations of the following situation on the Herrington Think Board: Nga built a tower that was 3 blocks higher than Clare's tower. How many blocks high might the two towers be?

Conclusion

Counting, reading, writing and interpreting numerals, arithmetic strategies and visualisation are all important aspects of children's early number learning. To effectively provoke children's learning in each of these areas, teachers need a clear understanding of how children learn number concepts and skills, knowledge of the growth points reached by each child in relation to a conjectured learning trajectory, and an awareness of the difficulties children may face when learning number ideas. Effective teaching takes account of this information when implementing instructional activities to provoke each child's number learning. ∎

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Learning to Talk and Talking to Learn

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What is language?

Language, spoken and written, is at the heart of teaching and learning. We learn to speak, listen, read and write to make things happen, to keep things in control, to find things out, to understand things better, to keep track of our thinking and much else besides.

Language is so closely bound up with all the things we do that it is sometimes hard for us to separate it out as an object of study, thinking about it apart from what we do with it. Language is a multi-layered set of sub-systems, each of which is rule-governed. The surface features are easy to discern. For instance, we are familiar with the sounds of our own language, the pitch contours, relative volume and the like.

The ways in which these surface features convey meanings along with vocabulary choices, sentence structures and the 'shape' we choose to give a particular piece of discourse, are not arbitrary. These various aspects of language are related to each other in intricate, rule-governed ways. When we learn language we learn how to orchestrate and control these different layers and the relationships between them to achieve our own purposes.

The complexity of language and language learning, therefore, defies any simplistic description or linear developmental pathway. However, this does not mean that we have no control over its increasing sophistication during the early school years. We know that language is sensitive to **audience**, **context** and **purpose**, and by manipulating these systematically we can ensure that students gain opportunities to use their language in a variety of ways. Through these experiences students' language will develop recursively. It will enable them to think and learn in increasingly appropriate ways.

> **Language:**
> ‣ is multi-layered and rule-governed
> ‣ is a complex inter-relation of subsystems
> ‣ is sensitive to context, audience and purpose
> ‣ develops recursively.

We learn language and we learn about language by using it for all the purposes which litter our every day. Indeed, the notion of purpose in talk is the power house of language development. We use increasingly more specific and sophisticated language as we shape our ideas more accurately in order to successfully share our understandings and beliefs with others. By doing this, we frequently discover more about our own ideas and we can modify them as a result of the feedback we get.

Speaking and Listening

At the centre of spoken language learning is the quality of interaction between the speakers and listeners. We know the significance of young children's spoken initiations and the influence of conversations with more knowledgeable others throughout the early years. We know the value of 'contingent' responses to these initiations. If the responses that listeners make to speakers are non-contingent, that is they bear no relationship to what has been heard, then the conversation will not go on for long and the purpose of the exchange will be lost.

Non-contingent responses, therefore, will not satisfy the communicative purposes of human interaction. When we listen, we actively listen to make sure that our responses are linked, that they are 'contingent' or dependant on what has been said before. What this means is that listeners work just as hard as speakers in their efforts to make sense of the spoken realisations of others' worlds.

> **Contingent responses:**
> ‣ keep conversations flowing
> ‣ indicate active listening
> ‣ provide positive feedback
> ‣ are emotionally satisfying
> ‣ extend meaning through scaffolding
> ‣ achieve a clear purpose.

Using the terms **speaking** and **listening** can misleadingly imply that these activities are different. They are not. The processes which are relevant to both speaking and listening are the same. Speakers and listeners construct a shared meaning through their conversations and they use language to make this happen and to ensure that it is happening successfully.

Listeners do not decode speech sounds and sequences of words first and then read off the meaning after this decoding. They predict and anticipate what the speaker is talking about in 'real' time and check their understandings of the meanings to be shared by responding as a speaker themselves. Both speaking and listening are dynamic and interactive processes.

Development of Speaking and Listening

Learning to talk is not only about learning to structure sentences, but about learning to engage with other people, to respond to what they say and to influence what they think and do. By the time students start school, they have achieved a large amount of knowledge about language.

Students starting school will:

‣ speak like others in their family and community with respect to accent and dialect

‣ have an extensive vocabulary

‣ use language for a variety of purposes.

These new school entrants will have control over most of the grammatical structures of their first language although some aspects of grammatical learning will continue to take place throughout the years of schooling. Naturally, these students will have adopted the speech patterns of those around them and this may not be Standard English. Their vocabulary, pronunciation and sentence structures may be non-standard even when English is their first language.

However, young children are surprisingly sophisticated language users, using language for a wide variety of purposes. They are able to speculate, predict, hypothesise, express emotions, negotiate and the like. They know how to adapt their language to that of others, talk about things not 'here and now' and they know how to engage others in conversations for their own benefit. Children entering school are able to joke, tell stories, enjoy conversations for their own sake and give instructions to achieve outcomes.

Nevertheless, there are wide individual variations. Children's competence will be dependent on the experiences of the world they bring with them to school and the opportunities they have been offered to share and talk about these experiences with more knowledgeable others. However, what five-year olds can find difficult is putting themselves in the position of their listeners. They can inappropriately assume that everyone knows what they know, and while this may be true in a close family context, away from that familiar group children need to learn to be far more explicit.

Speaking and Listening at Home

At home, children experience many opportunities for talk. They conduct conversations with people they know and who know them. When children share so much in common, with others they can make a large number of assumptions and their talk does not have to be specific in every detail. Young children are frequently engaged in conversations about the 'here and now', a context which is shared by both speakers and listeners. This makes it possible to refer to things perfunctorily in the knowledge that the listener will understand what is going on.

Conversations are also about social contact and much of this can be non-specific, with each partner taking turns to keep in touch, sharing feelings, points of view and comments on current experience. This kind of conversation is good for creating, establishing and developing social relationships which are important for everyday life and for learning, both inside and outside the classroom.

Home Talk:

‣ is directed at a familiar audience

‣ consists of known patterns of discourse

‣ often consists of short exchanges

‣ achieves an immediate purpose

‣ supports successful communication

‣ may also involve lengthy one-to-one exchanges

‣ involves exchanges between child and adult, child and other age children.

However, we now know that young children who experience a range of different kinds of language during their early years will be better able to take advantage of the linguistic environment of the classroom. Young children who have had opportunities to talk at some length about things that are not 'here and now' and also opportunities to listen to language used for these decontextualised purposes will have experienced the beginnings of learning 'school' language and learning about the language of school.

These decontextualised experiences of language can be encouraged by inviting young children to talk about their day with someone who didn't share that time with them. They may for instance reflect on their day as they get ready for sleep, listen to stories and tales about other peoples' experiences, recall and reflect on past experiences, explain something to someone else, plan what to do tomorrow etc.

There are two critical elements that distinguish this kind of talk. It is about things beyond the immediate moment and it gives the speaker a longer turn. The listener will require additional information to clue them in as the context will not be immediately obvious. Because of this it is called 'extended discourse'.

Extended discourse and decontextualised language are the hallmarks of later school language and learning. Later learning from texts, across the curriculum, will be of this kind. During primary schooling, students learn how to respond to texts and how to create texts for themselves, both in speaking and in writing. Children with skills in this kind of language will be better able to enter the culture of schooling, a culture which is predicated on developing thinking beyond the walls of the school.

Extended discourse:

‣ provides for elaboration

‣ encourages depth of understanding

‣ accounts for the needs of listener

‣ achieves a deferred purpose

‣ is intellectually satisfying

‣ establishes links between ideas and experience

‣ fosters precision and articulation of thinking.

There will be children who will have less experience of this kind of language. In these cases it will be the responsibility of teachers to bridge this gap and to create opportunities for students to recognise the different forms of language, the different purposes of language and how to take part in and respond to the language of the classroom.

Speaking and Listening at School

Children arrive in school as competent language users. Most will be confident conversationalists, however it will be a time of adjustment while they learn about school organisation and routines, how to take their turn with a large number of other students and how to join the discourse of the classroom. Some will learn quickly that certain kinds of talk are more appropriate in school and it may be talk that is unfamiliar to them.

School talk:

‣ involves an unfamiliar audience

‣ consists of unfamiliar patterns of discourse

‣ requires listening at length

‣ has delayed purpose

‣ may not always result in successful communication

‣ often consists of one to many, brief exchanges

‣ involves conversations between child and same age children.

Those students who are not familiar with 'classroom' talk may remain silent during their early days and weeks at school, mistakenly creating the impression that they do not understand what is going on. However, even adults who are confident and competent language users may react in this way when they find themselves in unfamiliar circumstances. Therefore, teachers will need to be patient and not rush to inappropriate conclusions concerning a student's capability.

Teaching and learning
Speaking and listening

Speaking and listening for learning is best taught by engaging students in speaking and listening with a purpose and by supporting and encouraging them to do this. The speaking and listening behaviour of teachers has a powerful influence on students, acting as a model for them, as teachers talk with them about their work, how they want them to proceed with activities, and how criteria for judging success are generated. In the same way, students' experiences of language use at home will influence the language repertoire they bring with them into school.

In language learning, comprehension (listening) exceeds production (speaking). In new contexts, students listen and learn until they feel comfortable with particular ways of talking, joining in, tentatively at first, feeling their way and welcoming positive feedback for effort. Speakers look for support and encouragement as they learn a new way of speaking and learn about this new discourse.

For many students, classroom discourse is almost totally unfamiliar. These students may be tentative at first. Teachers make them feel valued and secure by providing supporting and encouraging feedback and by planning experiences which will engage their enthusiasm and interest. Through these experiences, students gain in confidence as speakers and listeners and as learners in school.

Thinking aloud

Speaking and listening in school are primarily for clarifying understanding, for learning and for thinking. The relationships between thinking and spoken and written language are best demonstrated for students through the process of talk. Talk in the classroom is for refining our ideas and framing informed conclusions. Teachers and students hypothesise, summarise, compare, contrast, classify, clarify, and much else besides, through their classroom talk.

The route from already known ideas to new ideas is through the interactive use of language, and this will be talk between teachers and students and between students and other students. This is the power of language in creating new knowledge and it is central to the processes of learning taking place in classrooms.

While a wide range of thinking, speaking and listening activity takes place in school, the real business

of talk in the classroom is also learning a language for learning. This kind of talk will incorporate strategies which promote interaction and collaboration to reach agreed purposes and outcomes. In addition, teachers need to plan to carry these activities further and take students to the next stages of their thinking process; reflect, evaluate, draw conclusions and review.

These strategies of reflection, evaluation, drawing conclusions and review will ensure that students can experience using language to organise and refine ideas The practical outcome of an activity will not necessarily be the end of the intellectual activity; returning to an activity, preparing the outcomes for display, re-shaping the outcome for other purposes will provide additional consolidation. These processes and others will give students opportunities to focus their language, learn through their language and to learn language which is crafted for particular purposes and transfer that learning to other situations.

Types of Talk

Talking and engaging in interactive conversation comes so naturally and is so pervasive that it is sometimes difficult to focus on the kinds of talk being used in the classroom at different times for different purposes and to develop aspects of classroom talk for specific learning activities. In classrooms, the major focus for talk will be for learning about the world and, at the same time, learning about language itself and learning how to learn. This is revealed through students' increasing ability to ask questions, predict outcomes, grasp main ideas, give and follow instructions and the like.

Interactive conversations involve both speakers and listeners who take care to ensure that they understand what is being talked about. They use verbal and non-verbal behaviours to give information on the process of their co-construction of meanings, and both take a responsibility for the meanings which are shared. This view of interaction gives speakers and listeners active roles.

Speaking as process

When we communicate with other people, whether it is to let them know some information or to ask them about their concerns or their experiences, the person who initiates the speaking has an idea in their mind which is about an action, an event, and/or a set of circumstances. These ideas emerge from the model of the world which the speaker has and this has been formed through their personal experience as they have lived their lives.

For each of us, the model of the world we draw on to join in conversations will be personal and rich with meaning and this will be unique for everyone. No one has experienced the world in exactly the same way as anyone else. What this means is that a speaker can never 'transmit' information to a listener which will be understood in exactly the same way as the speaker conceptualises that particular piece of information.

In addition, the speaker has to choose elements of language which are temporal and sequenced. Language is the most effective form of communication because of its immediacy and its satisfying emotional impact provided by people paying attention to each other, it also forces speakers to select an ordered sequence of items which occur in rule-governed patterns. However, this sequence of language will not necessarily represent the sequence underlying the ideas.

As suggested before, ideas are personal and private while language is general and public. At the same time, the chosen elements of language will need to be transformed into speech which has an arbitrary, although conventional, relationship to the underlying ideas. This becomes clear when we turn to foreign language programs as we switch through radio or TV channels. If we come across a language we can neither speak nor understand, the speech sounds will be incomprehensible, representing ideas which will be inaccessible to us.

Listening as process

Even when a listener understands and speaks the same language as fluently as the speaker, the activity of listening is not as simple as working backwards from the speech sounds themselves to unlock the underlying meanings. Listeners do not unravel speech by attending to the pattern of the words directly and then reaching beyond the language to the intended meanings of the speaker. For instance, if you have tried to transcribe a tape recording of speech, you will know how hard this is if you do not already know what the speaker is talking about.

This may well sound paradoxical, but listeners make sense of language just like speakers, by making use of their previous experience and knowledge of the world. Interpreting what speakers say, therefore, requires the listener to have expectations about how the world works. Understanding a speaker will be the result of constructing meaning by anticipating and predicting talk in the light of relevant aspects of the listener's model of the world. This model has been developed from their own experiences and accumulated knowledge base.

There can never be any certainty that we share exactly the same meanings through conversations. We make informed responses on the basis of numerous verbal and non-verbal cues made available to us by the speaker. The fact that people do hold successful conversations means that for those of us born into similar communities and social contexts, we will share sufficient numbers of experiences to make ourselves easily understood. For many new students the social context of the classroom may not be familiar and this will be a source of difficulty for them, making it harder for them to understand what is going on.

However, in speech, there are procedures for checking and restating intended meanings if misunderstandings are suspected. In these ways, meanings and understandings between speakers and listeners are negotiated and renegotiated in the light of feedback each receives through successive turns. This is the dynamic activity of 'discourse' which is primarily concerned with the interactive and constructive sense-making which occurs during purposeful interaction within a shared social context.

Talk in school

There are clear implications here for our work with students in schools. Misunderstandings can occur at many points in the process. Teachers, as mature adults, and young students will not have similar experiences of the world, Students will not be as verbally adept in choosing just the right word or appropriately constructed strings of words, they may not speak the same language with any facility and all of these elements will be exacerbated if the students arrive in school from different speech communities with diverse expectations.

Because of these limitations on the active process of co-constructing meanings through speaking and listening, there are clear principles which need to be in the forefront of teachers' minds when they engage in conversations with their students.

Teachers will:

▸ listen actively to what students are saying

▸ invite students to say things again choosing different words

▸ respond to students by reflecting back on and extending the meanings as understood

▸ give students opportunities to extend their linguistic repertoire and their experience of the world (which will not be the same as their teachers').

Social talk is concerned with people getting to know each other and as such does have a place in classroom settings. Through social talk, students learn about each other and how to get on with other people. Students are observed to often move in and out of social talk while doing something together which demands actions more than words.

Students also share meanings through **communication**. There is a natural need to communicate and this kind of language provides a powerful motive, not only to speak, but to speak with clarity and precision while supporting the listener to attend closely to what is being said. Wanting to find out about something increases attention, and classrooms which provide authentic purposes for communicative talk will stimulate the need to share meanings with each other, in small groups and with the teacher. Collaborating towards shared understandings is at the heart of learning.

Cognitive aspects of talk are revealed through different ways of thinking. While young students are keen to acquire new skills and abilities, they also learn how to talk about them during this process. This happens more quickly when they are involved in setting the purposes for an activity, asking questions for themselves, inquiring, observing, recording, reflecting, reviewing and evaluating. Placing students in situations which demand these ways of using language will enhance the quality of student learning.

Vygotsky has argued that the ability to talk and think is in the first instance social and only later becomes cognitive;

> "Human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them..."

This is why it is important to allow for all kinds of talk in classroom activities, as students develop as learners. However, they learn not only to participate in activities but in the meanings which are embedded within them. In this way all knowledge is actively reconstructed by each student for themselves.

Learning and the acquisition of language are intricately involved, one with the other. Because of this, the quality of student learning is dependent on, firstly, the nature of the language used and, secondly, on the relationships between the participants.

The Role of the Teacher

In the classroom, teachers have a primary role in deciding and dictating the kinds of talk which accompany various activities. Teachers' own talk acts as a model for students and teachers can demonstrate how talk achieves different purposes. A valuable framework for talk in the classroom is encompassed by the acronym **SAID**:

*S*timulate
    – introduces an activity

*A*rticulate
    – identifies the focus of discussion
    – states clear goals

*I*ntegrate
    – links new to previous knowledge

*D*emonstrate
    – illustrates new knowledge in action.

This framework is offered here as a reminder for teachers when they are planning their classroom talk for specific instructional purposes. They will also use talk to organise the students and to manage activities. However, when they are engaging students' minds for learning, then their talk will need a special focus and framework which students themselves can follow when reviewing or sharing their own work with others.

> **Teachers need to bear in mind:**
> ‣ the interactive nature of language and learning
> ‣ the social and structural conventions of speaking and listening
> ‣ responses which extend and support student talk
> ‣ providing students with a range of purposeful contexts for talk.

Students' language will vary with **audience, context** and **purpose**. Teachers will need to provide for different opportunities which give students experience of these three dimensions both inside and outside their classroom.

In eliciting responses from students, **firstly**, respond to what students are talking about, and **secondly**, respond by modeling forms of language which are appropriate for the purpose of the moment.

> **Teacher responses include the following strategies:**
> ‣ making a statement about what you think which might invite a rejoinder or disagreement
> ‣ invite elaboration and rewording
> ‣ let students know if you are not clear about what is said or how it is said,
> ‣ encourage questions from students,
> ‣ keeping silent at strategic moments – this encourages others to speak.

Using a range of strategies like those shown above, teachers will begin to put students' language under pressure. This means that they will find it necessary to move towards more precise and explanatory speech as they explore different ways of saying something that matters to someone who wants to listen.

While students are offered these opportunities to construct and transform their meanings, correction of their speech may be reassuring for the teacher, but will not be effective for students' language learning. Surface features of talk are highly resistant to this form of feedback. Alternatively, teachers need to control the speaking and listening agenda at a much deeper level of intellectual demand.

> **Teachers need to plan for:**
> ‣ opportunities for talk
> ‣ learning activity which will promote talk
> ‣ their own intentions for the activity
> ‣ the students' intentions
> ‣ the context of the activity
> ‣ the talk outcomes.

Students use talk effectively and imaginatively to communicate with each other and with others. They do this to share what they know and think, and to learn what others know and think. The role of the teacher is crucial in this process. Teachers work through talking to discover what students already know so that they can be quite precise and sharp focused when they build links between new information and what students already know.

We make sense of new experiences by integrating past experience with new information and thereby transforming our knowledge base. We do not learn one thing and then another in any additive manner. The transformations which take place as a result of learning provide a fresh basis for new learning.

Learning to read and write and learning through reading and writing are enhanced by the medium of spoken language. Printed texts are conventional and inert. They are only rendered interactive through speaking and listening about the text. Students need support in developing their written language strategies and talk will provide opportunities to make the requirements of this learning clear and accessible for them.

> **Through talk, teachers can:**
> ‣ find out what students already know,
> ‣ discover students' thinking processes through active listening,
> ‣ help students access past experiences relevant to new activities,
> ‣ develop and extend students' thinking by building bridges from known to new information,
> ‣ model successful strategies,
> ‣ encourage, support and 'scaffold' through appropriate feedback.

We teach speaking and listening for learning by engaging students in speaking and listening, by supporting and encouraging them, by using speaking and listening in sharply focused ways. As teachers, our own speaking and listening behaviours will have a powerful influence on students, acting as a model for them as we introduce new activities, as we talk with them about their work, how we want them to proceed with activities, and how we generate criteria for judging success. In the same way, children's experiences of language use at home will influence the language repertoire they bring with them into school. Teachers, therefore, have a clear responsibility to bridge this gap and to build on the language repertoire which all students bring with them into the classroom. ∎

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A14 Multiaging

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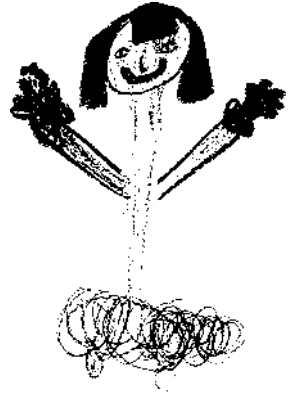Project Officer, Early Years of Schooling Branch

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Multiaging in the Early Years

"Multiaging in the Early Years" is a new resource due for distribution later this year, containing a book and a video that presents the issues and strategies that school communities may encounter as they develop a multiage approach to organisation in their schools. It has been developed in four main sections:

- ‣ Key Issues
- ‣ Case Studies
- ‣ Professional Development for Teachers
- ‣ A Process for Involving Parents.

The **Key Issues** section provides a summary of the important issues associated with multiaging from a review of the current literature. It defines multiaging and provides information about the factors identified through research that support effective multiage classroom organisation.

The **Case Studies** present the experiences of teachers, parents and students involved in early years multiage classrooms at Bellbridge and Cowes Primary Schools. Both schools have conducted multiage classrooms since 1994 and are strongly committed to this form of school organisation.

Professional Development for Teachers is designed to provide teachers and school leadership teams with a process for working through the key issues and understandings associated with introducing and implementing multiaging in the early years of schooling. This section is presented as five modules that can be conducted separately or as a complete set on a student-free day.

A Process for Involving Parents presents suggestions to involve parents and the wider school community in the information sharing and decision-making processes associated with introducing and implementing multiaging. A School Community Multiaging Meeting and two workshop sessions are presented for schools to explore and implement as a basis for ongoing parent communication, education and involvement.

A review of the current literature on multiaging is also presented as an appendix. This review was undertaken by Dr Christine Ure from The University of Melbourne in 1999.

References and abstracts of national and international texts are provided to further support the development of understandings of multiaging.

The video **'The Multiage Classroom'** demonstrates the features of the multiage classroom and includes commentary from Dr Christine Ure, along with a principal, teachers and parents who have experience with multiaging in the early years. The video will provide support to facilitators in implementing the professional development modules and in working with school communities.

Research

Schools may implement mixed-age groupings for a number of reasons and a number of different classroom structures exist including, family groupings and composite groupings in addition to multiage groupings. The reasons for implementing these classroom structures may be philosophical or they may be practical and influenced by school enrolment and staffing numbers.

A large number of research studies have attempted to discover which aspects of schooling impact most significantly on children's academic achievement and social development at school and the influence of classroom structure. Research has been complicated by the combined effects of class structure and teaching practice and the many different types of mixed-age class structures. This has resulted in a number of meta analyses on aspects of classroom structure and student outcomes. The results of these analyses have indicated that there are no significant differences in student achievement and classroom structure although there is a trend towards gains in social aspects of development for students in multiage grades.

The implications of these findings for schools are that the classroom structure employed should be supported by best practice. This includes a whole school philosophy on expectations of student achievement and personal development along with high quality teaching practices that are explicit and targeted to meet the immediate learning needs of students. Whatever classroom structure is being implemented it is important that classroom teachers employ strategies to ensure small group activities are effectively managed. All students should be active participants in the learning activities and the demands of the task should match their immediate learning needs. Ongoing assessment and revision of student needs form a crucial element in group placement.

Research supports the need for professional development for teachers when multiaging is being implemented initially. Communication with parents is also important to inform them about the nature and purposes of changes being made to school structure. Parents need information from research about good educational practice and how this is being reflected in the multiage program.

While there is not a lot of research literature on students' views about schooling and their inclusion in different class structures, some research suggests that students are forming their own attitudes to school and that this should not be overlooked. Students' attitudes to school will reflect aspects of school organisation and school climate.

Case Study: Bellbridge Primary School

Bellbridge Primary School adopted multiaging on philosophical grounds. Teachers were determined to examine ways in which the school program could more closely match individual needs and learning of its young students.

At Bellbridge Primary School a whole-school philosophy about students was developed to reflect both academic and personal needs. The staff and parents at Bellbridge Primary School took time to learn about multiaging and to understand the principles of this philosophy and implications for classroom practice.

Planning and preparation took place before making the change to a multiage structure. The school community made time to plan and prepare for the implementation of multiaging. This commenced in June 1993 when a core group of teachers set up a professional support network and took on leadership roles in introducing multiaging into the school.

Professional development was a priority. Teachers worked in teams, supported by the leadership team and a network of staff in the school. Time was taken for professional reading, for visiting other schools, trying out strategies and reflecting on their implementation.

Parents were supported through a parent education program that focused on explaining the nature and purpose of multiaging. Parents were also encouraged to visit other schools where multiaging was being adopted.

Changes in the classroom were monitored to ensure ongoing success of the program. This involved assessment of the student learning, behaviour and class placement.

Procedures were established to ensure that the impact of the changes on the whole school community were monitored. Parents were kept informed through the "Friends of the Junior School" monthly forum and were invited to raise issues for the staff and principal to consider and respond to.

Bellbridge Primary School continues to implement a multiage approach to school organisation. Teachers and parents have faced a number of issues together and they remain committed to the multiaging structure. Some of the initial concerns raised by parents related to the issue of whether or not the curriculum would cater for all students and whether more able students would be adequately catered for in classes where there was a wider range of ages and abilities. There were concerns about the needs of the younger students and whether they would be dominated by the older children. In addition, teachers were concerned about the need to plan the curriculum over a three-year cycle and about the availability of resources needed to support learning centres in the classroom. Further challenges included the need to build up professional relationships within the school.

Bellbridge Primary School has worked with the whole school community to establish a high level of communication across all of its stakeholders and this has been a key element in the success of the program. Teachers, parents and students have worked together within an environment that has provided opportunities to explore issues and to seek responses to problems and concerns.

The success of the program has been judged in a number of different ways including:

- the behaviour of the students in terms of responsibility, leadership skills and relationships in the play ground
- the inclusion of a developmental approach to curriculum and an improved ability to assess students and adjust the curriculum to meet learning needs
- the successful use of group learning strategies
- an increase in teacher satisfaction
- a high level of parent satisfaction and parent participation at the school. ■

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PowerPoint and the Digital Camera in the Early Years Classroom

Anne Baird
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Background

In 1996 Charlton Primary School and Charlton Secondary College merged to become Charlton College, a small P–12 school of 200 students in north west Victoria.

In 1996 the college became a member of the Leading Practice Classroom Network committing staff to developing learning technologies as an integral part of our teaching and learning. The three member team of Kelvin Baird, Jenny Ritchie and Anne Baird have offered inservicing on:

▸ video conferencing and establishing a network
▸ using the Internet
▸ collaborative projects in a remote setting (English and SOSE)
▸ using learning technologies in the Early Years classroom.

Video conferencing has been an important part of the curriculum, and has included links between primary students of the college and students in Japan and regional Victoria. Students have also engaged in a range of cooperative curriculum projects including the Weather Project conducted by Mag-Net and the Teddy Bear Project.

Since 1995 staff have committed themselves to developing an improved and successful literacy program in the Prep to 4 area using literacy programs such as W.A. First Steps and subsequently the *Early Years* Literacy Program. During 1998 and 1999, over 20 schools throughout the Loddon-Campaspe-Mallee region visited and observed how the Early Years team of Lianne Brett, Justine Bolte, Robyn Cockfield, Kirstie Gillies and Anne Baird have integrated learning technologies into the two-hour literacy block.

