

### Title

Exploring the impact of a growth mindset intervention on the mathematics attainment of pupils in low SIMD areas following transition to secondary school.

### What did we ask?

Can an intervention aimed at developing a growth mindset in S1 pupils from a low SIMD area have a positive impact on their maths attainment?

### What is the evidence base?

The current research explores the impact of a mindset intervention on pupils' attitude to learning and numeracy skills following transition to secondary school.

In West Lothian, the EPS aims to support schools to implement practical changes in line with research. Popular pedagogical research-based approaches which local schools were interested in taking forward, included Carol Dweck's theory on mindset (Dweck, 2008). In reviewing the Ellis & Sosu's (2015) guidance on closing the attainment gap in Scottish education, Dweck's work on mindset is relevant under the 'Curriculum Pedagogy Initiatives' recommendations (Dweck, C. (2008)).

A mindset refers to a personal belief system, which is based on experiences and gives meaning to how we view the world (Dweck, 2008). Dweck's research has found that there are two kinds of belief systems that people hold about themselves and others. A growth mindset is underpinned by the belief that intelligence and talent can develop and grow, whereas a fixed mindset assumes that intelligence and talent is innate or fixed from birth. These belief systems lie along a continuum, and influence our perceptions of what we believe we are capable of doing, which in turn influences our thoughts and actions. This has implications for learning and education. Dweck's ideas have been developed in the context of intervention in education, with the aim of encouraging growth mindset beliefs and improving learning.

Yeager and Watson (2011) reviewed nine studies on social-psychological interventions in education settings (interventions designed to change the way pupils think and feel about learning), which were found to significantly improve attainment. They found that an active pupil participation element and a universal rather than targeted approach were common features of effective intervention, and that interventions should be well timed to have greatest impact (for example, at transition points).

Blackwell, Trzesniewski and Dweck (2007) found that a mindset intervention which taught students about the physiology of the brain and the malleability of intelligence, not only changed mindset from 'fixed' to 'growth' (growth being the optimum mindset for learning), but was also found to have reversed the downward trajectory in mathematics attainment following transition from primary school. The mindset that an individual tends to hold at key transition stages is important as there may be an increase in the number of challenges encountered. In Scotland, a dip in mathematics attainment following transition to secondary is evidenced by the Scottish Survey of Literacy and Numeracy 2015 (Scottish Government, 2016b). Paunesku, Walton, Romero, Smith, Yeager and Dweck (2015) also demonstrated that an academically focused mindset intervention raised attainment, particularly for young people performing poorly. However, other studies have found no impact on attainment and no long term change of mindset (Donohoe, Topping and Hannah, 2012).

Educational Psychologists are in a good position to support schools to embed ideas from mindset theory at various levels. However, the mixed evidence base in this area led to the decision that there would be value in carrying out a research project applying mindset in a Scottish context, with particular interest in the impact on young people from more deprived areas.

### What did we do?

A total of 122 participants (61 intervention group, 61 control group) took part in this study, all of whom were S1 pupils from one Secondary School in West Lothian.

SIMD (Scottish Index of Multiple Deprivation) was obtained for all

participants. All participants completed a 50 question numeracy assessment (devised and administered by the school's maths department) pre and post-intervention. Further data was collected as part of the intervention process during Session 1 and 5. Participants completed a challenge activity using Ravens Matrices followed by a questionnaire about challenge and a mindset questionnaire. The data from the Ravens matrices was not used, this was purely used to act as a challenging activity.

The intervention sessions were developed based on the Blackwell et. al.(2007) study and were carried out by an Educational Psychologist.

Session 1 – data collection

Session 2 - introduction to mindset

Session 3 – the physiology of the brain

Session 4 – practical strategies

Session 5 – data collection

The intervention group received the 5 week intervention programme (detailed above). The control group received teaching as normal for the 5 week period. After the 5 weeks, all participants in both groups then completed the post-intervention numeracy assessment. The 'control group' received the same 5 week intervention 3 months later. Data was also collected from this group and the data will be analysed.

### What have we found so far?

The results so far are based solely on the data collected from the initial intervention. The second intervention with the 'control group' is currently being evaluated.

The results, so far, suggest that there was a significant correlation between pupil's baseline maths scores and their mindset i.e. those with more of a growth mindset scored more highly on the maths assessment. However, this result was not replicated at post-intervention. The results

also suggest a slight improvement in maths assessment scores following the intervention (this result was not significant). Interestingly, the data collected in the current research did not show a significant correlation between SIMD and mindset or maths assessment scores.

The initial results suggest there could be a correlation between attainment and mindset, however this will be further explored with the additional data gathered from the 'control group'. The initial data suggests that the intervention delivered by the EPS did not have a noticeable impact on the pupil's mindset, this could be due to a number of reasons such as how the sessions were delivered i.e. by multiple people rather than one consistent person, by an unknown agency rather than familiar teaching staff. The limited impact of the intervention could also highlight the limitations of a 'stand-alone' intervention rather than a more embedded approach within a whole department/school.

The additional data being collected will also include qualitative data gathered through focus groups with pupils who have taken part in the intervention. This will allow us to further understand the quantitative data and the young people's thoughts about the intervention as a whole.

### What do we plan to do next?

We are currently completing the data collection for the second intervention group. We will be able to analyse this data to observe similarities and differences in the data. We are also carrying out focus groups with a sample of pupils to explore their thoughts on the intervention. Furthermore, we will be able to use the more recently collected data to explore any longitudinal effects of the intervention with the original intervention group data.

This will give us a more robust analysis of the intervention and allow us to consider the most appropriate way to move forward in delivering growth mindset material to pupils.

## References

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