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CREATING A GOOD MATHS LEARNING ENVIRONMENT

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As Lecturer and Curriculum Writer: Mathematics for the Anangu Teacher Education Program, I write to share some of the successes of a Maths workshop which I facilitated for the program's Stage 3 students, 26 February to 2 March 1990.

I have included a brochure for further information regarding the Anangu Teacher Education Program (ANTEP).

The aims of the workshop, entitled *Creating a Good Maths Learning Environment* were:

* To provide students with the opportunity to observe an experienced, qualified teacher (modelling child-centred Mathematics methodology) by :

- involvement in structured observations sessions
- observation of a successful junior primary, team teaching situation.

* To develop a sound base of mathematical teaching methodology by:
- consideration of aspects which make up a good Maths learning environment -

- | | | |
|------------------|----------------|-----------------------|
| *planning | -personnel | -time |
| | -content | -working mode |
| *lesson delivery | -introduction | -equipment and |
| | -language | resources |
| | -working areas | -children's recording |
| | | -general |
| *record keeping | | -children's recording |
| and evaluation | | -reporting |
| | | -evaluation |

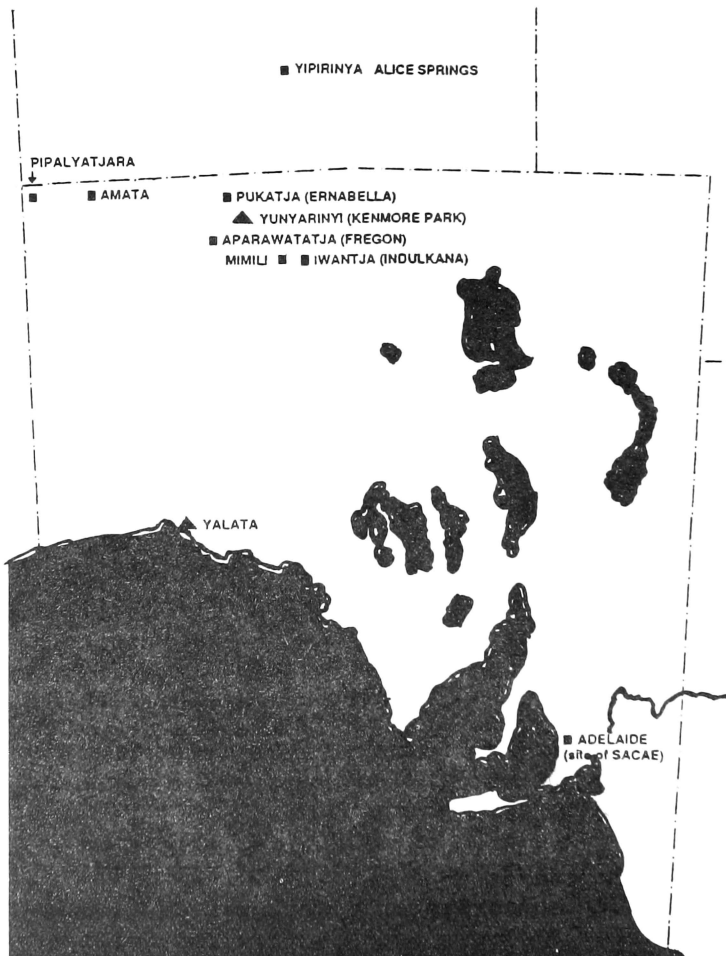
- *development of a group workshop chart to indicate aspects of a good maths learning environment, including descriptive behaviours for teachers and students.*

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The attached documentation is the result of extensive work by the students - Katrina Tjitayi, Jennifer Ingkatji, Ruth Anagka - and myself and corresponds to the *italicised* section of the aims.

Although not exhaustive of all the aspects which make up a good maths learning environment, the students (and their lecturer!) are proud of their efforts and hope that our work will provide a stimulus for thought and action in regard to the teaching of mathematics in schools catering for Aboriginal learners.