Rationale for the Use of Technology in the Early Years Program.

In the developing field of computer technology, it is very important that students become familiar and comfortable with computer hardware and software. Students have access to the Internet, email and a range of software. In the two-hour literacy block, teachers carefully avoid using computers as a means in themselves and rather use them as another means of developing reading and writing skills. The first challenge was to find computer software that was going to enhance literacy teaching strategies yet be fun, time efficient and effective.

Using *PowerPoint* in the Early Years classroom

In 1998 having seen the use of *PowerPoint* as a tool for making presentations interesting, teachers saw the potential for utilising this piece of software as tool for developing literacy skills in the classroom. The software can be used as a means of demonstrating specific literacy skills such as phrasing and fluency and so lends itself very well to being used in Shared and Modelled reading time by visually demonstrating the part of the story or poem the teacher wants the children to read.

It can also be used as a means of publishing materials authored by the class or by individual students, which can then be published in hard copy form as big books or small take-home books. *PowerPoint* can also be used to produce very simple texts for beginning readers with a strong repetitive base.

Digital Camera

The digital camera provides a very easy way to enhance writing using pictures of students. Drawings they have done can be simply photographed with the digital camera. Other graphics such as pictures captured from the Internet or created using *Kid Pix* can easily be imported into *PowerPoint* to further illustrate text. Students' photographs can also be digitally scanned into *PowerPoint*.

The Literacy Block in Prep/One

Over the past four years at Charlton College, the literacy program has been fine-tuned to ensure that all activities are authentic reading and writing tasks. Between the four classrooms there are two television monitors with Averkeys and there is access to a portable data show.

Students also have access to two computers connected to the Internet in each classroom.

Reading

The two-hour literacy block begins with a whole class Shared or Modelled reading activity, using a big book, enlarged poem or *PowerPoint* story. The *PowerPoint* stories are displayed on a large television monitor or data show.

Students then move into five reading groups. Each group does only one activity per day.

Group 1. Focus book (guided reading with teacher).

Groups 2 and **3.** Partner reading. These students read from their personal bookboxes which contain carefully levelled and selected classroom books, guided reading books, *PowerPoint* books, poems etc.

Group 4. Reading activity (includes one or more of the following):

- Listening post
- *PowerPoint* books in hard copy or read from computer screen
- Storymaker
- Big books
- Rhyme books
- Library books (carefully chosen selection of picture story books that can be read independently)
- Poems.

Group 5. Computer group – using CD stories, Internet sites such as *Sunshine Online* www.sunshine.co.aus or *Galaxy Kids* www.galaxykids.com.au (these sites have reading texts suitable for Grade Prep to 2).

We aim to ensure that all activities require sustained, authentic reading on text.

The reading activity group is the group that the running record is taken on, using the previous day's guided reading book.

Share time - reading

Two children per day are chosen to share their reading thoughts and understandings with the whole group.

Writing

The writing component of the two-hour literacy block begins with a session of Modelled or Shared Writing. Texts may be recorded on paper so they can be revisited later. There is also an opportunity to use the TV monitor and a program such as *PowerPoint* to write directly on to each slide thus easily demonstrating how to develop a story or piece of writing. Editing and revising can also be modelled directly on the screen.

Writing groups

Students are currently split into four flexible groups with one group working with the teacher. Teaching approaches include Interactive writing, Guided writing, Shared writing and Language experience. Depending on need, teaching may focus on secretarial aspects such as letter identification, sounds letters make, stretching words or Authorial aspects such as thinking of things to write about, publishing, improving how writing sounds, editing or particular genres.

Usually one group has access to a laptop or class computer which allows them to write directly onto the computer screen or edit work already typed in.

Share time – writing

Again, using the television monitor and laptop, students can easily show others writing in progress or the finished product.

Examples of *PowerPoint* 'Books'

Shared reading

It is effective in a Shared reading lesson to screen *PowerPoint* books on a large TV monitor or data show to enable all students to participate. Stories can be created in a variety of ways.

- *Example 1*

Innovation on text: Using a simple repetitive text such as *I Went Walking*, by Sue Malchin, or *Brown Bear, Brown Bear, What Do You See?* by Bill Martin Jnr.

Create a slide for each student with his or her picture inserted. Our text said "Korky, Korky, What do you see? I see Abby Looking at me." On each slide is a picture of Korky (copied from the Internet site *Sunshine Online*) and a picture of the student. Text and graphics can be programmed to come onto the slide in phrases at the click of a mouse. A very simple book which early readers can read easily is produced. It can then be printed out and used as a take home or classroom book.
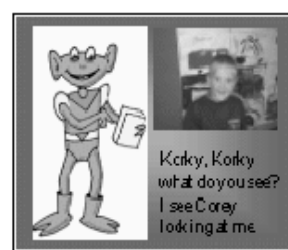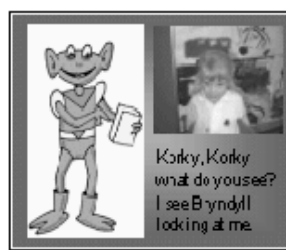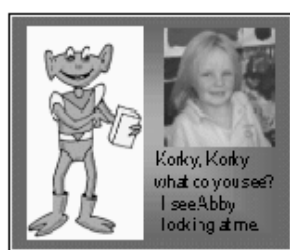
▶ *Example 2*

For Preps on their first day at school it is nice for them to take home a text that they can read. A range of digital photos of each child can be taken on transition days that can be stored and used over and over again. e.g. each child reading a book, each child playing outside, each child drawing a picture etc. Simple repetitive books can be created such as "Andrew is reading a book." "Annie is reading a book" etc. This can be read to and with the students using a large television monitor and then copies can be printed and photocopied and made for each child to use as take home reading.
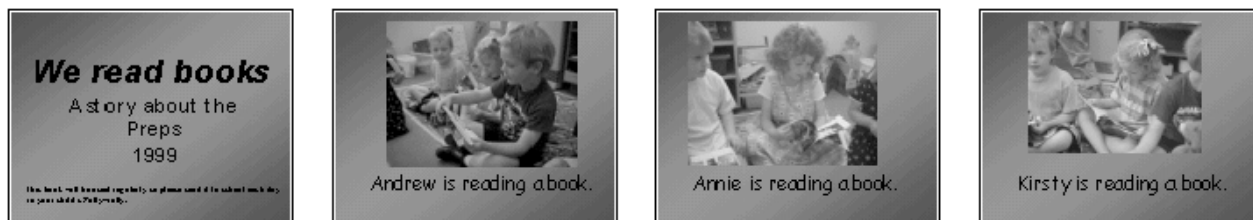
Modelled reading

When producing a book, *PowerPoint* offers the opportunity to animate text. When typing text onto each slide a text box can be created for each sentence or phrase. Then at the click of a mouse the operator can program *PowerPoint* to make each text box appear on the screen. This clearly demonstrates to the students both visually and aurally how to read with phrasing and fluency.

Individual writing

Students in Year 4 wrote some dinosaur poems. After the Year 4 students had read them to the Year 1 class, the younger students wanted to write their own. They wrote them as a rough draft on paper then typed them into a *PowerPoint* slide using one slide per poem. One text box was created for each line of the poem. At the click of the mouse the text boxes were then animated to come onto the screen one line at a time. As the poems were about dinosaurs, we found some pictures of dinosaurs on the Internet to insert on each slide. An A4 sized book in colour was printed for classroom use and a big book (A3) was also printed.

Language experience

A digital camera is a useful resource to be taken on a class excursion. After the excursion, each photo can be inserted onto a slide. As a whole class, students can plan and write a story about the excursion. The text for the story can be written directly onto slides using a data show/TV monitor so all the class can read as the text is typed. As well as reading on the screen, the book can be printed to make books.

Narrative

Teachers and students decide on a topic and as a whole class plan and write a story. It is often effective and exciting to include students in the story. Once the story is written, appropriate photographs are taken to act out the story.

Reports

During our dinosaur theme students chose and researched a species of dinosaur using selected sites on the Internet. They wrote the information as a rough draft then typed it onto a slide in a *PowerPoint* book. Using a picture of the chosen dinosaur copied from the Internet site, they put together their information book on dinosaurs. In this book an author's profile was added onto each slide.

Conclusion

PowerPoint has proven to be one simple effective way to incorporate learning technologies into the Early Years classroom. Books are simple to make and there are many shortcuts like copying and pasting repetitive text and linking text boxes when doing animations that will save time. Students enjoy the animations that can be created and the opportunity to incorporate their photographs into the books, making them personal and relevant. *PowerPoint* is limited only by your imagination – have a go and have fun! ■

References

Machin, Sue, *I Went Walking*, Ominbus Books, Illustrated by Julie Vivas

Martin, Bill Jnr, *Brown Bear, Brown Bear, What Do You See?,* Illustrated by Eric Carle

Sunshine Online – www.sunshine.aust.com

Galaxy Kids – www.galaxykids.com.au

Approaches to Teaching Readers in Years 3 and 4

Early Years of Schooling Branch

Reading is a valuable and empowering activity, which enables students to construct and reconstruct meaning while making sense of their world. A positive reading environment is significant in encouraging students to value reading and in supporting their reading development. Readers learn to read best in a community of readers. Involvement in meaningful literacy tasks, access to a wide variety of texts in a range of different text types and regular demonstration and modeling of literate behaviours encourage students to develop their reading. The key to students achieving success in reading lies with sound teaching and the implementation of a balanced classroom reading program.

Teaching Readers in Years 3 and 4 is specifically designed to build on the *Early Years* Literacy Program for students in their first three years of schooling, meeting the specific needs of students in the next two years of schooling. After three years of learning within the supportive structure of the *Early Years* Literacy Program, most students entering Year 3 will be fluent readers, able to integrate all sources of information to problem solve on text.

The classroom program for students in Years 3 and 4 focuses on supporting students to practise and extend their ability to integrate these sources of information as they problem solve on text and engage with more complex texts.

An important part of this process is supporting students to explore text meanings and to develop the skills and the ability to reflect and think critically in response to what they have read. Teachers, through focused questioning, will support students as they:

- begin to start questioning the author's view and the validity of texts
- make judgements and position themselves in relation to the text read
- become more consciously aware of the language used by the author to express the ideas and how this influences the reader.

Teaching Readers in Years 3 and 4 emphasises the use of powerful instructional approaches to teach readers to effectively develop, consolidate and extend their reading knowledge, understandings and skills as they read more complex text. The classroom program outlines a structured framework for teaching reading that, together with the teaching of writing and speaking and listening, will constitute a daily two-hour literacy block.

The Program Outline for Teaching Readers in Years 3 and 4

<table>
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Whole class focus on reading

- Reading to students
- Shared reading

Small group focus on reading

Teaching groups	Learning Tasks
	-Priority Learning Tasks
Fluent/	-Teacher Selected
Fluent-developing	Learning Tasks
readers	-Students Selected
Guided reading	Learning Tasks
Fluent-extending	Students consolidate and
readers	extend their literacy
Guided reading	understandings.
Guided reading	
– reciprocal teaching	- reading response
	- listening post
Book boxes	- word building task
Familiar and easy	- word analysis task
unfamiliar texts to support	- personal reading
and challenge the reader	- research task

Whole class reading share time
Reflecting on and celebrating students' learning – individual and group.

TEACHING WRITERS

</td><td>

TEACHING SPEAKERS AND LISTENERS

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**Program Components
and Teaching Approaches**

Whole Class Focus on Reading

The teacher begins the one-hour reading component of the daily two-hour literacy block with a whole class focus on reading. The teacher will select one of the two approaches for use during these daily sessions – Reading to students or Shared reading. The choice will depend on the teacher's major teaching focus for the session.

▸ Reading to students

Reading to students involves the whole class listening to a text read aloud by the teacher. The text will be carefully selected to suit the teaching purpose, students' interest level, understandings and challenges for their learning. Texts include short stories, poems, excerpts from novels or sections of a novel read sequentially over several days and a range of non-fiction texts including mass media material.

▸ Shared reading

Shared reading involves the teacher and students reading a text together. The text is selected for its specific language structures or features and with a teaching focus in mind. After discussing and establishing prior knowledge of the text, students are invited to predict the text from the title, illustrations, topic and text type. The text is read, focusing on meaning. Students may join in if the text is suitable or follow along on their own copies. Students may be asked to read a passage silently before continuing the shared reading or class discussion. During subsequent readings, the teacher uses the text to teach strategies and develop deeper understandings.

Small group focus on reading

During the small group focus on reading the teacher works with two or more small teaching groups of approximately 6–8 students with like need. Students are supported to achieve more complex learning outcomes than they would be able to achieve alone with teaching based on the premise that what students can currently do with help, they will eventually be able to do by themselves.

The teacher uses Guided reading as the teaching approach with fluent readers and fluent-developing readers. The teacher determines the most appropriate teaching approach to use with fluent-extending readers, either guided reading or guided reading-reciprocal teaching, depending upon the level of teacher support and student independence required in the teaching session.

▸ Guided reading

The teacher guides students as they read, talk and think their way through a text. The teacher selects a text at the students' instructional level, prepares the group for reading by establishing prior knowledge of the topic and/or text type, and briefly introduces the text then guides the students through it. Periods of independent reading are followed by discussion and teaching.

Central to a guided reading session are the interactions between the group members.

With students who have developed fluency and the ability to read silently and independently, most of the guided reading session will be spent discussing increasingly complex texts and developing their ability to think at a deeper level. Through discussion the teacher guides the students in refining strategies, making connections and developing insights that may not be apparent to them when reading independently.

▸ Guided reading-reciprocal teaching

Within guided reading, teachers may choose to use reciprocal teaching as a variant on this teaching approach. Guided reading-reciprocal teaching will empower the reader to read, talk and think his/her way through the text more independently than in a structured guided reading session. By using guided reading-reciprocal teaching teachers are selecting a teaching approach with a lower level of teacher involvement and the highest level of student independence.

In guided reading-reciprocal teaching, comprehension is fostered and monitored as the teacher supports students in leading a discussion about a text or segment of text. This discussion is shaped by the use of four strategies that promote comprehension: predicting, question generating, summarising and clarifying. By learning to lead the discussion, students focus their attempts as increasingly more independent learners to interpret the text as they actively construct and reconstruct meaning.

Initially, the teacher acts as leader of the discussion – modeling, discussing and explaining the use of the four strategies. The students are involved through adding their own predictions, responding to teacher-generated questions, commenting on the teacher's summaries and seeking clarification of their concerns at any stage of the session. The teacher guides the students from acquisition of the four strategies to independent application, transferring responsibility to the students as they demonstrate increased competence to think critically.

▸ Learning tasks

While the teacher is working with the small teaching group, other students are engaged in specific literacy Learning Tasks to consolidate and extend the students' literacy understandings – Priority Learning Tasks, Teacher Selected Learning Tasks, Student Selected Learning Tasks and daily independent reading from Book boxes feature.

Whole Class Reading Share Time

At the end of the reading hour of the two-hour literacy block, students are brought back together for a whole

class reading share time. During this session they reflect upon, discuss and celebrate their learning.

The whole class reading share time provides an opportunity for students to think about and articulate their learning, encouraging a conscious awareness of the process involved in reading. In this way students develop a sense of themselves as learners and an understanding of how they learn. The development of students' reading abilities is assisted by developing a language to talk about and reflect on their reading.

Through focused and explicit teaching, and by providing daily opportunities for learners to clearly articulate the processes they are using, teachers working with students in years 3 and 4 can support and challenge readers to extend and strengthen their reading abilities. ■

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B11 Dabbling – No Masterpiece
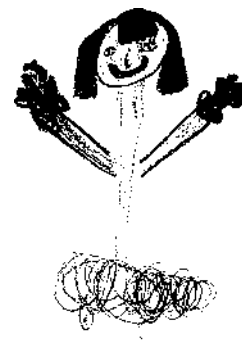
PAULINE FRY
Assistant Principal

SUE BUCKLEY, LOU WEBB
Early Years Coordinators

LEONA RYAN, LIZ LUBY
Classroom teachers

Paynesville Primary School

The Paynesville Primary School team has investigated ways of extending the teaching and learning approaches of the Early Years literacy program to the teaching of Reading in Years 3 and 4.

Background

Paynesville Primary School was a pilot school in the Victorian First Steps project into multiaging in junior classes. All classes continue to use the multiage structure, with a Junior, Middle and Senior school now operating. Enrolment for 1999 is 263 children, with 10 classes. Opening of a new school late in 1998, has enabled greater flexibility in class organisation with teachers having the option to work together through creative classroom design.

There is an established practice of team planning and whole school involvement in professional development and information sharing. As a result of the implementation of the Early Years program P–2, a considerable amount of interest has been generated throughout the school. A two-hour uninterrupted literacy block is in place, with a growing library of guided reading resources available for all students.

Professor Peter Hill and Carmel Crévola's design elements for school improvement (1997) is the basis used for examining and reflecting the current practices of the teaching of reading in the 3–4 area.

Beliefs and Understandings

The ongoing development of shared beliefs and understandings is seen as vital to the successful implementation of all programs. Some of the contributing factors have been:

- Valuing of and respect for Early Years implementation
- High expectations of student and teacher performance
- Successful students taking responsibility for their own learning
- Matching text to students' needs
- Acknowledgement of a range of reading skills – some students are reading to learn, whilst some still require reading strategy development
- Use of assessment to guide teaching.

Leadership and Coordination

The active support of the principal and the leadership team has been crucial to ensure the implementation of Early Years in P–2. The commitment to whole school improvement has been reflected in the allocation of resources, both human and material. Aspects of this include:

- Principal's role – meeting with coordinator, funding allocation, time provision
- Early Years coordinator – time allocation, expectations, resourcing
- Professional development – funding, teams
- Development and sharing of School Early Literacy Plan
- Building on existing school practices and programs.

Professional Learning Teams

The shared responsibility of staff to improve teaching and learning programs offered has been integral to the implementation of Early Years strategies. A long established ethos of team planning has been further refined to encompass the design elements for successful school improvement.

- Gippsland Region – team focus for professional development
- Whole staff professional development – curriculum focus at staff meetings

‣ Regular team planning

‣ Use of W.A. First Steps literacy throughout the school

‣ Development of local networks

‣ Use of integration aides to further support effective programs.

Class Teaching Strategies

Many of the key components of the P–2 materials have been introduced in our 3–4 classrooms. These include:

‣ Two-hour uninterrupted literacy block, including a one-hour focus on reading

‣ Whole/part/whole structure is used

‣ Catering for the developmental stages of students

‣ Planning, classroom management, teaching strategies, understanding individual learning styles and matching students to text.

Our challenge is determining how best to use the information that we have and to choose appropriate teaching strategies to take the children further.

Monitoring and Assessment

Western Australian First Steps literacy continuums have been, and continue to be, used by staff to monitor children's development and to guide teaching programs. The growing emphasis on the collection of data to guide teaching has provided us with further information. The following reflect our current, but flexible, practices:

‣ Whole school use of W.A. First Steps continuums

‣ The School Early Literacy Plan

‣ The development of a whole school Assessment Schedule

‣ Use of the T.O.R.C.H. test in the 3–4 area

‣ Use of a school benchmark text in the 3–4 area.

Standards and Targets

The targets established in our School Early Literacy Plan have already been revisited, with a clear need for extension into the 3–4 area. Guidance from the Early Years of Schooling Branch will be appreciated with these.

‣ P–2 targets

‣ School based 3–4 target emerging.

Intervention and Special Assistance

The importance of intervention and special assistance has been acknowledged at the school through the current training of a Reading Recovery teacher. Resources have been focused for students in Years 1 and 2, with both Reading Recovery and additional intervention offered.

‣ Whole school commitment to Reading Recovery

‣ Intervention within the context of the classroom

‣ Additional personnel used where possible.

Home/School/Community Partnerships

A spirit of cooperation between the home, the school and the community has always been encouraged. Strong links have been developed through:

‣ Newsletters – whole school and area

‣ Information nights

‣ Classroom Helpers program

‣ Special Friends program

‣ School Council

‣ Parents' Club

‣ Parent/student/teacher interviews and the development of individual learning plans

The design element, ***SCHOOL AND CLASS ORGANISATION*** is integral to all we do.

As our title acknowledges, we **are** just dabbling, we are excited by the challenge, and look forward to the masterpiece! ∎

B16

Teaching the Big Ideas in Measurement

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Introduction

This paper considers beliefs about measurement held by users and learners of mathematics, particularly beliefs held by children, and how these can inform the teaching of measurement in the lower and middle primary grades.

The paper includes:

‣ brief consideration of adult perspectives

‣ defining measurement

‣ young children's beliefs about the nature of measurement and mathematics

‣ implications for the classroom.

"Measurement" has been described as "a system of measures based on a particular standard" (Wilkes & Krebs, 1982, p. 700) and as "a practical activity which enables us to associate a number and a unit with a specific property of an object" (Ministry of Education, 1985, p. 3). Measurement attributes or properties include length, area, mass, volume, capacity, time, angle and temperature (e.g. Board of Studies, 1995; Wilson & Rowland, 1993). The *Curriculum and Standards Framework: Mathematics* (Board of Studies, 1995) also gives emphasis to units and numbers as "essential ingredients for measurement" (p. 58).

An overall message from these references is that measurement is commonly viewed as a practical activity that utilises standards or systems that are applied to a range of attributes by using units and numbers. Marked devices or tools for measuring in formal units include rulers, scales, and graduated containers. Estimation also is a key element within measuring (Wilkes & Krebs, 1982), making reasonable estimates is important, as is the ability to judge degree of precision required (Board of Studies, 1995).

Children's Beliefs about Mathematics: How does Measurement Fare?

Just as children learn mathematics in different ways and through negotiation of meaning construct their own understandings (Ernest, 1991), they also construct beliefs about the nature of mathematics. Of interest in the present paper is how measurement is perceived and whether it is included as one aspect of mathematics.

Children's beliefs about measurement

During a recent lesson with a Years 1/2 class, children volunteered the following responses when asked to tell anything they knew about "measuring":

" You need a measuring tape or a ruler."

" You can rule your page with a ruler."

" You need a measuring cup to measure water."

" You can measure wood with a measuring tape."

" If you are making something in a bowl you need a measuring bowl."

" A level is a kind of ruler. You measure stuff like bricks."

" You need a measuring cup to put medicine in."

These responses suggest that among this class were individuals who had an appreciation of the application of measurement, especially in terms of measures of length and capacity. References to tools such as rulers and measuring tapes suggest the use of standard units (e.g., centimetres), however, while the second quote suggests a link between measuring and rulers, the use of the ruler to rule a page suggests the ruler is used as a straight-edge not as a graduated scale. The reference to the use of the level in the second last quote suggests a comparative form of measurement, where the user aims to bring two objects into line. Once again straightness

is an issue of importance. So while measurement is a concept about which these children have knowledge and familiarity, scope remains for further conceptual development.

Children from a Year 2–3 class were asked also about the concept of measurement. After closing their eyes and thinking about the word "measurement", that is, what they thought it was, what things they could measure, and how they would measure, each child drew a picture. The pictures drawn by "Tommy" and "Alistair" (Figures 1 and 2) show further insights into young children's understandings about measurement.

Tommy described his picture (Figure 1): "My mum is measuring a cake. I'm measuring a light bulb." His mum is holding a ruler to measure "the stuff inside [the cake]". Although Tommy knew cake ingredients are measured, he did not seem to associate the ruler with the ingredients. Tommy knows that rulers are used to measure and that measurement is involved in cake-making but does not seem, in this case, to relate the measurement tool and the attributes measured. His measurement of the light bulb seems not to be based on his own experience: Tommy stated that he had never measured a light bulb but had changed one. The picture suggests Tommy believes measurement has relevance in non-school situations, but was not able to link clearly the measurement activity, the measurement tool, and the purpose.

Figure 1: Tommy's picture of a measurement situation

Alistair's picture (Figure 2) suggests a fuller understanding of measurement. Alistair described his picture : "Me and dad are measuring bits of wood". When asked what they were using he replied: "Dad's measuring tape . . . You could use a ruler too". Alistair's picture shows measuring in a real-life situation and suggests the measuring was occurring for a purpose. Alistair shows an understanding of the possibility of using different but related measuring tools.
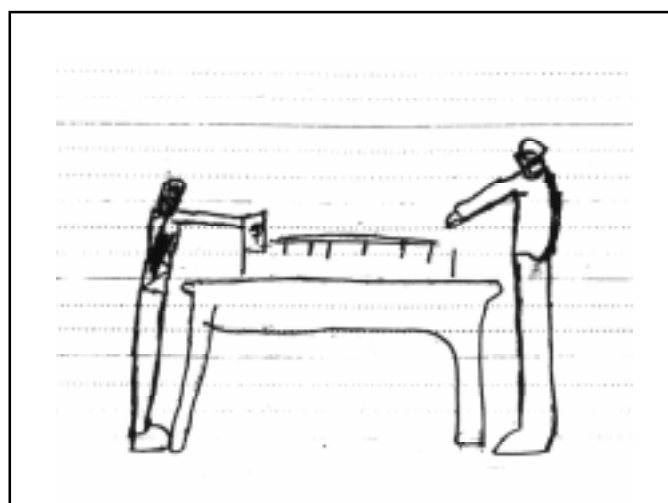
Figure 2. Alistair's picture of a measurement situation

The examples show that these children of about six to eight years of age have some idea of the application of measurement in real-life, non-school situations, but suggest that some measurement understandings such as the relationship between the attribute and the tool are not fully developed. It is not surprising that children of about six to eight years have some concept of measurement as it is a part of the intended school curriculum (e.g., Board of Studies, 1995). The question remains, however, of whether the children see measurement as a part of mathematics.

Children's beliefs about measurement as an element of mathematics

Research shows that children tend to focus on the computational or number aspect as the essence of mathematics (Cotton, 1993; Frank, 1988; Kouba & McDonald, 1987; McDonald & Kouba, 1986; Spangler, 1992). For example, Kouba and McDonald (1987) and McDonald and Kouba (1986) found that for primary and junior secondary children the presence of explicit numbers and operations in a situation was a major factor in identifying the presence of mathematics. There is little evidence of children identifying other areas as mathematics. The narrowness of beliefs of primary school children with, for example, geometry, statistics and probability generally not accepted as being within the domain of mathematics (McDonald & Kouba, 1986), contrasts with the range of content of the intended curriculum at the primary level (e.g., Australian Education Council, 1991; Board of Studies, 1995; National Council of Teachers of Mathematics, 1989).

Children tend also to see mathematics as a collection of rote, mechanical procedures leading to correct answers, and of the teacher and textbook as authorities on mathematical truth (Garafolo, 1989). The emphasis on mathematics as a rule-governed activity appears present within students both at the primary and secondary levels (Cobb, 1985). Mathematics is seen also as "divorced from real life, from discovery and from

problem solving" (Schoenfeld, 1987, p. 197).

However, an indepth study of the beliefs of Year 3 children (McDonough, in progress) suggests that beliefs may be more complex than they appear on the surface. Reference is made here to two case studies, each investigating the beliefs of a Year 3 child. The first child is "Cara" who was eight to nine years of age during the five months of data collection and chosen by her teacher as a low achieving female. The second child is "Emily", an eight year old who attended a different school from Cara. She was selected by her teacher as a high-achieving female. Cara and Emily each were interviewed on ten occasions for about thirty minutes and responded to a total of thirty procedures that included drawing, writing, discussion, sorting words or pictures, and commenting on situations shown in video snippets, children's drawings or photographs.

