

## The impact of using a ReaderPen on year 10 learners in a multicultural urban school

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### Introduction

Research conducted by the Department for Education in 2013, found that 17% of 15 year-olds in England do not have a minimum level of proficiency in literacy. In 2013, just over one in eight secondary school learners also had English as an additional language (EAL) and these learners were in the majority in 117 Birmingham schools (NALDIC, 2013). It has been argued that it takes ten years for a learner to move through the five stages of second language acquisition from no language to fluency (Stats Wales, 2013) ; a high proportion of these learners with EAL have not been in UK schools for this length of time and, although many may be competent in conversational language or Basic Interpersonal Communication Skills (BICS) (Cummins, 2009), and seem therefore fully proficient, they are likely to be challenged by the transition to both receptive and expressive academic language essential for examination success at 16 (e.g. Topping, 2018). These learners are therefore vulnerable and at risk of under-performing in those public examinations so crucial to their future.

Recently, English examination boards have been receptive to the argument that learners with learning differences such as SpLD/dyslexia should be offered access arrangements to compensate for difficulties with literacy in subjects where literacy is not the skill being assessed (Joint Council for Qualifications/JCQ, 2017). The introduction of technology, such as a ReaderPen, which can read text and provide dictionary definitions, has been permitted for SpLD/ dyslexia under the proviso that its use must have been habitual for the learner. It is, however, not easy to identify SpLD/dyslexia in learners with EAL (Mortimore et al. 2013) hence learners with EAL might not be offered this particular access opportunity to demonstrate their understanding of the exam topics. It is essential, however, to find ways in which secondary learners with EAL can independently develop the awareness of the academic language and the reading comprehension for Key Stage 4 prior to their examinations to prevent under achievement and subsequent marginalisation.

Small scale unpublished studies had indicated some benefits beyond the examination context of the use of a ReaderPen (Scanning pens, 2017) The current study was therefore driven by the need to identify the extent to which the use of a ReaderPen might have an impact upon the general reading comprehension of learners at the stage of transition to Key Stage 4. It was located within an urban school with a high proportion of learners with EAL, many of whom were recent arrivals in the UK education system.

### Aim

To undertake an evaluation of the impact of using a ReaderPen on 40 year 10 learners who have literacy issues in an urban comprehensive academy setting. The evaluation focused on the impact on three key areas of learning for learners; silent reading, curriculum comprehension, vocabulary and attitudes to reading.

All ethical issues and documentation had been scrutinised and passed by the Bath Spa University Institute for Education Ethics team working from the British Educational Research

Association guidelines (BERA, 2014). Information about the project and permission forms were issued to all learners/parents/carers and teachers involved and returned.

### Project Design

A mixed methods project was designed: with the aim of providing both a quantitative skills measure and qualitative information from the voices of the learners and the teachers involved.

#### Phase 1:

The literacy skills of all 40 year 10 learners would be tested pre intervention - mid January .

18 learners comprising an intervention (group 1) with ReaderPens and 21 waiting controls without the pens (group 2) matched as far as possible for reading ability from school provided scores. Both groups were retested after six weeks of pen use.

#### Phase 2:

A waiting control group would be offered opportunity to trial pens for a further 6 weeks to ensure equality of access for all and to explore impact over time.

### Context and participants

The study took place within academy A, located in one of the 10% most deprived boroughs in England. This is an urban academy, highly rated by Ofsted, of 900+ pupils within a widely diverse multi-ethnic neighbourhood with 57% of its learners from a range of non-white communities (Education Endowment Fund, EEF, 2016) . Academy A is a sponsored ICT academy, termed outstanding by Ofsted in 2013 and registered as offering strong value added performance for all pupils ( EEF, 2016). In 2016 (EEF), 90% of pupils were registered on the Income Deprivation Affecting Children (IDAC) scale; 57% were in receipt of pupil premium; 55% registered as having EAL. 1.3% of learners with SEN had a statement or EHC plan and 31% of KS4 learners were registered as low attainers (SCPT, 2016).

The participants comprised 40 year 10 learners taken from the three lower English groups (6,7 and 8). 60% were female, 40% male. Over 90% had EAL.

### Data gathering

A mixed methods design was adopted to enable both statistical analysis of impact plus capture of the voices of learners and teachers.

#### Pre-intervention:

1. The three English teachers had been issued with an interview schedule to enable them to indicate the needs of their particular learners (Appendix Doc 1).
2. All tutors and teachers who might have contact with the learners using the pens were issued with information about the nature of the research (Appendix Doc 2)
3. All participants' reading skills were assessed using the National Group Reading Test (NGRT. ,Ager et al, 2014) ; their self-concept as a reader and attitudes to the value of reading were assessed by the Motivation to Read Inventory (MRI, Pitcher et al, 2007) adapted slightly to suit this particular context, (Appendix Doc 3)
4. All group 1 intervention participant learners completed a brief self-report questionnaire devised for the study (My Reading in Year 10. MRY10 ). This used a Likert scale to indicate their own attitudes to their reading and comprehension within exams and curricular subjects to provide a base line assessment and an indication of their hoped for achievement from the Readerpen use (Appendix Doc 4)

A meeting was held with the English teachers of the three groups involved to establish the most manageable way to collect data around learner and teacher voice. The teachers agreed to select 8 case study learners from phase 1 and to keep a log of any changes in behaviour over the course of the 6 weeks of ReaderPen use. An aide-memoire document was devised enabling the staff to notice changes over the intervention period across:

- Confidence
- Behaviour
- Attention – to lesson
- Need for attention
- Starting work
- Independent working
- Low level disruption
- Others?

A focus group with the 8 learners was planned for the end of the intervention alongside a recorded discussion of the experiences with the ReaderPens of the 3 teachers. This would be transcribed.

### Intervention:

#### Phase 1

(6 weeks' duration) commencing January 2018

18 learners had completed all consent forms and, as group 1, were trained in ReaderPen use by Scanning Pen experts. Progress was tracked over six weeks using a monitoring proforma issued daily by the learners' tutors at the same time as the pens were issued. The content and layout of these monitoring proformas (Appendix Doc 5) was discussed at the training session with the learners and the importance of their voices to the project emphasised.

At the end of the six week intervention, the NGRT reading test and the MRI were repeated across all 40 intervention and waiting control groups. All group 1 learners completed a final summary monitoring form (Appendix Doc 6) which allowed learners to state if they wanted to continue using the pen for a further 6 weeks and to opt in or out for an interview with the researcher based on document 6. Further feedback was gathered from group 1 learners by researcher interview, although time constraints restricted the number of 5 minute interviews to 3

A guided discussion between the researchers and the 3 teachers of learners from intervention group 1 gathered data about the teachers' experience and the impact of the pen use. This was recorded and transcribed. The teachers also returned the 5 case study logs.

#### Phase 2

(6 weeks' duration) commencing March 2018

All learners who had returned consent forms and had been present for the post phase 1 NGRT were included in group 2. The ReaderPen group comprised 9 learners later dropping to 8. They were trained to use the pens, completed the My Reading in Year 10 questionnaire and were shown how to complete the monitoring sheets which were organised as before by their tutors.

At the end of the 6 weeks, 24 pen users, including 8 of the 9 group 2 learners (one learner had left the academy) repeated the NGRT. 4 of these learners were interviewed by the researcher, based on their responses to the summary monitoring record and responses noted on the record. All 24 learners tested completed a final monitoring sheet and were asked to indicate if they wished to keep the pens.

The small number (8) of pen users in the second phase, plus the absence of some of these from earlier testing with the MRI, made it impossible to undertake reliable statistical analysis of the NGRT or MRI. Hence the statistical analysis comprises data from phase 1 only. For the same reasons, data for group 2 from the monitoring sheets and interviews have been added to the general qualitative findings from the group 1 learners. Teaching staff were not interviewed a second time at the end of the project.

