

G54GPP

Project Proposal

*Literacy games for Key Stage 1 children with dynamic difficulty for individuals
produced by machine learning techniques*



wordZoo

Oliver Bodinar, Lawrence Cate, Robert Sadler

Background and Motivation

Literacy education is an essential part of the primary school curriculum but many pupils underperform in this key area. Tackling this issue and boosting literacy at a young age could have a dramatic positive impact on pupils' overall education. The traditional methods of teaching will always have a role to play, but schools should also consider new ways of teaching made possible by developments in ICT. Schools are slow to adapt due to a variety of factors and even if they do have modern resources they are not always able to use them in the best way. Even with new technology, the traditional methodology stays the same, "Slate evolved to paper and paper evolved to [electronic] tablets", it isn't really different, it's just technology doing the same thing in a shinier way" (Grey, 2012). Educational games could be better developed to allow teachers to achieve educational goals effectively using technology.

Computer games have made their way into the classroom as a way of interactive learning, but have their own problems. Looking at the existing market, *BBC Bitesize* (BBC, 2017) is the most commonly platform within the British school system. These games lack replay ability, and have a fixed structure with little replay ability, as well as lacking variety. A small selection of games which would only be ideal for one single session. Other commercial products such as *KidsSpell* (KidsSpell, 2017) and *Purple Mash* (PurpleMash, 2017) both follow the same format, but have a larger variety of games. The former however is based upon *Adobe Flash Player*, which is soon to become an unsupported plugin (Adobe, 2017), as well as being incompatible with IOS devices which have an 75.64% share of the tablets market (StatCounter, 2016/7). Schools are increasingly acquiring iPad's in particular for educational purposes. *KidsSpell* also includes adverts which are inappropriate for children (KidsSpell, 2017).

Expanding beyond the issues with educational games, to the issues with education as a whole. Taking data from the 2017 Department of Education report (Education, 2017) identifies a problem with the current mindset towards teaching. Education quality is assessed on whether a child reaches an expected standard which is set by the government.

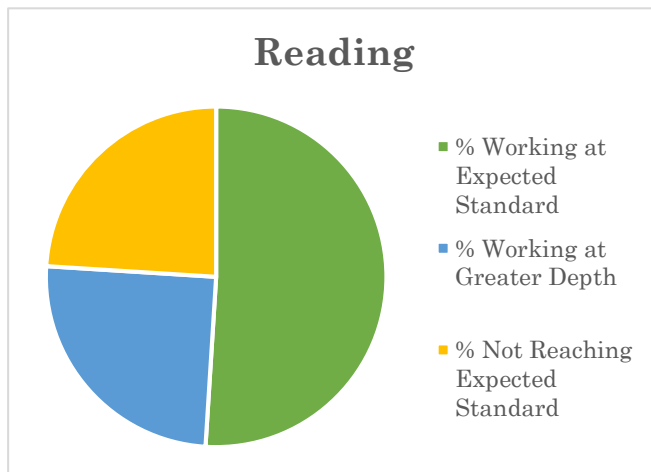


Figure 1

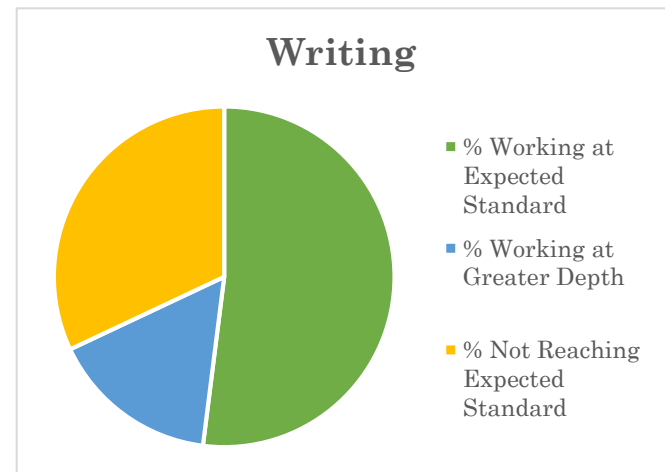


Figure 2

Source: (Education, 2017)

Of the charts in Figures 1 and 2, there is a clearly visible problem. For reading, 49% (Education, 2017) are not at the appropriate level set by the government for their individual ability, and for writing, it is 48% (Education, 2017). Nearly half of all children in Key Stage 1 within England are either below or above the standards, indicating that students are left behind or held back. This is a problem with the traditional teaching method, as the curriculum is designed for the average as opposed to the individual. Nearly half of pupils have their education compromised in some manner. Another issue identified within the data, is the discrepancy between boys and girls (Figure 3). Using the traditional teaching techniques, girls outperform boys considerably.

