

Initiatives to Enhance the Learning of Maths for at Risk Year 2 -4 Students

Principals Sabbatical Report

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Acknowledgements

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Executive Summary

In investigating successful initiatives to enhance the learning of maths for at risk students I looked at a number of programmes. It seems there needs a large degree of fun in learning maths mixed in with a serious approach that helps primary students who are struggling. Interventions that are based on developing targeted learning groups, are resulting in rises in student achievement. Small groups of children get daily practice in number knowledge with the help of a trained leader who can be a teacher aide, parent or student. These students benefit from a consistent and frequent series of support sessions, similar to those used by reading interventions such as Reading Recovery. The programmes give a useful structure for the teachers, teacher aides and volunteers to use. In researching initiatives I acknowledge two useful resources available to schools and teachers which I have not reported on. These being, the NZ Maths site [which anyone can access] and the ALIM [Accelerated Learning in Maths] which involves Ministry of Education resourcing.

Purpose

The intention was to explore initiatives used by schools to enhance mathematical learning for at risk students, ones struggling to grasp mathematics concepts, in Years 2 – 4. My intention was to visit schools, look at programmes in action and practices used by teachers and this was followed by an examination of the interventions, including benefits to students, similarities and points of difference, teaching requirements – time, cost, resources needed, and training.

After this gathering of information to make informed decisions about the effectiveness of our current teaching practice and make improvements where possible to our school mathematics programmes.

Methodology

My plan was to use the time to visit schools and observe programmes in action and discuss the intervention programmes with them. As well, I wanted to get ideas about what other actions the practitioners saw as useful interventions /changes to everyday mathematics teaching that help the students who struggle.

Part of the plan was to spend time reading research about mathematic teaching and applications used in schools and following this up with contact with math's facilitators and people involved with school professional development.

I had a set focus of questions that was the basis of the discussion and observation when visiting schools and/or in discussion with people. These were;

- How do you identify struggling students?
- Why do you consider they are underachieving?
- What interventions and / or changes have been implemented to enhance student learning of mathematics [to programmes, to teaching techniques, student organisation]?
- When implementing an intervention in your school what are; the organisational needs, resourcing, staffing and training costs.

Findings and Summary of Interventions

Interventions used by teachers and schools;

- Spring into Maths
- COSDBRRICS
- Invercargill Intervention Programme
- Maths for Learning Inclusion

Spring into Maths

This intervention focus is on students requiring extra support in number, both knowledge and strategies, as identified with weak understanding of number concepts.

Its Method: students are diagnostically assessed using IKAN [knowledge] or by spring into Maths Snapshot [strategy and number knowledge].

The intervention is with groups of 3-5 students working with a teacher or teacher aide for a 30 minute session done 3 - 4 times a week for a block of 6-7 weeks.

The teaching session is a structured process that uses the same procedure each teaching session. The structure follows; SPRING. S – Start counting P – patterns R- reinforcing strategy I identifying numbers N- numbers facts G- game. There are four 'Kits', levels that work within the Numeracy Stages. Kit 1 moving students to counting all. Kit 2 moving students to advanced counting. Kit 3 moving students to early additive. Kit 4 consolidating students at early additive.

Each Kit comes with a programme overview and resources to be used by teacher with the students.

These resources are required to be organised and developed so that the support materials is all together with paper/card copies ready for daily use with the students. Kit 2 has 13 activities to be used in the programme, Kit 4 has 19 activities. Additional references in each Kit programme overview are strategies that the teacher will use and page references to Numeracy Project Booklets, eg. Kit 4; Adding Ones and Tens Book 5 page 24 Spring into Maths is an intervention that is used as an additional time for each student to their daily classroom mathematics lesson. All Kits have an evaluation chart for individual student that tracks progress of student's development of number knowledge and strategy.

COSDBRRICS

This intervention focus is on Students who are at risk when there is a delay in strategy progress due to weak knowledge.

Its method: students are assessed for knowledge using IKAN to identify gaps to build an appropriate student profile of knowledge gaps.

The intervention is one to one working with a teacher aide for a daily 15 -30 minute intensive lesson focusing on the individual number gaps identified. Each daily session follows the Cosdbrrics structure of; C ounting, O rdering, S ay, D ictation, B asic facts, R evisite taught knowledge / strategy, R evisite known game I ntroduce new game, C heck, S et home work. This teaching time is additional to whole class teaching / student time with the classroom teacher. There are four 'success charts' ABCD that are used to track the student development that are sequential to knowledge stages.

A lesson plan needs to be developed for a student using the COSDBRRICS structure. The programme has a resource to help in the development of the lesson plan. The resource for the programme is based on Numeracy Project Booklets, that outlines each number domain, stage, and give activities references to booklets pages for the 'teacher' to use when putting the lesson plan together.

Invercargill Intervention Programme

This intervention is a hybrid of the COSDBRRICS Programme developed by numeracy facilitator/support team in Southland. It has the same intervention focus and methods of student's assessment.

The structure is a modification on COSDBRRICS using activities of; FNWS/BNWS (before/after/between), ordering, Say /read No's on flipchart, Write/make numbers, Basic Facts frames, Strategy, games. The design of the intervention programme gives a structured set of resources and session plans. The four plans are designed for; Stages 2-4 addition / subtraction, Stages 3-5 addition / subtraction, Stages 3-6 addition / subtraction, Stages 3-6 multiplication /division. There are also set of Chart and Basic fact sheets/activities.