## Findings

The findings are presented in the following order:

1. Statistical analysis of pre and post intervention testing instruments – NGRT and MRI
2. My Reading in Year 10 Questionnaire (Appendix Doc 4)
3. Monitoring proformas (Appendix Doc 5; Appendix Doc 6)
4. Final monitoring questionnaire plus interview responses
5. Learner interviews
6. Case study data (Appendix Doc 7)
7. Focus group – teacher discussion and records

### 1. Phase 1 Statistical analyses

#### Pre and post intervention testing

All the learners' data from the NGRT and the MRI were entered on a PASW database. Initially analyses were run to compare the impact on group 1 and group 2 of the intervention on the silent reading comprehension, vocabulary knowledge (NGRT) and on their reading self-concept and attitudes to the value of reading (MRI).

#### Analysis of findings

To evaluate the impact of the intervention, all participants had completed the NGRT at the start and finish of the first intervention phase. The scores were entered on the PASW database and the following analyses undertaken.

To identify whether parametric or non-parametric analyses could be used, Kolmorov – Smirnov statistics were used to check the normality distribution of scores for the pre and post intervention testing for both groups across all the dependent variables. With the exception of the total scores for the Motivation for Reading Inventory, all variables indicated non-normal distribution, usually for the control group, and therefore the non-parametric

analyses were undertaken for all the scores with the exception of the MRI total scores where a t-test was conducted.

Table 1 shows the normality of distribution across groups and items

Key NGRT = New Group Reading Test

MRI = Motivation for Reading Inventory

Item	Intervention group	Control Group
NGRT total	Normal	Not normal
NGRT Vocabulary	Not normal	Not normal
NGRT Comprehension	Normal	Not normal
MRI Total	Normal	Normal
MRI Value of reading	Not normal	Not normal
MRI Reading Self concept	Not normal	Not normal

Table 1: Normality of distribution

To explore the impact of the ReaderPen pen use upon the both groups, the Wilcoxon Signed Rank Test was used to measure change in the test scores for Silent reading and for Reading Motivation items for both groups over the duration of the intervention.

Significant gains were made by the intervention group between the pre and post-test sessions for the NGRT items (total standardised score, vocabulary score and comprehension score).

Table 2 shows the Wilcoxon Scores for the intervention group for the silent reading measures

Item	Significance
NGRT total	.001
NGRT Vocabulary	.001
NGRT Comprehension	.003

Table 2: Wilcoxon Scores for silent reading: intervention group

The control group made significant gains in the NGRT total and Vocabulary score but there was no significant change in reading comprehension over the intervention period. Table 3 shows the scores

Item	Significance
NGRT total	.000
NGRT Vocabulary	.001
NGRT Comprehension	.185

Table 3 Wilcoxon Scores for the control group

Due to a misunderstanding, only the intervention group and a few of the learners embarking on the second phase of the intervention had completed the MRI in March (Time 2) making it impossible to measure any changes in the MRI item scores for the control group between time 1 and time 2.

A Wilcoxon analysis was conducted to measure any change in MRI items between time 1 and time 2 for the intervention group. It indicated no significant changes in the MRI items for value of reading or self-concept. Since the MRI total scores indicated normality, a paired samples t test was conducted to evaluate the impact on the total scores for the MRI. There was, however, no significant difference between test time 1 (M=57.36,SD=9.49) and test time 2 [M=54.36,SD=9.22, t(10)=.82, p.434].

Table 4 shows the scores

Item	Significance
MRI Total *	.434
MRI Value of reading	.092
MRI Reading Self concept	.076

\* = t test scores for MRI total

Table 4: Wilcoxon and-T test scores for the MRI for the intervention group

Mann-Whitney independent sample tests were then used to compare the gains made by the intervention group with the gains made by the control group for each NGRT item over the period between January and March. No significant differences between the groups emerged indicating no significant differences in their skills development over the course of the intervention.

However, the difference between the two groups' reading comprehension scores almost reached significance and it should be noted that the control group showed no significant change over this period.

Item	Significance
NGRT total Jan	.471
NGRT Total March	.288
NGRT Vocabulary Jan	.263
NGRT Vocabulary March	.511
NGRT Comprehension Jan	.767
NGRT Comprehension March	.056

Table 5 shows the scores.

Table 5: Mann-Whitney comparison scores between the groups.

## 1. Phase 2: Statistical analysis

The intention had been to undertake similar analyses to compare the progress of the pen use for the waiting control group with those learners not issued with the pens. However, at the testing point, this second group, Group 2, contained only 8 self-selected pen users. Hence this reduced quantity of data made it impossible to undertake statistical analysis for the second phase of the intervention. Table 6 compares the NGRT scores for this group pre and post intervention.

NGRT Jan			NGRT May			Learner	
Vocab	Comp	Total	Vocab	Comp	Total		
Number/Name							
4.00	5.00	97.00	3.00	3.00	85.00	7	G
3.00	3.00	85.00	3.00	4.00	90.00	12	
5.00	3.00	91.00	5.00	3.00	89.00	21	
4.00	3.00	89.00	3.00	3.00	86.00	23	D
3.00	1.00	69.00	3.00	2.00	80.00	26	Ab
5.00	2.00	83.00	3.00	3.00	83.00	28	M
1.00	2.00	72.00	1.00	2.00	73.00	29	F
4.00	3.00	86.00	4.00	3.00	88.00	30	

Table 6: Intervention group 2: Standardised NGRT Silent reading scores pre and post pen use

Changes were inconsistent across the group. There was improvement in vocabulary scores (sentence completion task) for three learners; four learners improved their comprehension and 4 improved standardised total scores. However, three total scores for a further three learners had dropped

Pre-intervention, six out of eight learners scored within the lower average range (85 – 100). Of the 2 who scored lower than average (69 and 72) both improved, 26 from 69 to 80 and 29 from 72 to 73. Comments from their interviews are presented.

### Summary of findings

Statistical analyses of the scores for silent reading (NGRT) showed that the phase 1 intervention and control group had both made significant progress in both total scores and vocabulary. However, only the intervention group made significant progress in comprehension. When the progress of the groups across vocabulary, comprehension and total scores, was compared using a Mann Whitney analysis, there were no significant differences for silent reading (NGRT). The difference in comprehension scores, where the controls had showed no significant improvement over time, almost reached significance. Paired samples t tests indicated no significant differences between the scores for either group between the start and finish of the phase 1 intervention.

Pre and post intervention statistical analysis had indicated few differences between the two groups, with the exception of the silent reading comprehension where only the ReaderPen users showed a significant improvement over the time of the intervention. The small number of group 2 participants made statistical analysis of their scores inappropriate.

## 2. My Reading in Year 10 (MRY10) : Learner voice/ questionnaire

A total of 27 learners (18 participating learners in group 1 and 9 learners in group 2) completed the questionnaire. The data from the My Reading in year 10 questionnaire were analysed to identify both their feelings about their reading and the aims. The learner's scores for each item were averaged to provide an average group score. This was rounded up or down to a full number to reveal the extent to which the group agreed or disagreed with each item.

Table 7 shows the item statements and the average ratings for participants from both groups for each of the statements

Use numbers 1 to 5 to show how you feel about each of these statements:

1 = I really don't agree at all; 2 = I don't agree; 3 = I neither agree or disagree;

4 = I agree; 5 = I very much agree. All scores rounded to whole number

Statement	Group average	Whole number
1. I am happy with my everyday reading. (e.g. magazines, internet, timetables etc)	3.8	4
2. I don't read for fun	3	3
3. I find reading my science work easy	3.1	3
4. I find maths reading easy.	4	4
5. My silent reading is a bit slow	2.8	3
6. My homework reading is difficult	2.7	3
7. I need help with some of my school reading	3.2	3
8. I don't always understand what I read	3.4	3
9. I find it easy to read and understand exam and test papers	3.1	3
10. I find many of my subject words and vocabulary hard to read	3.2	3
11. I sometimes ask my friends or family to read things to me	2.1	2
12. I am expected to read far too many things	3	3
	Number citing	
Read more quickly	8	
Understand better	16	
Learn new words	13	
Enjoy reading more	6	
Subject difficulty English	9	
Subject difficulty Science	11	
Subject difficulty Geography	4	
Subject difficulty History	1	
Subject difficulty Maths	4	
Subject difficulty ICT	1	
Subject difficulty Tourism/travel	1	
Subject difficulty ICT	1	
Number of responses	27	



some were contradictory in terms of use and rating of level of usefulness. Although asked to estimate the length of time the pen had been used in each indicated lesson, only 9 did this reliably; 6 indicated very brief use, usually less than 5 minutes, 2 used it more lengthily – around 15-30 minutes per lesson.