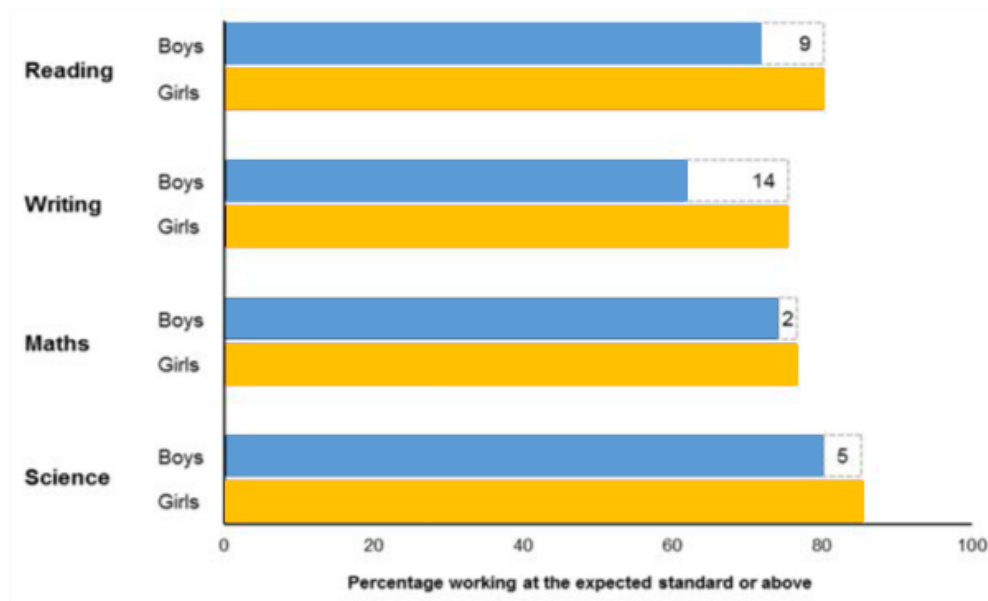


Figure 3

Source: (Education, 2017)

In short, the “one size fits all” (Wilshaw, 2012) approach does not work for a vast proportion of children. To attempt to address this problem, we want to use the developments within Machine learning to provide a personalised educational experience. We want to produce a set of browser based Literacy games with an AI foundation designed to be played on iPads. The game’s will have a dynamic difficulty, i.e. the difficulty of each session that the child plays of a game will be based on their previous performance. As a child progresses through the games, the games will adapt. If a child struggles with a certain area, then the words within the games will evolve to focus on what they are struggling with. Likewise, if a child is excelling with certain words, the games will increase in difficulty to challenge them more. The games will change with the child, with a constant aim of increasing their literacy ability, but at their own pace. The goal is that no one will find anything too easy, or too hard. (Cody, 2012)

Aims and Objectives

The aim of our project is to create a software tool that improves school pupils’ literacy ability.

Our objectives to achieve this are:

- **Create educational games:** Make a selection of games that teach and test different aspects of the National Literacy Curriculum
- **Investigate and apply machine learning:** analyse the difficulty of words and adapt tasks to pupil’s performance
- **Performance monitoring:** Create a system that allows teachers to monitor individual pupils’ and overall class progress
- **Test the games in a classroom environment:** Evaluating the quality and effectiveness of the software produced by trialling the system in a classroom

External Aspect and Impact

With a specific external focus on a local primary school within Nottingham, as well as applying IBM's machine learning tools for educational use.

The greater impact is the research into whether the approach we take is successful, and the practicality and benefits to such a system. The impact could attitude to education as a whole. This project will be a proof of concept, and an evaluation of the general theme of machine learning in education.

