Title

An Investigation of the Impact of Precision Teaching Methodology on Numeracy Development in an Angus Primary School

Angus Educational Psychology Service

What did we ask?

What impact will a small scale study of Precision Teaching have on raising attainment in numeracy in an Angus primary school?

Over two terms of implementation of a clearly defined model of Precision Teaching;

- Will participating children demonstrate increased self-belief and attainment in numeracy, and a more positive attitude to mathematics?
- Will implementers, parents and class teachers be more confident in supporting children to develop numeracy skills as a result of Precision Teaching methodology?
- Can this model of Precision Teaching be used to inform a future large scale intervention of numeracy development in Angus schools?

What is the evidence base?

Precision Teaching is an engaging, systematic intervention for evaluating the impact of teaching. The methodology aims to improve attainment in literacy and numeracy in individual pupils in short, regular sessions (10 minutes per day) utilising existing school resources. Precision Teaching also improves learners' self-efficacy through clear and positive feedback leading to fluency and mastery of literacy/numeracy targets based on pre-determined criteria.

Precision Teaching methodology has been found to achieve an improvement of almost twice (x1.8) the progress rate of learning specific skills compared to other intervention methodologies (Brooks, 2007). A systematic review of Precision Teaching examined five studies to explore whether it is an effective intervention for improving literacy and numeracy skills in UK schools. Precision Teaching was found to be

effective in raising literacy/numeracy skills in all five of the studies reviewed and the majority of these findings were found to be statistically significant (Freedman, 2012).

Research into Precision Teaching has been carried out in Angus since 2014. The improvement methodology initially involved running a pilot study in one school in 2014 and gathering information about what went well, highlighting any difficulties, and identifying next steps for progression. A target group of pupils was identified as the focus of the pilot intervention. Following the plan-do-study-act improvement methodology encouraged by the Early Years Collaborative and Raising Attainment for All agendas (Scottish Government 2013), the findings were evaluated to inform future implementation both in the pilot school and other schools in Angus. Since then, Precision Teaching has been scaled up across more than 20 Angus schools and the impact evaluated in 2016. It was highlighted through the 2016 evaluation that literacy was being implemented more frequently than numeracy, and that implementers were less confident in implementing Precision Teaching in this curricular area.

What did we do?

It was agreed by the Senior Management of a school in a high (SIMD 1,2, or 3) Scottish Index of Multiple Deprivation area and Angus Educational Psychology Service that the current study would focus on a group of 12 Primary 3 stage pupils who were progressing towards meeting numeracy expectations, i.e. scoring within the 85-99 standardised Interactive Computerised Assessment System (InCAS, Merrell and Tymms, 2005) scores (with 100 being the average). Nine of these twelve pupils were based in one class and three in another class. The pupils were allocated to either a Precision Teaching group or a control group (six pupils per group) by the school, with the three based in one class allocated to the Precision Teaching group, and three of the nine from the other class allocated randomly by the class teacher.

Progress in numeracy was measured over two terms from baseline scores (using numeracy subtests from the Wechsler Individual Achievement Test (2nd UK edition) (WIAT-II UK, 1995) and an Attitude to Maths questionnaire, based on Tapia and Marsh's (2004) "An Instrument to Measure Mathematics Attitudes". The Precision Teaching group received Precision Teaching intervention for 10 minutes per day in addition to their normal classroom teaching. The control group received their normal classroom teaching only.

Classroom assistants (the implementers) had been trained in Precision Teaching and had implemented the methodology for literacy in the previous school session. The parents of the 12 pupils, the three implementers and the two class teachers were asked to individually complete a baseline questionnaire exploring their own

experiences of maths. Implementers were also asked about their confidence and skills in using Precision Teaching and the support they have to provide for the children's maths needs (e.g. the processes and procedures to clarify initial starting points, the time they have to plan, prepare and administer Precision Teaching and the on-going support they have within the school).

The implementers completed weekly feedback forms and met monthly with an Educational Psychologist (EP) to chart pupil progress and discuss issues for implementation.

The two class teachers were asked about classroom experiences of maths and invited to describe each child's current level of attainment and achievement within maths. They were interviewed at the start of the project and again half way through.

Semi-structured interviews with implementers and teachers then took place at the end of the project, with a view to developing good practice guidelines for the scale up of Precision Teaching (Maths) across Angus.

Parents were invited to complete baseline and final questionnaires to ascertain their views of Precision Teaching, their child's progress in numeracy over the two terms and how home-school links could be improved.

What did we find?

Over the two terms of this study, we compared pupil numeracy attainment and self-efficacy, and considered factors for successful implementation of Precision Teaching for numeracy. Differences were noted between quantitative and qualitative data.

- **Pupil Attainment Results**

Numeracy attainment results were inconclusive but there are a number of reasons why this might be the case;

- Two terms of Precision Teaching implementation may not be enough to highlight significant differences in numeracy attainment.
- Using the WIAT-II may not have provided an appropriate measure of classroom teaching experiences during the two term time period
- Current InCAS data is not available due to the bi-annual cycle of testing in Angus schools
- Changes in class teacher led to lack of continuity and limits to implementer-

teacher links to provide the opportunity for generalisation of skills within the classroom

- **Pupil Attitude to Maths Results**

The "Attitude to Maths" baseline measure indicated that the children lack awareness about their maths abilities when cross referenced with teacher baseline reports. Final measures indicated that there was little difference in scores between the Precision Teaching group and the control group and that, in some children, instead of anticipated increases, scores decreased between baseline and final measures. Such results may be as a result of children becoming more accurate about their abilities in maths because of increased knowledge and understanding of what is required to succeed. More research is required to explore this area further.

- **Feedback from Staff and Parents**

Despite initial anxieties about implementing Precision Teaching for numeracy, due to lack of experience in this subject area, implementers reported, through monthly feedback sessions, an increased confidence and enjoyment of the methodology. They also expressed a willingness to support new implementers in others schools in this curricular area. They noticed an increase in numeracy progression and confidence in all the children they worked with, but noted varied motivational factors in some of the children and limited feedback/involvement from parents,

Baseline measures indicated that parents would have liked some explanation of current maths techniques so that they could help their children more at home. However despite information and feedback being sent home by implementers and class teachers, parental involvement was limited both for the Precision Teaching and control groups throughout the two terms.

Teachers reported that pupils in the Precision Teaching group are now more secure in basic numeracy concepts and are able to move on to new maths areas more easily than the control group. They have also noticed an increase in self-belief in some of the Precision Teaching pupils, reporting more confidence in the classroom and more willingness to self-challenge.

Class teachers and implementers highlighted factors for successful implementation including time factors (protected time, regular slots with pupils and persevering with pupils) and the development of relationships (rapport between implementers and pupils and regular links between class teachers and implementers).

What do we plan to do next?

Despite inconclusive quantitative data from this short study, the qualitative data from teachers and implementers indicate that Precision Teaching for numeracy has led to increases in pupil self-belief and numeracy progression. We therefore plan to scale up Precision Teaching for numeracy in Angus by producing a summary for school staff, including guidelines for implementation. We will also use the findings from this study to train and support staff in implementing Precision Teaching for numeracy in other Angus schools.

References

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Further information and materials

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