Cara

Cara's case is cited here as her beliefs about mathematics appear to contrast with those of children reported in previous research. Although number appeared significant for Cara, at times related to the getting of answers, she did not, for example, see mathematics as relating mainly to number. Measuring and estimating in mathematics appeared salient and of personal relevance to Cara, with estimating related at times to guessing. Cara's response to a word wheel task (Figure 3) shows her portrayal of maths as activity-based, involving both physical and cognitive action including measuring and estimating. Cara read her word wheel response: "Measuring, estimating, playing with things, guessing things, using things, doing things, games, learning things like maths".

During her ten interviews, Cara frequently referred to measurement. For example, when given the word "maths" in a word association activity Cara gave the response "measuring". When playing a Password game and asked for a synonym for "maths", Cara gave the word "estimating", and when asked whether she could think of any other words to do with maths she added "measuring". These responses suggest that measuring and estimating may have been the aspects of maths with which Cara was most familiar, or of which she was most conscious.
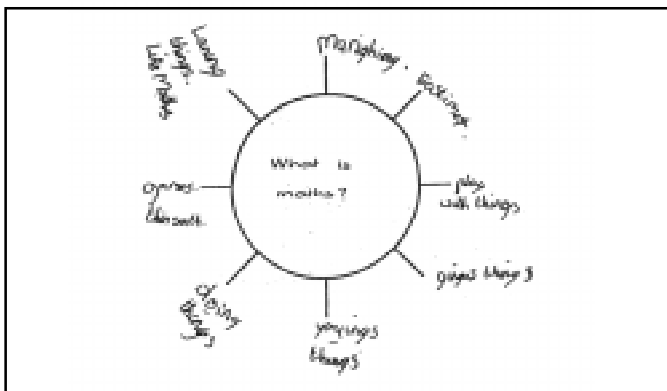

Figure 3: Cara's word wheel response

Cara saw measurement as something to be used in real situations and as having a purpose. For example, she spoke of her father using measuring jugs when baking cakes. When asked to show a maths activity, Cara referred to herself measuring with her father when building a cubby house and demonstrated that she saw a purpose to measurement when building: "Yeah 'cos if we didn't measure it, it would be too big and too small and too wide and too tall". Weighing fruit at a supermarket, measuring the size of a cake to be sure there were fair shares, and measuring mass in a science lesson were considered to be mathematical. These situations indicate that for Cara, measurement activities involving length, mass, and capacity were relevant to the school, the home and the workplace, with maths being used to meet a need for the person involved.

Formal units as mathematical tools were mentioned or implied at times such as when speaking of her father making cakes: "He gets a jug that goes up to 150 and he puts the cream in", and "He has to measure how big they want it like on the bottom, he goes, oh how big is the circle, and then he gets a ruler and he measures it everywhere and then he cuts around the circle and sticks it on whatever and it's a [wedding] cake". Formal units were referred to specifically when Cara described two photographs which she interpreted as a girl reading a packet and baking a cake: ". . . she's seeing like, she's seeing on the back here to see if it's 1 mil (mL) of water or 2 mils (mL), and there she's putting the water in".

As in the example of Tommy, above, Cara appeared to show one instance of not correctly matching a measurement tool and an attribute. When concluding a discussion regarding a photograph of a man measuring a big fish with a spring scale Cara said that he used the scale instead of the ruler because "the ruler wouldn't fit that big". This suggests that while Cara was able to talk about a number of situations in which measurement was occurring, there were some limitations in Cara's understanding of the attribute to be measured and the appropriate tool.

The use of formal units of measure of capacity and length were considered mathematical but Cara showed indecision as to whether situations, which according to curriculum documents would be classified as informal measurement, should be called "measuring". For example, when discussing a photograph of children measuring each other with string, Cara was not sure whether the use of string would be measuring. She referred to her own measuring of length in the school situation, but indicated that she used a tape measure.

In a recent experience of my own with a class of Prep–1 children who had used string to "fit around" objects, the children referred three days later, without prompting, to their string activity as "measuring". After formal measurement experiences, these children too, at one time, may question whether informal measurement activities are measurement.

One factor of seeming importance in Cara's beliefs about the nature of mathematics, particularly in relation to measurement, was her interaction with her father. For example, his work as a pastry cook was observed by Cara to involve a lot of measuring, and considered in turn to involve a lot of mathematics. This may have accounted, at least in part, for Cara's seemingly positive attitude to, and personal affinity with, mathematics, particularly with measurement and estimation. Mathematics with a real purpose in a genuine situation seems to have influenced the formation of Cara's beliefs. Doing or using mathematics together with her father seemed to be of importance to Cara. This suggests that for children to come to value mathematics, and particularly measuring, context may be beneficial, and so too may be the reality of the situation and possibly a close or caring relationship with the other users of mathematics.

The schematic portrayal (Figure 4) of the summary of insights gained into Cara's beliefs about maths suggests a breadth of perception, and gives some indication of the complexity and interrelatedness she portrayed. Number was seen as an element of maths, but just as salient, if not more so, were measuring and estimating. The broken lines signify indecision as to whether informal length and mass activities are measuring and whether estimation and guessing are the same.
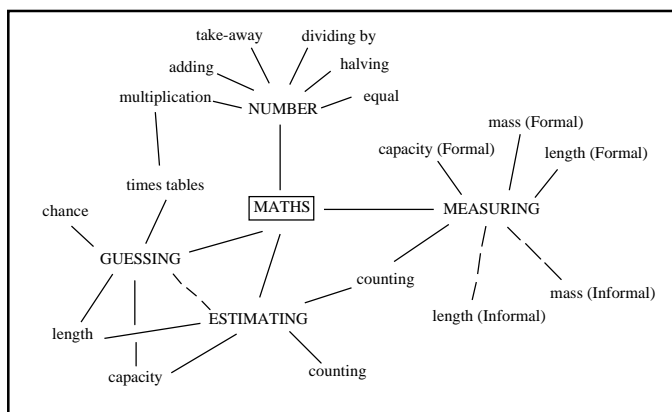
Figure 4: Cara's beliefs about mathematics – a schematic summary.

Emily

The overall impression from Emily's data is an emphasis on mathematics as number and related operations, suggesting a simplicity of belief. Such an impression is gained, for example, from Emily's word wheel response (Figure 5).
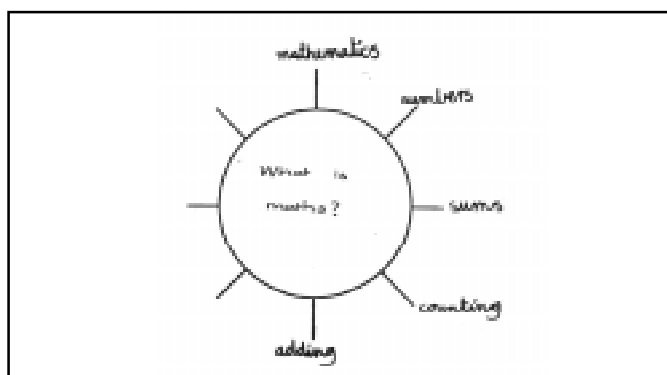
Figure 5: Emily's word wheel response

However, Emily's beliefs about the nature of mathematics, and the relationship to measurement, appear to hold subtlety and complexity that is revealed only from a closer examination of some interview responses.

For Emily, measurement does not automatically indicate use of mathematics. For example, Emily described the photograph of one child measuring another with a piece of string as "measuring how tall she is" but she did not indicate that she saw this situation as involving mathematics. She described a photograph of children measuring a bench as: "She is trying to measure how long is the bench and maybe that's not maths because, mm, if, no numbers or counting or whatever". Emily did not recognise comparison of lengths in this photograph as mathematical activity although she described it as measuring. It is significant that Emily spoke of the situation in the context of measurement, but looked for numbers or counting to decide whether the activity was mathematical. On another occasion she commented: ". . . it's nothing to do with maths because maths is like measuring and counting". An informal capacity activity, measuring cups of rice, was considered measurement because her mother had to "count how many cups to put in the rice cooker". Emily stated also that her mother was using sums.

It appears that Emily saw a possible link between maths and measuring, but with numbers or counting as a necessary connector. It appears that she believed that if numbers or counting are not present, then measuring cannot be considered as maths.

In other interviews Emily went further to suggest that mathematical operations make a measurement situation mathematical. When speaking of whether measuring in making jelly was mathematical, Emily stated: "I'm not really sure because you have to measure like you have to count two teaspoons of sugar [but] it's like no adding or something like that, but there's still numbers". Although Emily saw measuring and counting in the jelly-making, she tended not to see it as mathematics, mainly because of the absence of operations with number.

Emily appeared not always consistent in her beliefs; during the five month interview period they would have been in a state of development as beliefs tend to be, but she showed some indication that she believed measurement is not necessarily mathematics.

Emily implied that measuring with a ruler or tape measure was mathematical but she did not consider two mass situations involving the use of formal units as mathematical activity although she spoke of kilos or grams in each case. The numbers on the supermarket scale were visible in the photograph, their purpose seemed to be understood by Emily, but it appears Emily did not perceive their use on this occasion as mathematical. As on other occasions, Emily showed that although she believed numbers were necessary for mathematical activity, they were not sufficient.

Figure 6 portrays a schematic summary of the overall insights gained into Emily's beliefs showing an interweaving of concepts. The portrayal is different in structure from that of Cara due to different links, relationships and emphases in beliefs. Situations printed in italics were *not* considered to be mathematical.
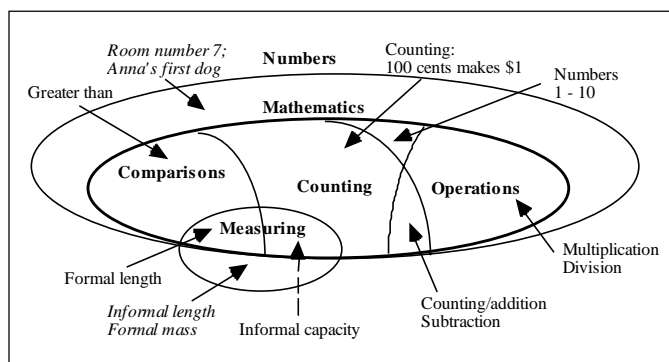

Figure 6: Emily's beliefs about mathematics – a schematic summary.

Unlike Cara, Emily saw mathematics mainly as a school activity with little application for others in non-school environments: Emily thought her mother used maths when cooking. The only out-of-school mathematical activity Emily suggested in relation to herself was essentially school-based, such as homework. Emily did feel positively about maths but did not seem to consider it as a feature of school and non-school activity in the same way that Cara did.

Emily's focus on number as mathematics but underlying complexity of beliefs in relation to measurement, suggests that although young children's beliefs about the nature of mathematics may appear simple on the surface, they can be quite complex. We should not assume that children simply believe that the presence of number will make a situation mathematical, nor should we assume that the use of the word measure implies that a situation is seen as mathematical.

What Does the Investigation of Children's Beliefs Tell Us?

Many of the beliefs discussed in this article are not commonly revealed in the day to day running of a classroom. Thus the insights presented above provide a focus for looking at children's learning from a different angle, and therefore to help develop an appreciation of the perspectives children take to their learning of measurement.

Responses from children in a whole class discussion, from Tommy and Alistair's drawings, and from indepth interview data from Cara and Emily, can extend teachers' knowledge about the type and complexity of beliefs that may underpin children's learning of measurement as a part of mathematics. They suggest also a number of points that can be taken into consideration in planning for teaching.

Whole class Year 1–2 responses regarding measuring

Reflection on the listed responses suggests that:

- these children believe measurement has application in real life situations
- length and capacity are attributes familiar to the children
- some of these responses suggest scope remains for further conceptual development linking attributes and units of measure.

Wilson and Rowland (1993) state that teaching of measurement should incorporate real world applications. It appears that these children may have encountered applications of length and capacity, either at school or elsewhere. It appears that building up awareness of measurement has possibly been a factor in their experiences.

Whether the study of other attributes in addition to length and capacity is appropriate for children at this level is open to discussion. It is noted that the *Curriculum and Standards Framework: Mathematics* [CSF] (Board of Studies, 1995) refers also to Time and Mass at Levels 1 and 2.

Whether the real world applications these children are assumed to have experienced have involved them in the necessary actions of being actively involved in measuring, and encountering problems associated with choosing units and dealing with fractional parts (Wilson & Rowland, 1993) is not known. A focus on choosing units which relate well to an attribute is an appropriate activity for Year 1–2 children (Board of Studies, 1995, p. 60, Choosing Units substrand, Level 2). As choosing units is one key stage of the measurement process (Board of Studies, 1995; Reys, Suydam, Lindquist, & Smith, 1998), it is worthwhile to consider that whole process.

The measurement process, that is, the process of assigning a number to an attribute of an object or event, is said to have common features for each of the attributes

covered at primary school level. These are:

I. Identify the attribute by comparing objects

II. Choose a unit

III. Compare the object to the unit

IV. Find the number of units

V. Report the number of units.

(Reys et al., 1998, p. 247)

This cycle will occur many times for each attribute,

"... the first time using only arbitrary units and counting, the next time using standard units and counting, and only then introducing instruments or formulas. The cycling should take place over several years for the first attributes studied, but after several attributes have been introduced, the length of the cycling should be shortened."

(Reys et al., 1998, p. 247)

Agreement with the belief that the first attributes should be studied for a number of years before formal units are studied is found in the CSF (Board of Studies, 1995) where facility with the use and choice of appropriate formal units is not expected until the end of Level 3 (end of Grade 4). Similarly, in a paper devoted to children's developing understandings of linear measurement, Rankin and Pengelly (1985) identify tentative stages of development during three years of exploration. Although the stages are discussed specifically in terms of length, they can usefully be applied to other attributes. The development stages suggested are:

▸ awareness of length as an attribute
includes Free Play and Sorting and Classifying (involving ordering, equality, comparing, conserving, estimating and approximating)

▸ using units to match and measure lengths

▸ awareness of the importance of accuracy

▸ using uniform units to measure

▸ awareness of the unit of measure affecting the outcome of the measure

▸ using appropriate units of measure

▸ awareness of and using standard units of measure.

It seems important that, for development through the stages, children experience much hands-on measuring, and that through reflection they are facilitated in drawing out key ideas from their experiences. Questioning, challenging and probing from other class members helps children to reflect and therefore assists them to construct ideas meaningfully rather than just to memorise (Wilson & Rowland, 1993). Rankin and Pengelly (1985) recommend the provision of materials with the mathematical ideas inherent in them, the use of tasks that are open-ended to encourage exploration, and the opportunity for children to talk about their activities.

An open-ended question used by Rankin and Pengelly that helps children build up awareness of length as an attribute is "Can you sort these objects?" (e.g., sticks). Other open questions, and strategies for making them up, can be found in Sullivan and Lilburn (1997). For example, an area question suitable for use in the junior classes is "Max made a flat shape using five square tiles. What might Max's shape look like?" (Sullivan and Lilburn, 1997, p. 57). This question assists children to see that different shapes can have the same area. Pengelly (1985) and Clarke (1998) have shown the value of the open-ended task "Make a clock" or "Draw a clock" for helping children focus on clocks and for enabling teachers to gain some insights into children's understandings. Discussion is important to find out children's reasons for elements of their drawings. A question that focuses on the understandings listed in Rankin and Pengelly's development stages is: "Tara measured a table and said it was 10 sticks long. Michael measured the same table and said it was 12 sticks long. How might this happen?" (Sullivan and Lilburn, 1997, p. 68).

Drawings by Tommy and Alistair

Reflection on the drawings suggests that:

▸ drawings are one approach through which some insight into children's beliefs can be gained

▸ children within one class can be at differing levels regarding awareness of attributes and understanding of appropriate tools for measuring attributes.

As discussed above, it is important that children make choices in their use of measuring tools. Their choice of tool might incorporate either informal and formal units. It is important that children develop a range of understandings related to units. Reys et al. (1998) list the following understandings:

1. A measurement must include both a number and a unit.

2. Two measurements may be easily compared if the same unit is used.

3. One unit may be more appropriate than another to measure an object.

4. There is an inverse relationship between the number of units and the size of the unit.

5. Standard units are needed to communicate effectively.

Once again, it is obvious that children need to do much measuring and to reflect upon their actions and findings to be able to draw out key principles.

Case studies of Cara and Emily

Reflection on the two cases suggests that:

- ‣ young children construct beliefs about mathematics

- ‣ young children may not necessarily consider all measuring as mathematical

- ‣ young children's beliefs do not necessarily reflect those that underpin curriculum documents

- ‣ young children's beliefs may be complex and subtle

- ‣ young children's beliefs can change as do those of adults, although not necessarily consciously

- ‣ at any one time formal and informal measuring may not both be classified as "measuring".

These findings suggest we should not assume that children see measurement in the same way as do writers of curriculum documents, or as do other adults. Discussion and reflection upon measurement activities can help children become aware of and consciously develop their beliefs. The findings suggest also that teachers should play an active role in assisting children to become aware of their uses of measurement.

Reflection on Cara's case suggests also that:

- ‣ contrary to the findings of previous research, young children may see mathematics as more than number

- ‣ young children may consider processes of mathematics, such as estimation, as important elements

- ‣ young children's perceptions of, and attitudes towards, mathematics and measurement may be related to their observation of, and/or joint use of, mathematics by and with important others in real and relevant situations.

Cara valued measuring with another person. Cara may be very developed in her interpersonal skills and may prefer to work in this way. Consideration of children's strengths, as for example discussed in the multiple intelligences theory of learning (e.g. Armstrong, 1994; Gardner, 1983) may benefit young learners of measurement.

Reflection on Emily's case suggests also that:

- ‣ a child's identification of a situation as measurement may be contingent upon the presence of numbers, counting, or even operations with numbers

- ‣ that although a child may appear to associate mathematics essentially with numbers, some measurement activities could be included within but not identified as such.

It appears from Emily's responses that a child may see measurement only through a "number lens". It has been observed by Dickson, Brown, and Gibson (1984), in a review of studies concerning learning of measurement concepts, that "children's experience of measurement usually begins with, and is often limited to, number, with little, if any, opportunity to explore the earlier principles upon which measurement is founded" (p. 80). They state that measurement cannot exist without numbers but experiences should include not only those of discrete counting. For example, measurement situations in the school should include use of estimation and approximation as well as ideas of upper and lower limits. Estimating and finding the number of playing cards to cover a table is a suitable task for Year 3–4 children. The discussion should include how to take into account the little bits not covered or overhanging. Similarly, the area of an irregular shape made with string can be discussed, with upper and lower limits of number of cards, or squares on a grid considered (Dickson *et al.*, 1984). This can develop "some notion of the approximating nature of measurement" (p. 83).

Conclusion

This paper has proposed that children's beliefs about the nature of measurement can assist teachers in planning for teaching in the lower and middle primary school grades. Through reflection upon children's beliefs, a number of issues and principles in relation to the learning of measurement have arisen.

Children "come to recognise the importance of measurement and become familiar with the concepts of length, mass, capacity, time and money . . . [they compare] objects and quantities with respect to particular attributes . . . [and come to] see the need for unit measures . . . [and] are introduced to formal units by level 3" (Board of Studies, 1995, pp. 58–59). For each attribute, children begin with the use of informal units and, over a period of much hands-on activity and reflection, come to understand the need for, and then use of, formal units.

The long-term objective, as expressed by Rankin and Pengelly (1985, p. 2) in relation to the attribute of length, but generally transferable to other attributes, is for children to:

- ‣ understand the conventional measures;

- ‣ be able to select the appropriate unit to measure any given length;

- ‣ execute the measurement with understanding and precision; and

- ‣ apply the information back into the occasion from which the measurement was initiated.

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"What Did You Say?" Auditory Processing for Students

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Children are commonly referred to Outpatients at the Royal Children's Hospital because parents and teachers are concerned that they do not seem to listen, are inattentive, and not progressing as expected with literacy. Following a neurodevelopmental, cognitive and behavioural assessment, and paying particular attention to noting any difficulties with vision, hearing, speech and language, the most common finding is a delay in the ability to process auditory information. This is the main difficulty in more than 80% of children presenting with such concerns. The ability to process information develops rapidly between the ages of 3 and 7 years and determines the number of isolated pieces of auditory information (e.g. digits or sounds) or the length of a sentence that can be retained in short-term memory and recalled. It therefore governs the length and complexity of instructions that can be understood or the number of letters (or sounds) in a word that can be sounded out, or blended together in decoding words.

Development of the ability to process auditory information is reflected in the expectation of parents and teachers that children will become more able to understand increasingly long and complex sentences. Preschool teachers give very short directions if they wish their instructions to be understood. By the end of year 2 most children can follow almost 'adult length' sentences. It is estimated that 10–15% of children (several per class) have a delay in the development of this ability. Such a delay places the child at significant risk of not acquiring necessary information in the classroom and of under achievement in progress with literacy and numeracy. Children are often considered to be inattentive, disruptive, 'deaf' or disinterested and a cycle of failure may follow.

As children are often identified late (after year 4 or 5) when they have missed much vital information and the children themselves are convinced they must be unintelligent, a study was planned to identify children at risk in the early years of schooling. If teachers are aware of the range of ability and adapt their classroom practice, this cycle of failure may be prevented. A test for assessment of auditory processing using digit span and sentence length has been developed for use by teachers and trialled during 1999. One thousand prep children from 40 representative government schools were assessed and literacy data collected at the beginning of the year. Data will also be collected again at the end of the year. Teachers were provided with professional development regarding the implications for classroom teaching practice for the range of auditory processing ability within the class.

The selected children were given the Auditory Processing Assessment and had participated in the trial of the Prep Entry Assessment Procedure. The assessment comprised three sections. A gross hearing assessment to ensure that the child has adequate hearing to hear the speaker on the tape, and also prepares the child for the repetition task required for the rest of the assessment. The second task requires the repetition of sentences. These sentences increase in the number of words and their complexity as the test proceeds. The third task is the repetition of numbers. These numbers are presented at one-second apart intervals, the number of digits to be recalled increases as the test progresses.

The teacher scores the assessment by noting the correct and incorrect answers. The numbers and sentences need to be repeated exactly, to be scored correct. Once the child is scored incorrect in two consecutive presentations of a sub-test, the maximum correct level is recorded.

Children in Prep need to be able to repeat three-digit combinations and eight word sentences to be regarded as having adequate Auditory Processing.

Digits

The ability to listen to and then recall three digits correctly gives us an indication of the child's ability to hold and retain three non-language-related pieces of

information at a time. For a child to begin to sound out and blend sounds together they must be able to hold and sequence them into something meaningful. E.g. C….A….T requires the child to hold three unrelated sounds and combine them into the related form of CAT. For the child who can only retain two pieces of unrelated information at a time this task becomes impossible. A suggested strategy for teaching the sounding out or spelling of words is to "chunk" the sounds into meaningful sub-units C…….AT so that the child has a word attack strategy that can enable them to attempt the reading or spelling of an unknown word.

Sentences

When a child listens to someone speaking they need to be able to hold and sequence the incoming information into a meaningful unit. As part of normal development of children the length of the sentences that can be listened to, sequenced and understood increases with age. This occurs at varying rates for each individual. For some children this ability develops at a slower rate than 'average' and impacts significantly on their ability to listen, learn and interact with others. This assessment requires the child to accurately recall an eight-word sentence to show adequate abilities for listening and learning in the prep classroom. At this level we have shown that approximately 15% of children at this year level will experience difficulties in accurate recall. The child will have heard each of the words said to them but be unable to hold, sequence and process its meaning. They have not 'heard' what has been said to them.

For the child in the classroom this has many implications.

▸ Instructions that do not have routines attached to them will not have been 'heard' and so cannot be followed.

▸ Stories that are being read to them may seem a meaningless jumble of words. Children retain their interest in a story if they understand and can follow the plot. Once the sentence length exceeds the listening capabilities of a child they go into information overload. They may retain only parts of what they have heard, or mix it up into a form that is totally unrelated to the original meaning, or they may just not understand and process *any* of the incoming information. The child is likely to lose interest quickly, give up listening and become distracted.

▸ As the child begins to read their abilities to comprehend the words into meaningful concepts is impaired also.

▸ Explanations of new concepts will not be understood, not because the child is not capable of learning them, but because they have not been able to adequately 'process' the new information because of the way it was presented to them. If they have not 'heard' it then they cannot learn it.

▸ Their participation in classroom discussions and other oral activities can also be impaired. When asked to relate an event or story they will find it difficult to sequence their information into a format that then enables them to recount it in a logical sequence. Large chunks of information will be lost in the process.

▸ As the child begins to write sentences and stories their inability to hold and sequence more than a particular length of sentence will interfere with their skill development. This will be reflected in their writing abilities.

These children need to be identified as early as possible in their academic years and suitable strategies implemented to optimise their learning potential. The growth of auditory processing skills depends on **maturation**, not training.

Some basic strategies for speaking to the child are:

▸ Attract the child's attention first.

▸ Break the information into shorter length sentences (less than eight words at a time). They still need to be meaningful units, properly constructed.

▸ LEAVE A PAUSE before the next sentence. The child needs time to process the last sentence before they are ready for more information. Short sentences with no pauses, one after the other, overload the system in the same way as one long sentence does.

▸ Set up routines wherever possible. The child will not need to listen to succeed. Listening is tiring. If the child needs to expend that energy in every area all day long, then their ability to maintain concentration is affected. Keep it for key listening times.

▸ Use a key word to clue the child into the topic or area under discussion.

▸ Repetition can also be effective if used sparingly. Do not repeat the same thing over, but rephrase it where possible. If every message is repeated it may discourage the child from attending to the speaker as they know that it will be said a number of times.

▸ Use visual cues to add information to what you are speaking about but be aware of its ability to distract the child's attention away from the speaker.

▸ Look at the child. The 'glazed' look will alert you to the child being overloaded with auditory information. Start again and be aware of sentence length and pauses.

▸ If important, get the child to repeat the message back to you.

▸ Encourage the child to feel comfortable about letting you know that they do not understand what has been said.

When reading to the child it is important to be aware of sentence length and pauses in your presentation. Sentences may need to have pauses inserted into them at appropriate intervals to ensure that the child can process them and therefore follow the story. Modelling these methods to the child and teaching them how to use these "chunking" strategies when they are beginning to read, will greatly assist their comprehension and understanding of story construction. These "chunking" strategies can also be incorporated when writing.

Care must be taken that numeracy teaching does not involve language-based questions or explanations involving sentences of eight words or more (in prep). For example if a question such as "If there are two cats and one goes away, how many are left?" is used, a 13-word sentence, then the child will be unable to process the question and unable to learn about the concept.

It is difficult for the young child with poor auditory processing skills, whose knowledge of language and its rules is developing, to find the constancy required from what they hear to internalise those rules. What they hear is a collection of words that do not make sense to them and that seem to be joined to each in a changing and unpredictable manner. Their speech may reflect this. Their abilities to write or to predict unrecognised words when reading then becomes greatly impaired. We know the rules and can make reasonable guesses but these young children cannot.

Behaviour

The classroom and playground can be daunting places for children with auditory processing problems. Things happen unexpectedly around them, they get into trouble for not paying attention or for not doing what they are told. How difficult it must be for these children to make sense of what is happening to them. Adults and other children speak at them but every thing becomes a jumble. At times, children are unaware that they have 'misheard' what has been said to them.

