

# **The Role of Thinking Time in the Classroom**

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## ***Rationale***

A strategy identified as promising within research literature in using questioning to enhance student achievement, is the think, pair, share method (Sampsel, 2013). Sampsel (2013) found that allowing adequate thinking time for students in response to Mathematics word problems, and subsequent discussion with peers, enhanced student achievement significantly for low and normative achievers within the classroom. Kwok and Lau (2014) have replicated these results in a Hong Kong primary school, giving limited credibility to the validity and reliability factors applicable from the idea. Nevertheless, the research evidence of think, pair, share as a method for raising student achievement still lacks in two key ways; the most appropriate quantity of time given to students to think about a problem posed, and the typology of the questions used by the practitioner in regard to the cognitive demands on students of the question (Lee, 2015).

## ***Aims***

This enquiry had two key aims. Primarily, this research would focus on the quantity of time given for less able students to respond to a Mathematical word problem, including time for peer collaboration using the think, pair, share model. Secondly, this enquiry will explore the use of three levels of question for a Mathematical word problem using Bloom's categories of thinking in order to try and improve the skill and confidence of less able pupils in reading and understanding word problems within numeracy and mathematics as well as challenging the more able pupils to avoid disengagement with the task.

## ***Methodology***

There were 25 Primary 7 students used as the observational cohort, where the average age was 10.5 years old. There was a total of 15 male participants, and 10 female participants, all of a mixed ability within Mathematics. Setting by ability was the predominate strategy used where the green group represent less able pupils, the blue group able pupils and the red group more able pupils. For the six sessions, pupils sat within heterogeneous ability groups in Mathematics, and were asked to use think, pair, share to answer a Mathematical word problem. All students were asked to consider three factors; *what* the answer was, *how* they got the answer, and *why* they solved the problem in this way. This structure was used to reflect the three levels of Bloom's Taxonomy and attempt to improve pupil focus when reading a word problem. Students were given 15 seconds to think in silence about the question, and then a further 30 seconds to share with a partner I asked randomised students for feedback.

The second series of three lessons used the same design and students, however changed the variable of the thinking time to 30 seconds and a further 30 seconds for partners to engage in think, pair, share with again in heterogeneous ability groups. Students were measured in regard to confidence in answering questions in relation to current ability within Mathematics as well as the accuracy of answers.

## Findings

Figure 1 depicts the differences in student engagement using the different quantities of thinking time, using the measure of lower, medium and higher order questions in regard to a single word problem answered.

