MMM

MATHS MOVEMENT MASTERY

Evaluation Report 2018/19

culture box surrey

Engaging Lives Through Creativity and Culture

cultureboxsurrey.org.uk

SURREY ARTS

phf Paul Hamlyn Foundation

MMM

MATHS MOVEMENT MASTERY

A partnership between Culture Box Surrey and seven primary schools in Tandridge led by St Mary's School in Oxted.

The Maths Movement and Mastery programme focused on raising attainment in maths using dance.

The development work started in Summer 2018, and workshops across participating schools commenced in Autumn 2018.

MASTERING MATHS THROUGH DANCE

SCHOOLS

Godstone Village School

Hurst Green Infant School and Nursery

Limpsfield C of E Infant School, Oxted

Lingfield Primary School

Reigate Parish Church Primary School

St Francis' Catholic Primary, Caterham

St Mary's C of E Primary School, Oxted

Lead school of the Tandridge Teaching Alliance

TTA LEADERS

Sarah Lewis, Angela Mance, Helen Roe

CULTURE BOX SURREY

John Stephens - Surrey CC / Surrey Arts

www.cultureboxsurrey.org.uk

DANCE ARTISTS

Katie Green

Alison Swann

PHOTOGRAPHY

www.emmabrownphotography.com

FUNDERS

Paul Hamlyn Foundation

Surrey Educational Trust

> “All the children found the session engaging and particularly the children who are still working towards the year 2 end of year expectations.”

AIMS

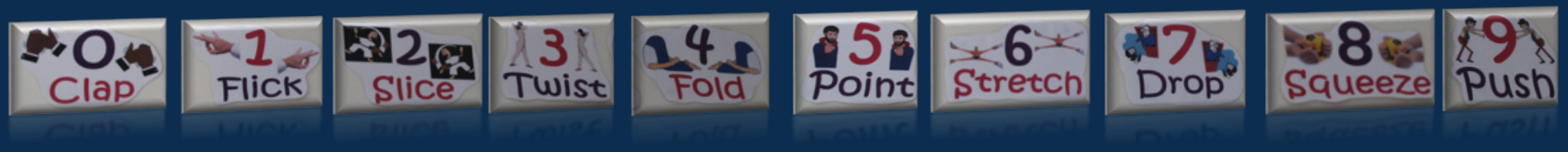
For teachers and artists to work together to create a vocabulary of dance actions to represent each of the digits from 0-9 and to build a ‘bank’ of starter ideas for dance sessions for non-specialist teachers to draw on

To explore how to use these ‘moves’ to help strengthen recall and fluency – which are the pre-requisites for mastery

To explore how the place-value of the digits could be represented through movement

To collectively explore how the movement ‘vocabulary’ created could be used for reasoning, and to reflect on the challenges in teaching this to teachers – so that they are confident to use them with children

For the 7 schools involved, to form a new ‘hub’ of the Culture Box Surrey. For the collaboration to help share and develop ideas, with a particular focus on the progress of vulnerable children



OVERVIEW

- In primary schools we know that many children struggle to recognise and retain number patterns and that this proves to be a barrier to their learning
- In the schools involved in the project there was a high correlation between these children and those who had SEN and/or were disadvantaged
- Many of the schools were becoming more familiar with aspects of the Mastery approach to maths teaching and learning – but many children still had 'gaps' in their understanding because they had not been taught in this way from the outset
- This project was designed to explore whether embodied movement could be used as a bridge between the pictorial and abstract
- It was designed to be of practical use in the mainstream classroom, as well as a tool for small group support, and to particularly support engagement in regular 'rehearsal' of basic number facts, which some children miss in their home setting
- In most schools 2 teachers were involved: one with a maths specialism and one with an enthusiasm for dance. At St Mary's the learning was cascaded to all teachers.
- All primary schools teachers are expected to teach dance, regardless of their level of experience – and this was a relative area of weakness for most teachers engaged with the project
- Teachers and children in every year group from EYFS to year 6 were actively engaged

STRUCTURE

Workshop 1 September 2018
Teachers and Senior leaders. Strong Dance focus – culminating with agreement around which actions would be used for each digit, and ideas around how these could be taught and rehearsed with children.