Some children become aggressive, resentful or pretend that they don't care. Their behaviour reflects this and they can easily become labelled as behaviour problems whilst the underlying auditory processing delay is the unidentified causal factor. For others, their shy or uncooperative behaviour can be understood if their poor auditory processing skills are identified. More appropriate communication can be set up to encourage the child to participate. On the other hand, a child may be overly chatty and need to direct and have control of communication, because of their poor abilities to understand if others dominate the interaction.

Over time a failure cycle is set up. The child 'gives up' trying to listen because they know that they have failed so many times before. For these children "trying harder" is not appropriate. It does not matter how hard they try, unless the speaker modifies what they want to say and the way they say it, the child still experiences difficulties related to their poor processing skills. Maintaining a good level of self-esteem is difficult but essential for maintaining the child's willingness to learn.

For English as a Second Language (ESL) children, the difficulties that they experience in listening to spoken English in their first few years at school are similar to those of children with poor auditory processing skills. Their lack of experience with the language means that they need the information to be in smaller packages to give them time to process it. Pauses are again essential for this to occur. The development of auditory processing skills in these children will increase faster than children with an underlying slow development. As the language becomes more familiar then their ability to code and sequence will more closely match normal maturational rates. Some ESL children will also have underlying auditory processing problems as part of the normal population distribution.

Optimising the way teachers and others communicate and interact with children experiencing delays in their auditory processing skills will optimise their learning. The preliminary findings from the study confirm that there is a significant number (15%) of children who have a delay in processing auditory information. They are at high risk of under achievement in literacy. When teachers are aware of the range of ability and adjust their teaching practice accordingly, children optimise their progress in literacy and behavioural difficulties are minimised. ■

Home-School Partnerships

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Home–School Partnerships at Maryborough Primary School have been shaped by the introduction of the Early Years Literacy Program.

Our school is in central Victoria and has an enrolment of around 450 students.

At Maryborough Primary School we believe that all parents want their children to be successful at school and that children who are read and talked to daily, and who see their parents reading, will in turn develop a positive attitude to reading.

We believe that the more our school creates opportunities for contact with parents, the better we can understand their children and their lives outside school, and the more successful ideas about how to support children's learning can be shared between home and school.

We believe that positive home–school partnerships have a direct benefit to children's education that these benefits far outweigh the challenges associated with developing positive home–school partnerships. Some of the specific benefits of developing strong home–school partnerships at our school include:

▸ Parents developing new ideas about how to help their children.

▸ Other families benefiting from the knowledge and understanding that participating parents share.

▸ Parents sharing their knowledge of their own children with teachers. Teachers then develop greater understandings about these children.

▸ Parents and teachers sharing understandings about children contribute to the best possible environment for future learning.

Research has given us the following insights:

▸ "Parental involvement includes all those activities which seek to bring together in some way the separate domains of home and school" *Jowett and Baginsky, 1988*

▸ "It appears most critical for children's achievement at school entry age that parents perceive themselves as educators of their children." *Nancy Dunn, 1981*

▸ Parental interest is a more potent influence on children's learning success than parents' background, parents' occupation, parents' cultural background or family income level" *Dawn Snodgrass, 1991*

As quoted in *The Parent Factor*, Australian Parents Council, 1996.

The picture at our school:

In 1997 we visited schools who were part of the Early Literacy Research Project (ELRP). Kerrie McMillin, now Early Years of Schooling Project Officer in our region, conducted professional development with our staff on reading and writing. As a result, we decided to introduce a balanced literacy program. We used the model of the Early Years jigsaw and worked hard at including all aspects of it, especially Parent Participation, which for us focuses on home–school partnerships. Some of the initiatives we have developed include:

Education

▸ Kinder/prep transition education sessions for parents on literacy, numeracy and other curriculum and school issues.

▸ Newsletter articles outlining the value of parent participation and including a suggestion for an activity that parents and children can do together at home.

▸ Classroom Helpers training for all parents who wish to help in classrooms. These sessions, involving class teachers, are usually held at lunch times or towards the end of the day. At these sessions we inform parents about the classroom program and ways they can participate. Strategies for how they can do so effectively are shared, and the importance of confidentiality of information is highlighted.

‣ Partners in Print – parents, teachers and children are involved in these sessions. Interest is built up through the children who then encourage their parents to attend. The sessions are held early in year, during the early evening, to coincide with daylight savings.

Communication

‣ Home–school journals
Class/unit newsletters

‣ Reports
School newsletter

‣ Parent/teacher interviews
Individual Learning Improvement Plans

Involvement

‣ Working bees
Parent club

‣ Swimming program
Cultural performances

‣ Parents helping in literacy program – reading to children, reading with children

Issues:

‣ Family attendance at parent education sessions

‣ Family literacy

‣ Consistency of information given to parents throughout the school

‣ Catering for new families during the year

‣ Ensuring that information is repeated regularly so that families hear it at a time when their child is at the appropriate stage

‣ Orientation of take home books for children at risk.

Imagine the possibilities –
What we might try next:

‣ Encouraging further participation in parent education programs, e.g. Partners in Print and Kinder/prep transition sessions, by making them more accessible, increasing the amount of child participation and making personal phone calls.

‣ Remembering families that arrive during the year, ensuring that we communicate effectively with them.

‣ Ensuring that parent information sessions and parent education programs are held for P–6.

‣ Encouraging parent help for book orientations for take home books

‣ Encouraging parents to participate in the Early Years Literacy Program by reading to children to assist with oral language development.

‣ Making the Reading CD available. This is a program developed at the school, which will be sent home to parents who are unable to attend any information or education sessions. Hopefully this will support them in helping their children at home. ■

Who Am I? A School Entry Assessment Tool

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Background to the Development of *Who Am I?*

Who Am I? was developed as a research tool for the ACER project on curriculum and organisation in the early years of school. This project is investigating the relationship between age of entry to school, school curriculum, teacher expectations and student outcomes in a sample of over 4000 children from preschool to Year 2. For the purposes of this project it was necessary to have a measure of developmental level that would cover the age range from preschool to Year 2 (age 4 to 7 years). It was also necessary to have something that was easy for teachers to administer, either individually or in small groups, and that young children could attempt and would enjoy doing. As part of a research study, it was also necessary to have a form of assessment that could be scored and evaluated independently of immediate teacher judgement or observation, so that we had a means of checking the consistency of the scoring and classification of children's responses.

While developed as a research tool, it soon became evident that *Who Am I?* had a number of advantages for use as a classroom tool to assess children's level of development in the early years of schooling, particularly at the end of the preschool year and on entry to school. It's main advantages are ease of administration and scoring, the relatively short time it takes to assess each child, and the fact that the information obtained provides a valid and reliable measure of the concepts and skills that underlie early literacy and numeracy development. Because the tasks are not dependent on language, *Who Am I?* can also be used to assess children whose knowledge of English may be limited.

The various tasks included in *Who Am I?* tap both underlying processes and learned skills. In this way it enables teachers to distinguish between achievements that are based on specific learning or teaching (such as the child's ability to write his or her own name), and achievements that are based on a more advanced level of conceptualisation (for example, the ability to copy complex geometric forms, or to transform spoken words into written form).

School Entry Assessment

The 1997 National Literacy and Numeracy Plan includes a recommendation for the assessment of all students as early as possible in their first year of schooling. This has led most States and Territories towards the development and trialling of various measures of early literacy and numeracy skills.

The move toward assessment at school entry level in Australia is paralled by similar moves in other countries, and particularly in the UK where baseline assessment on one of a number of recommended instruments is mandatory. Several British instruments have been developed and some data on these instruments is available (see, for example, the Journal of Reading Research, Special Issue on Baseline Assessment (Vol. 22 (1) 1999).

In this context, *Who Am I?* was seen as having the potential to provide a school entry assessment measure that was simple and easy to use, less time-consuming than most other measures currently available, but at the same time providing valid and reliable information on children's level of development. This is also the only instrument available that has Australian normative data based on samples of children from preschool to Year 2 drawn from all the States and Territories (except Tasmania), and which has validity data linking performance on this measure with other objective measures of literacy and numeracy skills.

For this reason, a decision was made to restructure *Who Am I?* so that it could be made available to teachers for classroom use (de Lemos and Doig, in press).

Description of *Who Am I?*

Who Am I? is a little booklet in which the child is asked to write their name, copy a series of simple geometrical shapes (a circle, a cross, a square, a triangle and a diamond), write some numbers, letters, words and a sentence, and draw a picture of themselves. Responses to these tasks are classified into a number of levels showing a developmental progression. Criteria for the classification of responses are provided.

Responses to the various *Who Am I?* tasks are used to construct three scales. A Copying scale, based on the copying of geometric figures, a Symbols scale, based on the child's ability to produce written symbols (numbers, letters, words, a sentence), and a Drawing scale, based on the child's representation of a person. There is also a Total scale based on the child's responses to all the tasks in the booklet. An individual Profile is provided which allows for the comparison of the child's overall score, as well as his or her pattern of scores across the three scales, to be compared with that of children at the same level of schooling. Different levels of schooling have been identified for different State systems according to years of schooling and the structure of the lower primary level. A Diamap for diagnostic interpretations of *Who Am I?* is also provided, as well as guidelines on the interpretation and use of *Who Am I?* results.

Normative information is provided in the form of both age norms and school level norms. These norms are based on the sample of over 4000 children who participated in the research study. Age norms are provided for children from four to seven years or over in three or six-month age bands, and school level norms are provided for the various school levels distinguished across the different school systems.

Technical data on the reliability and validity of *Who Am I?* is available from the research study. The estimate of reliability based on a Quest analysis of item data was .91, indicating a high level of internal consistency for the tasks included in *Who Am I?* A measure of stability of scores over time was provided by the preschool sample in the research study, who were assessed initially in the second term of school (May/June) and again at the end of the school year (November/December). The correlation between the June and November assessments was .82, indicating a high level of stability of the assessment over time for this age group. The scoring of the mid-year and end of year responses was undertaken by different raters, so this correlation also indicates a high level of consistency in the scoring of the responses between different raters.

The validity of a test is not based on a single measure, but on an accumulation of evidence relating to the test and what it measures. In the case of *Who Am I?* evidence of construct validity comes from the data which shows developmental trends over time, with an increase in score both according to age and according to school level, as well as information on the relationship between performance on *Who Am I?* and performance on other measures of early literacy and numeracy skills. Data from the research study indicates correlations of about .6 between scores on *Who Am I?* and scores on the Literacy Baseline test, administered to the pre-Year 1 and Year 1 children in Term 2 or Term 3, and correlations of about .5 between scores on *Who Am I?* and scores on I Can do Maths, a measure of early numeracy skills administered to the same group of children in the mid-year testing program. These results are comparable with other findings reported in the literature which generally indicate correlations of between .4 and .6 between various measures of development or 'readiness' and subsequent school achievement (see, for example, Tymms, 1999).

Origin of *Who Am I?*

Who Am I? arose out of an earlier Copying Skills task (Larsen, 1987), which in turn was developed on the basis of a major longitudinal study of school readiness and achievement undertaken at ACER in the 1970s. In this study a variety of measures *were* used to assess school readiness and subsequent school achievement (de Lemos and Larsen, 1979).

Of the various measures of school readiness used, the measure that tended to show the highest correlation with subsequent school achievement, for children from both English-speaking and non-English-speaking backgrounds, and also for children from different socio-economic levels, was the Anton Brenner Developmental Gestalt Test of School Readiness, with correlations ranging from .64 to .80 with subsequent measures of school achievement (de Lemos, 1980).

Of the various sections of this test, the subtest that showed the highest correlation with subsequent school achievement was the copying sentence task, which required the child to copy a given sentence (Fred is here).

Correlations between this one task and subsequent measures of achievement at the end of the first, second and third years of school ranged from .62 to .70 (de Lemos and Larsen, 1979).

The Copying Skills task was similar to *Who Am I?* in that it included the copying of geometrical figures. It also included various other copying tasks including the copying of specific numbers, letters and a sentence.

However, this task did not provide any opportunity for children to demonstrate their ability to write or to produce numbers, letters or words spontaneously.

In administering the Copying Skills tasks it was found that the copying of numbers and letters was for some children a demanding task that led to a feeling of failure or frustration. It was also found that this task did not always distinguish well between the more advanced children who recognised the numbers and letters immediately and could copy quickly and accurately, and less advanced children who spent a considerable time

carefully copying what, for them, appeared to be a meaningless mark on paper.

In the case of *Who Am I?*, the shift in emphasis from 'copying' to 'writing' was designed to give children more opportunity to demonstrate their level of competence in a situation that was more open and less like a formal test situation, and at the same time to allow for children who were not able to write numbers or letters to move quickly through the booklet, but at the same time to demonstrate their level of development on the copying of geometric figures, and also to attempt the more interesting drawing task at the end of the booklet, without experiencing a sense of failure or frustration.

Theoretical Basis of *Who Am I?*

The use of the ability to copy geometrical figures and to draw a person to assess level of development in children has been long established. For example the ability to copy figures such as a square and a diamond have been included in measures of intelligence and development over a long period of time, dating back to the original Simon Binet test. The reason for the inclusion of these tasks is that they have been found to be valid indicators of developmental level.

Further evidence of the validity of copying tasks as a measure of developmental level is provided by Piaget's research on the development of spatial concepts in young children, which provides a theoretical basis for linking stages in the development of the copying of geometrical forms to broader developmental processes that affect a range of cognitive abilities (Piaget and Inhelder, 1956). A replication of this research in a cross-cultural context has shown that the stages of development described by Piaget are also applicable to children from widely different cultural backgrounds (de Lemos, 1973).

The developmental stages in children's drawings of a person have been well documented (Luquet, 1927), and this task has been used as a measure of developmental level in tests such as the Goodenough Draw̃a-Person test and the Anton Brenner Developmental Gestalt Test of School Readiness (Harris, 1963; Brenner, 1964). Studies of children's early attempts at writing have also identified a developmental sequence, which is linked to a growing understanding of the way in which spoken sounds are represented by print (Ferreiro and Teberosky, 1982).

Research evidence indicates that recognition of letters is strongly related to subsequent achievement in reading (Snow et al, 1998). Relatively less data is available on the link between spontaneous writing and subsequent achievement in reading and writing. Nevertheless such tasks have been found to be good indicators of emergent literacy skills, and have been included in screening and diagnostic measures such as the Middle Infant Screening Test (Hannavy, 1993), and Clay's Observation Survey of Early Literacy Achievement (Clay, 1993).

Advantages of *Who Am I?*

Feedback from teachers who have administered *Who Am I?* has generally been positive. They have found that it gives them a relatively quick and efficient means of getting an overview of where the children are at the beginning of the school year, which can then be used as a basis for planning the teaching program and for identifying children who might need additional support or whose progress should be monitored. Teachers have also commented on the value of *Who Am I?* as a basis for parent/teacher interviews, particularly in cases where parents might have an unrealistic view of their child's capabilities. The fact that the booklet provides a permanent record of where a child is at a particular point in time, and which can be used as a basis for monitoring progress over time, was seen as an added advantage. Teachers also commented on how much the children enjoyed doing the booklets, and how proud they were of their efforts; some of the children were in fact reluctant to give up the booklets, because they wanted to keep them to take home to show to their parents.

Limitations of *Who Am I?*

Like any instrument, *Who Am I?* also has its limitations. It obviously does not cover all areas of a child's development, and should be used in conjunction with other procedures and measures that assess other aspects of a child's progress and development; these would include the child's social and physical skills, verbal language skills, and the skills that underlie beginning reading such as phonemic awareness.

It should also be remembered that assessments based on any one measure are not in themselves sufficient for making judgements about a particular child; any decisions regarding an individual child, particularly in terms of placement in a particular program, should always be based on information from a variety of sources.

It must also be emphasised that *Who Am I?* is not intended to be used as a measure for deciding whether or not a particular child is ready to start school. Children's entry to school should be based on their eligibility in terms of age rather than on an assessment of their 'readiness for school' or their 'social maturity'. The research evidence indicates no advantage in deferring a child's entry to school, and parents should not be pressured to defer a child's entry to school either on the basis of teacher judgement of social maturity or on the basis of the child's performance on a measure of readiness. Children do however vary in their level of development and the skills that they have acquired prior to entry to school, and it is important for teachers to be aware of these differences, and to plan their program accordingly.

Conclusion

Who Am I? provides a manageable, child-friendly and reliable assessment of children's developmental level which is appropriate for children at preschool and school entry level, which is relatively quick and easy to administer and score, which can be administered to children from different cultural and language backgrounds, and which has normative, reliability and validity data based on a national sample of over 4000 Australian children from preschool to Year 2. ■

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C5 Tell Me: Assessing Oral Language for Literacy Learning

Early Years of Schooling Branch

By the time students start school they have a great deal of experience in using language in their home and community. However the nature of these language experiences are often quite different from the language experiences of the classroom. Recognising and understanding the differences in students' language experiences is an important consideration when planning the classroom literacy program in the early years of schooling.

The purpose of *Tell Me,* the story retelling task in the *School Entry Assessment (SEA)* Kit is to provide teachers with a structured basis for observing aspects of a student's use of spoken language. *Tell Me* gives teachers an opportunity to observe vocabulary and the complexity of language structures used by students through the use of narrative. The student is assisted in the task by the use of a well-illustrated text that is shared and discussed with the teacher prior to retelling.

The *Tell Me* task consists of six subsets focusing on:

- comprehension
- sentences
- vocabulary
- organisation
- description
- content.

Results from these subtasks provide an indication of a student's ability to understand the main points of a story and to retell a story that is structured and may be quite elaborate. Instructions for administering and scoring *Tell Me* can be found on pages 21-27 of the *School Entry Assessment – Guide for Teachers* (SEA Kit 1999).

When teachers observe a student's spoken language in a very focused way, they are better able to:

- adjust their teaching to build upon the student's strength in spoken language
- provide effective scaffolds for the student's future language development
- incorporate the student's skill with narrative into other literacy activities
- monitor the student's progress in the use of spoken language.

The *Tell Me* task consists of two phases: familiarisation and assessment.

The purpose of the familiarisation phase is to help students understand the process of retelling a story so that an audience understands it and knows what is happening. For this reason it is suggested that teachers spend time introducing the retelling process to students before actually assessing the student with the text from the *Tell Me* task.

Early in the school year, when teachers are establishing classroom routines and developing a collaborative classroom environment, is an ideal time to introduce the familiarisation phase of the *Tell Me* task. Familiarisation with the process can be introduced when the teacher reads to the whole class or small groups of students. Over time the teacher models retelling and provides opportunities for students to retell stories to each other.

The books used during the familiarisation phase are selected from books available within the classroom and should be of a similar length and complexity to the books provided for the *Tell Me* task. In all other respects the activity follows the same procedure as the actual assessment. The familiarisation phase also provides teachers with an opportunity to practise how to make the judgements required during the assessment phase.

Teachers will be guided in their administration of the *Tell Me* assessment by informal observations they have made about the student's confidence and use of spoken language during the familiarisation phase.

There are two steps in the assessment phase: collaborative reading of the text and retelling.

Prior to commencing the collaborative reading it is essential that an audience be selected to listen to the retelling. Choice of audience is important as the success of the task relies on creating a situation that is as realistic as possible. An audience can be one other student or a small group of students but it is important that the audience does not repeatedly hear the same story as this decreases the validity of the task and often leads to the audience prompting or interrupting. Utilising students from other classrooms or year levels is an effective way to create an interested audience.

Once the audience has been selected the teacher begins the collaborative reading step with the student. From the six books provided for the retelling task the teacher selects two or three books and invites the student to choose one that the teacher will read. In preselecting two or three books the teacher considers the interests of the student and their skill in using language in informal situations, remembering that the purpose of the activity is to observe vocabulary and the complexity of language structures used by the student.

During the reading of the book it is important to ensure that the student is supported in listening to and talking about the text. Purposeful questions and comments clarify and extend the student's understanding of the text and enable the student to contribute further. At the end of the reading the teacher asks the student three comprehension questions which appear on the appropriate record sheet in the *School Entry Assessment – Guide for Teachers* (SEA Kit 1999).

The student then invites the audience to listen to the retelling of the story. It is very useful to utilise a cassette recorder during this stage as it provides an opportunity to refer to the response at a later stage. Many teachers find that a recording of the student's response to this task and other language activities are useful inclusions in the student's literacy portfolio.

During the retelling step the teacher needs to encourage the student to turn the pages and may provide encouragement to the student to continue moving through the story. The teacher scores the student's responses in line with the description provided in the *School Entry Assessment Kit – Guide for Teachers.*

While the student is retelling the story the teacher focuses on particular aspects of the student's spoken language including:

▸ the complexity of the sentences used

▸ the complexity of the student's vocabulary

▸ shaping and continuity of the story line

▸ expressive features of the student's spoken language.

Students who have experienced difficulty with the retelling task often need further assessment. Aspects such as health, welfare, social and cultural considerations need to be addressed prior to planning the learning program for these children.

Activities such as collaborative reading with the teacher or a classroom helper, language experience activities and participation in classroom conversations in small groups will be useful for these students. Teachers should structure opportunities for these students to describe their own experiences and recount familiar texts. The use of poems, chants, games and books provide a further opportunity for students to learn about the structure of language.

Students who demonstrate competent use of language through the **Tell Me** assessment understand the structure of stories and can generally use language effectively for a variety of purposes. They are able to make connections between their own experiences and those represented in text. Opportunities for these students to further develop their spoken language may be provided through focused conversations and explicit instruction within the two-hour daily literacy block.

The assessment of language through the use of **Tell Me** provides teachers with an opportunity to develop programs that accurately meet the learning needs of students on entry to school. It is a starting point for continuous, systematic observation over time and provides classroom teachers with an insight into the strengths and needs of students in their classrooms. ■

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Using KIDMAP in the Early Years
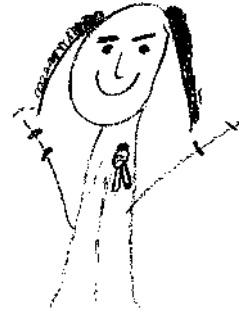
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Using KIDMAP within your school will be of great benefit because once you have an understanding of how it operates, staff will be able to:

1 Store curriculum

2 Plan for teaching

3 Record progress in the CSF – KLAs, strands, outcomes

4 Record progress of your own curriculum

  ‣ Generate lists of groups with which to work

  ‣ Check a particular child's progress across levels of the CSF. This is a new feature.

  ‣ Profile students and groups. Graphs can be generated at any time to show teachers class progress in meeting Literacy targets.

It can be encouraging for teachers to observe improvement in results which is easily achieved through KIDMAP.

1. Early Years Framework

‣ It is easy to find the Early Years Framework in KIDMAP. It sits at the top of the strand and outcome sections.

‣ It is not necessary to keep referring back to the outcomes in the teacher's manual for Reading when using KIDMAP, as teachers soon become very familiar with what is in each framework ie Beginners, Emergent, etc.

‣ The notes from *Teaching Readers in the Early Years* describing each framework are in the detail section of the framework. It's easy to copy them from here into other Literacy documents.

‣ The notes for schools section allows customisation of outcomes which can then be stored on KIDMAP and edited.

‣ Once there is some recording in KIDMAP teachers can generate graphs and analyse what is happening in groups, year levels, or for particular children. KIDMAP generates lists of children who have achieved, or who are yet to achieve an outcome. These lists can be used to create groups for small group instruction and learning centres.

‣ Teachers can generate a checklist to help get started from *Student Outcome Levels in a Strand.* They can give 1 2   3 against children's names. Some teachers prefer to work this way. It is a good way to start. When teachers become more familiar with the framework, they no longer need this prompt. Codes are defined at the bottom of the KIDMAP page.

2. Reading Recovery Text Levels Framework

‣ This framework is suitable for recording a child's progress through the Reading Recovery Text Levels.

‣ This framework is suitable for classroom teachers and Reading Recovery teachers to record information.

‣ A Reading Recovery teacher would open this framework in the Recording window each morning. When the child starts a new level, teachers would award a 3, if a child stays at the instructional stage teachers would award a 2 and when they get over 95% accuracy, established is awarded.

‣ Classroom teachers would record on Text Levels at least once a term.

‣ If teachers set Reading Recovery up as a Student Tag, they are able to accurately track the child's progress in literacy through the levels.

‣ When children move between schools it is possible to send the records of exiting students via edumail as an attachment to be imported into the new school's KIDMAP or you can send the records on a floppy disk

‣ Transient children would benefit greatly by having all records sent electronically.

3. Text Benchmark Framework

‣ This framework is recorded against once a year, it is an accountability framework and best recorded by the coordinator.

‣ Teachers only record the number one in one of the options for a text level.

‣ Teachers backfill previous levels with established. That is, if the child is on level 15, he/she would have an established for levels one and five. Teachers record one against his / her accuracy level in Level 15.

‣ The data gathered is useful for next year's teacher.

‣ It can be recorded in the Annual Report.

4. Individual Learning Improvement Plans

‣ We use KIDMAP to write Individual Learning Improvement Plans using the Early Years Framework.

‣ The Plan is small enough to be pasted inside a book cover.

‣ It has a place for notes to be hand written during the interview.

‣ Some teachers type the information into a Word document.

5. The Moderation Process can be Assisted by KIDMAP

Matching is the process of comparing actual student performance with all of the benchmarks and requirements of learning areas or strands.

‣ The main use of matching is for deciding when to award strands or learning areas when progress has only been recorded on outcomes.

‣ Part of the matching process is the option to let KIDMAP automatically award strands and learning areas to students once they have achieved these minimum requirements.

‣ Matching analysis can only be performed if teachers have set minimum performance requirements for outcomes, strands and learning areas: outcome benchmarks, essential outcomes, Strand Balance Minima, and Learning Area Minima.

‣ There are a number of different ways that teachers can match student performance with learning area or strand requirements.

‣ The Essential Balance Minimum (EBM) match for assessing progress on a learning area is a comparison of the student's performance with a learning area's Essential Outcomes and balance minimum (minimum outcomes required), as well as the Essential Outcomes and balance minima for the learning area's strands.

‣ The Help section of KIDMAP can help teachers understand this process.

Some Personal Reflections on Implementing KIDMAP

‣ A whole school decision to use KIDMAP as a tool to work smarter is essential for success.

‣ It's advisable for the KIDMAP key person to be tenacious, patient and a thoroughly prepared classroom/specialist teacher.

‣ Good hardware is essential and technical support is advisable.

‣ If schools are networked KIDMAP is very easy to use.

‣ Recording straight after assessment occurs avoids the duplication of work.

‣ The Sale KIDMAP book is useful if teachers need support in understanding the structure of the CSF.

‣ Teachers may want a KIDMAP team in their school. However, one enthusiastic person is enough to guide the implementation.

‣ KIDMAP can be written into performance plans. It is easy to monitor the implementation process and gauge the success of the indicators of the performance plan. e.g. "All teachers will record in KIDMAP in Strands in English and Maths by June. In December all teachers will record in English, Maths and one other KLA."

‣ The best training is one-on-one. The KIDMAP Key Person can train others on a needs basis. Setting time aside for training with each staff member in each function as required.

‣ A sense of humor is essential with all staff when things go wrong.

‣ Writing KIDMAP codes on worksheets and units of work helps to focus on the CSF.

