

# **The Use of Mathletics and the relationship to achievement at Key Stage 2 in England.**

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## **Part 1: Executive Summary**

### **1.1.1 Background to the report**

The project was commissioned by 3P Learning to analyse the evidence from the Department for Education data and Mathletics usage data. The aim was to explore the impact of using Mathletics on Key Stage 2 school assessment results in 2014.

The key questions addressed by the project were:

- Is there an association between whether a school has used Mathletics and the school's Key Stage 2 mathematics results?
- Is there a relationship between the length and extent of use (as measured by the average number of activities completed by pupils in a school) and the school's Key Stage 2 mathematics results?
- Does the nature of the school affect the impact of Mathletics on the school's Key Stage 2 mathematics results?

This report presents an analysis of the most recent England Key Stage 2 performance tables from 2014 and Mathletics user data with respect to the questions above.

### **1.1.2 Mathletics**

Mathletics is an online numeracy product for schools and pupils that is widely used both by schools in the UK and internationally. In 2014, 4127 schools used Mathletics at Key Stage 2 in England. Mathletics includes a wide range of tasks and activities for pupils as well as teaching resources and assessment resources. For the purposes of this study, Mathletics usage is determined by the average number of curriculum activities completed by schools.

### **1.1.3 Overview of Mathletics usage and Key Stage 2 school performance in mathematics.**

We analysed the headline figures from the 2014 School Performance data on the mathematics national assessment results.

Key conclusions are:

- Schools where, on average, pupils completed at least 3 curriculum activities per week had a significantly larger proportion of pupils who made at least 2 levels progress in mathematics
- Schools where, on average, pupils completed at least 3 curriculum activities per week had a significantly higher proportion of pupils who achieved at least a level 4 in mathematics.
- Schools where, on average, pupils completed at least 3 curriculum activities per week also had a significantly higher proportion of pupils who achieved at least a level 5 and a significantly higher proportion of pupils who achieved a level 6 in mathematics, the highest level possible.

#### **1.1.4 Structure of the report**

This report is presented in 3 parts:

Part 1 of the report is this executive summary of the main findings.

Part 2 gives the background to the research and outlines the research questions addressed in the report. It outlines the data that is recorded in the Department for Education tables and the data that was provided by Mathletics.

Part 3 explores the association between a school's use of Mathletics and the school's performance on the Key Stage 2 national assessments.

## 2 Introduction

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The number of primary schools using Mathletics is increasing, from 3721 primary schools using Mathletics in 2012 to 4127 schools in 2014. In this study the mathematics performance of 13,010 schools were analysed, with 30.1% of these schools using Mathletics.

The 2014 Key Stage 2 achievement results were taken from the Department for Education school performance tables and included the Key Stage 2 test results for over 13,000 schools. This study focused on some of the key mathematics results that are widely used in league tables, such as the proportion of pupils making at least 2 levels of progress at Key Stage 2 and the proportion of pupils achieving at least a level 4 in the Key Stage 2 mathematics national assessment. Individual pupil results have not been collected and analysed in this project; it focuses solely on average school results.

The 2014 Department for Education Key Stage 2 performance tables include independent schools, special schools and schools that have their performance data suppressed when there are fewer than 6 pupils that can be considered for the particular measure. This study focused on the proportion of pupils making at least 2 levels progress in mathematics at KS2 and the proportion of pupils achieving a level 4 or above in the KS2 mathematics assessment. Only mainstream state schools, including academies, where the outcomes of these measures are available have been included. This resulted in the analysis of the performance of 12938 schools.

The Mathletics data consisted of the number of users registered for each school and the total number of curriculum activities completed by all users in the school. Mathletics is made up of a variety of resource types but only the completion of curriculum activities is considered in this study. Additionally, for the purposes of this project, usage is determined by the number of curriculum activities completed on average in schools. A curriculum activity is comprised of a set of 10 questions that are completed by pupils. There are additional resources outside the core curriculum activities within Mathletics which are not considered in this study. So whilst the average number of activities completed by pupils has been declining during the period, this does not take into account the other resources available through Mathletics that have been introduced during this period.