The responses were tallied to compile a picture of the group 1 pen usage.

Table 8 shows the distribution of group 1 responses for the items

Item	1 lesson		2 lessons		3 lessons		4+ lessons	
Number of lessons with pen use daily	45		32		17		7	
Types of lesson	Science	English	Geography	Other subjects	Work sheets	Home work	Tests	Own reading
Number cited	46	60	22	18 e.g. History	17	7	10	12

Table 8: Group responses to the monitoring proforma items

The monitoring sheets asked learners to rate how helpful the pen had been in each lesson with 1 = not much; 2 = Ok; 3 = A lot. It is difficult to provide a reliably accurate picture because some sheets are contradictory (e.g. stating that it had helped in a specific way but still endorsing the not much judgement) and many sheet omitted this or did not clearly link the rating with the item. However, taking this into account, a calculation produced:

1 not much 22 endorsements;

2 OK 80 endorsements;

3 a lot 19 endorsements.

Learners were also asked to complete a final monitoring summary sheet which asked them to share:

- How much did you use the pen? – every lesson; every day; some days; not much
- How much did it help you? A lot; a bit; not much
- Do you think it has made a difference to your reading and how you feel about it? Yes, No, Why?
- Has it made a difference to understanding what you read? Yes, No; If yes, why?
- Learners were also asked what was good or bad about the pens and for suggestions for improvement.

15 learners from group 1 and 3 from group 2, completed these final monitoring summary sheets. The responses were tallied. Numbers represent the learners' responses.

Table 9 provides the distribution.

Item	Every lesson	Every day	Some days	Not much
Usage of pen	1	2	10	5
Helpful?	A lot	A bit	Not much	
	3	9	6	
	<b>Yes</b>	<b>No</b>	<b>Unsure</b>	
Reading improved	11	5	3	
Understanding improved	9	8	1	
Keep pen?	5	12		

Table 9 Group responses to the final monitoring summary sheets

Usage seemed to be intermittent, however 67% of the learners agreed that the pen had been helpful with 72% feeling reading had improved and 50% that their comprehension was better.

Comments and suggestions were transcribed into a word document and scrutinised for themes. Appendix 8 provides full comments from the learners' record sheets.

### Summary

The My Reading in Year 10 questionnaire at the outset had revealed that learners' aims were predominantly to improve understanding, learn new words; English and science had been cited as the areas where they particularly wanted to develop their reading and understanding and this was reflected in both the ongoing and final monitoring checklists completed during and at the end of the project which indicated where they had used the pens most often and where the help offered had been 'OK'. The scores for both subjects indicate that learners used the pens most for these two subjects. The pens were, however, also used quite frequently in geography and across other non-specified subjects (eg history). 99 out of 121 responses also indicated that, when used for the range of subjects, the pens had been helpful.

Positive responses focused on help with pronunciation (3), help with understanding the meaning of key or new words (10), help with understanding the home work (2), help reading worksheets (2), help with grammar (1).

I was struggling and it helped me a lot. Learner 8

It helped me a bit with the words I could not understand and keywords. Easy to scan dictionary helped me in lessons to understand words. Very helpful with words. Provided definitions of words I did not understand. It helped with key words I did not understand and helps you know words you do not know. Lots of new word meanings. Learner 4

It helped me with my grammar. Used it in science and it was useful. It helped me in English and in science for a test. Learner 16

There were, however, also criticisms. These tended to centre upon the definitions provided for words which were seen to be too long and/or confusing (4) or upon the speed or clarity with which the text was read (10). Two learners suggested that the languages should include some non-European languages, two others also wanted it to scan handwriting as well as printed text. Issues around speed or clarity seemed to discourage the use of the pen.

Initially the learners had not been allowed to take the pens out of school but this was relaxed in the second phase and the learners who completed the final questionnaire made more use of them for homework and for their own reading outside school, reporting a broader use and very positive responses.

#### 4 Final monitoring questionnaire and Interviews

Data from the final monitoring sheet and accompanying interviews with 5 female and 3 male learners from both phases shed further light on all these issues. There was further criticism of the complexity of the definitions (3), speed (3), clarity and the need for it to read handwriting (3). However, there was a higher number of positive comments, mainly focusing on the increase in vocabulary understanding.

It's helpful during tests and exams and helped me know some new words and to pronounce new words correctly.

The words that I didn't know in geography I used the s p and it helped me. Learner 9

There were words I didn't know and it was easy to know what is the word. It was useful and I checked though what is the words. It has made a difference. Learner 11

It was useful when I was using it for a test paper and it helped me pronounce the words and meaning .It helped me learn new words and made a difference to my understanding because I have been introduced to new words by the scanning pen. Learner 16

I have been made more confident and my concentration has been helped by saying the words. Once I knew the pronunciation, I remembered most of them. Learner 19

Learner 11 encapsulates the tension between the positive and negative:

I found it helpful when I didn't understand the word I could just scan it and it would tell me the meaning but sometimes it wouldn't answer clearly. It would be better if it could read and explain sentences. It helped my reading because it made it easier for me to read bigger words and my understanding because I can figure it out more faster.

Despite many positive evaluations, only 5 of the 17 phase one learners who responded, voted initially to keep the pen during phase 2 when given the opportunity. The second phase group was also a much smaller cohort. However, a final monitoring questionnaire was distributed at the end of Phase 2 to 24 learners from both phases who had used the pens. It then transpired that 21 out of the 30 pens indicated that they wanted to keep the pens and only 9 of the original pens used in the study were returned at this point.

## 5. Individual interviews

The interviews with the phase one pen users are detailed below. Some comments from the 4 phase 2 interviewees have been incorporated into the data from the final monitoring questionnaires presented in section 4 above. Further comments from interviews with 5 of the participants are presented later in this section.

Individual interviews with three learners after phase 1 and five after phase 2 all took place at the front of the same room as the remainder of their English group who were set a task using headphones to maintain the privacy of the interviewees. Interviews were recorded and transcribed. The data from the MRY10 questionnaire, the daily monitoring sheets and final comments sheet were combined with the short individual interviews to provide the learners' voices. The three phase 1 students, MX, SX and PX, were all female.

### Learner MX

The MRY10 questionnaire had indicated that, although MX felt happy with her everyday reading, science, maths and exam/test papers, she felt her silent reading was too slow and was aware she did not always understand what she read and that much of the subject vocabulary was hard to read. She cited English, geography and RE as problematic and wanted the pen to help her read more quickly, understand better, learn new words and enjoy reading more. In her interview, she stated that she did find the pen helpful and used it some days for reading worksheets, in English, science, geography and for test papers. She took it to all the lessons and used it all the time at the start but by the end weeks, she needed it less because she understood more and she did not want to keep the pen for the following weeks. She found the dictionary very helpful

It helped me with a lot of the words which I didn't understand....

particularly for some difficult words which she looked up and reported that she has remembered. She felt that the pen had made a difference to her reading and how she felt about it

I understand more words and now I read (out loud) more confidently. Before I would read quietly because I was scared I would get them wrong but now I speak up. I now understand words more across the subjects.

She had some criticisms and suggestions for improving the pens

The dictionary did not get some words and it did not explain well. Sometimes it wouldn't give the meaning I would need. Some words I needed to know but no clear definition and I found it hard to think about the context. If the dictionary could be improved – if the pronunciation could be improved and the accent. Some of the words didn't sound the way we would say them.

### Learner SX

The My Reading in Year 10 questionnaire had indicated no concerns with reading or with her subject language and vocabulary until the items around understanding where SX strongly

agreed that she did not always understand what she reads and that she finds it hard to read test and exam papers. Her aim for the ReaderPen was to understand better and learn new words. Her summary comments indicated that she had not actually used the pen very much as it was not as helpful as she had hoped it would be and she did not feel that it had helped her reading. The only area where she had felt she needed it was English and sometimes history, where she did feel it had helped her understanding a bit. She had specific suggestions for improving the pen.

The definitions should be short and not long because if we were to search it online it would be sentence whereas on the pen it is a paragraph. Not everyone speaks European languages. Have some more options – this will make more profit.