WHERE ANTEP OPERATES



WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* <i>Helps you, the teacher, know what you are going to do.</i> 1 Encourages you to think about: - long term aims - short term aims 2 Assists you in: - preparing timetables	- planning a synopsis of the year's work and breaking it down, term by term - planning week by week (in conjunction with aims for each term) - developing lesson plans for each day (in conjunction with aims for the week/term) - scheduling regular time slots during non-contact and planning times, for Maths, to keep check of - how many lessons per week - when the lesson takes place - how long each lesson is	

P L A N N I N G

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
- developing lesson plans - discussion with AEW - preparing for the lesson delivery	- during meeting times discuss and program lesson: * content * activities and student groupings * equipment - consider subject integration (creative play, S.S., language etc) - schedule regular meetings with the AEW to discuss: * students prior understanding * lesson content, strategies, activities, outcomes and equipment * relevant Pitjantjatjara language to assist discussion and concept development - work with AEW to prepare aids/charts to assist learning - collect all necessary equipment prior to the lesson	

P L A N N I N G

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* <i>Helps you, the teacher, know how the children are progressing.</i> 1 Provides opportunities to assess the mathematical understanding of each child 2 Enables teacher and AEW to plan activities relevant to their students' needs	- with the AEW, look at child's work folder which assists discussion regarding: * work completed/not completed * use of equipment * working mode (individual, pair, small group) * types of recording used * acceptance of challenges * willingness to report back to group - plan activities which consolidate learning and challenge students' thinking and recording	

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* <i>Helps you, the teacher, know how effective your teaching is.</i> 1 Provides opportunities to reflect on teaching practise 2 Provides stimulus to implement other strategies to meet teaching/learning needs	- during meeting times with AEW/team teacher etc., consider: * What aspects of Maths lessons are working well? Why? * How can those aspects be improved/modified to meet ongoing needs? * What aspects of Maths are not working well? Why? * How can those aspects be improved/modified to meet needs? - investigates options regarding teaching practise, eg (1) discussions with other personnel, including Principal (2) reading of articles from school maths resources (3) contact with Maths Project Officers (4) contact with personnel in Maths Focus Schools (5) attempts made to modify practice in order to achieve goals	

P L A N N I N G

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* Helps students know what they are going to do. 1 Reinforces appropriate behaviour 2 Encourages listening and questioning skills	- make sure that students are ready to listen and contribute in an appropriate way, eg seat students in a whole group on floor and do not commence until all students display appropriate attending skills - lead discussion about work that the students have already experienced that is relevant to this particular lesson/activity - encourage student input in discussion - clearly outline required procedures, eg working mode (individual, group, etc), equipment, work areas, recording etc - ensure that all students know what is required of them, eg asking "Is everyone sure of what they need to do?" "Ben, where are you going to work today?"	- employing appropriate learning behaviours, eg * all students should be able to hear and see the teacher * all students acknowledging each other's right to uninterrupted learning - employing appropriate attending skills (eye contact, listening, questioning) - contribute to discussions - ask questions of clarification when understanding of instruction is not clear - respond to questions - set about working on assigned tasks

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* Assists students and teachers in learning 1 Reinforces appropriate behaviour 2 Encourages students mathematical activity	- positively recognise students behaviour eg "Jacinta, I like the way you have begun work so quickly." "It's good to see that Jason has completed one activity and is beginning another." - use questions to provide opportunities for children to discuss and clarify their activities eg "Can you tell me (or another person) about what you are doing?" "What happens if...?" "Can you describe...?" "What have you found out about...?" - use voice in an appropriate way eg talks softly to individual children, or when requiring a child to listen carefully	- employing appropriate learning behaviours - learning from the behaviour of role-models - responding to the questions of teacher, AEW, and other students - showing a willingness to talk about their work, in a variety of situations (1:1 students, 1:1 teacher, group situation) - use their own voices in an appropriate way when discussing maths activities

LESSON DELIVERY

LANGUAGE

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
LESSON DELIVERY 3 Provides a basis to share ideas (particularly student with students but (in written form) also with parents and other visitors)	- positively recognise students' maths efforts, eg "Terry-Anne would you share your work with the rest of the class because you've found out some very interesting things." - positively encourage discussion between students (in English and Pitjantjatjara) during activities - set up a forum in which students tell other students about their work and respond to questions - display students' work possibly with photographs and captions	- positively recognising each other's maths efforts - value their own efforts and in turn feel safe about taking maths learning risks - talking with each other about maths during activities - talking about their mathematical findings for class feedback sessions (sharing understanding of concept and process) - talking with students, teachers, other staff and visitors about their work - writing captions for photographs and descriptive accounts of their work