Small groups of children get daily practice in number knowledge with the help of a trained group leader who can be a teacher aide, or parent. Teacher aides ran daily half-hour sessions for five weeks. After a five-week break, they ran further revision sessions if needed. The children review their progress against a chart of objectives and when they show they can do something for the third time, they get a star. It also engages the students' caregivers to support the intervention by monitoring the students learning goals, reinforcing and practicing basic facts and related Maths learning tasks. There is a set of

sequence charts eg. Starting with Chart 1 – Numbers to 10, Chart 2 – numbers to 20. included in the whole programmes resources.

Maths for Learning Inclusion [M4LI]

This is a South Australian programme that has been developed to move students on. M4LI has two parts. Part 1 covers; Numbers 1 -10, Numbers 1 -20, Using the base 10 system. Part 2 covers; Saying, Reading and writing Numerals, Beginning Multiplication and Division, Multiplication and Division.

Each of the six stages resources has a series sequential concept development with questions and attached master sheet of learning activities. Eg. Part 1 Numbers 1-10

Question 1 – counting has learning activities a – k

Question 2 – subitising has learning activities a – i.

The activities need to be organised so that the materials for each activity are assembled ready for daily use.

The teacher has to develop lesson plans and consider the daily structure of the programme, there is no guide to the structure of lessons. Therefore I see it as a great additional structured resource more than a programmed intervention.

The benefits to students;

Almost all interventions are of benefit to students. Firstly because it is targeted learning specific to a student need, and assists in the reduction of knowledge gaps. The students that benefit most are students who should be ‘at standard’ but for some reason have required some form of intervention to develop the missing understandings of numeration. The students of lesser ability ‘well below’ now progress but it does not provide a ‘fix’ for all students.

Interventions where students self-assessed their learning and involved the home added to the student’s enthusiasm. This spiral of successful achievement gives on to greater student engagement.

Similarities and points of different;

All of the interventions use ‘targeted learning’, groups of students who get daily practice in number knowledge with the help of a trained leader. The students benefit from a consistent and frequent structured series of support sessions, similar to Reading Recovery.

The programmes can be taught by a teacher or a teacher aides /volunteer once they are trained in the programme delivery. Different schools used various staffing methods mainly due to time available, staffing personal and costs.

COSDBRRICS is a programme designed for one to one and requires more teacher involvement in designing of the programmes content to match the individual student’s needs. Whereas the others can be more group delivery.

The Invercargill Intervention Programme makes greater use of student setting goals and home / school partnership.

Teaching requirements – time, cost, resources needed, training;

All of the following aspects need to be thought through when a school is considering implementing a programme.

Each programme uses equipment that is used by the students in the daily teaching activities which requires; storage, management and some construction or gathering together of equipment and photocopying of work sheets masters.

Staffing needs to consider;

- Group size,
- Use of a teacher or teacher's aide,
- Time for staff training in the intervention,
 - allowing time for interaction with the students classroom teacher which is pre/ ongoing/ post,
- The cost of staffing hourly rates or the use of banked staffing,
- The number of groups and duration 4 -5 weeks, repeat times, once a year or twice.

The student selection and monitoring of intervention successfulness, pre, during and post for retention of progress gains

The training is best done by allowing the Principal, maths team leader, and of staff person involved in the delivery of the programme to visit a school using the programme. The written documents that outline each programme are usable by themselves. However greater clarity and insight is gained by a visit or instruction from Maths facilitators it would be more desirable to include this in the establishment phase of such programmes. If a whole school professional development can be done, teachers can integrate some of the techniques in classroom teaching and it helps in the selection of students and their needs.

Conclusions

All the intervention are similar, target strategies for individual students needs, extra to classroom teaching, use of small group or one to one, repeating learning activities on daily base to reinforce concept development.

All NZ programmes are based on numeracy project stages', ensuring number knowledge is of greater importance than strategies, and make use of material / hands on activities. The interventions are enhanced if the cost of using a skilled teacher can be achieved. This is due to the teachers knowledge of how maths concepts are developed, and while students use hands on activities and the teacher using open questioning of the individual students 'answers'.

I ask the question why the need for targeted interventions? All the interventions start at year two onwards when the analysis of testing show clear gaps in student understanding. For some students any intervention will be on going but for a large number of students the intervention are successful in improving the gaps in knowledge.

Therefore;

How well prepared are the teachers of Year One students in mathematics?

Does the quality of teacher understanding of mathematics impact on the learning of Year1 and 2 students?

What interventions might be required if teacher's knowledge and reflectiveness in teaching Maths, particularly number was of a higher level?

What interventions are available in order to elevate and expand teacher knowledge?

Can all Teachers question and assess effectively? Do they have sufficient knowledge of the needs of beginning students and their stages of understanding eg. Can they conserve? Are they ready for adding?

Would this then decrease the numbers of students that require intervention to reach National Standards.

The major road block to any of these interventions is the cost of resourcing to a school. To reach the Ministry of Education National Standards Targets, an intervention would require full resourcing of all costs to schools so they can make best use of an intervention.

References

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