While you are scanning the words it should speak at the same time because the first time we used it we thought it was not working. I found it really difficult to scan a single word to get the meaning.

### Learner PX

PX indicated no concerns with her every day or school reading, homework or silent reading speed. However she agreed strongly that she did not always understand what she read, found subject language and vocabulary hard to read and was challenged by exam and test papers. She stated

My reading for all of my subjects are easy but the meanings is hard. Mostly science

Her aims were also to understand better and learn new words.

In her interview and summary statement, she felt that it had been quite helpful. She had brought it to lessons every day but only needed it on some days. She used it for homework and for reading a book. She found it helpful in science “where it would give me the meaning and I could then figure it out” and the same in history where she agreed that she has remembered some of the meanings and now uses them in her work. Pronunciation and definitions were particularly helpful but she was critical of some definitions which were too long and confusing. She wasn’t certain if it had helped her reading – “I’m not sure – meanings maybe” but it has helped her understanding – “it helps me because I understand some words I read and it still helps me – I remember”.

She suggests improvements -

When I read I need to understand some words and the definition of the words was confusing some times. It (the pen) needs to explain it in the way you talk to someone – the definition should be in understanding (understandable) words because it would explain too much and confuse us; like in history I underlined (seeking definition) Adolf Hitler and there were so many definitions! When we scan a word and it explains it is as though it is copied from google and gives everything. There are too many lines of words. You have to figure out which is the one.

PX was however keen to keep the pen if this did not deprive another student.

## 6. Phase 2

The purpose of the second phase had been mainly to ensure that all learners were offered the opportunity to use the ReaderPens. The low number of group 2 participants (8 – one participant left the school) was insufficient for statistical analysis. Although it was not possible to undertake reliable statistical analysis, the NGRT scores for the 8 learners were calculated and compared with their scores at the start of the phase 2 intervention

Their monitoring forms were scrutinised – only one pen user filled out more than a couple of days - and the final monitoring summary form enabled their voices to be added to the overall learner voice. Themes and issues arising from these have been included in the phase one analyses.

Five learners from phase 2 were interviewed. Learners 28 and 29 were female, 7, 23 and 26 male.

Despite the mixed impact registered from the NGRT scores (Table ), the phase 2 interviews provided a positive endorsement for the pens. Two of the three male learners, 26 and 7, were reasonably fluent silent readers and, unlike some from phase 1, more able to skim the dictionary definitions and select the most appropriate. Hence they were not critical of the nature and number of definitions provided.

It was actually good because it has not only one meaning, it has more than one meaning .... When I searched it up and then like listened to it with the headphones and it helped me to pronounce it better. Learner 7

These more competent readers emphasised the positive impact upon reading comprehension,

Yeah (it has) definitely (made a difference to my reading) because like when I didn't get a word I searched it up and then like listened to it with the headphones and it helped me to pronounce it better. Learner 7

I use it a lot at home....for like information.....like when I need to translate what it means and stuff... meanings.... Like learning words and stuff ... and the way you say it because like some of the words are hard to say.... Like complex words, like and stuff like that.... Like how to say them and what they mean. Learner 23

These learners mentioned increased confidence, better concentration and the ability to work independently. They also made a point of using the pen at home for homework.

With reference to the technology, they commented that it was quick and easy but learner 26 suggested improvements to the clarity of the display and that it took him a week to teach himself how to use it effectively – a problem that had meant that some of the first phase participants had stopped using the pen. He stated,

The more I used it then eventually I could understand it (the controls) more.....I started to use it more frequently in lessons.....and used it home for my homework ... for words I didn't understand for travel and tourism

Two female learners from phase 2, who both spoke up to 3 languages, were less proficient in English or reading comprehension.. Both had been in the UK and speaking English for less than a year – learner 28 for only 5 months. She stated,

It is very helpful because I use it every day and every lesson. Most of the time it help me understanding the read and it help me in test paper. Nothing was bad about this pen. Learner 28

They had used the pens consistently both in lessons and at home and were particularly enthusiastic. Learner 29's comments are presented in some detail as they indicate the ways in which the pen can be used which offers suggestions for teachers when introducing the pens.

Every day. Every day it is in my pocket..... The time we got holiday I talk to Miss because she gave me book about \*inaudible\* ..because I not here when we read it, do it, so she gave me and she said use the pen at home and read it..... I am working hard, more than before..... Before in science my level is level 1, but now it has come 2.

Interviewer: Do you think that is down to the fact that you were using the pen?

Yes because we do test a lot and the test I do I use the pen. Because of this pen I got just one I fail, in 12 I got 11 but before I failed just all of them.

Interviewer: So how does that make you feel?

Nice and happy, I show my dad that's why. And my dad feels nice...

The dictionary I can put it (new words) in the dictionary and see what it means. And read for me, and put it in my head, I see it again later, I can read it for myself..... I feel better about my work in English too. Everything getting higher..... Homework and sometimes, maths book for GCSE, I take it home, so that I can use the pen for anything I like. I use it the maths book and I use it at science book and for revision at home. So I have the revision books at home, and dictionary sometimes I use to read it.....

It's really helpful because at maths before Miss, if we are going to learn something through told me and she will ask her and she told me if I go home I check the thingy and I read it you know before a question that key word, that explain how it work, I use the pen I can hear how it's worked and answer the question before we do it and the day we use it I know I am going to use it, I do it again and make sure that I know it.....

And in on this month, on the 14th we have exam for travel and tourism, so it give us big revision paper, there's more pages I am using the pen and read one page every day.

I think the pen is perfect. I understood more of the reading and asked fewer questions. I love the pen. Learner 29

The interviews also provided further information about the background stories of some of these young people. For example, learner 7 speaks 4 languages; he has only been in the UK for one year, arrived with minimal English, learnt in Italy, and now communicates fluently; he learnt and spoke Italian during their previous year in Italy, which he still speaks with his siblings, they speak Punjabi with their parents. Learner 29 has only been in the UK for 5

months; Portuguese and their own African language is spoken at home and she now also speaks English. Learner 28 has only been taught in English for 11 months and they speak both Xhosa and English at home.

## Summary

As in the monitoring questionnaires, the reactions and experiences are mixed. The aims of all three phase 1 learners focused on learning new vocabulary and increasing understanding, particularly in tests. All felt that the pen had helped with subject specific understanding – which was one of the aims highlighted in the initial MRY10 questionnaires – however they also criticised issues around the lengthy definitions offered for vocabulary. The five second phase interviewees were more enthusiastic, also citing improvements with understanding new vocabulary, increased confidence, better concentration and the ability to work independently. They had also made a point of using the pen at home for homework, revision and reading – this was not necessarily offered to the phase one learners. The group included both learners whose silent reading was almost age appropriate and those with lower scores and it seems that the more fluent readers use the pens in fewer contexts and focus on using them for definitions and understanding new vocabulary while the newer arrivals in the UK use the pen more consistently across a range of places and tasks.

This would indicate a need for teachers to consider the background and skills of individuals when issuing pens and supporting the learners in their use. This kind of information and support was not offered to participants in this study as the aim was to explore the learners' usage, reactions and experience without mediation of this sort.

## 7. Case study data

The teachers had identified and tracked eight case study students, five male, P,N, F,H, A, and three female, MM, MH and J. One learner, A, proved to have dyspraxia and found the pen impossible to use effectively so was dropped from the study so seven remained, P, F, A, MM, MH and J.

It was not possible within the constraints of school timetabling to conduct focus groups with the case study learners, Data from the 7 learners was collated from the My Reading in year 10 questionnaire (Doc 4); the monitoring proforma (Doc 5) the final summary monitoring form (Doc 6), the teacher case study logs and the post intervention discussion with the teachers to provide brief pen pictures of the impact on these learners. Full case study pen pictures are provided in the appendix (Doc 7). The summaries below are compiled from collating all the information provided by the case study students across the data gathering instruments. They do endorse many of the findings presented earlier.