‣ Early Years Frameworks and KIDMAP encourage teachers to utilise data to drive teaching.

‣ CSF implementation and KIDMAP work together beautifully. It's worth considering CSF11 with KIDMAP.

‣ The KIDMAP help line is outstanding when support is required.

‣ Reporting on Early Years Texts and End of Year in Strands is very easy and efficient.

‣ Do not DO KIDMAP! It is not another framework. It is simply a tool to use to assist teachers in the many aspects of their roles as educators. It will not do everything for every teacher, but it can help us to work smarter – and is especially useful in the implementation of CSF. ∎

C14 Mathematics Intervention

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A *Mathematics Intervention* program has been established at Boroondara Park Primary School for children "at risk" of not succeeding with Year 1 mathematics. The program is based on current research that shows that children become numerate by progressing through five counting stages. The development and results of clinical interviews used for testing will be discussed along with strategies that have been used to assist children overcome common difficulties identified by the testing. The importance for classroom teachers to be able to identify each child's strategies and thus their counting stage will be stressed as a starting point for numeracy teaching in the early years. The presentation will highlight those strategies used in the intervention program that can be modified for classroom teachers to incorporate into their mathematics program.

Mathematics Intervention is a collaborative project involving the Principal and staff of Boroondara Park Primary and a mathematics educator from La Trobe University (Pearn, 1994; Pearn & Merrifield, 1996; 1997; Pearn, Merrifield & Mihalic, 1994) and was developed by three primary teachers who recognised there was a growing number of students who were not succeeding with school mathematics. The program was designed to identify, then assist, children in Year 1 "at risk" of not coping with the mathematics curriculum as documented originally in the National Statement on Mathematics for Australian Schools (Australian Education Council, 1991) and more recently the Victorian CSF (Board of Studies, 1995). Year 1 was chosen as it was felt that the earlier the intervention was provided in mathematics the more effective it would be as with the Reading Recovery program (Clay, 1987).

Previous Research

Developed in 1993 the *Mathematics Intervention* program features elements of both Reading Recovery (Clay, 1987) and Mathematics Recovery (Wright, 1991; 1996) and offers students the chance to experience success in mathematics by developing the basic concepts of number upon which they build their understanding of mathematics. Students are withdrawn from their classes and work in small groups with the additional assistance being provided by a trained specialist teacher who provides a program that promotes the development of their mathematical skills and more efficient strategies.

The theoretical framework underpinning *Mathematics Intervention* is based on recent research about children's early arithmetical learning (Steffe, von Glasersfeld, Richards and Cobb, 1983; 1988; Wright, 1991; 1996) and about the types of strategies used by children to demonstrate their mathematical knowledge (Gray & Tall, 1994). In particular, the program documents students' progression through the counting stages as developed by Steffe et al. (1983, 1988) and is summarised below.

Counting stages: The five counting stages were developed in theoretical work by Steffe, Cobb, von Glasersfeld and Richards (1983) and in summary are:

1. *Perceptual.* Students are limited to counting those items they can perceive.

2. *Figurative.* Students count from one when solving addition problems with screened collections. They appear to visualise the items and all movements are important. (Often typified by the hand waving over hidden objects.) If required to add two collections of six and three the student must first count the six items to understand the meaning of "six", then count the three items, then count the whole collection of six and three.

3. *Initial number sequence.* Students can now count on to solve addition and missing addend problems with screened collections. They no longer count from one but begin from the appropriate number. If adding two collections of six and three, students commence the count at six and then count on: six, seven, eight, nine.

4. *Implicitly nested number sequence.* Students are able to focus on the collection of unit items as one thing, as well as the abstract unit items. They can count-on and count-down, choosing the most appropriate to solve problems. They generally count down to solve subtraction.

5. *Explicitly nested number sequence.* Students are simultaneously aware of two number sequences and can disembed smaller composite units from the composite unit that contains it, and then compare them. They understand that addition and subtraction are inverse operations.

Our research has confirmed this work but experience with interviewing Year 1 students leads us to believe that there is an earlier counting stage which we have called Stage 0. This is the stage where students recite the verbal sequence, either successfully or unsuccessfully, but do not seem to realise that we count for a purpose. Thus their counting is really just a recitation of number names. At this stage they do not have one-to-one correspondence. That is, they are unable to co-ordinate the number words with the items being counted.

We have also observed that within some of these counting stages there appears to be a progression in the types of responses by children at the beginning of the stage compared to a more sophisticated or efficient strategy when they have consolidated within that stage. In Table 1 we have given the counting stage, an example of a task and the responses that indicate whether a student is beginning at that stage or is using a more efficient strategy within that counting task. In bold we have included a "teacher-friendly" name for each stage. For example, we have called Stage 3 the "*count on*" stage and have shown how students' responses become more efficient when they count on from the larger number rather than the first number they are given.

Counting Stage	Example of task	Indicator for "beginning"	Indicator for "efficiency"
Stage 0 **Verbal count** When attempting to count, students are unable to coordinate number words with items being counted.	Count out loud for me starting at one. I will tell you when to stop.	The right words are used but may be in the wrong order: one, two, three, four, six, five. A number could be omitted: one, two, three, five, six. Usually limited to counting to a number less than ten.	Right words in the right order up to ten but less successful from 10–20.
Stage 1 **Count only what can be seen** Students are limited to counting those items they can perceive.	Child is given a container with 20 beads or counters. "Can you count out 14 beads?" If unsuccessful: "Can you count out eight beads?"	Successful counting of small collections up to ten objects. Depends on their knowledge of the verbal sequence.	Successful counting of larger collections of more than ten objects.
Stage 2 **Count all** Students count from one when solving addition problems with screened collections	There are six counters on the table. "Under this paper are three counters." (Lift paper briefly). "How many counters do I have altogether?"	Student counts six counters: 1 2 3 4 5 6 then three counters: 1 2 3 then all the counters: 1 2 3 4 5 6 7 8 9	Student counts all the counters starting at one. First the six he/she can see: 1 2 3 4 5 6 then usually waves his/her hand over the paper while counting 7 8 9
Stage 3 **Count on** Students begin from the appropriate number to solve addition and missing addend problems with screened collections.	There are three counters on the table. "Under this paper are seven counters." (Lift paper briefly) "How many counters do I have altogether?"	Student counts on from the three counters he/she can see: 3 4 5 6 7 8 9 10. That is, they count on from the first number given.	Student counts on from the larger number: 7 8 9 10. That is, they count on from the most efficient number.
Stage 4 **Count back** Students are able to focus on the abstract unit items. They generally count down to solve subtraction.	I had 10 lollies and gave away seven. How many lollies would I have left?	Student counts down from ten: 10 9 8 7 6 5 4 3. Student may count on from seven: 7 8 9 10 and says the answer is 3.	Student 'counts back to' seven from ten: 10 9 8 7 and says the answer is 3. May also count on from 7.
Stage 5 **Flexibility** Students are simultaneously aware of two number sequences. They understand that addition and subtraction are inverse operations	Can you tell me what 26 take away 3 is?	Student uses variety of strategies. Uses known facts to derive new ones. For example: "I know that 6 – 3 = 3 so 26 – 3 = 23" or "I know that 3 + 3 = 6 so 23 + 3 = 26".	Student uses a greater variety of strategies which indicate a good knowledge of place value.

Table 1: Counting stages and indicators showing progression in strategies

Strategy choice

Research studies by Gray and Tall (1994) have shown that young children who are successful with mathematics use different types of strategies from those who are struggling with mathematics. Students struggling with mathematics are usually procedural thinkers dependent on the procedure of counting and limited to the "count-all" and "count-back" procedures. In summary, Gray and Tall (1994) defined procedural thinking as being demonstrated when:

> "... the numbers are used only as concrete entities to be manipulated through a counting process. The emphasis on the procedure reduces the focus on the relationship between input and output, often leading to idiosyncratic extensions of the counting procedure that may not generalize." (p. 132)

For example, when asked to count back from a given number students have been heard to count up to each number before responding with the number required which is highly unlikely to generalise into a backwards counting sequence.

While some students were dependent on rules and procedures other students gave instantaneous answers. For example, when students who gave an instant correct response to tasks were asked "How did you do that" they gave several different strategies they could have used and checked that their solutions were correct. According to Gray and Tall (1994) this use of known facts and procedures to solve problems, along with the demonstration of a combination of conceptual thinking and procedural thinking, indicates that these children are proceptual thinkers. Gray and Tall (1994) defined proceptual thinking as:

> "... the flexible facility to ... enable(s) a symbol to be maintained in short-term memory in a compact form for mental manipulation or to trigger a sequence of actions in time to carry out a mental process. It includes both concepts to know and processes to do." (pp. 124–125)

Identification of Students "at risk"

The initial assessment for the Year 1 *Mathematics Intervention* program requires teachers to assess the extent of the child's mathematical knowledge by observing and interpreting the child's actions as he/she works on a set task. Peck, Jenks and Connell (1989), Leder (1990), Clarke, Clarke, and Lovitt (1990), and Yackel et al. (1990) all advocate encouraging students to talk about their mathematical strategies as the superior method of obtaining information on children's own mathematical constructs and knowledge.

Encouraging students — particularly those deemed to have difficulties — to talk about mathematics and listening carefully to what is being said provides invaluable information about students' learning. It is a strategy that can be used readily by classroom teachers to probe and monitor their students' learning. The data obtained can serve if necessary, as a rich data base for subsequent error analysis (Leder, 1990, p.26).

As there was no comprehensive test available that allowed Year 1 students to talk about their mathematical strategies an instrument was developed, administered and consequently modified by three teachers. This is called the Initial Clinical Assessment Procedure-Mathematics (ICAPM) -Level AA (Pearn, Merrifield, Mihalic, & Hunting, 1994). Because three teachers were involved in the initial clinical interviewing considerable time was spent refining the wording of the tasks. This was to ensure each interviewer was comfortable about the way the questions were to be asked and was aware of anticipated responses. The assessment record was also discussed at length; it needed to be easy to use while allowing individual or unusual responses to be noted.

We have decided to maintain the focus on number in the *Mathematics Intervention* program although we acknowledge the importance of a breadth of mathematical activities. However, as the Curriculum and Standards Framework [CSF] states:

> "As a student acquires an appreciation of different levels of understanding of number, intersections occur with other mathematical studies in ways which give number a central unifying role. Work in the number strand links with work in all other strands ... Later work in all strands requires that they understand and work confidently with all kinds of numbers (Board of Studies, 1995, p. 42).

In 1994 both Year 1 and 2 children were assessed but since 1995 participation in the program has been restricted to Year 1 children when children were interviewed at the beginning of each school year.

The initial clinical interview included tasks that ascertained the facility of the children's verbal counting skills, their knowledge of the number word sequence and tasks that would help ascertain their counting stage level. The clinical interview takes 10 minutes and includes verbal counting tasks such as:

> "Can you count out loud for me, beginning at one, until I tell you to stop?"

> "Can you count forwards by 10's starting with 10?"

> "What number comes *after* 4?" "What number comes *before* 15?"

There were only two tasks based on the counting stages. The first counting stage task was designed to determine whether the child can count-on.

Ten counters are displayed.

> "Here are some counters. Count them."
> (Cover all the counters, remove two and display).

> "How many counters are under the paper?"

Year	ones	back 20-1	back 10-1	twos	fives	tens	6-12	before /after	14 beads	patterns	numeral	6+3=	10=+2
1993 (n=27)	100	—	96	30	26	59	67	85	—	100	—	85	59
1994 (n=48)	98	69	77	44	48	67	69	—	88	—	71	—	71
1995 (n=26)	96	65	96	50	50	54	88	92	100	96	46	85	69
1996 (n=57)	95	44	95	32	32	72	54	67	82	72	33	69	62
1997 (n=62)	100	73	97	53	47	66	63	84	90	94	37	79	56
1998 (n=58)	95	52	97	24	41	59	50	72/84*	78/97**	69	29	72	55
1993-1998 (230<n<278)	**97**	**60**	**93**	**38**	**41**	**64**	**62**	**77**	**86**	**83**	**41**	**76**	**62**

* 72% of the children were successful with "before" while 84% were successful with "after".

** 78% of the children could count out 14 counters while 97% were able to count out 8 counters.

Table 2: Year 1 results from Level AA tests: 1993–1998 (in percentages)

In the second task six counters were displayed and three hidden:

> "There are six counters on the table. Can you count them?"

> "Under this paper there are three counters." (Lift paper briefly)

> "How many counters do I have altogether?"

Table 2 compares Year 1 results from 1993 until 1998. In 1993 the program was trialed at Bulleen Primary but was transferred in 1994 to Boroondara Park where it is still a prioritry in the school charter.

Results from 1993–1998 revealed that of the 278 Year 1 children who were interviewed:

▸ 40% were unable to count backwards from 20 to 1 by ones

▸ 62% had difficulty counting by twos from 2 to 24 and 39% with fives from 5 to 60

▸ 36% were unable to count by tens from 10 to 100

▸ 38% could not say the numbers "between" 6 and 12

▸ 23% confused "before" and "after"

▸ 14% could not count out exactly 14 counters

▸ 17% were unable to accurately count the patterns of dots on a card

▸ 59% could not correctly name the numerals 13, 14, 15, 31, 41, 51. (Most confused 31 with 13, 41 with 14 and 51 with 15).

▸ 24% were only able to count things they could see, hear or feel (counting stage 1)

▸ 38% were unable to "count back" or "down to" thus had difficulty with subtraction (counting stage 3).

These results indicate that most Year 1 children were successful in counting forwards by ones to 20 and backwards by ones from 10, counted patterns of dots and counted out exactly 14 beads. They were less successful identifying the numbers between the numbers 6 and 12 or determining numbers "before" or "after" a given number. Children included in *Mathematics Intervention* were those who displayed difficulties with most tasks and were at Stage 0 or Stage 1 and used procedural strategies such as "count all".

By carefully observing the children's solution methods, interviewers ensured that they were aware of the strategies being used and if needed the following prompts were given: "How did you work that out?" or "How did you do that?" For example, Table 3 highlights the typical responses of children and their corresponding Counting Stages to a task from the initial interview given to all Year 1 students.

Counting Stage	Task: *"There are six counters on the table. Under this paper are three counters."* *(Lift paper briefly)."How many counters do I have altogether?"*
0	Response is usually a guess. Children attempt to recite verbal sequence but have no one-to-one correspondence.
1	Children can only count things they can see, hear or feel so guess responses when given tasks with some counters that are covered.
2	Usually incorrect response. Children count all collections from one. For example, will count the six counters starting at one, count the three counters starting at one, then attempt to count the nine counters again starting at one.
3	Children count on from the first collection of six: six, seven, eight, nine.
4	Children give instant response and can justify it: "I know 3+3 = 6 and another 3 is 9".
5	Children give instant response. (As for Counting Stage 4).

Table 3: Typical responses to counting stage task

Comparison with previous research

These results are of concern when we compare the results with some previous research. Wright and his colleagues (1996) have documented the results from more than 200 interviews of children aged between three and eight years. Three conclusions arising from his research included:

- Reasonable educational goals for children are to reach Arithmetical Stage 2 or 3 at the end of the Prep year and Stage 5 at the end of Year 1.

- Only a very small percentage (probably less than 5%) of beginning first grade children have not attained at least Stage 2.

- Year 1 children who begin at lower than Stage 3 are less likely to advance to Stage 5 than are children who begin at Stage 3 or 4.

However in our study there were 24% of Year 1 children and 9% of Year 2 children who had not attained at least Counting Stage 2 compared to 5% of the children in Wright's study.

The *Mathematics Intervention* Program

Selection criteria

Screening interview: Since 1994, *all* children from Year 1 are clinically interviewed using the ICAPM Level AA short version. Children are chosen to participate in the program based on the results of the clinical interviews. After recording all results, children are grouped according to similar difficulties with the interview tasks and then matched so that those in each group would need the same beginning strategies. Some of these difficulties would require intervention while others require extra assistance. For example children experiencing difficulty with the 'ty/teen' confusion would probably only require assistance from their classroom teacher while children having difficulty with one-to-one correspondence would probably require time in the intervention program.

Individual profile interview: After the initial grouping, children considered 'at risk' are listed and a tentative list constructed. Decisions are made after looking at the particular cohort of children. After deciding on the children to participate in the program an in-depth interview is conducted by the *Mathematics Intervention* teacher to test the security of the children's strategies as demonstrated by the initial screening interview. Examples of questions that need to be addressed include:

- Does the child demonstrate one-to-one correspondence in all tasks?

- Can he/she count forwards by ones from one to ten?

- Can the child count backwards by ones from ten back to one?

- Can he/she give the number *after* a given number? Is this an instant response?

- Can he/she give the number *before* a given number? Do they count all the way up to the number before responding?

- Does the child guess the response to the counting tasks? What strategies are used – count all, count on or count back? Are these strategies used in counting the dots on the cards?

- Is there any evidence of 'invented strategies'?

The program

The children are withdrawn from their classes for seven half-hour sessions per fortnight with a maximum participation of twenty weeks. They work in groups of no more than three, with a clinically-trained teacher, to assist with the development of their mathematical language skills and co-operation strategies. Small groups of children with similar difficulties, working together with a trained teacher ensures that the children's 'on-task' time is maximised. Emphasis is each session is placed on:

▸ counting activities both verbally and using concrete materials such as blocks, counters, bead frames, straws.

▸ games designed to highlight and correct a perceived weakness.

▸ oral work using concrete materials.

▸ questions that expect the children to reflect on their strategies.

▸ the verbal interaction between teacher and students, and between students.

▸ the expectation that all children would explain their strategies and would listen when some-one else was explaining solutions and/or strategies.

▸ a written activity.

We believe that children experiencing difficulties with mathematics in the early years of schooling need to be withdrawn from the mainstream classroom for lessons with a teacher who has undertaken special training.

Common difficulties

Since the introduction of the *Mathematics Intervention* program it has been noted that there were common problems exhibited by young children considered to be mathematically "at risk". These problems have been noted both in the assessment procedure and during *Mathematics Intervention* classes.

These difficulties include the following:

1. Difficulties in elaborating the number sequence.
   a) This could be an incorrect count where the right words are used but in the wrong order: one, two, three, four, six, five.
   b) A number could be omitted: one, two, three, five, six.
   c) Sometimes children confuse two sequences as in: ten, eleven, twelve, thirty, forty, fifty, sixty, seventy, eighty, ninety, twenty.

2. Children exhibit little or no one-to-one correspondence. We found children in need of *Mathematics Intervention* have difficulty in coordinating their spoken number sequence with the actual counting of objects.

3. Once children are able to count past ten there is confusion with the "teen" words and "ty " words. Incorrect sequences seem to result from the irregularities in the English system of words for the words from ten to twenty and the decade words.

4. Children experiencing difficulty learning the forward counting sequence to 20 have great difficulty in counting backwards from 20.

5. Bridging both forwards and backwards. Several children did not recognise that 20 came after 19, and similarly 30 after 29. Each bridging of the decades appeared to be an additional hurdle for the child.

6. Difficulties in understanding what the symbols mean. Although children had encountered the signs: + , –, = in their classroom mathematics they do not appear to understand what they mean.

Teaching strategies

Both the initial assessment and the *Mathematics Intervention* program require the teacher to observe and interpret the child's actions as he/she works on a set task. The initial interview requires the teacher to assess the extent of the child's mathematical knowledge while the intervention program relies on the teacher's ability to interpret the child's mathematical knowledge and then design or adapt tasks and problems that enable the child to progress mathematically. All teachers involved with the *Mathematics Intervention* program have attended a course in *Clinical Approaches to Mathematics Assessment* (see for example, Gibson, Doig & Hunting, 1993; Hunting & Doig, 1992) to develop and refine their observational and interpretative skills as they all felt the need for additional support in this area. They all believe that this is a requirement for teachers working with students 'at risk' in mathematics.

In *Mathematics Intervention* emphasis is placed on the verbal interaction between teacher and students, and between students. Each session is planned to build on previous understandings as interpreted by the teacher during the session. The *Clinical Approaches to Mathematics Assessment* course ensures that teachers can observe what the child is doing, interpret the child's actions, act on these actions and then reflect on the intervention. Experience with the *Mathematics Intervention* program has highlighted several teaching strategies that will allow children to experience success with mathematics. These include:

Verbal counting

To facilitate the improvement of children's counting skills time must be spent each lesson counting both orally and with structured materials. For example, counting beads on a bead frame, collections of counters, beads, bears and in fact

anything countable. Emphasis is also placed on the pronunciation of the number words. Every year *Mathematics Intervention* teachers have observed that children experience difficulties with the number sequence due to poor speech especially with the "teen" and "ty" words. Quite frequently the mispronunciation had been missed by classroom teachers. As Fuson (1988) wrote,

"... children's ability to say the correct sequence of number words is very strongly affected by the opportunity to learn and practise this sequence. Children within a given age group show considerable variability in the length of the correct sequence they can produce. Frequent exposure to "Sesame Street" or to parents, older siblings, or teachers who provide frequent counting practice undoubtedly enables a child to say longer accurate sequences at a younger age." (p. 57)

Questioning

Teachers need to be skilled in questioning and able to ask mathematical questions using the correct mathematical language. Skilful questioning by the teacher is imperative to ensure that the children's mathematical knowledge can be used to form a strong foundation on which to build further mathematical knowledge. Children should be expected to explain their strategies to both the teacher and other students and where necessary prompts should be given such as: "How did you do that?"

Alternative solutions

Children are encouraged to think of, and discuss, different ways tasks could be solved. Teachers must refrain from saying whether answer is correct or incorrect or that one procedure is better than another. Teacher should encourage children to explain their solutions and to tell each other whether or not an explanation makes sense to them.

"Young children will eventually construct the algorithms that are now prematurely imposed on them. By letting them change their minds only when they are convinced that another idea makes better sense, we encourage them to build a solid foundation that will enable them to go on constructing higher-level thinking." (Kamii, 1990, p. 30)

Invented strategies

Carpenter et al. (1998) noted that many children constructed their own procedures for adding and subtracting multi-digit numbers without using concrete materials. They called these strategies "invented strategies". They found that children who use invented strategies developed a knowledge of base-ten number concepts earlier than children who relied more on standard

algorithms. In their study they found that children made "relatively few conceptual errors in using invented strategies, whereas children exhibited a number of buggy procedures in using standard algorithms" (p. 19). Children in *Mathematics Intervention* are encouraged to develop and record their own strategies, first with concrete materials, and then without using concrete materials.

Games

To ensure active participation in the intervention program, games are used wherever appropriate. The variety of the games depended on the imagination and skill of the teachers. This is another activity that can be used successfully in the classroom by classroom teachers.

"Games are excellent activities because children play them to please themselves rather than the teacher. They are desirable because in games children care about sums, supervise each other, and give immediate feedback. ... Games are good also because the social interaction they require contributes greatly to children's social and moral development." (Kamii, 1990, p. 29)

Games using dice are used to compare numbers, add and subtract numbers and to make up their own sums. It is this ownership of the mathematics that becomes a very powerful tool in learning. Different sized dice can be used depending on the child's ability. A game called Twenty was devised by the *Mathematics Intervention* teacher to assist children to make the transition from counting all the counters (Stage 1 and 2) to counting on (Stage 3), or "counting back" which are much more powerful strategies. The use of these more efficient strategies are necessary if children are to succeed with the formal processes of addition and subtraction.

Conclusion

This research has highlighted the differences in children's mathematical knowledge and the type of whole number strategies they use when solving tasks set in different contexts. Year 1 students who were successful with the tasks from the initial interviews counted fluently by ones, twos, fives and tens from a given number, and demonstrated their ability to choose and use the appropriate strategy of count on and count back. These children appeared to exhibit proceptual thought (Gray & Tall, 1994). Clinical interview results show that Year 1 children requiring *Mathematics Intervention* were experiencing difficulties with the verbal counting sequence and were at either Counting Stage 0, or 1 or 2. That is, they were unable to count successfully or used the procedural strategy of "count-all". When unsure of an answer these children guessed with no attempt to confirm their answer.

Imagine if all primary school teachers were aware of the importance of children needing to progress through the Counting Stages and use efficient strategies. Maybe then most children would be able to "acquire mathematical skills and knowledge so that they can deal confidently and competently with daily life." (Board of Studies, 1995, p.9) Maybe then mathematics at school would be "a positive experience in which students develop confidence and a sense of achievement from what they learn" (Board of Studies, 1995, p.9). For students "at risk" of not succeeding at mathematics, one of the greatest difficulties is that they do not possess either rich mathematical ideas, or have the powerful strategies, that will enable them to use their mathematical knowledge to improve and enhance their mathematical thinking. These strategies need to be highlighted in their classroom mathematics lessons.

The importance of providing additional assistance such as a *Mathematics Intervention* program to students "mathematically at risk" cannot be over-emphasised. There will always be a need for a program such as *Mathematics Intervention* which is specifically designed to cater for those children who are "at risk". Mathematics Intervention teachers need to be confident and competent in mathematics and need to share their knowledge of these special students with the classroom teacher. By being aware of the child's mathematical knowledge and the types of strategies used the teacher is able to design appropriate activities to extend his/her mathematical understanding together with the classroom teacher.

The research continues into the need for special programs for students "at risk' with testing of Year 3 students in 1998 who were originally tested in 1996 when in Year 1. The question remains: Can we help teachers to develop flexibility in their mathematics classrooms so that children are able to develop their own strategies that will allow them to be less reliant on inefficient rules and procedures? ∎

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Looking at Pictures, Looking at Words
Using picture books for English and Arts curriculum

DENISE PHILLIPS
Dromkeen Children's Literature Collection

In recent years, the selection of books to use in the classroom has been strongly influenced by the topic or theme being covered, particularly in the key learning areas of Studies of Society and Environment and Technology, either as isolated 'subjects' or as part of an integrated curriculum. The demands of an outcomes based curriculum are often met by language programs or schemes. These aim to provide prescriptively written texts related to the topics being covered in classroom programs and at the same time provide examples of a specific writing form or genre.

Although the need for the explicit teaching of factual writing is a vital component of the reading and writing program, perhaps the pendulum has swung too far. Consider the following:

▸ Has the reading and writing of texts related to Integrated Curriculum topics dominated classroom programs in schools at the expense of fictional reading and writing? Is the balance still there or has it tipped the scales?

▸ Has the selection of picture books related to classroom topics resulted in a forced fit situation in which the message or purpose of the book is compromised for a loose connection the story may have to the topic being studied?

▸ Have too many of the texts being offered to students become too 'narrow' in their style of presentation and writing form? Perhaps being too restricting as they present examples of a single writing form when in reality, not all books follow the prescriptive guidelines for each genre. Many are a combination of writing forms aiming to entertain and engage the reader.

▸ Are we returning to an era reminiscent of the basal reading scheme, at the expense of real literature, at a time when the quality, availability and range of literature has never been so great?

▸ Has the reading of 'real' books become restricted to silent reading time or as a fill in when time permits?

▸ Has responding to reading shifted in focus from the exploration of the book as a work of literature to the completion of tasks which trivialise the integrity of the book and involve students in inappropriate response activities which may not lead to a greater understanding of the text?

Many teachers do continue to share the delight of picture books and are often frustrated by the difficulties in having to justify using picture books in an already busy curriculum. This paper does not suggest that teachers abandon existing programs, resources and activities in favour of picture books. Rather, it recognises the role of picture books as a resource that can fit neatly and easily into the curriculum when they are used appropriately and for authentic purposes.

