To what extent does technology enhance the acquisition of times table knowledge and the fast and accurate recall of times table facts?

Hoxton Garden Primary School, Upper Phase

Abstract

The purpose of this study was to examine to what extent technology enhances or reduces the acquisition of times tables and the fast recall of them. For six months, three children in each class in Key Stage 2 were given login details for an online app called 'Timestable Rockstars'. These children were given the opportunity to access the app three times a week whilst the remaining children in the class practised times tables using a range of other popular methods, without the use of technology. All teachers within Key Stage 2 found that the use of technology to support the learning of and fast recall of times tables was successful and that children with logins, improved significantly compared to their counterparts in the study.

Introduction

Hoxton Garden Primary School is a multi-cultural primary school situated between three estates in Hackney, London. The proportion of pupils eligible for the pupil premium is higher than average and a significant number of children enter Nursery and Reception below the expected level for their age across a number of areas of learning. The proportion of pupils from minority ethnic groups and those who speak English as an additional language are much higher than the national average.

Following conversations throughout phase meetings and analysis of times table data; it became apparent that in some year groups, the percentage of children in-line to meet age related times table expectations was significantly below the desired target. Also, as a result of gap analysis of test papers, it was noticed that children were failing to answer questions correctly due to the lack of times table knowledge and the fast and accurate recall of them.

At the time of the action research beginning, there was no specific way to teach times tables across the school. Teachers would use a range of different strategies, such as, chanting, number fans, bingo, counting stick and other games, between 3-5 times per

week as part of their Maths lesson. Some teachers used times table games on the interactive whiteboard, but this was irregular and inconsistent.

Technology in today's world has grown significantly and research from the EdReview (2012) suggests that as a result of the advances of technology, the way in which people are educated has improved. In classrooms across the country, an increasing number of professionals are incorporating the use of ICT and technology in their day-to-day learning in order to improve the progress and outcomes of children and enhance the learning process. This is something that Hoxton Garden is becoming acutely aware of and are constantly developing the curriculum in order to meet the expectations of this currently generation.

Also, upon further reading, it is acknowledged that evidence also supports the idea that technologies can improve pupil achievement, as long as such tools are thoughtfully integrated into the teaching and learning process (Timestable Rockstars 2018). When online environments are incorporated into teaching meaningfully, opportunities are provided for children to learn and achieve.

As a phase team, discussions were had about the different ways in which a better understanding of children's attitudes towards times tables could be established and which strategies would be the most effective for acquiring times table knowledge alongside developing a fast and accurate recall of them. The basis of the research was to examine the effects that technology had on the learning of times tables. To investigate this, teachers identified six children in each class and paired them up, based on their times table knowledge from the school's times table tracker (fig 1). One child from each pair would be given a login for Times Table Rockstars while the other child in the pair, would rehearse times tables using methods that didn't require technology. It was expected that the outcome of the project would result in teachers placing more emphasis on the use of technology to support teaching and learning.

Fig. 1

	I can count forward and back...wards in steps of 5 (...dependently)	I know my 2 times table	I know my 10 times table	I know my 5 times table	I know my 3 times table	I know my 4 times table
	Emerging		D = Developing		S = Secure	
s	D	D	E	e	e	
s	S	S	D	e	e	
s	S	S	S	e	e	
s	S	S	S	e	e	
s	S	S	S	e	e	
s	s	s	s	s	S	
s	s	s	s	s	S	
s	s	s	s	s	S	
s	s	s	s	s	S	
s	s	s	s	s	S	
s	s	s	s	d	d	
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s	s	s	s	s	S	
s	s	s	s	d	d	
s	s	s	s	s	s	
s	s	s	s	s	s	
s	s	d	d	d	e	
s	s	s	s	s	s	
s	s	s	s	s	d	
s	s	s	d	e	e	

Year 4 / Year 5 / Year 6

Research Process

The project was co-ordinated by the phase leader and supported by four teachers within the Upper Phase. At the beginning of the research project, the phase leader met with class teachers to discuss the learning of times tables in the classroom. The school's times table tracker (fig 1) was used to identify children who were emerging, developing or secure on their journey towards learning their age-related times table expectations. After further discussions and research, class teachers and the phase leader decided that Times Table Rockstars would be the app most appropriate for the research project.

Times Tables Rockstars is a carefully sequenced programme of times tables practise. Each week concentrates on a different times table, with a recommended consolidation week for rehearsing the tables that have recently been practiced every third week or so. According to website, This format has very successfully boosted times tables recall speed for hundreds of thousands of pupils over the last 7 years in over 4500 schools - both primary and secondary – worldwide.

