Year Six/Seven transition

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Abstract/Summary
The new location of the Waterhead Academy has provided the academy with new feeder primary schools which would not previously have been considered to be in our catchment area. The aim of the project was to open curriculum links with these schools, with the aim of improving planning, CPD and delivery of numeracy at year 6, and continue the themes through to KS3. The specific focus of the project was to look at the use of number lines or similar techniques used at KS2 and thus providing smoother transition to year 7, with the ultimate aim of improving both contextual understanding and attainment. The latter stages of the project were to focus on the sustainability and continuing collaboration with Hey-with-Zion and other feeder primary schools, such as Knowlsey and St Thomas’s.

Background
- Ofsted Made to Measure report indicated issues around transition and quality of teaching and learning specifically in KS3.
- Development of arithmetic proficiency in KS2 at Hey with Zion has focussed on algorithms with manipulatives and the use of the empty number line.
- Research from the likes of Anghileri, Fosnan and Dolt, Thompson, Rousham and more have influenced the development of the MAST inspired practices at Hey with Zion.
- Hey with Zion has secured very high maths end of KS2 scores in recent years. “Pupils’ achievement in mathematics is a particular strength of the school. More-able pupils, in particular, reach standards above Level 6” - Ofsted 2013.
- Hey with Zion was a Host School in the ‘NCETM Primary Host Schools Programme’.
- Improvement agent has completed the NCETM PD lead programme.
- A growing number of Hey with Zion pupils are joining Waterhead Academy each year.

Aims of the Collaborative Teacher Project
The aims of the project were to develop a smoother transition between year 6 and 7, and improve rates of progress at KS3 by:
- Increasing awareness among KS3 staff of KS2 pupils’ experiences.
- Engaging KS3 staff with pedagogic styles practised at primary schools e.g. use of Dutch style empty number lines, algorithms with manipulatives, and contextualised maths.
- Deepening maths subject knowledge of KS2 teachers.
- Engaging KS2 teachers with transitional concerns of KS3 teachers.

However, as the year progressed the following issues became evident:
- Lack of continuity at KS3 around the use of embedded arithmetic skills, in fact there was a stark difference in how the four arithmetic operations were delivered.
- A distinct lack of contextualisation at KS3.

Details of those involved in the Collaborative Teacher Project
- Hey with Zion - Andrew Clowes, Sarah Patterson, Kirstie Bradley, Michelle Murgatroyd
• Staff from Waterhead Academy included Michael McGuinness (head of dept), Richard Taylor (head of KS3), Gordon Johnson (Teaching and Learning Co-ordinator).
• Yasmin Jan (lead teacher Maths) has now taken lead and will be continuing the work from March onwards.

A description of the Collaborative Teacher Project
Further dates have been set aside for pupils from Hey with Zion to travel to Waterhead Academy in the build up to SATs to have lessons in their prospective secondary school. The outstanding success of the project underpinned by the energy and enthusiasm to partake by staff from both schools is such that the transitional contacts between the two institutions has been extended in other areas as well as and beyond maths- Dance and Science, and cross curricular maths links between the schools are currently being explored in the context of Music and S.T.E.M.

The staff of both schools met in September at Waterhead Academy to introduce the project and discuss strategies of pupil calculation in the context of arithmetical proficiency. The primary focus was to explore the mathematical starting points for year 7 pupils by understanding at a deep level the calculation strategies used in primary schools. The improvement agent explored the primary school’s calculations policy, discussing Dutch style number lines (see Rousham) and the use of manipulatives – Dienes block and Singapore-style chips - drawing on his work on the NCETM PD Lead programme. The active construction of maths by pupils was discussed and the varied but channelled methods employed by pupils exemplified. Maths exercise books were discussed and strategies for differentiation emerged as a key focus. Mutual respect from the participating schools was evident and there emerged a menu of requirements for staff from the project.

The initial plans for the project were adapted and reconstituted in two four way meetings between the improvement agent, the new maths subject leader at Hey with Zion, the head of maths at the Waterhead Academy and the maths lead at Waterhead. The purpose of this was to optimise impact at a deep and ongoing level, where the change would be generative rather than superficial.

We focussed on the two key areas of contextualisation in KS3 and continuity of approach in approaches to arithmetic between KS2 and KS3. Lessons were taught and observed contextualising fractions and transformations in the context of stained glass window manufacture and pricing, and mean, median, mode and range were taught in the context of Olympic 100m sprint records, and a "Spot The Maths" activity revising shape in the context of Art history was used as a starter to demonstrate the existence of maths all around us. Resources used at Hey with Zion "Making Sense of Maths" (Hodder) were shared and pupils were invited to attend a pupil voice interview to provide supplementary evidence to the lesson observations, book scrutiny and interrogation, which formed the key discursive focus of the professional development.

The outcome of the first meeting was a greater awareness among KS3 staff of how contextualisation creates meaning and has the capability of generating greater understanding. Discussions took place around whether connectionism can in fact dissipate focus from given learning objectives, and research (Askew et al) demonstrating the superior effectiveness of connectionist teachers as opposed to transmissionist teachers was discussed. Further exploration of contextualisation will continue at Waterhead, and such has been the success of this project the two way professional collaboration between the schools will continue in the future.

Alongside the meetings, staff from Hey with Zion visited Waterhead Academy on a number of occasions to observe and work with KS3 teachers. The Head of Maths at Waterhead Academy visited year 6 at Hey
with Zion to observe a lesson there, with a primary focus on how differentiation and deployment of support staff can be used to facilitate optimum progress using AfL. Feedback was provided to all key staff in meetings.