Autumn term: teachers agreed to:

- Establish a 'baseline' for fluency in counting (by videoing the children) and identify target children
- Teach a discrete dance session every week for the remainder of the term – to help children embody the actions fully
- Play short counting games, using the actions, 3 times a day
- Work with Alison or Katie on a dance session – primarily on teaching the actions

Workshop 2 January 2019
Practical dance workshop concentrating on:

- representation of place value;
- linking movements in sequences determined by the pattern of the digits in the '1s' in times tables

Spring term
Teachers:

- experimented with using the actions to support understanding of place value
- explored 'stories' linked to action sequences in dance sessions
- continued with the regular counting activities
- Katie and Alison visited every school again to support teachers in applying the new ideas

Workshop 3 June 2019: Sharing of learning and impact

Across the project children from every year group from EYFS to year 6 were involved

AREAS COVERED

Linking actions to digits to aid counting activities

When done as a counting activity children only represent the digit which is in the '1s' but they SAY the whole number.

As children began to associate actions with the digits games were played:

- Counting forward and backward in varying units, starting on any number
- Reinforcing number bonds to 10
- Playing 'more than less than' – and reinforcing varied fluency e.g. 3 more and less starting on 4
- 4 -7- 4 -1-4
  14 -17 -14 -11 -14
  24 -27 -24 -21-24

AREAS COVERED

Linking the actions into 'phrases' to aid pattern recognition

These 'phrases' of actions represent key core number patterns in times-tables. They can be taught to children as 'stories' and learnt and memorised/embodied well before they are ready to use them in conjunction with the numbers (EYFS to Yr2).

*These first four 'dances' all start on **EVEN** numbers and have a sequence of **5 moves** – which need to be 'performed' twice to get to 10x the original number.*

Phrase A (*2s and 12s forwards and 8s backwards*) Dance of the 2s
Slice Fold Stretch Squeeze Clap
Phrase B (*8s forwards and 2s and 12s backwards*) Dance of the 8s
Squeeze Stretch Fold Slice Clap

Phrase C (*4s forwards and 6s backwards)* Dance of the 4s
Fold Squeeze Slice Stretch Clap
Phrase D (*6s forwards and 4s backwards)* Dance of the 6s
Stretch Slice Squeeze Fold Clap

*These next 4 'dances' all start on **ODD** numbers and have **2 sequences of 5 moves***
Learning theme as 2 separate phrases is likely to be more manageable than a continuous string of 10 actions.

Phrase E (*3s forwards and 7s backwards*) Dance of the 3s
Twist Stretch Push Slice Point Squeeze Flick Fold Drop Clap
Phrase F (*7s forwards and 3s backwards*) Dance of the 7s
Drop Fold Flick Squeeze Point Slice Push Stretch Twist Clap

Phrase G (*1s and 11s forwards 9s backwards*) Dance of the 1s
Flick Slice Twist Fold Point Stretch Drop Squeeze Push Clap
Phrase H (*9s forwards 1s and 11s backwards*) Dance of the 9s
Push Squeeze Drop Stretch Point Fold Twist Slice Flick Clap

AREAS COVERED

Place value and partitioning of numbers leading to multiplication and division by 10 and 100

When introducing the concept to children it helps to have 2 digit numbers 'performed' by 2 children – one taking responsibility for the '10s' and the other the '1s'

Most importantly – when introducing the number '10' – we can support the children in embodying the '0' – which is otherwise invisible when using Numicon or dienes

This sense of 'holding' or 'inhabiting' a 'place' with a zero is quite powerful
It seems that 'seeing' the numbers in 'action' is as powerful as the actual 'doing'.
When working on this with children who have not yet developed a strong sense of place value we will need to work in conjunction with LOTS of other visual and concrete prompts.

2 digit numbers have 2 distinct actions – they are performed slowly and deliberately to physically embody the partitioning.