Every child in the study was given a questionnaire (Appendix 1) so that the class teachers and phase leaders could assess the current attitudes to times tables of children in the study. All participants also completed a baseline assessment on Times Table Rockstars so that average speed and accuracy scores could be identified.

Once average speeds and accuracy had been measured, three children in each class continued to use Times Table Rockstars three times a week. Their partners in the study would continue to use other methods of rehearsing times tables with the remainder of the class.

The phase leader monitored the use of Times Table Rockstars regularly to ensure that children were given the opportunity to access the app three times per week and noticed a significant improvement in the average speed and accuracy of the children who were accessing the app regularly.

Weekly feedback during phase meetings provided an opportunity for dialogue between the professionals who were undertaking the project. This provided essential insight to how well the project was working in different classrooms and how children were responding to the Times Table Rockstars app.

As the programme developed, it became apparent that the Times Table Rockstars was improving the knowledge, speed and accuracy of times tables within all classrooms. Teachers also expressed their surprise at how positively the children spoke about Times Table Rockstars and their new found love and engagement for learning times tables.

At the end of the project, all participants in the study were re-assessed for their average speed and accuracy and each child was given the same questionnaire to complete, that was completed six months earlier. Also, the phase leader met with teachers to discuss their thoughts, feelings and effectiveness of Times Table Rockstars. Teachers also provided a range of times table tests to showcase evidence following the end of the project.
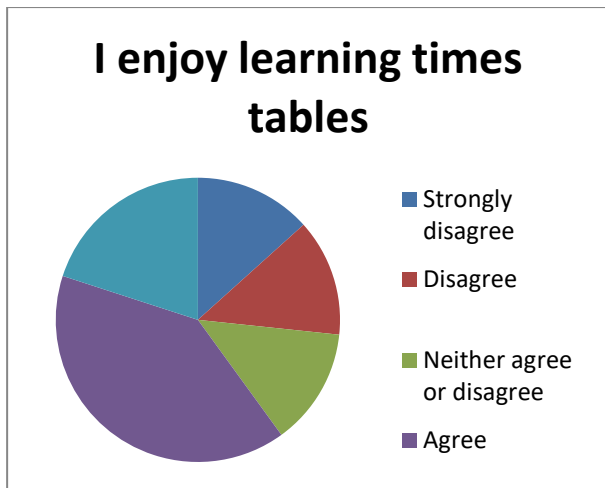
Findings

The children responded very well to Times Table Rockstars and there were a number of quick noticeable differences. Children's' engagement and enjoyment in the process of learning times tables increased and teachers expressed that the app promoted a love of learning and rehearsing times tables. Children also became more confident in their ability to use times tables in a range of different areas of Maths.

As a result of analysing and comparing questionnaires (fig 2) from the beginning and the end of the study, it was clearly shown that children who had used Times Table Rockstars three times a week had more positive attitudes towards times tables and the importance of them in answer questions on a range of mathematical concepts and ideas. The graphs below also know how their confidence in their own abilities increased. However, on the other hand, data analysis from the questionnaires completed by those who didn't use Times Table Rockstars clearly show that the attitudes of children who didn't use technology hadn't changed and a high percentage of children still didn't enjoy learning times tables or find them important.
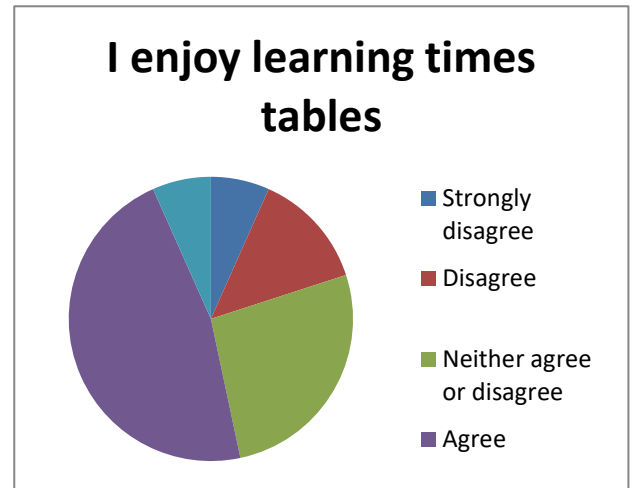
Fig. 2