Why picture books?

In this highly visual age, when technology seems to be in competition with books and reading, picture books help to make the act of reading desirable and attractive. Unfortunately, many students (and teachers) who visit The Dromkeen Children's Literature Collection still regard picture books as books for the young, books to read when you want an easy read or books to read when you are learning *how* to read. Picture books borrowed from the library frequently sit on classroom shelves for children to read at their leisure. Many works by some of the finest authors and illustrators go unnoticed as students and teachers explore the works of 'old favourites' at the expense of the other exciting authors and illustrators. Kim Gamble, Gregory Rogers, Andrew and Janet Mc Lean, John Winch, Craig Smith, Duncan Ball, Matt Ottley, Peter Goudlthorpe, Jeanie Adams, Stephen Michael King, Shaun Tan, Steven Woolman and Wayne Harris are just a few whose work is enjoyed by a wide audience and who would be valuable 'subjects' for an author or illustrator study.

In many cases, today's authors and illustrators create picture books which demand much more of readers, as they discover there is much to be gained by reading and interpreting the pictures.

The uniqueness of the picture book is in the way the written and visual texts interweave to entice the reader into the story and convey meaning - neither the words or illustrations being fully effective without the other. Many picture books have multiple voices and multiple meanings and make the reader ask of themselves "what is going on?" Teachers need to demonstrate to students how to manage the three texts all at once, how to look at the internal structure of the book, how to look at and compare texts.

Today's students are bombarded with images at an increasingly fast rate, yet teachers must not presume that they are able to interpret, decode and analyse the visual information presented to them. Perhaps it is a symptom of the visual age that today's generation want immediacy, an instant response, instant understanding. The phrases "it's boring" or "that's stupid" may be interpreted as a resistance from students to rereading, exploring, reflecting, taking the time to work out the meaning for themselves rather than having all the information laid out before them. This was most evident when working with students at Dromkeen when discussing the award winning picture book, *The Watertower.* There were those students whose immediate response was 'I don't like that book; I don't get it; It's stupid - it doesn't have an ending; But what happened?'. Other students responded with excitement, with shouts of 'What a great book; That's fantastic; Look what you can find in the illustrations; What do you think happened?' The teachers of these students also shared the enthusiasm – 'What a terrific book; We spent ages discussing that book; Our literature groups couldn't spend enough time exploring the book!' These students had been given the opportunity to reread, to talk, share ideas and alternative responses, compare the text with others, explore the illustrations, the design and layout, to look for hidden clues, read about Gary Crew and his approach to writing. The students' understanding and enjoyment of the book was dependent on the amount of time and type of discussion the teachers were prepared to allow and plan for in the classroom.

It is not only picture books considered for older readers which place demands on the reader. *Suddenly!, Splash, Pig Out! What Faust Saw, Game Plan, Jeremy's Tail,* aimed at a younger audience also require the reader to read and interpret both the visual and written text simultaneously over repeated readings. The visual jokes, the word plays, the information embedded in the illustrations both in their visual content and their style of presentation, the design, layout and typography all contribute to the telling of the story.

Responding to reading

The diversity of quality picture books available enables teachers to explore *how* and *why* picture books are created and to identify those features used by authors and illustrators to effectively convey the meaning of the story while engaging and entertaining the reader. They demand repeated readings so that the reader can gain understanding and meaning for themselves. Therefore in many cases, the students should be encouraged to reread the text as the first response.

It is important to remind ourselves that the priority when sharing picture books with students is that it is an enjoyable experience. Teachers should think about why they have selected a particular book and plan activities which generate interest, reflection and interaction, lead to challenging discussion and sharing of ideas with students talking about their reading and justifying their ideas with evidence from the written and visual text. Picture books often fall victim to the forced fit situation when the theme of the picture book is misinterpreted to fit neatly into the topic being studied. At first glance for example, *The Staircase Cat* is a story told from a pet cat's point of view. On further reading it is clear that it is about the impact of war on communities and families. However, suggested follow-up activities have frequently related to the topic of pets, looking after pets, losing a pet. Such an approach stretches the book beyond what the author intended it to be.

The range of topics covered in picture books also influences the types of responses by readers. Some stories beg for a lively discussion, a written response or naturally lead to further reading or research, while others are more suited to personal reflection or quiet rereadings. When responding to reading, students should be involved in practices that duplicate those of experienced readers – practices which show students that it is fun, satisfying and enriching to think about what we read, to discuss what we read with others, to experience both the private and public pleasure of reading. Students need opportunities to acquire the strategies and the skills required by readers that allow them to make sense of what they read and see in picture books.

Discussion about the words and the illustrations of picture books helps to give students the skills to be able to read, reflect and respond to their reading. Sharing the written text of picture books exposes students to a wide range of authentic writing forms, linguistic styles and literary devices used by authors to convey meaning, providing many opportunities for students to broaden their reading and writing skills. The illustrations of picture books are more than mere decoration. They can enhance, contribute to and even change the meaning and significance of the text. They are a source of meaning having all the elements of a written text but in a visual form. Picture book illustration is also an accessible art form which is ideal for introducing students to elements of art, artistic media and techniques. Many teachers are already comfortable with talking about the written text. However, talking about the illustrations is essential to develop the students' ability to identify, interpret, decode and respond to the elements of visual images to gain full information, leading to greater understanding.

The discussion points presented here are posed not as a test of comprehension at the expense of the reading experience. They are points for discussion to invite reader response in a supportive reading community, the sharing of opinions and ideas and to encourage the dialogue of "real readers". They enable the students to develop a deeper understanding and mastery as they are empowered with the knowledge and language to help them explain the feelings and responses the written and illustrative texts may evoke.

Planning for discussion around picture books requires teachers to be familiar with the written and illustrative texts and to be able to plan questions and talking points which help students on their path to becoming skilled readers. Taking a few moments to explore even a small selection of picture books can open our eyes and minds to the wealth of written and visual information found between the pages. Investigate picture books that "work" with students as a starting point for talking about the words and the illustrations. Remember however, not to analyse, interpret or question the book *or* the reader to excess. Leave some questions unanswered, some puzzles unresolved, some issues set aside - leave the door open for further talk, exploration and reflection.

Looking at Words

The author's purpose and the intended audience
Is the story designed to purely entertain the reader or to convey a point of view or message about the social or natural world? Which stories might help the reader deal with a personal problem or conflict? How is the purpose and audience reflected in the written text? Is the written text in the form of a retelling, a recount, a poem, a memoir, a persuasive text – why did the author choose one style of writing over another? What devices has the author used to convey his/her purpose such as dedications, acknowledgments, use of anthropomorphism, rhetorical questions, background information?

Literary structures and the features they have to engage readers
How has the author used punctuation, rhetorical questions, story beginnings and endings, alliteration, rhyme and rhythm, indeterminacy, contesting discourses, typography, or placement of text on the page in communicating the story?

Establishing the context for the story
How do the words indicate setting, period in time, the influence of a particular culture, the genre of the text, suitability and relevance to the intended audience?

Creating and conveying mood, emotion and atmosphere
For example, word selection, style of text, use of punctuation and typography, use of imagery.

Authenticity, accuracy and credibility
What did the author need to know to be able to write the text? What research might the author have carried out? How do authors ensure accuracy in the information in their written text? What resources might authors use to gather information? What evidence is there that the author has credibility for writing about a particular topic? How can we as readers check for accuracy and credibility?

Stereotypes
What stereotypes are reinforced or challenged in the written text, particularly in relation to ethnicity and gender? Where do stereotypes come from?

Point of view
From whose point of view is the story told? Is it told by a narrator? Is the story told in the first or third person?

Intertextuality
How does the reading of related texts help you to sort out ideas about the new text? What similarities and differences are there between texts? What other texts does the story remind you of? What links can be made between this and other stories, between characters?

Attracting readers - the importance of the title
What is the purpose of the title? What would the students consider to be a good title? Why might a particular title have been chosen? Why might titles change from country to country?

The creative process - creating the written text for picture books
Explore the writing process with students. How might the authors background, interests or approach to story be reflected in the text? Investigate different approaches to creating and writing stories. Use reference books, videos, journals, visit publishers web sites, authors' and illustrators' web sites to find out about the creators behind the stories.

Looking at Pictures

Book design
How might the design of the book contribute to the telling of the story? For example, the size, shape, placement of written text and illustration, varying page layout, use of endpapers, features which challenge conventional picture book design.

Choice and selection of artistic media, technique and style
What decisions might illustrators make when selecting a media, technique and style when illustrating the written text of picture books? What may influence an illustrators' final selection?

Explore the range of media, techniques and styles used by illustrators to create images. Which illustrators have an easily identifiable style? Which illustrators vary

their style? Why? What elements in a written text influence the choice of media, technique and style?

Illustrative techniques to enhance the written text and engage the reader
What techniques might illustrators use to enhance the written text and engage readers? For example, symbols, hidden clues, position, perspective, colour, page layout, use of white space, providing the story punchline in a visual form? What 'extra' information is provided by the illustrative text?

Contextual information
What elements in the illustrative text establish the cultural and social context, geographical location, period in time? How do the illustrations reflect the story genre and the intended audience?

Characterisation
What elements in illustrations provide clues to the personality, feelings and motives of the characters? What conventions/stereotypical images do illustrators use to convey character? For example, posture, facial expressions and features, clothing, symbolic imagery, stance, position on the page, furniture, jewellery. How do line, shape and colour convey character? What ideas, stereotypes, expectations are associated with particular objects or images? Where do these impressions come from?

Conveying movement
What techniques do illustrators use to convey movement? For example repeated images, posture and stance, the use of line and shape.

There may be times when a topic just begs for a focus on factual texts, yet planning all reading and writing activities around topics can be somewhat limiting. Similarly programs which focus too heavily on literature based reading programs at the expense of other types of literature also fail to broaden student experience with a range of texts. Balance is the key to any successful program to ensure students have the opportunity to use and enjoy a wide range of informative and entertaining texts. ∎

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Teaching Speakers and Listeners
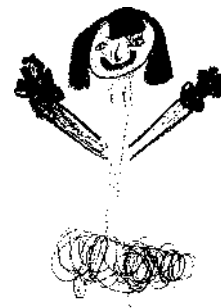
Early Years of Schooling Branch

The reading, writing, and speaking and listening modes of language are interrelated and cannot be separated in any practical sense. The SAID framework, developed to support the teaching of speaking and listening, when overlaid on the teaching approaches already in place within the literacy block provides for a balanced and comprehensive program covering all modes of literacy development in the early years. The framework has been designed to assist teachers in refining their teaching practice in reading and writing while at the same time addressing the learning needs of their students as speakers and listeners.

Teaching Speakers and Listeners in the Classroom is based on the premise that speaking and listening is best taught when teachers engage students in talk that is meaningful to the students themselves. At the same time teachers will create opportunities for students to discuss topics at length using spoken language in which all contextual details are supplied, where information is sequenced and temporal and where everything is made clear to the listener.

Classroom talk needs also to be sensitive to audience, context and purpose. By manipulating these conditions systematically and modeling appropriate choices of language, teachers can ensure that young students gain opportunities to use and learn language in a variety of ways. Through these experiences their language develops, enabling them to think and to learn to speak appropriately in an increasing range of contexts.

The teacher is crucial in the process of encouraging students to use talk effectively. Teachers use talk to discover what students already know so they can be quite precise and sharply focused when they build links between new and known information. Teachers support students to make sense of new experiences by integrating past experience with new information and thereby transforming their knowledge base. When eliciting responses from students, teachers should, in the first place, respond to what students are talking about and, secondly, respond by modeling forms of language that are appropriate for the purpose of the moment.

The SAID framework (Raban, 1999) has been developed to assist teachers in deliberate planning for this explicit teaching of speaking and listening. This framework may be overlaid on all teaching approaches already in place in classrooms that have implemented *Teaching Readers* and *Teaching Writers in the Classroom.* The framework provides teachers with a clear structure for focusing the activities of speaking and active listening within the two-hour literacy block.

The SAID Framework

Stimulate

At the start of an activity, the teacher engages the students' interest, finds out what they already know about the subject matter of the activity and introduces the purpose of the planned activity. The students are given the opportunity to talk about the topic and demonstrate what they already know.

Articulate

The teacher clarifies the specific task or strategy/strategies that is/are the focus of the planned activity. The teacher explains exactly what the students are to achieve. To check students' understanding of the task the teacher may ask one or more students to describe in their own words what they have to do and/or provide an example.

Integrate

Having taken the processes of reading and/or writing apart by articulating separate elements, the teacher spends time bringing these elements back together. The students may then work independently with support from the teacher as required. The students use other strategies from within their repertoire but are particularly mindful of the strategy that has just been practised.

Demonstrate

At the end of an activity the teacher demonstrates fluent behaviour, incorporating the strategies that have been the focus of the session. Students may be encouraged to take part in this demonstration and ask questions to clarify their own understandings.

The SAID framework gives teachers a clear shape and purpose to their own speaking and listening. It provides teachers with a means of planning, monitoring, and reviewing the interactions that occur within each teaching episode. In addition, the use of the SAID framework enables teachers to fully engage students by presenting each activity in a purposeful and predictable manner. The predictability of the sequence provides a secure framework that enables students to build on prior learnings over time and is especially important for students with language backgrounds other than English.

The following examples indicate how the SAID framework can be overlaid on two of the teaching approaches described within *Teaching Readers* and *Teaching Writers in the Classroom.*

Guided reading

Stimulate

Introduce the text to students, explaining that it is a book they have not read before and that they will first read and discuss the text together as a group and then have the opportunity to read themselves. Discuss the topic of the text so that students can begin thinking about related experiences.

Articulate

Provide support though the book introduction and as students read the text, relating to meaning, structure and visual information. Be explicit about the teaching focus of the session, clearly describing to students what they are required to do. Provide students with the opportunity to put their thinking and their knowledge about reading strategies into words and to display what they know. Discuss with students why they would use certain strategies on one occasion and not another, and the order they might call on strategies.

Integrate

Students read the text independently. Bring the processes of the activity together by inviting students to experience the role of the reader by reading independently at their own pace. Provide support to individual students as required.

Demonstrate

Discuss text meaning. Confirm and consolidate students' learning by providing them with the opportunity to demonstrate their growing confidence in the use of strategies by reading a text with unfamiliar words and structures.

Shared writing

Stimulate

Invite students to contribute to the composition of the piece of writing and discussion. The discussion can take place around the purpose and audience for the writing they decide to compose.

Articulate

Negotiate aspects of composition during this phase of the discussion. Make choices about appropriate words, expressions and reasons for these explicit. Discuss how to order the ideas for a desired effect. The composition will take shape through talk.

Integrate

Bring together the composition and conventional aspects of the writing that will be used to express students' meanings. In making choices concerning these conventions aspects of writing, talk about how different conventions will give different shades of meaning to the text.

Demonstrate

Reread the text, showing how all the elements come together to form a finished piece of writing. Talk about the value and purpose of rereading, both for meaning and for appropriate use of written conventions.

The main purpose of teacher talk during the literacy block is to structure opportunities for student learning. Teacher talk used purposefully and concisely allows students opportunities for active and focused listening as well as providing a model for student talk. Students will also be encouraged and supported to use the SAID framework to structure their own speaking and listening as they engage in literacy tasks. In particular it may be used to structure student talk during whole class share times.

Teachers teach speaking and listening for learning by engaging students in speaking and listening, by supporting and encouraging them, by using speaking and listening in sharply focused ways. Teacher use of the SAID framework for structuring speaking and listening interactions will have a powerful influence on students, providing a model for students as teachers talk with them, introduce new learning and discuss how to proceed with literacy learning tasks. ∎

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Learning Technologies and the Early Years

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School Profile

Footscray North Primary School is situated in Footscray, approximately nine kilometres west from the City of Melbourne. The school is used extensively by the community and is surrounded by industrial, residential and commercial areas.

Of the four hundred children who attend the school, approximately two-thirds come from non-English speaking backgrounds and many families receive government assistance. The school is organised in multiage classes wherever possible with emphasis on team planning.

Computer Hardware, Access and Professional Development

Staff professional development is a high priority at FNPS with a particular emphasis in the last couple of years on Learning Technology. The approach to meeting the diverse needs of staff has evolved over the past number of years and has also been linked to the direction that has been taken with the distribution of hardware across the school.

Pre-1998 the school had stand-alone computers (of varying antiquity) in each class and a computer lab of l6 Pentium computers. Professional development was provided through one-off inservice activities, voluntary workshops conducted after school and class teachers' attendance at lab lessons with the children each week. Staff skill levels and confidence did increase but at best it was *ad hoc* and did not promote a whole school direction nor adequate links to teaching and learning or classroom programs.

The 1998 school year was pivotal, with the school management team taking on Learning Technologies as a focus to provide a united direction. With some initial support and guidance from Lynn Davie (Project Officer, Essendon North Primary School), the management team developed a common understanding of the task and an action plan for the year. Networking was achieved, the whole school and three 'hub' classrooms (based on the Navigator School model) were established in the junior, middle and senior school teams. The hub classrooms provided the opportunity for staff to see how learning technologies could become a normal part of classroom programs. It also highlighted the need for quality teaching and learning and sound curriculum to drive the use of technology and not the other way around. This provided a clear direction to the staff and a focus for the implementation of learning technologies within the *Early Years* Literacy Program.

The Early Years Literacy Program is based on sound curriculum, supported by quality teaching and learning – the use of learning technologies within the program may support and enhance it.

The next step for *Early Years* staff was to select programs which authentically supported the program, providing opportunities for students to explore and consolidate their skills.

Choosing Appropriate Software

The choice and purchase of software was critical, with staff addressing such issues as:

- Why is the software needed?
- How will it support the *Early Years* Literacy Program?
- Is it diverse and flexible?
- Does it encourage students to explore and use effective risk taking skills rather then being 'driven' through the program?
- Ease of use for students/teacher
- Suitability for multiage classes
- Ability to be integrated into other programs
- Cost
- Licensing agreements/accessibility.

As we progressively build on new resources and software we continue to utilize the current software to its full advantage. Software needs to be appropriate, highly versatile and adaptable. It should be able to support learning experiences that are open–ended, challenging, motivational and well explored by children.

Strategies that have enabled staff to develop their skills in learning technologies:

- Learning technology is a school priority with a structured approach to its implementation

- All staff have access to a work station

- Every classroom has access to computer facilities with intra/internet access

- Staff were given the opportunity to request a 'hub' of computers within their classrooms

- Professional development is a high priority. It is offered regularly within the school and access is given to external professional development.

- Access to laptops/notepads/internet is available throughout the school.

Choosing appropriate software will enable teachers and students to build, learn and consolidate their knowledge rather than using computers as a non-focused, activity-based learning centre. ■

Linking Literacy and Learning Technologies in the Early Years

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Our journey began as two Curriculum Leaders in a new school setting. The two curriculum areas of Literacy and Learning Technologies were the focus as whole school priorities. Our decision to work collaboratively to achieve these priorities was based on the need to support and assist staff to implement the *Early Years* Literacy Program. The essential components of good literacy practice were used to develop a comprehensive program that could integrate learning technologies into classrooms.

Issues for whole school implementation of the project were considered as we planned and montiored a strategic approach which encompassed the following components.

Beliefs and Understandings

Over a period of four years, as part of a professional learning team, we have continually planned, implemented and evaluated the use of the learning technologies program with a specific focus on improved literacy skills for all children.

From our collaborative work and reflection we are committed to the belief that learning technologies are powerful learning tools. Our philosophy for the implementation of learning technologies within classroom literacy blocks (P–4) is based on the understanding that:

- Learning technologies immerse children in meaningful and challenging learning experiences promoting reading, writing, speaking and listening in authentic contexts.
- Learning technologies engage children in interactive literacy experiences.
- Learning technologies inspire children to take risks to develop, consolidate and extend their literacy skills.
- Learning technologies cater for the specific learning needs and individual learning styles of children.
- Learning technologies promote peer tutoring and teamwork to achieve shared goals.

Leadership

The initial planning determined the following goals for our shared project. These goals became our guiding principles, which directed the development of the project.

- Develop a shared school philosophy and vision for the implementation of learning technologies.
- Formulate, implement and review three-year school plans – literacy and learning technologies.
- Address the need for professional growth for all staff.
- Provide quality resources to support the integration of literacy and learning technologies.
- Develop the understandings and skills of Classroom Helpers to support the classroom implementation of the project.

Professional Development

Our approach to professional development was directly related to the individual needs of staff members. The following strategies were designed and implemented to gather data, in order to plan future professional development sessions:

- Learning technologies – whole school audit to identify classroom practice and individual computer skills.
- Literacy – each staff member reflected upon current practice and selected three goals to support the implementation of Stage 1 of the *Early Years* Literacy Program *Teaching Readers*.
- Each staff member identified a yearly learning technology goal on his/her personal professional development plan.

From the data collated we were able to plan and implement professional development sessions directly related to the staff identified needs. A variety of approaches were employed to promote professional growth of all staff. These included:

▸ Accessing a range of current learning technologies and literacy resources for classroom implementation.

▸ Providing colleagiate support and peer tutoring.

▸ Modelling team teaching in the literacy block.

▸ Encouraging professional reading.

▸ Planning cooperatively to integrate literacy and learning technologies.

▸ Utilising whole school workshops and school based expertise.

▸ Investigating and utilising expertise from other educational institutions including TAFE colleges.

▸ Providing elective skill development workshops such as *PowerPoint*.

▸ Exploring software to support classroom literacy programs.

▸ Utilising the network consultant to develop staff understandings of newly installed network computer system.

▸ Visiting other school settings.

▸ Participating in Southern Metropolitan Regional Network professional development sessions.

▸ Hosting staff from other schools.

▸ Accessing self-paced professional development packages.

On a regular basis staff completed surveys to evaluate the professional development opportunities. The critical and constructive feedback provided directions for future professional development sessions in terms of content, skills development and the form of presentation.

Throughout the total professional development program we were committed to identifying successful classroom practice and celebrating achievements. Colleagues were encouraged to share their successes and expertise by presenting their classroom practice.

Resourcing

Our goal was to develop a systematic procedure to plan, purchase and evaluate resources for literacy and learning technologies. Resources were purchased to support the learning activities, reflecting the needs, interests and learning styles of all children. Common characteristics for the resourcing of the project were:

▸ Completing an inventory to provide direction for the resource plans.

▸ Developing, implementing and reviewing three-year resource plans.

▸ Utilising Department of Education grants to purchase software, computers and printers.

▸ Surveying staff to establish the resourcing needs in relation to classroom implementation.

▸ Investigating learning technologies that support the development of skills in daily literacy programs.

▸ Organising presentations and displays from suppliers to enable staff to view and recommend resources.

▸ Introducing all new resources to staff to ensure implementation in the classroom program.

▸ Developing guidelines to manage the network system and to share software.

▸ Formulating procedures for staff to access technical support.

▸ Visiting schools to investigate quality resources.

▸ Cataloguing and storing all resources in the central location of the multi media centre to ensure access for all staff.

▸ Establishing parent teams to create activities for literacy learning centres.

Parent Participation

Our goal was to develop a shared view of integrating learning technologies with literacy learning. Our beliefs underlying successful parent participation are:

▸ Communicating and increasing parent understandings of the purpose of learning technologies in literacy learning.

▸ Developing a range of opportunities for parents to be actively involved in the classroom-based project.

▸ Educating the parents to participate effectively in the classroom literacy block.

▸ Valuing the parents' expertise and needs as learners.

The strategies we adopted to reflect our beliefs were:

▸ The implementation of the "Classroom Helpers" program.

▸ Learning technology education programs – 'Connecting Parents to Computers'.

▸ Presentations to School Council.

▸ Presentations to Parents and Friends Team.

▸ *PowerPoint* presentations to prospective parents.

▸ Weekly school newsletter articles.

▸ Displays of children's work throughout the school.

▸ Annual 'Open Night' Expo.

▸ Parent working teams to create activities for learning centres.

▸ High level of parent participation in the classroom.

▸ Reporting to the school community at assembly.

‣ Parent resource section in the library.

‣ Parent Liaison Group – meeting with the Principal each term.

‣ Parent/teacher/child communication books – "The Link".

‣ Whole School Home Learning programs.

Throughout the development of our project we continually reflected and developed strategies which encouraged parents to identify the potential of learning technologies in the development of literacy skills at home and school.
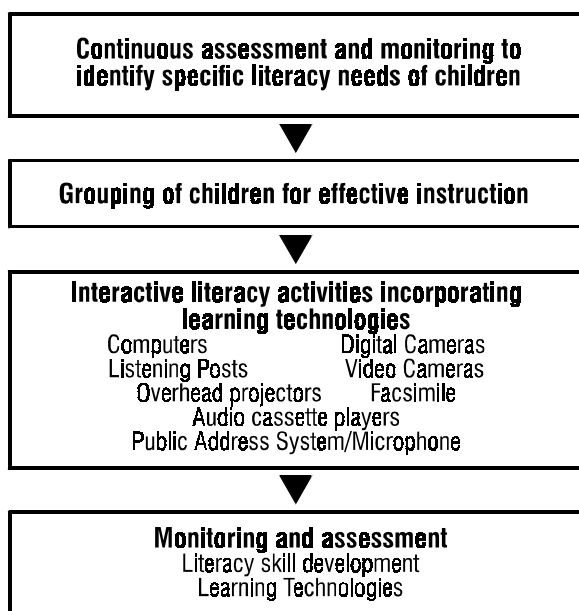
Classroom Implementation

The literacy block structure is consistent in all classrooms (P-4) within the school. The children have opportunities to work as a whole class and in small groups. The teaching approaches employed by the classroom teachers include shared reading/writing, modelled writing, learning centres/tasks, book boxes, language experience, guided reading/writing, reciprocal teaching and share time.

Within the one-hour reading block the use of learning technologies is incorporated as tools in authentic learning centres/tasks. Within the one hour writing block the children fulfil their authorial and secretarial roles by using learning technologies to plan, compose, revise, record and publish.

The children utilise at least one learning technology session per week during the reading block. The computers are utilised daily within the writing block to facilitate all aspects of the writing process.

It is essential when planning the integration of learning technologies that interactive learning experiences directly cater for the literacy needs of the children.

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┌──────────────────────────────────────┐
│ Continuous assessment and monitoring to │
│ identify specific literacy needs of children │
└──────────────────────────────────────┘
                 ▼
┌──────────────────────────────────────┐
│ Grouping of children for effective instruction │
└──────────────────────────────────────┘
                 ▼
┌──────────────────────────────────────┐
│ Interactive literacy activities incorporating │
│            learning technologies              │
│   Computers           Digital Cameras         │
│   Listening Posts     Video Cameras           │
│   Overhead projectors      Facsimile          │
│       Audio cassette players                  │
│   Public Address System/Microphone            │
└──────────────────────────────────────┘
                 ▼
┌──────────────────────────────────────┐
│       Monitoring and assessment       │
│       Literacy skill development       │
│         Learning Technologies          │
└──────────────────────────────────────┘
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Snapshot of Learning Activities

The following are examples of linking learning technologies and literacy during the daily literacy block. These activities are explored during our interactive workshop.

PowerPoint

The *PowerPoint* program enables children to present shared reading texts, personal recounts, individual writing pieces and topic-based projects.