Workplan

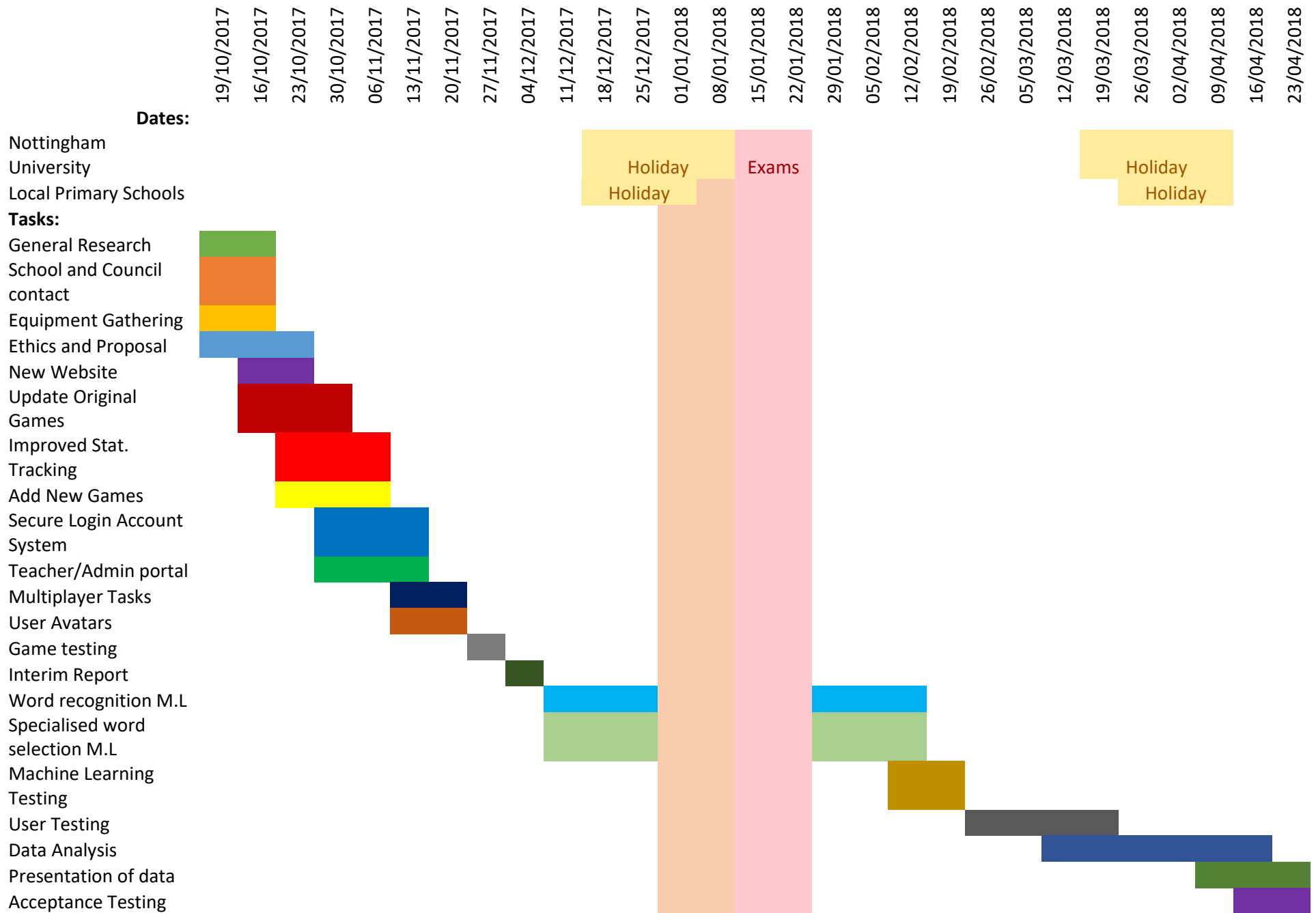
Workplan is made up of an overall Gantt Chart with specific milestones.

Milestones

Milestone	Date
Website	30/10/2017
Educational Games	13/11/2017
Unique Login System	20/11/2017
Teacher's Portal	20/11/2017
Machine Learning	19/02/2018
User Testing	16/04/2018
Data Analysis	24/04/2018

Gantt Chart

See Following Page.



Bibliography

Adobe. (2017, July). Retrieved from AdOBE: <https://blogs.adobe.com/conversations/2017/07/adobe-flash-update.html>

BBC. (2017). Retrieved from BBC Bitesize: <http://www.bbc.co.uk/education>

Cody, A. (2012, July). Retrieved from Education Week Teacher: http://blogs.edweek.org/teachers/living-in-dialogue/2012/07/could_school_be_both_too_easy_.html

Education, D. o. (2017). *Phonics screening check and key stage 1 assessments in England*. Department of Education.

Grey, C. (2012). *Digital Aristotle: Thoughts On The Future Of Education*.

KidsSpell. (2017). Retrieved from Kids Spell: <http://kidsspell.com/>

PurpleMash. (2017). Retrieved from Purple Mash: <https://www.purplemash.com/login/>

StatCounter. (2016/7, September). *Tablet Operating System Market Share United Kingdom*. Retrieved from <http://gs.statcounter.com/os-market-share/tablet/united-kingdom/#monthly-201609-201709-bar>

Wilshaw, (. h. (2012). Interview with Graeme Paton. *The Telegraph*.