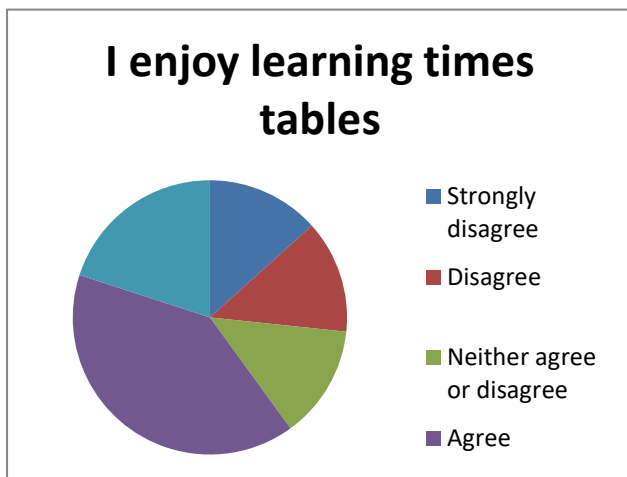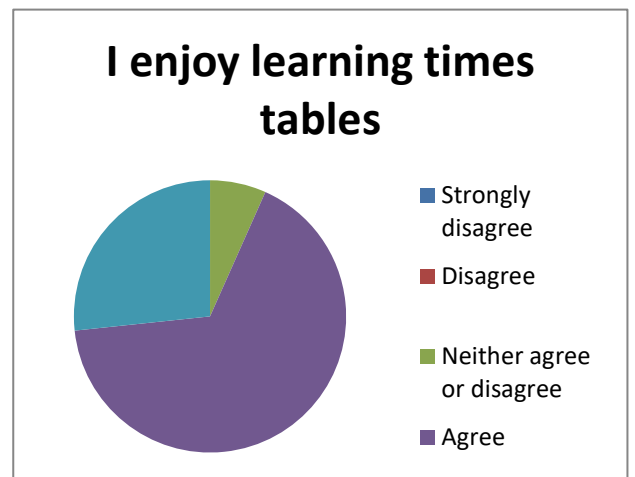Children without logins

January

June

I enjoy learning times tables
- Strongly disagree
- Disagree
- Neither agree or disagree
- Agree

I enjoy learning times tables
- Strongly disagree
- Disagree
- Neither agree or disagree
- Agree

Children with Times Table Rockstars logins

January

June

I enjoy learning times tables
- Strongly disagree
- Disagree
- Neither agree or disagree
- Agree

I enjoy learning times tables
- Strongly disagree
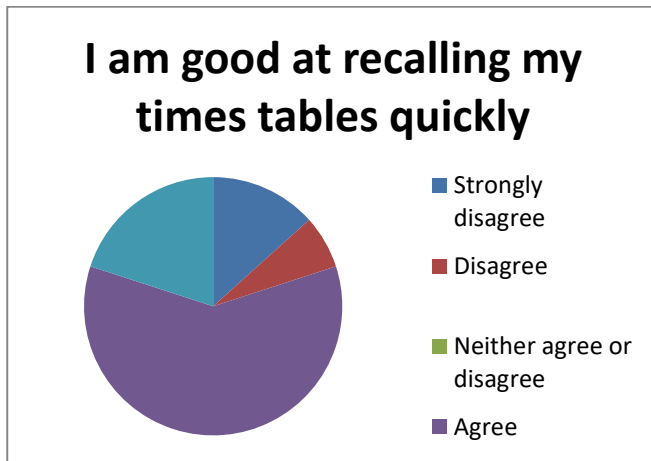- Disagree
- Neither agree or disagree
- Agree