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* Helps students thinking and working 1 When students can see, feel and move equipment, learning is reinforced.	- have access to an extensive variety of equipment * from children's own environment * junk materials * commercially produced materials * consumables (paper, glue, textas, etc) - allow time for children to familiarise themselves with new/unusual equipment - direct children (where appropriate) to equipment which is suitable to their activity - encourage children to make their own choices about suitable equipment - encourage the use of a variety of materials for maths investigation, ie in patterning for example, any materials could be used and reinforces that similar solutions could be achieved despite different materials)	- assist in the collection, storage and labelling of equipment - take responsibility for distribution, packing up and maintenance of materials and equipment - touching, feeling, 'playing' and experimenting with equipment either in maths activity time or at other times (creative play) - making informed decisions when choosing equipment for maths activities - experimenting with a variety of materials and making comparisons
EQUIPMENT	AND	RESOURCES
LESSON	DELIVERY	

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT		WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
LESSON DELIVERY	2 Human resources (teacher, AEW, other children, parents, visitors) provide support and direction for learning	- to include and encourage all possible human resource people to be actively involved in maths activities: - as role model - to provide direction - to challenge children's thinking - question children and listen to their findings	interacting with a variety of people in mathematical situations
	* Classroom environment stimulates and supports students and teachers learning. 1 Physical layout of working areas affects how students work	- develop a classroom setting which meets physical needs of students: - working areas at desks or on floor, wet areas, quiet areas - display areas for children's work - displays at appropriate heights particularly for written descriptions and photographs - allocating space, which is accessible to students, for storage of a variety of materials	- making informed decisions when choosing working areas - using working areas appropriately whilst being aware of the needs of others - taking an active interest in classroom displays - take responsibility for choosing and returning materials
WORKING AREAS & ROUTINES			

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
2 Clearly defined routines and ways of working ensure that students know what is expected of them	regular discussions with students re: • acceptable behaviour • use of resources • how to gain help and support • appropriate ways of working (oral, written, etc) move about the classroom during working time, discussing, asking questions and supporting the students as they work develop a classroom atmosphere in which children make informed decisions about their mode of working (eg individually, pairs etc)	verbalising the importance of: • acceptable behaviour • use of resources • how to gain help and support • appropriate ways of working working independently as individuals or in small groups, seeking clarification and asking for help when necessary making informed decisions about appropriate times to work individually, or as a team making informed decisions when choosing partners or teams for working seeking support to, or dissolving an unsuccessful working arrangement

LESSON DELIVERY

WORKING AREAS & ROUTINES

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
* <i>Helps the children to understand, remember, and share their ideas.</i> 1 Encourages children to formalise their ideas	- encouraging all children to 'have a go' at recording their activities - providing a forum for children to look at, discuss and ask questions about other children's work - valuing each child's attempts at recording, eg • role model good attending skills (eye contact, questioning, listening) • ensuring that all children (over a period of time) take the opportunity to show and discuss their work - displaying work so that it becomes a focal point and stimulus for discussion (not only for children, but also for visitors)	- making an effort to record their activities - helping each other - showing their work to the group and engaging in discussion about it - discussing similarities/differences with other children's work - taking pride in their achievements - being prepared to show and discuss their work with the teacher and others - using good attending skills when others are showing and discussing their work. - equitably share air-time - taking pride in their achievements, and their class displays - discussing their work with others

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
2 Provides a basis for children to assess their own development.	- providing a means by which children's work can be stored for future reference (eg folder, envelope) - regularly encouraging children to sort their work and make comparisons of previous work with recent attempts	- naming and dating each piece of work before storing it in Maths folder/envelope - sorting work and making statements about their own development - setting challenges for themselves to consider in future sessions

CHILDREN'S RECORDING
LESSON DELIVERY

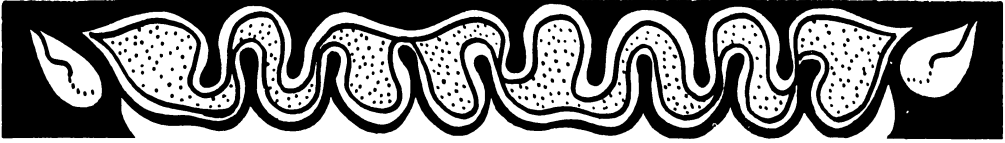
WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
<u>Children's recording</u> * <i>Helps you to assess each child's development</i>	- regularly going through each child's folder/envelope and noting: • ways in which recording has been attempted • exposure to which equipment • overall development - noting areas of work which: • require additional attention • have been grasped • are suitable for challenging - retaining pieces of work (in folder/envelope) which highlight achievements/developments and allowing children to make decisions about culled examples - using information gained from observation notes and children's individual folders, to effectively plan and implement future sessions which challenge and stimulate children's thinking and ways of working	