Digital camera

The digital camera provides visual stimulus for a variety of literacy activities including shared and interactive writing, personal profiles, recounts and sequencing events. These uses are directly transferable to the Reading Recovery program. The program *Power Goo* enables the children to alter the image produced by the digital camera, and write texts to match the image.

Publishing Programs

The publishing programs, including *Kid Pix*, *Print Shop*, *Publisher* and *Word*, provide opportunities for children to present the meaning gained from text in a range of writing forms. Examples of forms include, business cards, brochures, advertisements, bannners and quizzes.

Fax

The fax is used as an electronic form of communication similar to pen pals.

Public address system

The P.A. system enhances verbal communication in a classroom/whole school setting. The children plan and develop a topic to be announced on the system. The audio tape is utilised in the planning process.

Video

A video is viewed, in which children develop note-taking skills and transfer their knowledge to data charts, and publish final presentations on computers.

Internet

Topic-based projects are enhanced by the use of the Internet. Children complete a written plan before accessing the Internet and present the information retrieved using a variety of publishing programs.

Listening post

The listening post is utilised to focus on a range of texts, which the children listen to and create listening post quizzes to be completed by peers.

Monitoring and Assessment

Our current focus is the trialing of a checklist which identifies the learning indicators achieved by the children whilst using a range of learning technologies.

We selected the writing component of the *Early Years* Literacy Program. Utilising the writing analysis guide in the focus areas of planning, composing, recording, revising and publishing, we have formulated a checklist. Each child will have an individual checklist, which promotes continuous assessment and monitoring. The classroom teacher monitors and records the children's writing skills in direct reference to learning technologies. The checklist outlines each indicator for beginning, emergent, early and fluent writers. At a glance the teacher can view the link between literacy skill development and learning technologies.

Final Reflection

Through our personal and professional journeys we have continually identified that integrating literacy and learning technologies does not require a high level of technical skill. Essential elements to success with linking literacy and learning technologies, are a willingness to accept challenges and to reflect and celebrate these experiences with colleagues.

We hope the sharing of our journey begins a new pathway for you. ∎

The Early Years Literacy Program in a Multiage Context

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VICKEY FROOMES
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Somerville Rise Primary School

Setting the Context

Somerville Rise Primary School is a developing school on the Mornington Peninsula. The school opened in 1995 with an enrolment of 370 students. Enrolment of students has greatly increased over the years with the current number at 600 students.

Common practice throughout the school reflects a developmental approach to learning where children are encouraged to learn at their own rate and the school operates within a multiage setting. This year, there are eleven Junior School classes, six Middle School and five Senior School classes. There are four support teacher programs operating as well as 3.5 Learning Support staff; this includes two Early Years Coordinators as a shared role. A team approach in the planning and delivery of our programs is an integral part of the Somerville Rise ethos.

Junior School staff utilise Early Years Literacy Program (EYLP) ideas and structural organisation to deliver a quality literacy program and to meet the individual literacy needs of students. Staff have developed effective administrative and organisational structures as well as a range of open-ended activities within the EYLP framework to best meet the needs of a multi-ability class.

It is our belief that:

- All classrooms are multi-ability regardless of their structure.
- The Early Years structure and organisation compliments the multiage setting.
- Class teachers can and do cater for the range of multi-abilities in a single classroom.
- Most activities can be 'opened' so that they are either open–ended or multi-leveled.

All Classrooms are Multi-ability

Within a multiage class, there is a wide and diverse range of abilities. This is clearly evident when examining Clay Observation Surveys at the beginning of this year to identify children's stages of literacy development. Graphs clearly showed that reading abilities varied within one classroom from children reading at Instructional Level 0 (Dictated Texts) up to children reading at Level 20 and beyond. When looking at the various writing abilities within this classroom, we can also see a broad range of abilities, ranging from strings of letters to edited pieces of work that reflect an understanding of some forms of writing.

This is not, however, isolated to multiage classrooms. This range of abilities can also be clearly exemplified in a graph outlining the Instructional Reading levels of a 'straight' Year One classroom. This classroom clearly shows that the range of abilities is similar to that of a multiage class with reading abilities ranging again from Level 0 (Dictated Text) to Level 20. Writing samples also reflect the range of abilities similar to that of the multiage class.

So what does this data show? It shows clearly that all classrooms are multi-ability regardless of whether or not it is of a multiage or a straight grade structure. Data from both classrooms shows that children display a range of abilities in both settings.

This raises many questions and challenges for us as teachers, in both settings:

- How do we cater for this broad range of abilities within a single year setting?
- How can we provide an environment where each student can learn at their own rate of development?
- How can we, as educators, cater for these children's individual needs?

We believe that by utilising the Early Years structure and developing activities that are either open-ended or multi-leveled, we can provide a supportive environment where children will learn at their own rate, will be encouraged to take risks with their learning and will experience success at their own level of development.

The Early Years Classroom Structure

Staff within the Junior School have been trialling and experimenting with the structure and organisation of the Early Years over the past three years with ideas flowing from sources such as:

 ‣ Staff attending the Early Years conferences.
 ‣ Visits to other schools utilising the Early Years structure.
 ‣ Staff sharing ideas and resources as a professional learning team.

Last year, common practice was documented to ensure a consistent approach across the Early Years. The structure and teaching procedures were outlined and represented diagrammatically. The whole/small/whole structure is used during both our reading and writing sessions. The school had been utilising W.A. First Steps and so was acquainted with this structure and many teaching procedures common to both First Steps and Early Years, such as modelled writing, share time, etc.

Team planning is seen as a vital ingredient in the planning and implementation of the Early Years program. Term and weekly planners include details of the Early Years program and planning reflects the whole/small/whole structure. W.A. First Steps is constantly used as an excellent resource for activities that are open-ended and therefore cater for a range of abilities.
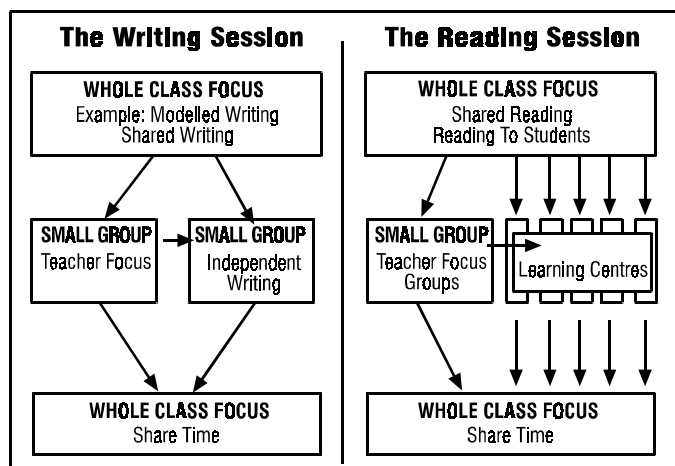
A Beginning Teacher's Perspective

For the beginning teacher, the EYLP provides a very clear, manageable structure to cater for the diverse needs of students in a classroom. Each component provides the opportunity to teach to a focus or need and to maximise student learning.

The major advantages it provides are:

Teacher focus group sessions

 ‣ Focus teaching to the specific needs of a group in both reading and writing e.g. concept of a word, fluency, expression, visual information cues.
 ‣ Provide the opportunity to listen to, read and assess students' reading and writing on a regular basis.
 ‣ Enable the teacher to have time with each individual student on a regular basis.

Learning Centres

 ‣ Provide the opportunity for students to take responsibility for their own learning in a supportive environment.
 ‣ Cater for a range of abilities – activities are developed to cater for multi-abilities.
 ‣ Enable students to consolidate learning through active involvement.

Share Time

 ‣ Provides effective role models for children.
 ‣ Enables children to learn from each other.
 ‣ Enables children to reflect on their own learning.
 ‣ Provides opportunity for teacher assessment/ monitoring of progress.
 ‣ Provides effective teaching and learning context to develop appropriate speaking and listening skills.

Whole Class Focus

The whole class focus in both a writing and reading session is vitally important to bring the children together to teach and revise one or more particular elements of literacy. In any classroom setting, multiage or otherwise, we can effectively utilise this time to cater for a range of abilities.

Small Group Focus

This part in the Early Years structure encompasses both a teaching focus group, where the teacher works with a small group on either reading or writing, and learning centres.

Teaching Focus Groups

 ‣ Group students on a like needs basis.
 ‣ Have a focus/aim that is related to each individual or the whole group e.g. for an individual in a reading session – provide prompts to activate visual information cues, as a group in a writing session – outline the editing steps required.
 ‣ Provide individual teaching time with each student.
 ‣ Provide time for assessment.

Learning Centres are

‣ Open-ended and multi-ability.

‣ Related to a range of literacy skills.

‣ Multi-ability grouped.

With the emphasis on providing an environment that caters for the range of abilities in the classroom, learning centre activities are designed so they are either open-ended or multi-leveled, that is, there is a range of levels the student can choose from within the one activity. They provide the opportunity for children to work independently and take responsibility for their learning

Examples of these are:

The Writing Centre
Children choose from a range of writing options such as narratives, recounts or lists. Paper and small books are available in various forms and computer programs such as Creative Writer are available also. Helper charts, alphabet strips, dictionaries and editing steps are also included for students' use.

The Spelling Centre
An open-ended activity where children are provided with pegs that have single letters, blends and pictures on them. This is an excellent activity in that children take this activity as far as they want to take it. A beginning child will take the pictures and attempt to place a peg that has the initial sound of that picture on it, e.g. p for pig. Another child will choose a variety of pegs to make the word for that picture or to make other words. Other children can use the pegs to make words and score points for number of words made. This can be played as a game between two or more players.

The Speaking Centre
One child stands or sits on one side of an easel or some sort of barrier. He or she must outline verbally to the other what is on his or her sheet of paper. The other child must draw what they are verbalising. Compare results.

The Reading Centre
Reading centres can have a different focus according to the need of the group and the purpose of the activity.

1) The activity can be related to the text in a guided reading session and can be open-ended through the use of activities such as story maps and charts of interesting words.

2) Children can read from a range of texts from book boxes or other sources and select a text to respond to through either:

   – a drawing of an aspect of the text, e.g. character, plot, setting

   – a drawing and a short written response to the text

   – a detailed response to the text outlining setting, characters, plot and preference for book.

The Listening Centre
Children listen to a tape or listen to and watch a visual text. They can respond in a variety of ways such as making a puppet or model of a character, writing a new ending to the story and finding all the rhyming words or making some rhyming words of their own.

Computers and their Place in Learning Centres
Computers are highly motivational and, when used within the literacy block, provide children with the opportunity to develop and utilise both their literacy and computer skills. We presently utilise the following programs because they provide for a range of abilities and children can work at their level of development – Wiggleworks, P.B. Bear, Phonics Alive, Creative Writer, Kid Pix and Living Books.

Our Challenge for the Future
Our challenge is to continue to stretch the boundaries, broaden the horizons and to strive to 'open up' children's learning so that the full range of student abilities can be effectively met while improving each student's achievement in literacy. By working together as a team and by being responsive to individuals' needs, we will continue in our endeavour to achieve this. ∎

D11 Teaching Gifted Readers in the Early Years

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All children fall somewhere along the continuum of intellectual potential. In any class the group of students toward either end of the continuum will need curriculum to suit their needs. Within the group of gifted students there may be a vast difference in potential from the mildly gifted through to the exceptionally gifted. Some gifted students will be obvious to the teacher, others will be "hidden".

Defining giftedness remains nebulous. Like defining a learning difficulty, it is easier to list the characteristics. The definitions of Gagne and Morelock offer useful models.

Gagne (1995 p.106) defines giftedness as *"the possession and use of untrained and spontaneously expressed natural abilities (…aptitudes or gifts) in at least one ability domain…among the top 15% of age peers"* and *"talent"* as *"…the superior mastery of systematically developed abilities (skills) and knowledge in at least one field of human activity, to a degree that places a child's or adult's achievements within at least the upper 15% of age peers who are active in that field…"*

Morelock (1996 p.6) believes that *"Giftedness is … a distinctive and atypical pattern of development in childhood in which a child's intellectual or cognitive abilities are developing at a much faster rate than would be expected for his or her age. This "asynchronous development" creates disparities between attained levels of intellectual, physical, social, emotional, and skill development of the gifted child. The result is that the child is "out of sync" with other same-aged children and does not fit the age-related expectations of the culture. This … generates special needs within educational settings constructed to accommodate more normally developing children – much in the same way that children with development delays are recognised to have special needs in such settings. Talent … refers to potential for notable performance…"*

Exceptional children at both ends of the spectrum require special provision. They are significantly different from the norm (Silverman 1993). In both directions the further from the norm a child is the greater the difference in their needs and the more likely they are to be at educational risk. A mildly gifted child, for example, may have most of their educational needs met within the regular classroom program. A highly gifted child will require a classroom program to meet their needs. An exceptionally gifted child will require a specialised learning program with the involvement of an education psychologist with experience and expertise in working with gifted children.

A range of tools can assist teachers to identify gifted students, for example parent nomination and teacher observation. Examples of checklists appear in the Bright Futures Resource Guide (1996). Discussion with parents during the identification process is crucial. Parents are able to provide information regarding early development that is essential, as there is a strong correlation between early milestones and giftedness. Other useful indicators are the Raven's Coloured Progressive Matrices, the Raven's Standard Progressive Matrices and the Peabody Picture Vocabulary Test (PPVT-111).

Characteristically gifted children may display:

- complex knowledge or "older" understanding of issues
- advanced mathematical concepts
- early ability to read/write
- trying to fit in – may lead to hiding of ability and under achievement
- faster learning pace–a non-reader who suddenly zooms ahead
- less need for sleep
- alertness
- intensity of purpose
- curiosity
- task commitment
- exceptional memory
- advanced classification and investigation skills
- high level of imagination.

Gifted children may ask
▸ probing questions.

Gifted children may be
▸ difficult to identify
▸ suffering from poor self-esteem (Harrison 1999 p.24).

Social and emotional characteristics may include:
▸ heightened awareness in early social interactions
▸ feelings of frustration
▸ heightened sensitivity
▸ social maturity
▸ sensitivity and the ability to empathise
▸ perfectionism
▸ sense of humour
▸ advanced play behaviour
▸ enjoying the company of older children/adults (Harrison 1999 p.43).

Each gifted student will have their own individual profile. Personality and family background will impact on the observability of certain characteristics. Gifted ESL and Koorie students in particular are likely to be more difficult to identify and for these groups some of the assessment tools will be inappropriate. For some gifted children entering school high ability may not be initially obvious. For example, on a teacher checklist, Kosta in grade one came up as gifted on everything except reading and writing. He initially required additional assistance through the reading recovery program, but then progressed rapidly.

Myths abound in the field of gifted education. For example we are often concerned that children showing advanced skills may have been "hot-housed" and may later "burn-out"! If we measure this by the amount of new work confronting a child each day then it is certainly not this group that we need to be concerned about.

The features of the Early Years Literacy Program provide an excellent framework for catering for gifted children in the classroom. The program is not focused on content but on the *process* of developing literacy, and it provides a structure so that classroom teachers cater for all students in the early years classroom. Guidelines for additional assistance are very useful at both ends of the continuum.

Assessment and monitoring is a key feature of the program. This assessment and monitoring provides the opportunity to:
▸ allow for flexible grouping to cater for an individual's leaps forward
▸ inform teaching
▸ match to appropriate teaching strategies
▸ match to text.

Continuous monitoring and assessment is just as essential for gifted students. The teacher or parent, for example, may observe regression. This is serious, indicating that the child is at a significant education risk, and must be responded to accordingly. This regression is not always obvious, particularly when the child is performing above the class average. For example, Sally started school with advanced writing skills. On the South Australian Spelling Test she showed a spelling age of 7. Within a few weeks all words she wrote had only two letters. Despite the best efforts of the teacher this pattern persisted. She explained to her mother that in Prep you had to write two letters for each word. She had noticed that other children wrote in this way and wanted to be the same.

Informal Observation needs to be undertaken as soon as the child starts school. Gifted children can be quick to hide their ability. For this reason it is critical that discussion with parents take place early in the year and continue on a regular basis.

Formal assessment should start early in the school year to maximise the opportunity to plan appropriately for students. Clay's Observation Survey should be used on any child you suspect (or parents claim) is already reading, at the beginning of Prep. You may need to go further and use the Neale Analysis of Reading to establish just where the student should be working. Be aware that gifted students sometimes have a higher comprehension age than they do reading accuracy age. This has implications for text selection. For some gifted students a lower percentage accuracy level may be acceptable.

Discussion with the gifted child can be very insightful but may equally be very misleading. It can be difficult to establish their true understanding of the text.

For example Tony had an apparent lack of comprehension of "The Lion, the Witch and the Wardrobe". Diagnostic testing using the Neale Analysis of Reading revealed that he had a comprehension age of over 12 years! His difficulty was in working out which bits of the story were important. He remembered everything and to him it was all-important. Tony needed to be taught how to summarise, how to pick the main threads. The teacher had to learn to be far more careful in framing questions. He simply couldn't answer a question like "Who do you think is the central character?" Tony needed to be taught the skills of summary.

Discussion with parent/s, however, is crucial. It is essential that you know of the child's home literacy experiences. A child who is capable of reading a novel at home may disguise this at school and be frustrated, bored and disillusioned because the teacher understandably provides her/him with an emergent level take-home book.

Student self and peer assessment can be equally misleading when the gifted child is disguising their

ability. For example, Tam in Prep, with a reading age of 9 and a comprehension age of 8.5, was desperately trying to be like others and refused to select take home books from the appropriate box. The teacher arranged for him to spend time with a grade one class for reading. He reported to his mother how exciting this was and said "In grade one you read by running your finger along under the words"! His focus was on how to fit in. That "students learn much from each other" can sometimes be a problem! Clearly the need here is for Tam to be matched with other children functioning at his level.

Running records may also need to be taken more frequently with gifted students "to enable teachers to fine tune their teaching of these students". Gifted children can have periods of progressing at a phenomenal pace. Stefan started learning English at kindergarten last year. At the beginning of the year he was considered to be an emergent reader. His teacher soon found it necessary to take a running record on a weekly basis. By the end of term when assessed on the Neale Analysis of Reading he had a reading accuracy age of 10 and a comprehension age of 7.5. Stefan, a gifted ESL student, needed extensive vocabulary work to reduce the gap between his reading accuracy age and his comprehension age.

Gifted students will be at any of the four developmental stages. Teachers need to watch for sudden and rapid progress. However, it is unlikely that any gifted child will be totally at a beginning stage. Where this occurs their contextual understanding and awareness of linguistic structures and features is likely to be superior. Be conscious of the possibility of a bright child sitting at this level having a specific learning disability.

At each developmental stage the gifted child may require more challenge to ensure they are motivated. A gifted child who is not yet reading may require some curriculum focuses suitable for fluent readers. S/he may have sophisticated skill in orally responding to text – in expressing opinions and viewpoints. Allow for this and encourage it.

There can be a big gap between oral language and written language with some gifted children. It is difficult for a child with a mental age of say 9 and the fine motor coordination of a 5 year old. Classroom helpers might be asked to assist these children to take dictation or record on tape so their rich language can be recorded and shared with others, to help prevent the gifted child from giving up on writing. Sometimes gifted children end up writing less than everyone else. This can be the result of a mind that is operating at an extremely fast pace that the young hand has absolutely no chance of recording, or their thoughts can be quite complex and detailed and they simply don't have the stamina to start on such a daunting task. Gifted children assisted by their parents should be encouraged to record stories on the computer. This will help alleviate their frustration

and encourage further language and writing development. Writing practice is an important part of their development too, but use opportunities when the amount of writing is finite and manageable.

It is important to seek specific parent contact. Gifted children generally need extra challenge at home too. A request for homework for a gifted child may be a call for help. Parents of gifted children who seem to provide extra stimulation at home either through a range of after school activities or by providing "school work" may just be trying to meet their child's insatiable need to learn. Providing interesting and open ended homework is appropriate.

Planning challenging activities requires a little extra thought. Other teachers are a great resource and sharing ideas, activities, successes and failures will help reduce the load. Regular planning meetings with colleagues are strongly encouraged.

In whole class focus sessions, it is important to be mindful of advanced readers. The teacher should regularly provide comment that extends and challenges them, vary choice of material for different focuses, otherwise in time this will become their "switch off" time. It is easy to ignore the "hand up" of a gifted child because (at least at first) it is always up! Gifted children often express their frustration of this and what they read as teacher lack of interest can have devastating effects on their self-esteem. A useful strategy can be to ask all children to think of questions that could be asked that are not allowed to have a yes or no answer. Often when we ask a question of a group of students, once the question is answered you can see the other children stop thinking. Being asked to pose the questions requires ongoing thought because there is no right answer and if someone else comes up with yours you are challenged to think of something else.

Teachers need to be aware that, in extreme cases, for highly gifted students to gain the full benefit from the whole class focus on reading they may need to do this with a higher class. For some highly gifted children the text chosen to share with the class may be well below their instructional level and is unlikely to provide new vocabulary.

To maximise the opportunity for gifted children to work with a group functioning at the same level in focused teaching sessions it may be necessary to mix with higher grades or other classes that have students at the same level. It is important to remember that in guided reading the teacher is targeting instruction to what the group needs to take their literacy understanding further. This requires the teacher to be clear about the teaching focus and thoughtful about their questioning.

Selection of texts for gifted children requires special attention. Ensure gifted children are working at the "hard" edge. Ideally at each stage of development gifted children are best grouped with other gifted children. For example gifted early readers together with gifted

emergent readers because they may need different text for independent and instructional purposes to other children at the same stage.

Most of the time when you are looking at the literacy focus and teaching to that rather than the content of the material children will be engaged because they are learning something new. Just occasionally there is an exception. For example, Nathan in Year One refused to read until his teacher discovered his passion for snakes. The teacher went to great lengths to find easy non-fiction books, however this only served to further frustrate him. He was unable to learn anything new about snakes from these books. Not until in exasperation the teacher allowed him to select his own books from the library did things start to change. He chose books with long passages of small print totally inappropriate for his reading level. From these he doggedly taught himself to read. He was driven by his desire to learn. He would study the same unknown word sometimes for minutes and strongly resented being told the word. Frequent contact with his parents was maintained over this time.

With fluent readers texts need to be sufficiently complex but also "age" appropriate – gifted children will understand and comprehend big issues that others are less aware of. This can cause great anxiety. News, world issues and unfair behaviour may cause them to become very distressed and even depressed at times. Myths, quests, subtleties, humour and complex or intellectually challenging ideas should be sought in selecting texts and illustrations. Generally avoid horror and books with unresolved and/or disturbing endings. There will of course always be children who are the exception.

Remember that some non-verbal texts are highly intellectually challenging and should be used across all stages. Include challenging picture storybooks for fluent readers. For example, *Counting on Frank, Just Another Ordinary Day, Drac and the Gremlin, John Brown Rose and the Midnight Cat,* some of Anthony Brown's picture story books, *Crow Boy, Where the wild things are…* Some books provide an excellent opportunity to discuss moral and ethical issues. For example, Roald Dahl's *Danny the Champion of the World.*

Gifted children are often interested in topics that are not familiar to them – another culture, another time, specialised non-fiction topics. In the library corner include hard texts to ensure they cater for the specific interest of a particular child at a depth that they will find satisfying. For example, space, rocks, etc. Allow children to borrow these to take home to read or share.

Be aware that a book used as an instructional text on Monday may be easy independent reading the next day! Repetition should be avoided where possible. Most gifted children need very few repetitions to grasp a concept or a new word.

Learning Centres provide an excellent opportunity to provide appropriate work for gifted children. A listening post provides the opportunity for a gifted child to listen to a challenging text. Advanced word games such as Scrabble can be played (initially with the support of a classroom helper). Ensure advanced levels are difficult but not impossible for the gifted child. The poem box can extend to different styles, purposes, origins, etc. with associated work card activities. The alphabet corner should include a range of advanced vocabulary and dictionary skill activities. The library corner should include books with sufficiently complex information to satisfy the incredible thirst for knowledge that many gifted children have. Bloom's Taxonomy and Gardner's model of Multiple Intelligences are useful in assisting the teacher to develop a varied range of suitable activities for Learning Centres.

Vocabulary extension, including the teaching of advanced dictionary skills, is important and provides an excellent opportunity for additional challenge. Many of the suggestions for specific teaching of the visual features of print such as identifying syllables, exploring prefixes and suffixes, word roots, letter patterns, compound words and understanding how words change e.g. tenses, singular to plural irregular verbs, contractions, etc provide a marvellous range of opportunities for extension. Most gifted children find the study of linguistics fascinating. Activities can be included in the Learning Centre that allow children to explore this aspect. The book by David Hornsby, *Sounds Great,* works very well with gifted students.

Classroom helpers working with gifted children may need additional training in:

- how to ask challenging questions
- use of praise
- assisting with independent text selection for texts to take home
- hearing gifted children read aloud
- reading to gifted children.

Classroom helpers need to be warned to take care when praising gifted children. High achievement in comparison to other classmates does not necessarily indicate increased effort or focus from a gifted child. Like all children, gifted children respond negatively to unworthy praise and may switch off or no longer take the helper seriously.

Classroom helpers can:

- read advanced text with challenging vocabulary to children (the classics are an excellent source here)
- record the child's response on tape or by dictation or enter on the computer
- assist gifted students in Learning Centres
- assist with take-home text selection.

The further children are away from average the more likely they are to be at educational risk. This is as true of the gifted child as it is of the child at the other end. Some gifted children will need additional assistance. Referral to a psychologist will be required particularly if the teacher or parents/s suspect the child is highly gifted, or where there appears to be a big discrepancy between potential or known IQ (if already assessed) and actual achievement, or if the child appears to be making little or slow progress. This will often be far more difficult to observe than with other children with learning difficulties. It is possible for the child, who relative to other students has reached the highest standard in the class, to be grossly underachieving and at serious risk.

For gifted children who require additional assistance it is recommended that most of the procedures, forms etc developed for other children requiring additional assistance be used. The development of a Home-School Support Group is essential. Inclusion of an expert such as a psychologist with expertise and experience with gifted children is recommended. Classroom helpers may need to spend extra time with this student. Extra care must be taken to select suitable texts and continuous assessment is essential. Ideally the classroom teacher should be given the opportunity to receive additional professional development in this area to enable them to plan effectively for the student/s. In conjunction with the Home-School Support Group, an Individual Learning Improvement Plan should be developed. This will always be required for exceptionally gifted children.

Cross age tutoring can be very effective with gifted children. It is essential that young gifted children are matched with older gifted children and that the older students are trained as tutors.

In exceptional cases full grade acceleration may be the best option, placing the child in the best place for them to learn. This must be done in consultation with experts in the field. The research consistently finds acceleration a very effective and successful strategy for all aspects of the highly gifted child's development. When this is being considered it is essential that guidance on acceleration be sought from the Gifted Education Section of the Department of Education, Employment and Training. Other acceleration (appropriate grade placement) options may also be considered. Multiaging may allow for fluid movement.

In the past it has been generally true that the students who have the highest capacity to learn at a fast pace are the very children who are given the least amount of "new" or "unknown" work. It is our job to ensure they are learning and not just marking time. The Early Years Literacy Program provides teachers with an excellent opportunity to do this. ■

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The Collaborative Classroom: Making the Connection

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Three Teaching Practices

Think of most classrooms that abound today and you would find a vast array of teaching practices. Bennet, Rolheiser & Stevahn (1991:23), argued that these practices can be divided into three general categories, individualistic, competitive and cooperative.