Children without logins

January

June

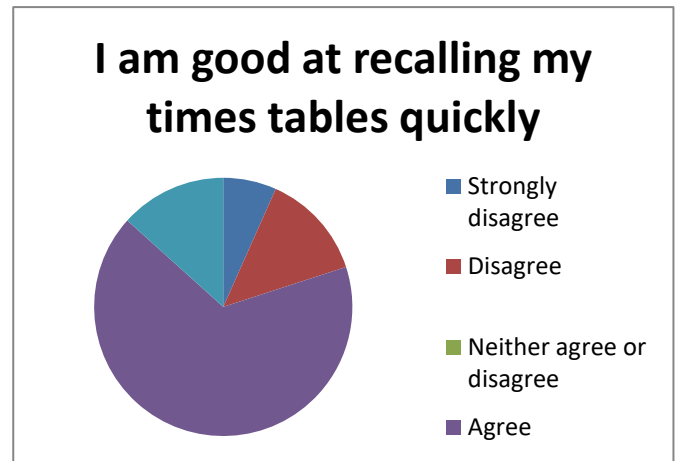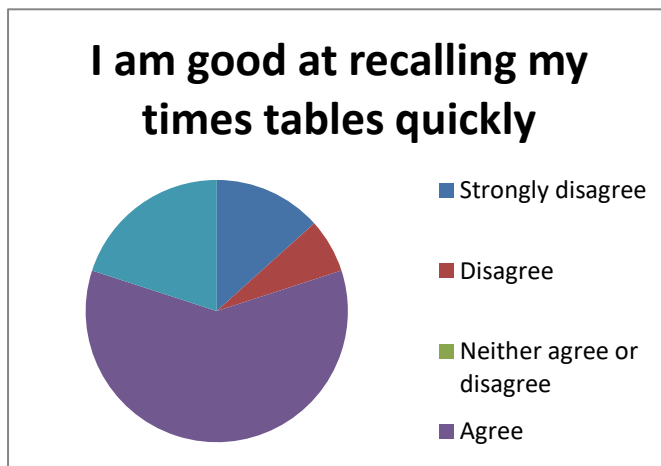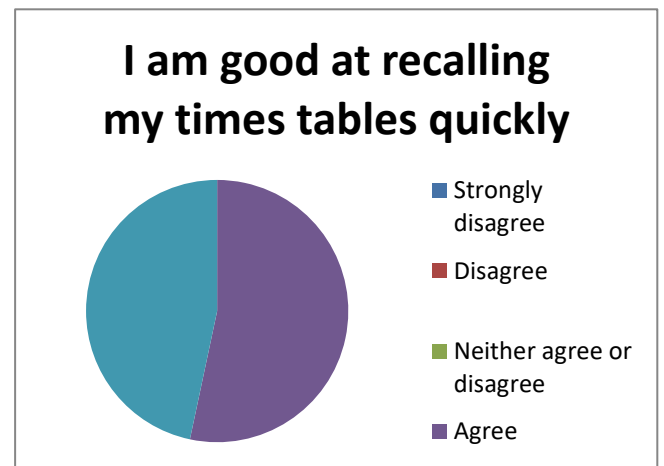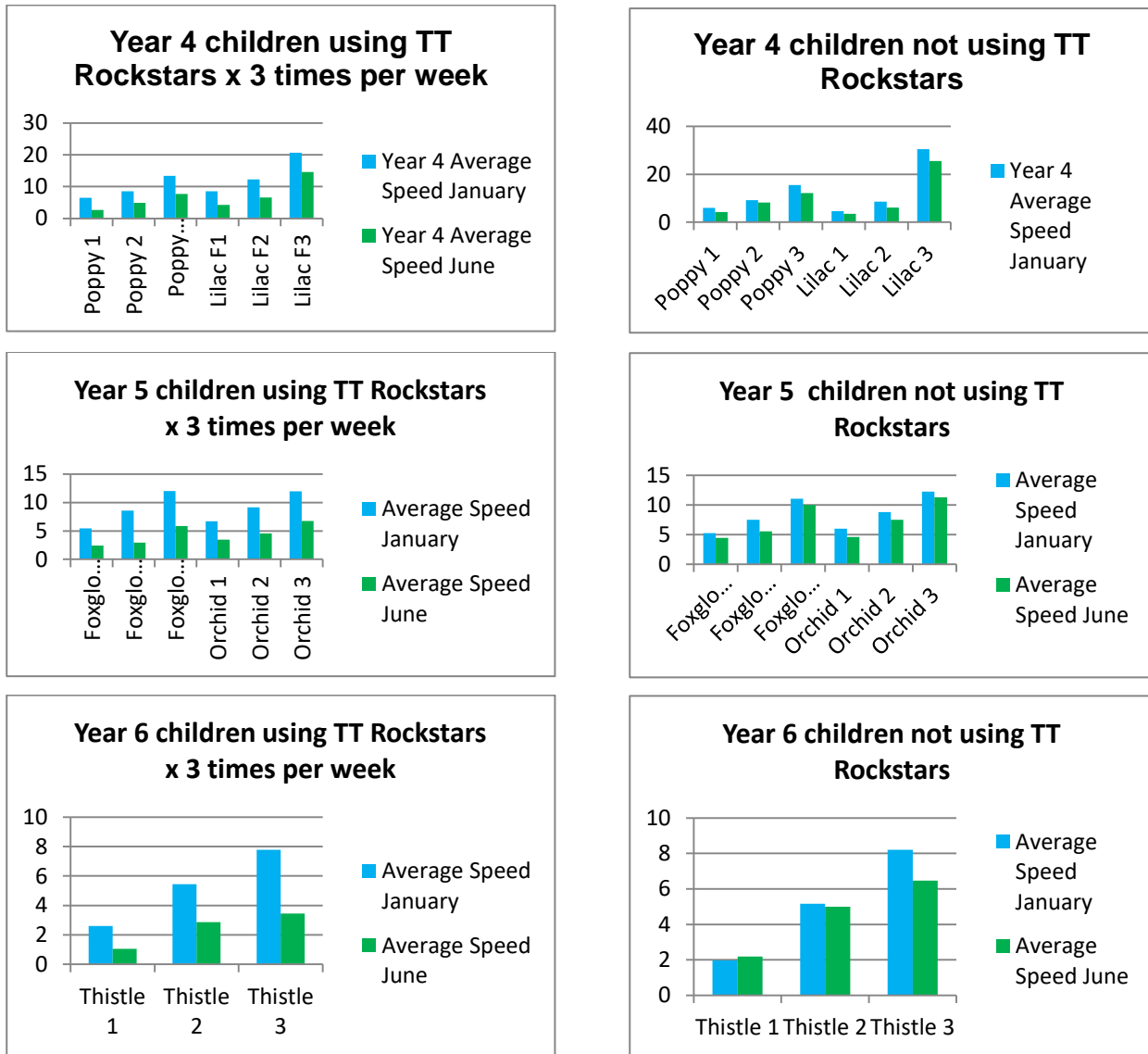Children with Times Table Rockstars logins