P

The MRy10 questionnaire gave a contradictory account. P stated he doesn't need help with reading – silent reading not slow and HW not difficult but despite this cited maths and science reading as hard and wanted to read more quickly, understand better and learn new words. Teacher log suggested initially that P is a slow starter when given a task, usually able to give verbal answers but in exams and assessments, rarely writes much that shows

any knowledge. Initially with the trial there was some low level disruption as everyone wanted to use the pen to see how it worked. After this initial use, P seemed a little embarrassed to get the pen out as others might mock. When encouraged, P used the pen to look up some words. The final summary monitoring indicated that P had used it for English/science words/ other subject words Helped a bit and P wanted to keep the pen. Examination of his 25 completed daily record sheets revealed consistent pen use throughout. Usually in 2 or sometimes 3 lessons, regularly in English (13) and predominantly in Science (7) or geography (12) although also used for own reading 4 times, other subject words 7 homework once. Rated the level of help from good to OK. P explained how it helped with reading worksheets, other 'stuff' also a book and my work'

Helping spelling words and get other words from the dictionary to help with writing. Helped reading because I know more words and made difference to understanding reading.

### **Comment:**

Contradictions in the MRY10 questionnaire maybe indicate difficulties more with understanding and vocabulary than decoding skills. Despite some initial embarrassment, P continued to use the pen effectively throughout the trial particularly in the subject areas he had cited in the questionnaire and was keen to keep the pen.

N

The MRY10 questionnaire indicated that N reads, for fun, no help needed with maths, science, homework, general reading – no difficulty understanding exams, tests or subject vocabulary ; doesn't feel he is asked to read too much. Wants help with speed reading , to learn new words and to enjoy reading more. Teacher reported that N used pen actively throughout lessons in the first week. Made a good start and showed signs of increasing independence. However as weeks continued he started to slip back into old habits. N reported he lost the pen at the end of the third week of the project and subsequently in the 4<sup>th</sup> week (a run up to assessment) reliance on teacher increased. There were only two completed record sheets – one the first week noting that it had helped a lot in English, the second (12/2/ noting it was lost)

H

The MRY10 was inconclusive (scored 5 for all statements) but expressed need to read more quickly and understand better – particularly in English. Unfortunately the teacher log stated that H was unable to use pen properly due to his dyspraxia and struggles with hand eye coordination – unable to drag pen across the line of text in a straight line with the correct amount of pressure. Consequently it does not read correctly for him. Issues emerge here around the suitability of the pen for learners with Dyspraxia.

A

MRY10 indicated that A feels happy with all aspects of his reading , found no subjects really hard to read and wanted the pen simply to help him to understand better. Teacher reported that from the start (week 1) he needed less support from her because of using the pen and that, by the time of an assessment mid-point in the trial , showed more independence. He also took to using the ReaderPen with his partner who encouraged him to use the pen more during lessons. He only completed one daily monitoring record from the first week when he

had used it for reading in English and stated that it was not much help, despite commenting favourably that it reads the words. His final monitoring sheet stated that the pen was not used much – used mainly for other subject words and did comment that it was helpful

It tells you what a word means

However it had not made a difference to his reading or understanding and he felt it could be made better and more useful but did not suggest how. He did not want to keep the pen. The absence of regular monitoring sheets makes it hard to explore the difference between the teacher's comments on his increased independence and his feeling that he had not benefited much.

MM

The MRY10 indicated that MM is happy with her reading across subjects and other texts and does not need help with reading although admitting that she does not read for fun and that she has some difficulties reading and understanding exam and test papers. She does not find particular subject words hard and hopes the pen will help her to understand better and learn new words. Her teacher's log stated that she has always been an independent learner but suggested that the pen has allowed her skills in English to improve and that she has noticed some more developed vocabulary used in her work. The log does not contain any weekly comment. Only 2 monitoring sheets were completed from week one and two. She used it in Science and to read a worksheet. She stated

It is not helpful because not always we get printed sheets. It also does not scan the screen.

Her final assessment stated that she felt that it had not helped her much although she used it in geography, science and for a test paper. She suggested it helped her because the dictionary was helpful but it had not made a difference to her reading or understanding. An improvement would be for a key board to be added on to the pen and for it to scan written words

MH

The MR1yr10 indicated that MH is aware that she needs some help with her school reading and that much of her subject vocabulary is difficult to read, and that science work is hard to read. In general she is happy with everyday reading and silent reading is fine. She finds geography, English and science challenging and hopes the scan pen will help her understand better.

Teacher profile indicated that MH was new to England and the language in Sept / Oct. Very interested in the pen at first and used it a lot. She got a bit confused at the dictionary definitions that were being read out and it often brought up some questions about another word that she didn't know the answer for and that she couldn't scan. When encouraged she would continue.

Her final monitoring sheet showed that she had used her pen some days for reading worksheets, test papers reading in English and science and some of her own reading. The dictionary was more helpful than other functions. But there were some words with no definitions. She didn't feel that it had made a difference to her reading or her understanding.

It is not useful during the lesson but maybe it is useful during the exams.

15 daily sheets had been completed – pen used 8 times – not needed for 7. Mostly used for English (6), Science (3) and for tests (2). MH did not feel it was very useful (10 /15) she complained that it was too slow, needed more words included.

It needs to be in more languages

It cannot explain the question

## J

The MRY10 indicated no concerns about reading at school although 5 items were marked 3 (neither agree nor disagree) and she did suggest that she was less secure with her everyday reading. No subjects were endorsed as difficult and her aims were to learn new words and enjoy reading more. Teacher reported that J used the pen quite a lot at the start of the project. She showed increased confidence and voluntarily answered more questions in class. She needed less support from the teacher. However, although the four weeks show steady growth in confidence and independent working, there are lapses when she slips back into asking more questions and by the end of the intervention she still does rely on working with a partner. However, she benefits from using her pen with her partner in which they look up certain words together. In her final monitoring sheet J stated that she used the pen some days for reading in English and science words. It helped her a bit in that she

Found out new words also I know words that I once didn't know.

She also felt that it made a difference to her reading and how she feels about it because

I felt more confident with it also I learn new words and I said the words I didn't know how to pronounce

And to her understanding because

Some words I know how to say and how to use that word.

However, she didn't want to keep the pen.

## Summary

The voices of these case study students confirm themes emerging from the earlier data. Much is contradictory, making assumptions difficult. However, the trend for wanting to use the pen, not because the learner feels (or admits to feeling) that his or her reading is poor but to develop vocabulary and understanding in academic subjects is noticeable. The users do not seem certain that the pen helped improve reading in general but they mention issues such as understanding, ability to pronounce certain new words, confidence. The teachers cite evidence for developing independence but also mention issues around embarrassment or disruption at the outset when the pens are first introduced. It is clear that the learners who use the pen consistently report the highest satisfaction but this can equally be interpreted that higher satisfaction leads to more consistent pen use.

## 8. Group discussion with English teachers

An informal 30 minute discussion with the 3 teachers was undertaken by the researcher in a separate room using a loose question framework (Doc 8). It was recorded and transcribed into a word document and analysed for themes.

### Analysis

It should be noted that these teachers were all English teachers and stated that they probably talk more in their lessons about text and ensure understanding than may happen elsewhere. Apart from the information on the monitoring record proformas, we did not create any record of pen use across other subjects.

The following issues emerged:

The learners who were the most pro-active generally got the more use out of the pens as they were more aware of the appropriate times to use them. However, the less able or engaged learners who were usually 'slow starters' engaged more swiftly because of the novelty – they started the work exactly as the same time as everyone else and continued to get down to their work more quickly.

In terms of getting them to realise that they can do the work I would say it helped in that respect... T2

**However** pen use tailed off for all learners “probably about half way through” (the five weeks) T4

*All learners generally I think start to tail off towards the end so there was like an essential excitement around using the pen and sort of the novelty of it, it didn't sort of continue as the weeks gone on and I would say that's with all learners generally. T3*

The pens were easy to use – no technological issues were quoted and the technical training had worked well.