RECORD KEEPING

WORKSHOP: CREATING A GOOD MATHS LEARNING ENVIRONMENT

WHY IT'S IMPORTANT	WHAT YOU COULD EXPECT THE TEACHER TO DO	WHAT YOU COULD EXPECT THE STUDENTS TO DO
R E C O R D K E E P I N G	- reporting to students, parents, visitors and staff, in an informed way, about: * the teaching of maths in your classroom, and * each child's individual development	- be positive about themselves as learners of mathematics - share their interest with others - take learning risks in supportive situations



ANTEP

ANANGU TEACHER EDUCATION PROGRAM

ANTEP is a teacher training program run by the Underdale campus of the South Australian College of Advanced Education for traditionally oriented Aboriginal people living in remote areas of Australia.

This program was originally initiated for the Pitjantjatjara people (or Anangu) in the north-west of South Australia, hence the name ANANGU TEACHER EDUCATION PROGRAM (ANTEP).

Plans for the ANTEP program began in December 1979 when the Director General of Education requested that the then Torrens College be responsible for developing and implementing a training program for Aboriginal people in the north-west of South Australia. In December 1983 the ANTEP course gained accreditation through the South Australian College of Advanced Education and in September 1984 the first intake of ten students began full-time study with ANTEP at the regional centre of Ernabella.

To date there have been three different intakes with ANTEP:

i) The first intake has always comprised full-time students studying with an on-site lecturer at the regional centre of Ernabella. Of the original ten that began the course, six have qualified for the Certificate in Anangu Education (Stage 1) and three with the Associate Diploma in Anangu Education (Stage 2). Three students are currently studying at the Stage 3 level and hope to qualify towards the end of 1990 with a Diploma in Teaching (Anangu).

ii) A second intake began at Yipirinya school, Alice Springs in August 1986. These students were teaching in the classroom as well as studying full-time with an on-site lecturer. A number

of these students have qualified for the Certificate in Anangu Education.

iii) A third intake of 28 students began a decentralised program in the north-west of South Australia in November 1988. These students are studying part-time in seven different Pitjantjatjara communities with S.A. Education Department tutors. They come together for regular workshops with ANTEP staff in Ernabella, Alice Springs or Adelaide.

ANTEP is unique in Australia in that it offers teacher education to Aboriginal people in their own communities for all stages of the course, rather than on campus in a large tertiary institution. From the beginning there has been close consultation with members of the communities it seeks to serve. One means of achieving this has been through Joint Management Committees comprising students, community members and College representatives.

ANTEP adopts a negotiated curriculum design model which ensures that what students study is relevant and meaningful to them, yet still achieves the aim of preparing Aboriginal teachers to run their own schools and hence be in control of their children's education.

AIMS OF ANTEP

1. To provide a teacher education program which will enable Anangu to gain formal qualifications leading to certification as teachers.
2. To enable students to develop the specialist skills necessary for presenting effective bilingual and bicultural programs in Anangu schools, following directions and approaches established by the local community.
3. To provide Anangu schools with graduates who can bring their cultural experiences to bear on reducing contradictions between schooling and Anangu society.
4. To provide graduates who may represent a more stable teaching force in Anangu areas.
5. To provide courses and appropriate qualifications for those students who want to develop skills and knowledge related to working as Aboriginal Education Workers, Grades 2 or 3, but who do not want to become fully qualified teachers.

6. To enable students to further develop personal skills and understandings in all the curriculum areas covered by the local schools.
7. To enable students to reside in an Anangu community while undertaking study with the program.
8. To involve Anangu communities and students in the design and management of ANTEP throughout the life of the program.
9. To enable ANTEP students to develop regular contacts with the traditionally oriented students enrolled in similar programs.
10. To provide an appropriate basis for the ongoing professional and career development of graduates.

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Are you ready for the challenge?

An appointed Distance Education Centre, the University of New England at Armidale offers the following external courses of study:

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(3 years' part-time external study)
- **GRADUATE DIPLOMA IN EDUCATIONAL STUDIES - ABORIGINAL EDUCATION**
(2 years' part-time external study)
- **MASTER OF EDUCATION (ABORIGINAL STUDIES)**
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