- First the '10s' – which has a stamp, followed by the 'action' which represents the number of 10s
- AND THEN an action which represents the number of '1s'

3 digit numbers have 3 distinct actions –performed slowly and deliberately to physically embody the partitioning.

- First the '100s - which has a stamp with both feet/jump, followed by the 'action' which represents the number of 100s
- First the '10s' – which has a stamp, followed by the 'action' which represents the number of 10s (*NB this could be '0' 10s*)
- AND THEN an action which represents the number of '1s'

This principle can be applied to decimals and used to support multiplication and division by 10 and 100 as below:

	H	T	O	.	1/10	1/100
	Upper body performs the action linked to the digit					
Lower body	JUMP	STAMP		.	Lift 1 heel	Lift both heels

AREAS COVERED

Using actions/dance to communicate mathematical reasoning

Once the children had internalised the 'vocabulary' of the actions they were then able to apply them to reasoning activities such as 'show me 24'.

- Groups of children would collaborate on deciding how they would represent 24 (being encouraged to find as many different ways as possible)
- They performed their ideas
- The other children watched their ideas – and tried to decipher their reasoning

This meant that:

- The quality of the dance movement needed to be very precise in order to communicate meaning
- The quality of the collaborative maths reasoning needed to be strong
- The 'audience' were challenged to 'make meaning' from the performance – and check their interpretation against their own maths knowledge

OUTCOMES

CHILDREN

- Pupils are more able to demonstrate clarity in their movements, which is on-going
- Pupils are more familiar with the language of dance
- More children are increasingly able to describe movements using the language of dance
- Children enjoy the dance lessons and picked up actions REALLY quickly!
- Children continue to embed the actions and pattern when counting in steps

"The dance session was really helpful – we can do the maths, it's the dance that is tricky. Alison helped the children make their actions really clear – and when we did it today they had remembered it much better."

“children who find maths challenging are beginning to remember actions and movements.”

FEEDBACK

TEACHERS CPD

- Teachers are able to ‘see’ which children have grasped the patterns – through the commitment with which they make the moves. They can also ‘see’ where the pattern/recall becomes weaker
- Teachers are making more time for ‘counting’ throughout the school day – giving the dual benefit of active brain-breaks and regular practice outside maths lessons
- Some children have begun to use the actions independently to aid their recall during maths lessons
- Some SEN children when counting in even numbers were able to ‘self-correct’ because they had learnt the ‘dance of the 2s’ and therefore spotted their errors if a number didn’t match

FEEDBACK

DANCE ARTISTS

- Having a head teacher leading and driving the project and ensuring buy in of other head teachers is a huge positive
- Schools understanding of the expertise that the dance practitioners have grew during the course of the programme
- Children have changed perceptions about dance eg boys
- The dance practitioners observed progress in maths
- Sessions would work equally effectively in classrooms rather than in hall spaces
- Practitioners learnt that the language of dance was effective in the maths domain
- Partnerships were more effective when teachers communicated well, less effective where teachers expected the practitioners to just turn up and deliver, without engaging with them
- Where schools incorporated a timetabled co-planning session this proved really important and helpful, particularly when lead teachers were involved in the planning from the beginning
- Teachers needed to develop a basic confidence in leading dance sessions before developing maths content. The process at the beginning of the programme is vital, giving teachers more time to become comfortable with dance

"The progress was visible throughout the lesson with regard to their knowledge of the actions and their spatial awareness."












"children who struggle with times tables have been doing daily counting and movements daily. The children are keen to do this each day and are becoming more confident in their pace of counting and movements."

Class Teacher

"It was really helpful to have the chance to watch the children and see how they responded. I was surprised by 'X' – usually they only wait and copy, or don't concentrate, but in this they were fully engaged and leading the way."

Class Teacher

"It was so helpful to see how she (dance artist) ran the session – to see what she was doing differently to what I have done"

Class Teacher

"I particularly enjoyed watching children who find following a sequence and using motor skills tricky; it was challenging for them but they showed great progress remembering the patterns."

Class Teacher

"We feel that the learning captured here is only the tip of the iceberg in terms of the potential that this way of working has to offer."

Head Teacher

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