The focus of the analysis in this report considers both whether Mathletics is used by a school and how often pupils are using Mathletics. A very small number of schools had far more users of Mathletics than pupils for a variety of reasons. These schools were excluded from the analyses because they often resulted in an underestimate of the amount of use of Mathletics by schools in terms of the average number of activities completed per pupil.

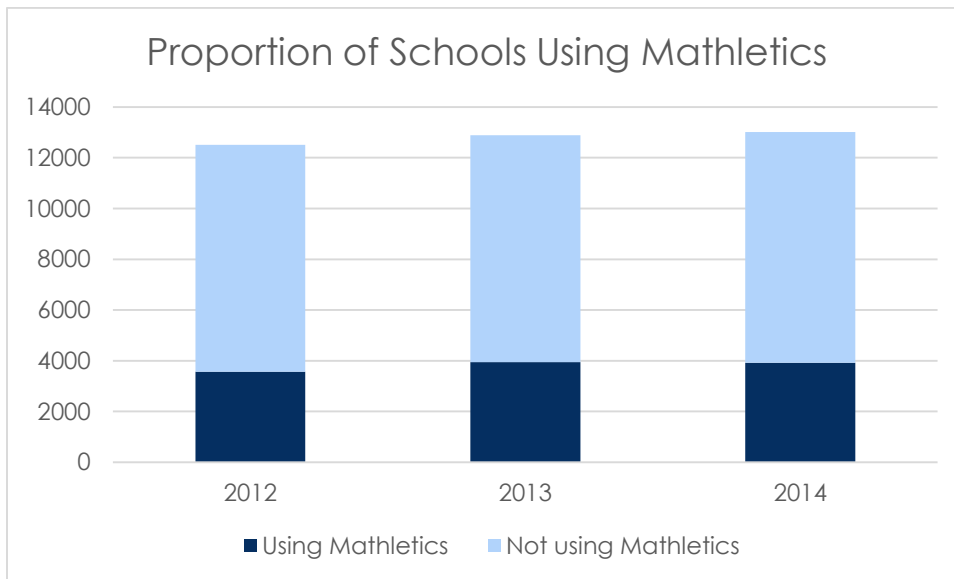
The study also looked at the level of usage in Mathletics schools to ascertain if there was a relationship between higher levels of usage and the Key Stage 2 mathematics attainment measures for schools. It also considered contextual features of the schools,

such the proportion of pupils claiming Free School Meals (FSM). Schools were categorised according to the proportion of pupils claiming Free School Meals. Schools were grouped into quintiles so that the first group contained the 20% of schools that had the lowest proportion of pupils claiming free school meals and the last group contained the 20% of schools that had the highest proportion of pupils claiming free school meals.

## 2.1 Use of Mathletics

The number of mainstream state schools using Mathletics rose from 3,564 schools in 2012 to 3,920 schools in 2014 as can be seen in Figure 1. This is an increase from 28.5% of mainstream state schools to 30.1%. Independent schools, international schools, and special schools were omitted from these figures.

Figure 1: Proportion of Schools Using Mathletics 2012-2014



Schools where the number of users was similar to or less than the total number of pupils were included in the subsequent analyses, which resulted in only a few schools in each year being omitted from the analysis as can be seen in Table 1. The average number of activities completed per pupil is across an academic year, from September 2013 to August 2014 and is the total number of activities completed by users in a school divided by the number of users. This measure represents the average usage for a school and does not reflect the individual variation in usage within a school.

Table 1 : Number of schools using Mathletics for 2012-14 and the average number of activities completed per pupil for those included in the analysis.