While this is a "final report" and as such sums up what has been done within the timespan of this funded project the benefits of this collaboration are clear to both schools and the development of this work will continue. On the Waterhead maths development plan, the development of contextualisation and continuity in arithmetic from KS2 will feature for the next twelve months, and at Hey with Zion the development of staff subject knowledge will feature, with the pledged support of the Lead Maths teacher from Waterhead.

**What has been learned from the project?**

*Hey with Zion:* has learned how secondary schools see as absolutely key the development of arithmetic fluency in making their pupils KS3 ready.

*Waterhead:* has learned how differentiation within the lesson aids maximum progress; how primary pupils use and adapt Dutch style empty number lines to develop number sense; how struggling students can use manipulatives to support their understanding of algorithms; how contextualisation of maths is used to make maths meaningful and increase the engagement of pupils.

**Impact on teachers’ practice**

Staff are increasingly aware of a pupils prior knowledge, reducing wasted transition time between years 6 and 7, which in turn allows teachers planning to become more effective. Lesson observations scores and observer notes provide evidence that high levels of progress are now being made in year 7 as we spend less time re-teaching and allow for more time developing pupils’ existing knowledge.

Furthermore, teaching now has more stretch and challenge (CAPE) and this again is evident in the WA teams’ improved lesson observation scores in year 7. Teachers are able to plan using knowledge of student’s prior attainment and use more appropriate levels of challenge when questioning and task setting.

Higher level challenge from the outset is apparent when year 7 books are scrutinized. In the past year 7 books would often show a heavy concentration of ticks for work that was accurate, suggesting the work was too easy and rapid progress was not being made.

Typically in the first half term of year 7 the maths department would spend time recapping and consolidating what we believed the primary school to have covered but we were not wholly confident they had. This collaborative project has given us the assurances of where our starting points are, eliminating the need for a year 7 baseline test in September. Furthermore, year 7 exercise books now include work that is not 100% accurate as students are being challenged more by the task setting and have more opportunities to learn from mistakes.

At KS3, there has been a vastly improved contextualised delivery of numeracy topics. “Making Sense of Maths” (Hodder Education) books which are used in the primary school were shared and a lesson on mean, median and mode was demonstrated where the data related to real life (Olympic sprint times). The use of number lines was developed in year 7, keying more closely to the pupil’s pre-existing understanding, but still moving where possible to more efficient algorithms and previously embedded algorithms. New techniques such as the use of number lines keyed into Science and Geography areas of learning, for example where number lines correspond directly with graphs and charts used in Science contexts, and Geography teachers used double number lines when teaching scale that also support cross-curricular links.

Improved teaching and learning, which is regularly discussed at weekly dept meetings and the learning outcomes are now minuted to form a KS3 teaching and learning folder.

Performance management targets have been organised to include the use of number lines and teaching algorithms using manipulatives as modelled in this project. Lesson observations have confirmed their existence and a high deployment in the active construction of their learning by the pupils. Ongoing monitoring indicates improved pupil progress as a direct result. With the ongoing improvements in the classroom, and the drive to challenge pupils to achieve 2 sub-levels during year 7, myself and the Head of KS3 maths fully expect to see vastly improved year 7 results in the end of year test scores.
Furthermore, the maths dept at WA are improving SOW’s to incorporate regular assessment points using open book tests, thus meeting the changing Ofsted criteria regarding book and work scrutiny.

Impact on others
Staff at both schools have greatly appreciated the opportunity to work collaboratively on this project. The joint CPD as well as team teaching have provided both sets of staff with a greater awareness regarding the depth of contextual and understanding required at year 6 and 7. We believe there has been a tangible improvement in the delivery of topics such as arithmetic (especially with decimals), and a greater conceptual understanding of the practices underpinning algorithmic calculation, which has curriculum links with the project, especially around fractional and decimal work. Visible and measurable improvements have been made by the year 6’s. Pre-SATs tests show an improved average point score from around 27-28(4b) to over 29 (solid 4a). This improvement even more evident in the pupils already identified as future pupils at Waterhead academy. Other sources include routine pupil voice discussions conducted by SLT which have found visible and quantifiable differences between pupils’ attitudes towards maths now than twelve months previously. This project has also helped to springboard other collaborations between the schools beyond the maths departments, such as Literacy, Science, Art and Sport.

Advice to teachers who may want to try something similar
- This is an excellent project- false distinctions between primary and secondary schools should be eliminated.
- The difference between Year Six and Year Seven is one school day and should be no greater than that between any other school years.

We would strongly suggest the following:
- Consider the longevity of the project you decide to undertake.
- Allowing for practises and staffing to continue past the project deadline.
- One of the main successes regarding this project is the fact that it’s not stopped at just maths, with the initial successful collaboration of both schools, it has paved the way for other curriculum areas to get involved and share good practises.

References:
Anghileri, J Principles and Practices in Arithmetic Teaching Buckingham, OUP. 2001
Askew, M and Brown M, How do we teach children to be numerate? BERA 2003
Beishuizen, M Two Types of Mental Arithmetic and the Empty Number line from Informal Proceedings 17-18(2)BSRLM) 1997
Fosnot and Dolt Place Value on The Horizon in Young mathematicians at Work: Constructing Number Sense, Addition and Subtraction. Portsmouth. Heinemann 2001
Ofsted Understanding the score- 2008
Sugarman, I: The Same Difference in Mathematics Teaching Incorporating Micromath 202/ May 2007
Thompson, I Place Value: The English Disease in Enhancing Primary Mathematics Teaching. Maidenhead. OUP pp 29-40 2003
Thompson, I Deconstructing Calculation Methods Part 2: subtraction in Mathematics Teaching Incorporating Micromath 204/ September 2007
Thompson, I Mental Calculation in Mathematics Teaching 213; March 2009