Teaching practices that are classified as individualistic tend to emphasise the achievements of the individual rather than the group. Students are encouraged to work toward a goal without much involvement or collaboration with their peers. Individuals are held accountable for their learning and behaviour and their success and failure is judged independently of others. While individualised learning may be desirable, in that it focuses on the specific skills and strategies utilised by different children, it may overlook the many gains that can be attained through the sharing of learning.

According to Slavin (1995:3), teaching practices in a competitive classroom climate may be an effective means of motivating students to learn. Many children are anxious to participate in competitive game-like activities, which emphasise reward upon successful completion. However, Bennett, Rolheiser & Stevahn (1991:22) claimed that the achievement of a goal for one student inevitably means that another is less likely to achieve theirs. It is often the case that successful students depend on the failure of others for their own recognition. Success is built on the notion of doing better than others, and it is most likely to be based on within-class comparison. Slavin (1995:3), pointed out that "for most low achievers, a competitive situation is a poor motivator; for some it is almost constant psychological torture".

Competition may not, necessarily, be fair. Often the school classroom fails to provide the 'level playing field' necessary for equitable or unbiased competition. If we consider the range of individual differences in ability, prevalent in students in most classrooms today, the premise on which competition is built is that only a small group can succeed and the majority do not succeed. The outcome of competition on those students is to gradually eliminate children who face the greatest barriers to success earliest in the competition process, and can only be detrimental to those students who may not be quick enough, or who experience difficulty giving of their best when under pressure, or who simply require more time to be able to demonstrate their knowledge. Individuals who bring to the classroom differences in ability or background may be disadvantaged from the outset.

For some children, competition remains a positive motivator where teachers employ it as an effective tool in their teaching repertoire. There is a danger, though, that it can be an overused strategy thereby becoming less efficient. One of the difficulties teachers have in dealing with the competitive classroom is to provide students with an understanding of the nature of competition evident in society. The wise teacher would point out the elements of positive and negative competition, the notion of 'it's not in the winning but in the taking part' is a positive aspect of competition. Schools need to think through their approach to 'rewards' and 'prizes'. If the emphasis is on positive effects of competition, then taking part should be reward in itself rather than any resulting prize. In a society that thrives on tangible rewards, the discerning teacher would strive to instil in his/her students a desire for the value of intrinsic motivation rather than the often short-lived effect of an extrinsic reward. Some children who rely constantly on the teacher's praise fail to develop an appreciation for making effective judgements of their own progress and to distinguish between differing levels of performance.

One way in which the level playing field can be attained in the classroom environment is to consider those children who learn in different ways and provide opportunities for the development of individual strengths and propensities which Gardner (1993), presents as intelligences for example, the kinaesthetic, the visual spatial, the musical rhythmic, the logical mathematical, the verbal linguistic, the interpersonal and the intrapersonal.

In the classroom that exhibits cooperative teaching practices, the emphasis is based on the need for students to support each other in their learning. Students work together with their classmates to learn, and they share a responsibility for their teammates learning as well as

their own. Slavin (1995:5) holds that there are three elements common to all cooperative learning approaches; namely: team rewards, individual accountability and equal opportunities for success. Consider how these three elements distinguish cooperative learning from a competitive approach to learning. Rewards are present, however, there is an element of shared responsibility attached; not only is the student accountable for their own learning but the student is also accountable for that of their peers. The individual is expected to contribute to the group and, because of the additional support, has as much chance of experiencing success as the strongest member of the team.

As in a competitive classroom, cooperative groups may not always succeed, however, rather than the accountability for failure being on the shoulders of only one person, there is shared responsibility. Individual failure is far more debilitating to one's self esteem than group failure. Khon (1993:108) argues that failure does little to boost one's intrinsic motivation in itself but he suggests that the challenge for teachers is to provide feedback following failure in the form of a 'problem to be solved'. In a cooperative classroom, such feedback can be individually tailored, unlike a whole class approach where only part of the feedback is likely to be relevant to each group.

As cooperation is *required* of the student in a cooperative classroom, there is a developing necessity to ensure that students possess adequate skills to enable a more proficient level of cooperative interaction. When a teacher moves toward a cooperative learning approach, time needs to be spent in assisting students to develop good communication skills to enable them to share how and what they are thinking with their group members. Cooperative learning experiences foster positive social relations and communication within a classroom, and students feel more able to participate equally amongst their peers, thereby raising self esteem. However, teachers who adopt cooperative practices in order to improve their classroom efficiency are missing the point, as cooperative learning is not a short cut to an efficient classroom, but rather, a means by which students can acquire relevant skills to aid their growth and development.

Where cooperative learning practices are in place, students have a greater degree of autonomy. According to Sharan & Shaulov (1990:174) the independent decision-making processes and the decentralisation of the learning tasks provide children with opportunities, often not available in competitive teaching environments, where they can regulate their own learning. Teacher support is provided as the group requires it and is therefore tailored to meet specific needs at the time. Individual skills can be taught in this manner as well. For some teachers, these teaching practices may sound beyond reach in a lower primary classroom, however, many teachers have encouraged shared ownership of classroom procedures through the use of class meetings and sharing sessions where students are encouraged to participate in the day-to-day running of the class.

A child's ability to learn independently is an attribute valued by teachers. Take, for example, the use of a learning centre approach in a primary classroom, cooperative groups are often formed to work effectively in such a situation. Children are expected to be able to focus on a task and work efficiently together. If children are instructed in specific social skills and processes required to implement a cooperative classroom, enhanced student achievement is one likely result.

Cooperative Learning

Cooperative learning is not new, nor is the desire for a more nurturing classroom environment that supports the diverse needs of the students within. Cooper and Henderson (1995), argued that during the agrarian age of schooling, when small community schools were numerous, early forms of collaboration in the school and community setting were employed. The school calendar revolved around community life with the long break, still evident in many US states today, coinciding with the harvest. The entire community collaborated at harvest time to support each other in the achievement of a goal. Without such cooperation, the winter would inevitably bring with it famine. Celebration followed the harvest and was a time when the entire community reflected positively on their achievements.

The dawn of the industrial revolution brought a faster pace of life with less emphasis on the small rural community and spawned a trend toward the individualised and more competitive models of schooling, many of which have stayed with us into the twentieth century. We are in the midst of a rapidly changing technological age, some would suggest that there is a greater need now, than at any previous time in our history, for students to be well versed in communication skills to enable them to better articulate their understanding of things learned. In an age where there is a growing emphasis on computer-aided learning, as an innovation, which may lead to decreased communication with peers, the ability to communicate well with others is a skill that is highly prized by many in the business and education communities and is seen as a growing necessity for employment, now and in the future.

The publication of the Mayer Report (1992), identified several key competencies seen as necessary for participation in the working community such as; the ability to work well in groups, problem-solving skills and effective communication. A glance at any employment advertisement today will confirm just how important these abilities are viewed by employers today. Thus, cooperative learning is especially relevant for

students both in school and in the workplace.

During the past ten or so years, education has been through some of the most rapid changes in its history, and yet, there are some things that appear to be unaffected by change. Glasser (1986:14), claimed that all children have four basic needs, 'belonging', 'power', 'freedom' and 'fun' that require satisfying in order to lead a productive and contented life.

Children have individual needs that teachers should address. Soderman, Gregory & O'Neill (1999) contended that today's teacher has to keep in mind a broad array of differences evident in the students they teach, such as chronological age differences, gender differences, variations in brain organisation, and sociocultural influences.

Teacher-student and student-student interaction is an important aspect of an effective classroom. Johnson, Johnson & Johnson-Holubec (1987:3) found that instruction for teachers in how children interact with each other in the classroom is often ignored and consequently is readily overlooked in the classroom setting. They assert that "how teachers structure student-student interaction patterns will have a lot to say about how well the students learn, how they feel about each other, and their self esteem".

As an educator, I am heartened, that in a rapidly changing world, the value of relationships and of meeting the social and emotional needs of the child as well as his or her academic requirements, remains the most important role of the teacher.

Cooperative or Collaborative?

The terms cooperative and collaborative can be confusing the first time one reads the literature. Frequently the terms are used interchangeably as they differ very little, and are both based on similar fundamental principles. The distinction needs to be made between cooperation, or working together to accomplish shared goals and the implementation of a cooperative learning approach. Johnson & Johnson (1990 a :27) maintain that certain conditions must be in place for cooperative learning to occur, namely; positive interdependence where students believe that they will succeed only with the help of their teammates and vice versa, face-to-face interaction, individual accountability, the teaching of social skills as an integral aspect of the implementation of the approach and regular group processing to evaluate the group's progress. These conditions set cooperative learning apart from a group learning approach where students may be seated together to facilitate discussion and the sharing of materials.

During the last three decades, interest in cooperative learning has continued to ebb and flow. Research concerning group interactions (Johnson and Johnson 1990 a , Sharan & Sharan 1976, Slavin 1987) identified a range of methods by which cooperative learning could be implemented in the classroom.

Davidson (1994:23) argued that the collaborative approach, while reflecting many of the same understandings as the cooperative one, tended to be aligned more with the literature related to the teaching of Literacy.

Reid, Forrestal & Cook (1989) defined the collaborative learning model as having five distinct phases; 'engagement', 'exploration', 'transformation', 'presentation' and 'reflection'. Students work in heterogeneous groups exploring new ideas and completing activities organising and clarifying information gained, prior to presenting their findings to their peers, and finally reflecting on what they have learned from this experience. This model allows for most of the essential elements of a cooperative approach but makes no specific reference to the teaching of social skills, as a phase in the learning model.

During the nineties a slight shift in emphasis occurred from the classroom-based research of cooperative learning, to the wider research base of 'collaborative learning communities' which encompassed the wider school community. The term 'collaborative learning communities' became aligned, by some, with the emerging focus on educational change. Fullan (1997:226), suggested collaboration may well be the way to overcome the many stresses resulting from the current educational climate. He asserted that in times of extreme change, it is relationships that matter most. Teachers can benefit from collaboration with their colleagues in many of the same ways that their students can. Innovation often springs from shared ideas. Often it is simply the loneliness of working in isolation, a state often aligned with the teaching profession, referring to the relative isolation of the classroom, that can be overcome through collaboration with one's peers. In advocating for collaborative learning communities, it could be argued that the cumulative effects of closer working relationships both for students and staff have led to working 'smarter' together to solve problems and implement new educational innovations, thus overcoming some of the difficulties inherent in constant change.

As teachers today, we are called upon to deliver an ever-broadening curriculum as well as provide other services ministering to the 'whole child'. Johnson & Johnson (1994:43) argued for the 'back to basics' approach, asserting that the abilities students acquire when participating in a classroom using cooperative instructional practices will hold them in great stead for the many challenges they will meet as members of society. They claim that personal relationships between students can be enhanced, as well as students gaining technical skills like problem solving, reading, speaking and listening.

The Teaching of Social Skills

The systematic teaching of cooperative skills is an essential aspect of any cooperative classroom. Although many social skills used with cooperative learning are desirable in all classroom settings, in a cooperative classroom, children assist each other to master the use of these skills. It is the joint ownership and individual accountability rather than the imposition of the use of a particular skill that sets the cooperative classroom apart.

Kelly (1994:107), advocated the benefit of class meetings, in a cooperative classroom, as a means of communication and a forum in which social skills can be highlighted and particular issues, such as disruptive behaviours, can be discussed. Students feel empowered when given the opportunity to raise problems that may be of particular concern to them. Class meetings can bring about a level of trust between the teacher and students, which in turn will impact on the successful implementation of cooperative learning as students learn the skills of how to run a formal meeting. With the appointment of a chairperson and minute secretary, the students can take turns in putting together an agenda and chairing a meeting.

Johnson & Johnson (1987), maintained that there is a hierarchy of stages of group development when establishing a cooperative approach. Groups move from an establishment phase called 'forming' through several other stages until they reach what Johnson and Johnson have termed the 'fermenting' stage. Each stage in the development of group processes is aligned with a series of cooperative skills which are introduced over time. For example, if the group is in the forming stage, then 'moving without noise' and 'encouraging participation' may be the focus, however when the groups are 'functioning', the skills are more complex, including; 'asking for help or clarification' and 'paraphrasing'. At the 'formulating' stage an example of the skills to be taught are 'summarising out loud' or 'asking other members to plan out loud'. In the fermenting stage, some relevant skills for group members to work on are 'criticising ideas, not people' and 'working through disagreements'.

The skills outlined by Johnson & Johnson (1987), have a wide application for students both in the classroom and in society in general. While other researchers in cooperative learning have highlighted additional skills, the common element is that social skills are sequentially taught.

The Challenge of the Nurturing Classroom Community

According to Mackay (1997:69), "the experience of living together in neighbourhoods and communities … develops the sense of mutual obligation which is fundamental to any ethical framework". With the decrease of close neighbourhood ties and the greater mobility of families at the end of the twentieth century, many schools have taken on a new role. Some schools are providing the community links that a church or neighbourhood may have provided a generation ago.

For some children, the closest sense of community they will experience may be the classroom. The challenge is for the classroom teacher to weave a sense of community among the class members that encourages nurturing, caring and concern for each other of the highest quality. Johnson and Johnson (1990 b : xiii), proposed that "the quality of life within classrooms improves when … students care about each other and become committed to each other's success and well being". That being the case, it would appear that cooperative learning deserves another look by those of us wishing to create the kind of environment in our schools and individual classrooms that may be missing in many a child's life today.

As professional educators, we need to remind ourselves again and again why we employ the practices we use. If we responsibly structure our classroom activities, we will consider the varying needs of the children we teach. Cooperative learning can be empowering for teachers and students alike. By employing the principles of cooperation, care and concern, teachers can create a cooperative classroom where students can experience positive relationships that may be missing in their family life. The classroom can become the model for the community we'd all like to be a part of. In creating a cooperative classroom community, we make a commitment to our students to impart to them skills that will stand them in good stead for a lifetime, not just a year. That is where the real benefit of the cooperative classroom community lies, its influence can last a lifetime. ■

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D15 Enhancing the Understanding of Data, P–4

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Dealing with Data and Statistics

The Australian Bureau of Statistics defines data as 'observations or facts which when collected and evaluated become information or knowledge' (Castles 19994, p.3) and statistics as 'numerical data that have been organised to serve a useful purpose' (Castles, 1994, p.5). Descriptive statistics describes the data whereas inferential statistics is the science of interpreting data in order to make predictions. Statisticians either describe or interpret data by ascertaining its centre (middle measure) and then by describing how the data is spread about that centre. Statistical literacy is becoming increasingly important in daily life and there is a need for children to be able to interpret the reasonableness of data. It is therefore important for children in the early primary school to be introduced to the beginning ideas of statistics.

Recently introduced curriculum documents encourage teachers to cover a range of statistical notions. For example, from the *Curriculum and Standards Frameworks II (Draft consultation)* Board of Studies, (1999):

▸ represent and summarise data using concrete and pictorial displays and oral descriptions (Level 1, p.226);

▸ use simple language to describe the features of collected information (Level 1, p.226);

▸ describe and interpret whole number data organised in lists and a variety of visual displays (Level 2, p.238);

▸ describe and interpret data summarised in tables and presented graphically (Level 3, p. 252).

These curriculum foci lead onto the expectation that children at Level 4 have an understanding of simple statistics as mean, mode and range. In order that children can construct this knowledge at Level 4 they need many experiences at the previous levels.

Children's Early Notions

This paper focuses mainly on the development of the notion of 'middle measures'. Children come to school with some understanding about the idea of middle particularly from stories like *Three Billy Goats Gruff* and games like *Piggy in the Middle.* When talking to children about their notions of 'middle' the following comments were collected:

"It's when you have a middle name." (Prep pupil)

"Middle sized ..... like middle-sized bears." (Prep pupil)

"It's half of something." (Year 3–4 pupil)

"If you cut an apple in half, where you cut is the middle." (Year 3–4 pupil)

"Say with the Earth the hot part is right in the middle." (Year 3–4 pupil)

"When you draw a line through something it has to even on each side." (Year 3–4 pupil)

"When all the planets around the Sun and that's like the middle." (Year 3–4 pupil)

"With the Red Sea and the Blue Sea the middle is where they meet." (Year 3–4 pupil)

One interesting story occurred during this discussion with the Prep pupils. One boy came forward to explain that middle could be discussed in a context of book size. He initially talked in terms of big books and little books and was able to competently discuss their comparison and show two books as examples. He was asked to get a third book and compare its size in relation to the other two. He was able to compare them by placing them back to back but he was unable to explain which book was middle-sized even when the books were placed in a row. When asked which book was middle-sized he pointed to the smaller one. It was unclear whether it was his ESL background or his lack of experiences with this term that explained this apparent lack of understanding. Another child came forward to give their explanation of middle. While the three books were arranged in order of size this child could identify the middle-sized book. But once this book was swapped

with the smaller book he said that the book was no longer middle-sized. It seems that this second child was confusing position and size.

These discussions with children about their idea of 'middle' show that the term has many connotations which obviously leads to confusion and children need lots of experience to sort these out. All of the children needed a context in which to give their explanation and had a visual or spatial model. Some children viewed the idea of 'middle' in a two-dimensional way whereas others saw it in three dimensions. The idea of half was connected to the idea of 'middle' by the Year 3–4 pupils and this leads to further notions involving symmetry and balance. These varied ideas about 'middle' could be pre-cursors to the approaches to using and understanding averages outlined in research by Mokros & Russell (1995). They found that children had five approaches to the idea of average: as a mode; as an algorithm; as reasonable; as a midpoint; and as a mathematical point of balance (p.26).

Classroom Stories

The following two classroom stories illustrate some of the ways 'middle measures' can be explored.

Middle-sized bears – Prep

The story of *The Three Bears* was read to the class. The children were then asked to make the middle-sized bear and could choose from a range of different sized paper to draw their bear. Without any apparent planning the children busily drew their middle-sized bears and cut them out. When questioned later about how big to make their bears, the typical response was *I just thought and did it*, or *I just knew.*

There was a range of different sized bears on every table. This created a dilemma and led to further class discussion. The children came to the floor to discuss their bears. Two bears, one large and one small, were selected and placed on the floor. The question was posed; *Look at these two bears. They're both middle-sized. What do you think?* One child suggested that one of the children thought about making their bear big and the other one thought about making their bear small. Many of the children believed the bears were still all middle-sized despite the variance in size.

One child who held this belief, added his bear to those on the floor. *Tamara's is the biggest and William's is the smallest and mine's middle-sized.* He then ordered the bears to prove his point. Having the reference point of the other two bears gave this child a context in which he could further develop his understanding of the notion of middle-sized. This resulted in him changing his ideas as he no longer believed that all the bears could be middle-sized.

Further discussion resulted and more bears were added to those on the floor and then ordered. The children were again asked if they could find the middle-

sized bear. One child when asked how she knew that one particular bear was middle-sized said, *There are two bears on this side and two bears on the other side and this bear is the one in the middle.*

The children were asked to return to their tables and as a group find the middle-sized bear by ordering the bears (see figure 1). Some groups found the ordering of the bears difficult. They often were focusing on different attributes of the bears such as, *This one is the biggest because it has a small body and a big head.* Agreeing on a strategy to use to compare and order the bears was difficult and some teacher direction to give the group a starting point was required.
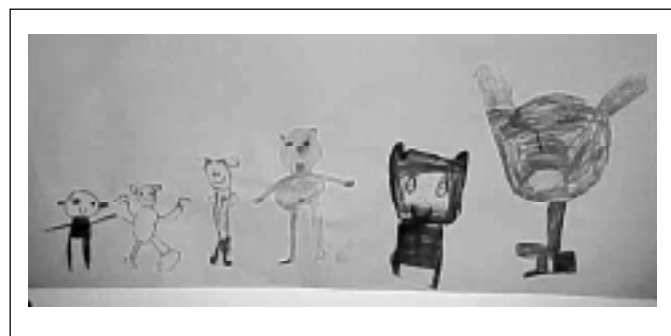

Figure 1: An example of a group effort at ordering the bears

The children returned to the floor and one group's work was displayed on the board. The children again discussed which bear was the middle-sized bear. This was challenging for the children, as there were six bears. Determining the midpoint was difficult. Some children thought it was the third bear, others thought it was the fourth bear. One child thought it was somewhere between the third and fourth bear. One child suggested that if we added one more bear then we would have three bears on each side and there would be a bear in the middle. In essence the children were looking for the point of balance in the data they had collected.

Dice totals – Year 3–4

Although the context is different and there are additional connections to other mathematics topics the inspiration for this activity comes from Pereria-Mendoza & Dunkels (1989) and the 'Make Tens' game from Booker, Bond, Briggs, & Davey (1997) (p.70). The pupils were each given a ten frame worksheet for recording, a six-sided die and a handful of counters. Their challenge was to roll the die as many times as they could in three minutes and keep an ongoing total by putting counters into the spaces on the ten frames worksheet (see figure 2 for an example).
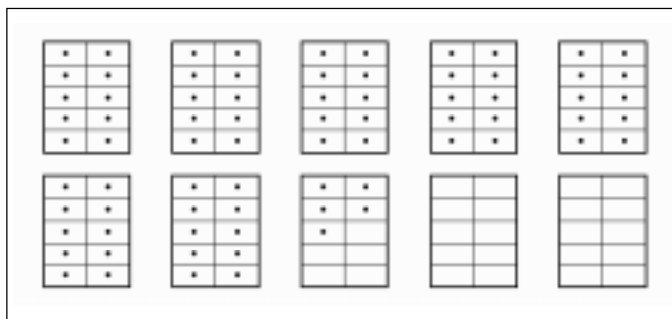
Figure 2: Ten frame worksheet showing 75

Several children ran out of counters during the three minutes. One boy, instead of waiting for extra counters to be delivered, re-used counters from a completed group of ten. Once the three minutes was finished the pupils had to write their total on to a rectangular piece of paper that had been folded down the middle. The tens part of their number in the left-hand space and the units part of their number in the right hand space (refer to the examples in figure 3). The pupils then cut the number in two along the fold.

Figure 3: Examples of the way the pupils recorded their dice totals

There were some children who wrote the total in the format in figure 4. Did this indicate some lack of understanding in place value? These children were assisted but it was noted that in a later session some further place value work would be undertaken for this small group.
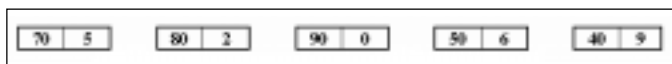

Figure 4: Examples of the way some pupils recorded their dice totals

The whole class then sat in a large circle on the floor for discussion. They were asked to make their total with the cut pieces in front of them on the floor and some pupils read out their numbers.

A long piece of dowel was then placed on the floor and some children placed their number on the floor so that the tens part was just to the left of the dowel and the units part just to the right. Once five children had done this the numbers were sorted into ascending order (see figure 5).
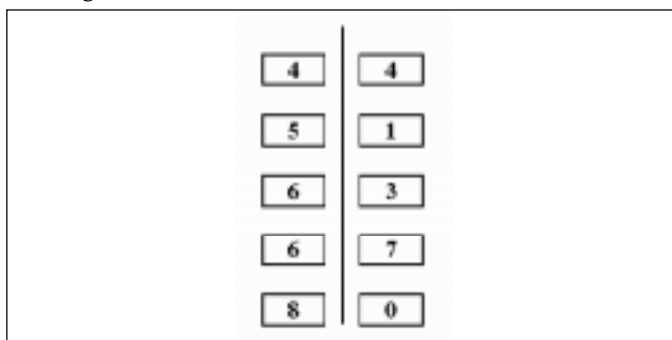

Figure 5: Dice totals ordered along the piece of dowel

The rest of the class then put their numbers into the correct places so that ascending order was maintained. The range went from 44 to 90 but most of the dice totals were in the sixties. One pupil then said:

"There are doubles and triples of some numbers."

Was this giving credence to the use of the mode as a middle measure? After much discussion and several suggestions it was decided that the 'triple 90' could be recorded as illustrated in figure 6.
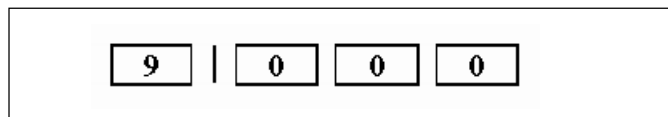

Figure 6: Recording for 'triple 90'

The teacher then picked up all the 'fives' representing 'five tens' just leaving one five. The class then rearranged the 'units' numbers as illustrated in figure 7.
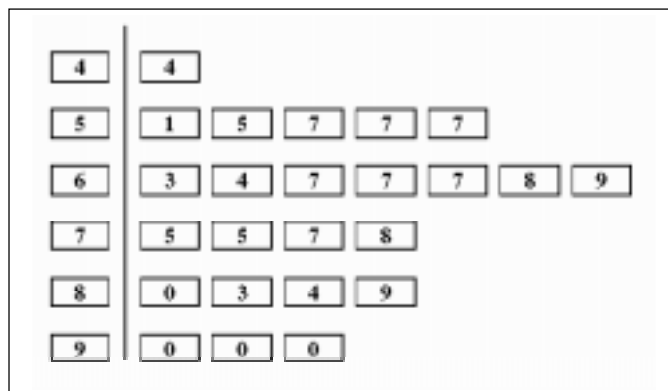

Figure 7: Dice totals ordered along the piece of dowel

By doing this the class had assembled a stem and leaf plot of their data 'where the stems record the 10's part and the units are represented as leaves.' The pupils were able to make a number of observations from this plot.

▸ Some people rolled low numbers and some people rolled high numbers.

▸ Seven people threw in the sixties and only one person threw in the forties.

▸ Most people threw in the sixties.

▸ Everyone was throwing at a different pace.

Then the pupils were asked which result was typical or representative. They realised that this involved locating a middle score. One of the pupils had difficulty with the notion of the range of dice totals starting from 44. He felt that the typical score could be found by halving the highest score, resulting in 45. He could see that this did not make sense and proposed the idea of halving again and finding quarters and concluding that the typical or middle score was about 67.

Another boy decided that you could total all the dice totals and then halve this grand total. He worked on this theory to one side of the group using a calculator.

His result was 845. The idea of halving, finding a balance or locating symmetry in the data was uppermost in this boy's mind. At the end of the session this boy was taken aside and shown three numbers and asked what he thought the middle result would be. This proved interesting because he had difficulty comprehending the idea of one middle but wanted to list the middle between each consecutive pair of numbers. When given two numbers – 30 and 40 – he said the middle was 35. He worked this out by realising that he could add five to the 30 and subtract five from the 40 giving 35 as a balance point. He then discovered that his rule worked for two numbers, that is, total all the scores and halve (70 ÷ 2). Was this boy on the way to discovering the rule for calculating the mean?

One girl wanted to just take the sixties set of scores because they were generally in the middle and locate the middle score of those. The teacher had the children with sixties scores stand in a line holding their numbers. The class was asked which one was the middle. One pupil said that 67 was the middle and explained that he worked it out by counting in evenly from both ends. The class then realised that if there were 24 numbers in their dice totals data that you could find a middle score by counting down 12 scores, and checking this by counting back 12 scores from the largest dice total. The class had discovered the median.

Conclusion

The two classroom stories illustrate how important it is to encourage children to think about how to summarise data. It is also clear that many other mathematics topics have also been attended to: place value, counting, sorting, ordering, comparisons of size. As with chance activities (Taylor & Smith, 1998) teachers need to explore the possibilities and outcomes of including early statistics notions in their teaching. ■

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