January

June

The charts below know the average speed of children who took part in the study. (Fig 3) As a result of analysing the data, it is clear to see the positive impact of using technology to learn times tables as opposed to other methods which do not require or incorporate technology. The data shows that the average speed and accuracy of the children who were using Times Table Rockstars three times a week has improved significantly compared to their study counterparts who didn't use technology to support their learning of times tables.

Fig. 3

Year 4 children using TT Rockstars x 3 times per week
- Year 4 Average Speed January
- Year 4 Average Speed June

(Categories: Poppy 1, Poppy 2, Poppy…, Lilac F1, Lilac F2, Lilac F3)

Year 4 children not using TT Rockstars
- Year 4 Average Speed January

(Categories: Poppy 1, Poppy 2, Poppy 3, Lilac 1, Lilac 2, Lilac 3)

Year 5 children using TT Rockstars x 3 times per week
- Average Speed January
- Average Speed June

(Categories: Foxglo…, Foxglo…, Foxglo…, Orchid 1, Orchid 2, Orchid 3)

Year 5 children not using TT Rockstars
- Average Speed January
- Average Speed June

(Categories: Foxglo…, Foxglo…, Foxglo…, Orchid 1, Orchid 2, Orchid 3)

Year 6 children using TT Rockstars x 3 times per week
- Average Speed January
- Average Speed June

(Categories: Thistle 1, Thistle 2, Thistle 3)

Year 6 children not using TT Rockstars
- Average Speed January
- Average Speed June

(Categories: Thistle 1, Thistle 2, Thistle 3)

Impact and Conclusion

The impact of the action research is that teachers feel that in order to improve acquisition, accuracy and speed of times tables, children need to be engaged through technology.

Teachers have expressed a desire to continue to use Times Table Rockstars in their teaching practise, as they found huge benefits. As a result of the Times Table Rockstars, children are enjoying the learning and rehearsing of times tables and have an increased level of confidence in their abilities to use times tables in all areas of Maths.

References

Edtechreview.in. 2002. *How Important is use of Technology in Education*. [ONLINE] Available at: http://edtechreview.in/news/681-technology-in-education

ttrockstars.com. 2018. *Benefits*. [ONLINE] Available at: https://ttrockstars.com/login

Appendix 1

Name _____

Times Tables Pupil Questionnaire

	Strongly Disagree	Disagree	Agree	Strongly Agree
I enjoy learning times tables				
I think learning times tables is important				
I am good at recalling my times tables quickly				
I know most of my times tables				
Learning my times tables helps me with other areas of Maths				

How many times a week do you practise your times tables at home? _____