*I didn't have any oh mine's not working, I can't find this, I can't find that at all and if one question came up about the settings, another learner knew the answer, so the functionality of it was fine, it was easy, like I didn't have any issues. T3*

The pens were used a lot for reading on paper (not internet) at the start and one learner used his for reading an assessment which increased his independence from the teacher. T3 commented that the pen became a “*sort of bridge... an extra scaffold...*”. However she commented that this was not always sustained after the intervention and that she did not see any learner using the pen in a mock exam towards the end of the project despite encouraging them to use it. T4 also stated that some people cooperated in using the pen and they were ‘*sort of helping each other but with this, with a tool*’. T4 reported, however, that one learner was reluctant to get the pen out because of some mocking by peers and that

*one of my learners did clock that it was the lowest ability groups that were using the pens.*

However, this was countered by the comment from T3

*In fact they sort of enjoyed the fact that .... they had the pen and they would sort of get it out you know you could just tell that there was that, that sort of flare about them that they wanted to use it and show that they were using it, so that again was in the first couple of weeks but there was less, the initial excitement had sort of worn off by then, I think so people were still sort of getting it out but it was like less obvious and it was like oh they've got their pen out now. So it was less sort of obvious like everyone getting them out and feeling confident about it but I didn't have any issues with being perceived negatively.*

*and she added*

*I know that it's probably quite silly but the idea that they could use headphones was. T3.*

*Oh god yeah that's currency at school isn't it, was yeah. T4*

*It was a winner yeah definitely, I was like get out and use your headphones, it was like oh, so they were quite happy about that. T3*

*The pen was used for definitions by learners with EAL but, as in the interviews, frustration was expressed about the definitions which were a little confusing*

## Summary

The experience was mostly positive although the pen use tailed off significantly after the first three weeks. Teachers reported increased independence, use of the pen as a scaffold and engagement with tasks but this was not always sustained. The teachers all agreed that the learners needed rather more guidance on how and when it was appropriate to use the pens so that the pen use is modelled to enable them to use it independently in other subjects. For example,

*Right we're all going to use our scanning pens now for this and get.... feedback on right what word did you look up, what new words have you looked at and having a bit more. T3*

*I would probably, if all the learners had them and were using them, every now and then I'd probably be like, right what subjects have you used it in this week, you know, like what new words have you learned in other subjects and you know, it would just be sort of ad hoc, sort of general things and that would sort of get the momentum going. T3*

They recommended that one training session was insufficient to embed the pen in everyday school life and acknowledged that they felt constrained by the research project as they felt that they couldn't model the pen use for them or structure the way in which it might be used.

This indicates the need for a structure alongside issuing the pens.

## Discussion and Conclusions

Research conducted in the real life environment of a challenging and pressured secondary school must attempt to present the voices of all involved on a foundation of rigorously executed measurement and analysis. This study adopted a mixed methods design to achieve this. However, the reality of this kind of research can often challenge the reliability of findings – numbers of participants cannot be guaranteed, data gathering is dependent upon the commitment of all involved and affected by numerous pressures beyond the control of either the researchers or the participants.

Hence, although every effort has been made to undertake reliable statistical analyses, the quantitative findings should be considered in combination with the voices of all involved to offer a rich picture of the experience of introducing the ReaderPens within a year 10 UK context rather than a gold standard trial. However, although the reliability and generalisability of conclusions must be assessed in the light of real life circumstance, there is much to be learned from this study which could be seen as a pilot to inform a larger study.

The statistical analyses of pre and post intervention data for phase 1 had indicated few differences between the intervention and control groups, with the exception of the silent reading comprehension aspect of the NGRT where, unlike the controls, only the post-intervention scan pen users showed a significant improvement over the time of the intervention. However the intervention was limited to a maximum of six weeks – a short time for differences to appear. A future study might consider a longer period of intervention to enable more reliable statistical analysis.

The voices of all those involved in the study offer insights to inform the future development, application and introduction of the ReaderPen in a secondary school context with high numbers of students with EAL.

### The student voices

Data from the MRY10 pre- intervention questionnaire, the monitoring proformas, final proforma questionnaire, interviews with learners and case studies provide a range of insights.

Despite being drawn from lower English groups, this year 10 population with EAL, were predominantly happy with their general reading skills and hoped that the pens would improve their understanding, help them to learn new words, particularly for tests. Science and English were identified as the most challenging subjects and learners used the pens most for these two subjects alongside some use in geography and across other non-specified subjects (eg history, travel and tourism).

82% of responses to the final questionnaires also indicated that the pens had helped with subject specific understanding. Over half of the learners agreed that reading had improved and comprehension was better although this was not necessarily reflected in the reading scores. Individuals also mentioned pronunciation and reading worksheets.

However tallying the responses indicated mixed levels of pen use with the majority of learners only using the pens on some days and mixed responses as to how useful they had found them. The voices of these case study students confirm these themes and that contradictory responses make interpretation difficult. However, the drive for pen use to develop vocabulary and understanding in academic subjects, reading remains. Users are again uncertain as to whether the pen improved general reading skills but comment positively on understanding, ability to pronounce certain new words, and those who persist and use the pen consistently report the highest satisfaction –of course this can equally be interpreted that higher satisfaction leads to more consistent pen use.

Across all data sources, there was some criticism of the pen. Some learners suggested that definitions provided for words were too long and/or confusing (4) or criticised the speed or clarity with which the text was read (10). There was some indication that students would stop using the pens very quickly if they could not master them instantly. However, of the 30 pens issued for the study, 21 pens were retained by the students, indicating their approval of the pens.

Overall, interviews with students provided mainly positive outcomes. The second group had been allowed to take their pens home and this had increased the usage with the interviewed students reporting a broader range of activities including, revision, homework and general reading. The five second phase interviewees were more enthusiastic than the first group, citing improvements with understanding new vocabulary, increased confidence, better concentration and the ability to work independently. The group included both learners whose silent reading was almost age appropriate and those with lower scores. The more fluent readers tended to confine pen use to definitions and understanding new vocabulary. The newer arrivals in the UK, or those with lower reading scores, used it more widely and consistently across a range of places and tasks.

### Lessons from the learners

These learners with EAL are more concerned to develop their understanding and subject specific vocabulary than their general reading skills which they do not perceive as limited.

The research project needed learners to participate so it is likely that some learners in the study would not choose to use a ReaderPen and were therefore more likely to abandon the pen swiftly if they did not find it helpful. Consistent use of the pen seemed to underpin satisfaction with the outcome.

This kind of information and support was not offered to participants in this study as the aim was to explore the learners' usage, reactions and experience without mediation of this sort.

Individuals have differing needs – and the individual's level of reading skills seemed to influence the ways and contexts in which he or she uses the pen. The weaker readers, or those whose English is less developed, use them more for reading skills beyond vocabulary.

This would indicate a need for teachers to consider the background and skills of individuals when issuing pens and supporting the learners in their use.

Learners do need some support at the outset beyond the simple demonstration of how to use the pen – which was not adequate for some of the learners. They could also benefit from some scaffolding of the types of activity that the pen might support. These activities should reflect the individual needs of the learner who should have a sense of control over how the pen is used. .

Individual learners gain real benefit in terms of developed confidence and independence but this is not universal. Pen use should be carefully targeted at those whose needs seem appropriate and whose progress can be monitored until the learner is in control.

### Technical improvements

The languages should include some non-European languages;

The pen could scan handwriting as well as printed text;

Consider simplifying the dictionary definitions;

Develop technology to recognise the spoken word;

Ensure clarity and ease of use.

### Lessons from the Teachers

The focus group data indicated that the experience, was mostly positive with increased independence, use of the pen as a scaffold and engagement with tasks. They did feel, however, that this experience was not always sustained, and recorded some disruption or initial embarrassment among learners at the start of the pen use. The teachers all recommended:

one training session is insufficient to embed the pen in everyday school life;

the learners needed more guidance on how and when it was appropriate to use the pens;

pen use should be modelled by the teacher to enable a learner to use it independently in other subjects;

a structure for use should be provided alongside issuing the pens.

### Conclusion

This small scale project has provided a rich picture of the impact of and potential for the use of a scanning pen at this transitional stage of the education of year 10 learners with EAL. It is striking that the aims and priorities of these learners with EAL are to develop curriculum vocabulary and subject specific comprehension rather than general reading skills. Although the messages from all data sources are mixed, there is clear indication that many of the participants did benefit from development of vocabulary, reading comprehension, confidence

and independence through the six weeks of pen use, particularly when given the freedom to use them both at home and at school.