	Number of Schools using Mathletics	Number of Schools included in the analysis.	Average number of activities completed per pupil
2012	3721	3700	44.27

2013	4132	4115	41.62
2014	4127	4055	39.87

The usage of Mathletics within schools was also considered in terms of the average number of activities completed by pupils each school week. The school year is taken as being 38 weeks and schools were grouped according to whether pupils completed less than 1 activity each week, between 1 and 2 activities each week, between 2 and 3 activities and more than 3 activities per week. The number of schools with pupils completing between 4 and 5 or more than 5 activities per week was small and therefore statistically limited so these groups were combined with the schools with pupils completing between 3 and 4 activities each week. The number of schools in each category for 2012 to 2014 is show in Table 2

*Table 2: Number of schools for each category of the average number of activities per pupil per week for 2012-2014.*

	Under 1 activity per week	Between 1 and 2 activities per week	Between 2 and 3 activities per week	More than 3 activities per week
2012	1958	1170	316	161
2013	2338	1204	315	152
2014	2427	1151	284	125

### 3 Use of Mathletics and the association with School Performance in Mathematics

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#### 3.1 Use of Mathletics and the Proportion of Pupils making at least 2 Levels of Progress in Mathematics.

The more Mathletics activities schools complete, the better their performance tends to be. Table 3 shows the proportion of pupils making at least 2 levels of progress during KS2 with respect to the average number of Mathletics activities completed per pupil per week. Schools where pupils completed on average at least 3 activities per week had a significantly higher proportion of pupils who made at least 2 levels of progress compared to schools that did not use Mathletics. This was the case in both 2013 and 2014. Whilst the proportion of pupils making at least 2 levels progress in schools where pupils completed between 1 and 2 activities, and between 2 and 3 activities, were larger than the proportions in schools that did not use Mathletics, these differences are not significant.

To put it simply, in schools where pupils completed on average at least 3 activities each week a higher proportion of pupils made 2 or more levels of progress in mathematics during Key Stage 2. This was the case in both 2014 and 2013. This proportion of pupils making at least 2 levels of progress in mathematics in Key Stage 2 is maximised when pupils complete at least 114 activities on average per year.

*Table 3: Proportion of pupils making at least 2 levels of progress during KS2 by average number of activities per pupil per week.*

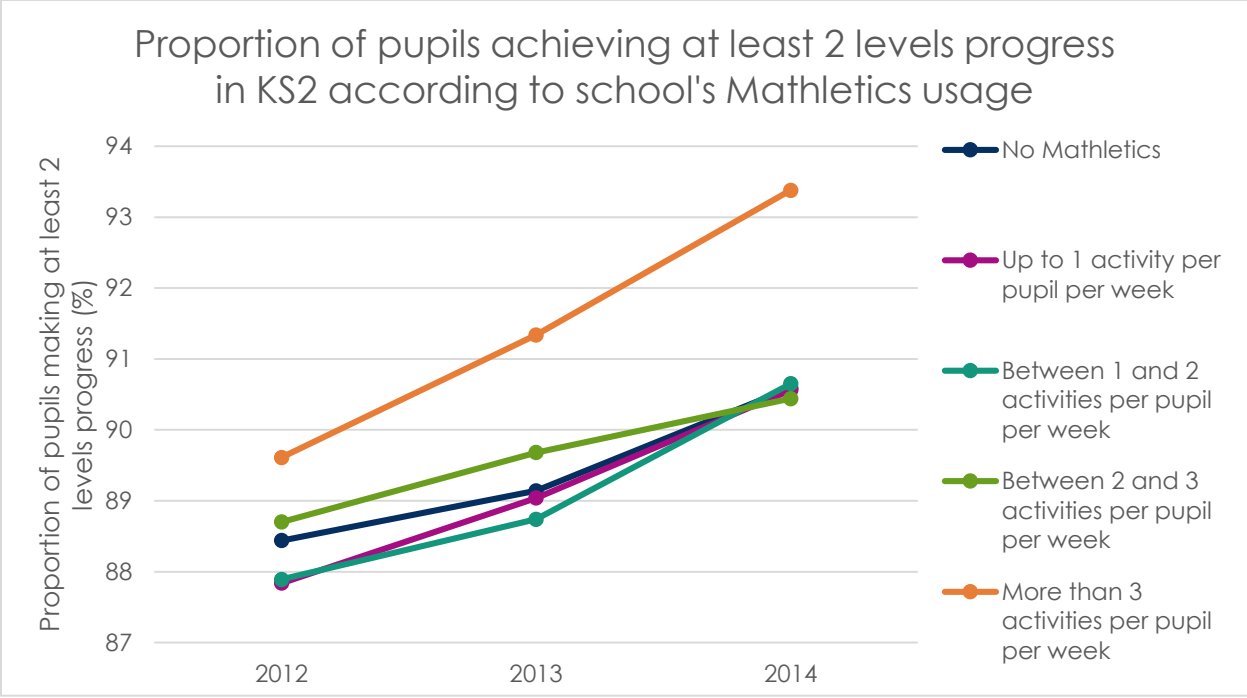
	No Mathletics	Up to 1 activity per pupil per week	Between 1 and 2 activities per pupil per week	Between 2 and 3 activities per pupil per week	More than 3 activities per pupil per week
2012	88.44	87.84	87.89	88.70	89.61
2013	89.14	89.04	88.74	89.68	91.34**
2014	90.59	90.56	90.65	90.44	93.38***