Figure 1

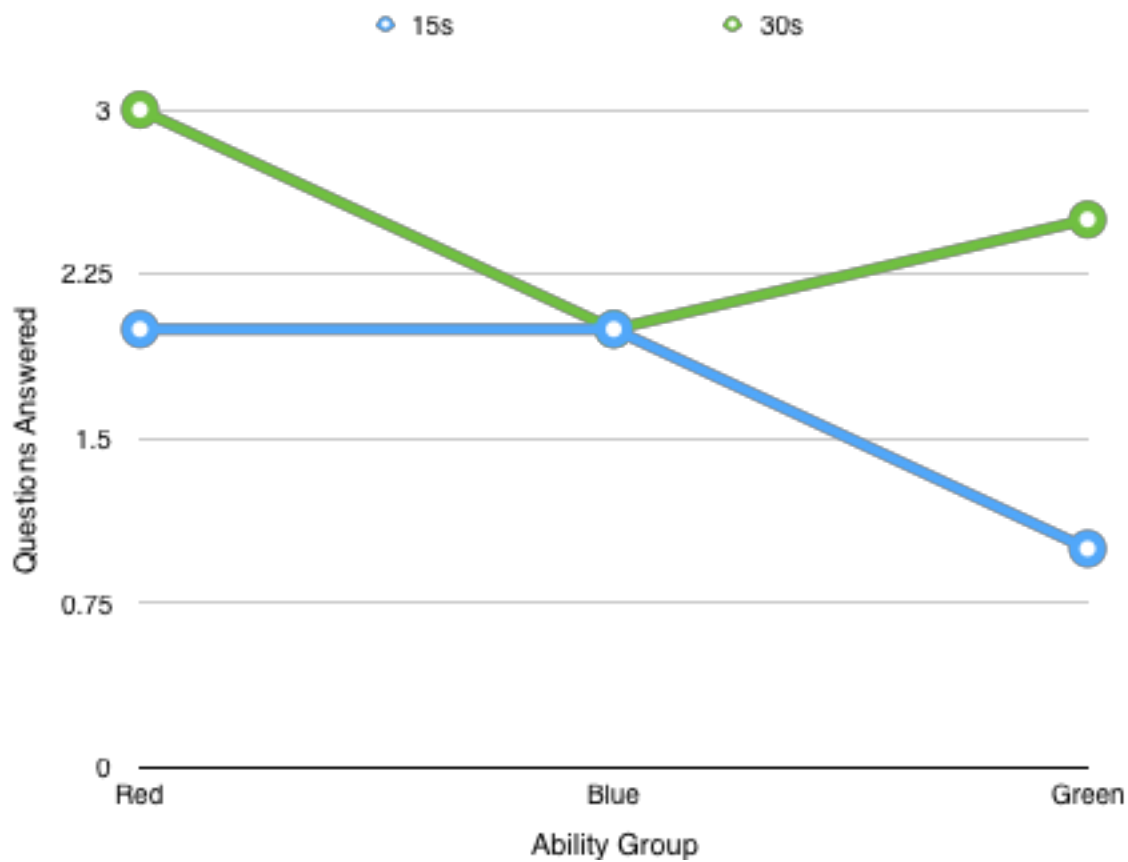


Figure 1: A line graph representing the differences in the quantity of answers provided by each ability group in Numeracy and Mathematics, between 15 seconds of thinking time and 30 seconds of thinking time as part of the Think, Pair, Share strategy.

## ***Conclusions***

The current research found that there was a significant increase in student confidence in answering Mathematical word problems, when think, pair, share was used in heterogeneous ability groups, for all levels of student ability but particularly less able students where the thinking time was increased to 30 seconds from 15. As can be observed in Figure 1 less able pupils became increasingly confident in discussing more medium to higher order aspects of a mathematical or numerical word problem. Specifically, as Lee (2015) suggested, the allowance of greater time to consider medium to higher order questions appears to have allowed less able students to develop greater depth in their understanding of a mathematical word problem without any negative effects on more able or able students. Sampsel (2013) suggested that adequate thinking time was a critical factor in enhancing achievement for students in response to a Mathematical word problem. Within this enquiry it appears that the 30 second think time followed by 30 seconds to discuss initial ideas with a partner allowed pupils of all abilities to answer word problems with greater accuracy and confidence. As Kwok and Lau (2014) suggested, the time period before students responded required discussion between students before answering the initial teacher question in order to allow increased understanding and confidence.

## ***Implications for Future Practice***

Further research is required to gain a greater understanding for practitioners of appropriate quantities of time when using the think, pair, share approach to enhance student achievement in mathematics. However, it appears that when attempting to solve word problems which place greater cognitive demands on pupils than basic algorithmic operations, pupils benefit from more time to consider how to solve the problem effectively and the subsequent answer. Furthermore, there was an apparent benefit for pupils in being allowed to discuss how they would solve the problem with a partner before attempting to do so. Within this enquiry 30 seconds of thinking time and a subsequent 30 second period of partner discussion appeared appropriate for the specific class when asked to solve a mathematical and numerical word problem.

Moving forward I will continue to use think, pair, share with 30 seconds of both thinking and paired discussion time in order to try and improve the confidence of pupils of all abilities in solving word problems within numeracy and mathematics.

## ***Bibliography***

Benseman, J., Sutton, A., & Lander, J. (2005). *Pedagogy in practice: an observational study of literacy, numeracy and language teachers*. Auckland: Auckland UniServices Ltd.

Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2004). Working inside the black box: assessment for learning in the classroom. *Phi Delta Kappan*, 86(1), 8-21.

Kwok, A.P. & Lau, A. (2015). An Exploratory Study On Using The Think-Pair-Share Cooperative Learning Strategy. *Journal of Mathematical Sciences* 2, (22-28).

Lee, D. E.. (2015). *Using questions to develop students' higher-order thinking skills : a primary English teacher's beliefs and practices*. (Thesis). University of Hong Kong, Pokfulam, Hong Kong SAR. (online)

Murray, S. (2011). Secondary students' descriptions of "good" mathematics teachers. *Australian Mathematics Teacher*, 67(4), 14-21.

Mccluskey, G. (2017). Closing the attainment gap in Scottish schools: Three challenges in an unequal society. *Education, Citizenship and Social Justice*, 12(1), 24-35

McConney, Andrew & Perry, Laura. (2010). Socioeconomic status, self-efficacy, and mathematics achievement in Australia: A secondary analysis. *Educational Research for Policy and Practice*. 9. 77-91.

Sampsel, A. (2013). Finding the Effects of Think-Pair- Share on Student Confidence and Participa- tion. *Honors Projects*. Paper 28.

Scottish Government. (2018). Pupil attainment: closing the gap. Retrieved from <https://www.gov.scot/policies/schools/pupil-attainment/>