The information given by participants and teachers should also help to establish some guidelines for the introduction and development of this technology within the secondary school system. In brief, pen use is likely to be more successful if it is offered to appropriate and motivated users; these users' needs must be clear and pen use should be structured and modelled to suit the background and skills of the user and enable him or her to take control of the pen use.

Further ideas for technical development have emerged, alongside the suggestion that training offered by the ReaderPen team should go beyond ensuring that users have the technical skills needed to work the pen efficiently. Both learners and teachers would benefit from the suggestion of ideas and structures to maximise the effectiveness of using the ReaderPen which would be likely to lead to more universal positive impact.

### References:

Ager, R., Burge, B., Cook, R., Lynn, L., Rabiasz, A. & Styles, B. (2014) *New Group Reading Test*. Brentford: NFER and GL Assessment

BERA (2014) *Ethical Guidelines for Educational Research*

<https://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011> accessed 5.06.2018

Cummins, J. (2009) *Language, Power and Pedagogy: Bilingual Children in the Crossfire* Buffalo: NY Multilingual Matters

Department for Education (DfE) (2013) Achievement of 15-Year-Olds in England: PISA 2012 National Report, p.66] <https://readingagency.org.uk/about/impact/002-reading-facts-1/> accessed 3.6.2018

Education Endowment Fund (2016) <https://educationendowmentfoundation.org.uk> accessed 5.6.2018

Joint Council for Qualifications (2017) <https://www.jcq.org.uk/exams-office/access-arrangements-and-special-consideration> accessed 5.6.2018

National Association for Learning development in the Curriculum (NALDIC) (2013) *EAL Pupils in School* <https://www.naldic.org.uk/research-and-information/eal-statistics/eal-pupils/> accessed 3.6.2018

Pitcher, S. M., Albright, L. K., DeLaney, C.J., Walker, N.T., Seunarinisingh, K., Mogge, S., Headley, K. N., Ridgeway, V. G., Peck, S., Hunt, R., Dunston, P. J. (2007) *Assessing Adolescents' Motivation to Read*. *Journal of Adolescent & Adult Literacy*, 50, 5 p378-396

Scanningpens (unpublished study, 2017) *The impact of the use of a ReaderPen on secondary school learners' literacy*.

School and College Performance Tables SCPT ( 2016) <https://education.infotap.uk> accessed 5.6.2018

Stats Wales (2017) *Pupils in nursery, primary, middle and secondary schools acquiring English as an additional language by local authority, region and stage of development*

<https://statswales.gov.wales/Catalogue/Education-and-Skills/Schools-and-Teachers/Schools-Census/Pupil-Level-Annual-School-Census/Ethnicity-National-Identity-and-Language/PupilsAcquiringEnglishAsAdditionalLanguage-by-LocalAuthorityRegion-StageDevelopment> accessed 3.06.2018

Topping, K. (2018) *The What Kids are Reading Report:*

<https://www.dundee.ac.uk/news/2018/study-uncovers-literacy-challenge-among-teenagers-due-to-lack-of-reading-focus-in-secondary-school.php> accessed 12.6.2018

## APPENDICES

### Appendix: Document 1: Interview Schedule English Teachers

Teachers will be asked to complete these forms and bring them to the interview. The conversation will be semi-structured to pull together the main needs that their year 10 students show at this stage and how the teachers hope these might be addressed. Names will be anonymised and students will be allotted a research number which will be used throughout the assessments and any statistical analysis.

*The aim of our conversation will be to establish your understanding of the needs of the students from your group who are participating. Please can you provide brief information electronically about the following for each participating student who causes you concern. Please include concerns about reading and comprehension across the curriculum and the challenge of the GCSE exams. Please put not known (NK) or not applicable (NA) rather than leaving blanks.*

<b>Name:</b>
<b>Comprehension Age:</b>
<b>Attitudes to reading---</b>
<b>Your concerns</b>
<b>Your preferred outcomes from the scanningpen use</b>
<b>Name:</b>
<b>Comprehension Age :</b>
<b>Attitudes to reading---</b>
<b>Your concerns</b>
<b>Your preferred outcomes from the scanningpen use</b>

**Appendix Document 2: Letter to participating teachers**

We hope that you will be happy to participate in this small scale study which aims to explore the wider impact of using a scanning pen on year 10 students' literacy and learning and will contribute to understanding the ways in which this technology might be used to enhance the progress of year 10 students whose literacy might be particularly challenged by the transition to GCSE curricula. We really welcome your input to the project which we hope will not take up too much of your time and will provide you with useful ways of enhancing the learning of some of your more vulnerable year 10 students at the start of their GCSE courses.

As stated in the information sheet, the project involves three phases covering a period of seven months. We hope to involve up to 40 students in trialling the scanning pens. Scanningpens will provide the necessary equipment, training and technical support.

We would want to involve you in finalising the planning and selection of students at a meeting at your school in November. We will then need help during a second visit to the school in January straight after Christmas with the management/supervision of one period of a provided group silent reading test and in one period of a training session which Scanningpens will provide for each participating group. You will also be asked to carry out a provided 'attitudes to reading' assessment measure with your group in one period at your convenience soon after the visit. Once the intervention is under way, you should not be formally involved until the retesting at the end of the seven week period when the two periods of reading assessments will need to be repeated. This retesting will take place twice, once at the end of the first phase in the week straight after February half term and again at the end of the second seven week phase in April. We would also hope to be able to interview you briefly about your selected students' needs at the outset of the project and, at the end, about the impact of the scanning pens on their learning.

The research proposal has been approved by Bath Spa University and is in accord with their research ethics, which seeks to ensure that participants are protected from harm. Bath Spa University abides by strict ethical procedures with regards to conducting research with young people, teachers and parents. Prior to commencing with the research, students, parents and guardians will be informed about the research and given the opportunity to refuse to participate and withdraw at any time if they wish to do so. We will ask you to disseminate the provided information and collect back the consent forms. All participants will be anonymised. The data gathered will be kept strictly confidential, accessible only to the researchers from Bath Spa and Scanningpens, and not used other than specified without the further consent of all involved being obtained. Any interviews may be audio recorded and would then be transcribed to *word* after which the recorded material will be destroyed. Data gathered from these interviews will be run past the participants prior to inclusion in reports to rule out any possibility of misunderstandings.

After the study we would like to share the findings with you and you will be provided with a summary report. The results may also be published in articles for journals and/or presented in national and international seminars about the use of technology in teaching and learning but full anonymity will be assured.

If you have further questions about any aspect of the study, please contact me on [t.mortimore@bathspa.ac.uk](mailto:t.mortimore@bathspa.ac.uk) or James Green Head of Global Business Development on [james@scanningpens.com](mailto:james@scanningpens.com) m+447962135260 D +442039069512

Regards,



**Dr. Tilly Mortimore: Senior Lecturer in Inclusion and SpLD/Dyslexia: Bath Spa University**

Please can you sign and return the following consent form:

.....  
.....

### Scanning Pens Study

I \_\_\_\_\_ have been fully informed of the nature of the study, of my right to withdraw consent for participation at any time, at which point my data would be destroyed, and of the fact that any information provided will not be attributable to me or to the school in any report published anywhere.

I give my consent to participate in the Scanning Pens Study.

**Appendix Document 3 Adapted Adolescent Motivation to Read Profile (AMRP)**

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Reading a book is something I like to do \_\_\_\_\_

- never
- almost never
- sometimes
- often

2. My friends think I am a \_\_\_\_\_

- a very good reader
- a good reader
- an OK reader
- a poor reader

3. When I come to word I don't know, I can \_\_\_\_\_

- almost always work it out
- sometimes work it out
- almost never work it out
- never work it out

4. My friends think reading is \_\_\_\_\_

- really fun
- fun
- OK to do
- No fun at all

5. I read \_\_\_\_\_

- not as well as my friends
- about the same as my friends
- a little better than my friends
- a lot better than my friends

6. I tell my friends about good books that I read. \_\_\_\_\_

- never.
- almost never
- some of the time.
- a lot.