Statistical significance levels, \* 0.05, \*\* 0.01, \*\*\*0.001

Figure 2 illustrates the association between the average number of activities completed and the proportion of pupils making at least 2 levels progress in mathematics during Key Stage 2.

*Figure 2: The association between the number of activities completed on average each week and the proportion of pupils achieving at least 2 levels progress in mathematics.*





The differences in the average proportion of pupils making at least 2 levels progress in mathematics during Key Stage 2 between schools where students completed at least 3 activities on average per week and schools where pupils completed less than 1 activity per week on average were also highly significant in 2013 and 2014.

Table 4 shows there is little difference in the proportion of pupils making at least 2 levels of progress during Key Stage 2 between schools that use Mathletics and schools that do not when the amount of use of Mathletics is not taken into account.

Table 4: Proportion of pupils making at least 2 levels of progress during Key Stage 2.

	2012	2013	2014
Schools not using Mathletics	88.44	89.14	90.59
Schools using Mathletics	88.01*	89.09	90.67

Statistical significance levels, \* 0.05, \*\* 0.01, \*\*\*0.001

Similar results are found when considering the proportion of pupils who achieve a level 4 or above, a level 5 or above, or a level 6 in mathematics at the end of Key Stage 2 as well as the Total Average Point Score for schools which also takes into account attainment in reading and writing. Again, schools where on average pupils completed at least 3 activities per week had a significantly higher proportion of pupils achieving a level 4, 5 and 6 at the end of KS2 compared to schools that did not use Mathletics in 2014.

Table 5 also shows that the proportion of pupils achieving a level 6 in mathematics was higher for schools where the average number of activities completed per week was greater than 1 compared to schools that do not use Mathletics. These proportions were significantly higher for schools where pupils completed between 1 and 2 activities and 3 or more activities on average per week compared to schools that do not use Mathletics.

*Table 5: Proportion of pupils achieving a level 4, 5 or 6 in mathematics at KS2 by average number of activities per pupil per week.*

	No Mathletics	Up to 1 activity per pupil per week	Between 1 and 2 activities per pupil per week	Between 2 and 3 activities per pupil per week	More than 3 activities per pupil per week
Level 4	87.27	86.91	87.43	86.57	89.96**
Level 5	42.14	41.23*	43.13	42.71	45.58*
Level 6	8.61	8.56	9.52***	9.37	10.74**
Total average point score	28.94	28.85*	29.05*	28.99	29.31*

Statistical significance levels, \* 0.05, \*\* 0.01, \*\*\*0.001

## 4 Conclusion

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The results of this study show that regular use of Mathletics is associated with a significantly higher proportion of pupils making at least 2 levels progress at Key Stage 2. Similarly, regular use of Mathletics is also associated with a greater proportion of pupils achieving a level 4, 5 and 6 in mathematics.

The results suggest that for schools to benefit from using Mathletics, pupils need to complete at least 3 curriculum activities each week. This is typically 114 activities each year.

This study has focused exclusively on the completion of Mathletics curriculum activities by pupils. Mathletics includes a range of additional resources and activities that pupils can use outside of these core curriculum activities which may also influence pupil attainment in mathematics.

The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education or 3PLearning.