7. When I am reading by myself, I understand \_\_\_\_\_

- everything I read
- almost everything of what I read
- almost none of what I read
- none of what I read

8. People who are read a lot are \_\_\_\_\_

- very interesting
- sort of interesting
- sort of boring
- very boring

9. I am a \_\_\_\_\_

- poor reader
- an OK reader
- a good reader
- a very good reader

10. I think libraries are \_\_\_\_\_

- a really great place to spend time
- a great place to spend time
- a boring place to spend time
- a really boring place to spend time

11. I worry about what other students think about my reading \_\_\_\_\_

- a lot
- sometimes
- almost never
- never
- 

12. I think becoming a good reader is \_\_\_\_\_

- not very important
- sort of important
- important
- very important

13. When my teacher asks me a question about what I have read, \_\_\_\_\_

- I can never think of an answer
- I almost never think of an answer
- I sometimes think of an answer

- I can always think of an answer

14. I think spending time reading is \_\_\_\_\_

- really boring  
 boring  
 great  
 really great

15. Reading is \_\_\_\_\_

- very easy for me  
 kind of easy for me  
 kind of hard for me  
 very hard for me

16. When my teacher reads books aloud, I think it is \_\_\_\_\_

- really great  
 great  
 boring  
 really boring

17. When I am in a group talking about books I have read, \_\_\_\_\_

- I hate to talk about my ideas  
 I don't like to talk about my ideas  
 I like to talk about my ideas  
 I love to talk about my ideas

18. When I have free time, I spend \_\_\_\_\_

- none of my time reading  
 very little of my time reading  
 some of my time reading  
 a lot of my time reading

19. When I read out loud, I am a \_\_\_\_\_

- poor reader  
 OK reader  
 good reader  
 very good reader

20. When someone gives me a book for a present, \_\_\_\_\_

- I am very happy  
 I am happy

- I am unhappy
- I am very unhappy

21. I read from things other than books (e.g. Kindle; iPad; Nook; computer)

- a lot
- sometimes
- almost never
- never

I am a \_\_\_\_\_

- boy
- girl

English is my first language?

- yes
- no

Adapted from Adolescent Motivation to Read Profile (AMRP) by T.M.



**Appendix document 5 : Exemplar monitoring proforma**

Please can you help us to learn about your experience of using the scanning pen by filling out this checklist as often as you can. Please mark days you didn't use it with an 0

Date	How often ?	Why?	How long for each time?	How much did it help? 1 = not much 2 = Ok 3 = lots
Week 1				
Mon	4	geog words text in english Science hw worksheet Motor bike manual	10 mins 15 mins 20 mins 15 mins	3 hard words 1 teacher helped 3 2 Just a few words
Tues	0	Left at home		Missed it in science
Wed	2	Reading lesson Geog HW	20 30	3. Got on by myself. Book good 3 Lots of tricky words
Thurs	0	Didn't need it		
Fri	0	Couldn't find it		Annoyed because wanted it for science
Sat	1	Reading book from reading lesson	30	3. Finding book easier to read
Sunday	0	Busy		
Week 2				
Mon				

**Appendix Document 6: Final monitoring form**

Name: .....

**How useful did you find your scanning pen?**

**Final comments**

**THINK BACK OVER THE PAST 5 WEEKS:**

<b><i>How much did you use it?</i></b> Ring one answer			
<b>Every lesson</b>	<b>Every day</b>	<b>Some days</b>	<b>Not much</b>
<b><i>What did you mostly use it for?</i></b> Ring as many as you want		Reading worksheets Homework help Test paper Own reading (e.g. magazine; manual, book)	
<ul style="list-style-type: none"> <li>• Geography words :</li> <li>• Reading in English</li> <li>• Science words</li> <li>• Other subject words</li> </ul>		Other things? What?	
<b><i>Did it help you?</i></b> Ring one answer			
<b>A lot</b>	<b>A bit</b>	<b>Not much</b>	
<b><i>Please tell us what was helpful.</i></b>			
<b><i>Please tell us what was bad.</i></b>			
<b><i>What would make it better?</i></b>			

***Do you think it has made a difference to your reading and how you feel about it ? Yes No***

**If yes; How?**

***Has it made a difference to understanding what you read? If yes: Why?***

**If no - what needs to be done?**

**Anything else you would like to say about the pen?**

**Would you like to talk more to me about the trial?  
Yes/No**

**Thank you so much for taking part.**

**Tilly Mortimore**

## Appendix Document 7: Case studies and interviews

Comments from the Case studies MRin Y10

### My reading:

P

Contradictory account. States he doesn't need help with his reading – silent reading not slow and HW not difficult but despite this cites maths and science reading as hard and wants to read more quickly, understand better and learn new words.

F

Reads for fun, no help needed with maths, science, homework, general reading – no difficulty I understanding exams, tests or subject vocabulary ; doesn't feel he is asked to read too much. Wants help with speed reading , to learn new words and to enjoy reading more.

HM

Mrin yr 10 questionnaire all responses 5 except claim that he reads for fun. However stated that English was difficult reading and that he wants to read more quickly and understand better.

A

Again the MEINR10 indicated that A feels happy with all aspects of his reading , found no subjects really hard to read and wanted simply to understand better.

MM

The MRlyr 10 indicated that MM is happy with her reading across subjects and other texts and does not need help with reading although admitting that she does not read for fun and that she has some difficulties reading and understanding exam and test papers. She does not find particular subject words hard and hopes the pen will help her to understand better and learn new words

MH

The MRlyr10 indicated that MH is aware that she needs some help with her school reading and that much of her subject vocabulary is difficult to read, and that science work is hard to read. In general she is happy with everyday reading and silent reading is fine. She finds geography, English and science challenging and hopes the scan pen will understand better.

J

The MRlyr10 indicated no concerns about reading at school although 5 items were marked 3 (neither agree nor disagree) and she did suggest that she was less secure with her everyday reading. No subjects were endorsed as difficult and her aims were to learn new words and enjoy reading more.

### Comments from the final monitoring questionnaire

P

Used some days, reading worksheets English/science words/ other subject words Helped a bit. Nothing bad about it. Wanted to keep the pen (**despite initial embarrassment**)

Helping spelling words and get other words from the dictionary to help with writing. Helped reading because I know more words and made difference to understanding reading.

F

Not used much, Unfortunately he did not have his pen for a few weeks because it was lost. When he did use it, .mostly for reading in English, science words and homework help when it did help me a lot as *it can tell me words I don't understand* .

*There were words I did not understand and the pen helped me.*

A

Not used much – used mainly for other subject words and commented it was helpful

*It tells you what a word means*

However it had not made a difference to his reading or understanding and he felt it could be made better and more useful but did not suggest how.

MH

She had used her pen some days for reading worksheets, test papers reading in English and science and some of her own reading. The dictionary was more helpful than other functions. But there were some words with no definitions. She didn't feel that it had made a difference to her reading or her understanding.

*It is not useful during the lesson but maybe it is useful during the exams.*

J

J used the pen some days for reading in English and science words. It helped her a bit in that she

*Found out new words also I know words that I once didn't know.*

She also felt that it made a difference to her reading and how she feels about it because

*I felt more confident with it also I learn new words and I said the words I didn't know how to pronounce*

And to her understanding because

*Some words I know how to say and how to use that word.*

However, she didn't want to keep the pen.

*Make it better*

MH

*More words for the dictionary*

P

*Adding other apps in like a microphone thing that to talk to it and make your sentences better*

J

*That it could read my handwriting also it would be better if it showed the meaning to a word in a small sentence not a very long sentence. .*

## Comments from the Teacher log

P

Profile - slow starter when given a task. Able to give verbal answers most of the time but in exams and assessments, rarely writes much that shows any knowledge.

Some low level disruption at first as everyone wanted to use the pen to see how it worked. After this initial use, P seemed a little embarrassed to get the pen out as others might mock him. When encouraged by me, he used the pen to look up some words.

F

Used pen actively throughout lessons in the first week. Made a good start and showed signs of increasing independence. However as weeks continued he started to slip back into old habits IF reported he lost the pen 12.2 – (this was the end of the third week of the project) At 4<sup>th</sup> week in run up to assessment reliance on teacher increased.

H

HM unable to use pen properly due to his dyspraxia and struggles with hand eye co-ordination – unable to drag pen across the line of text in a straight line with the correct amount of pressure. Consequently it does not read correctly for him.

A

Teacher reported that from the start (week 1) he needed less support from her because of using the pen and that, by the time of an assessment mid point in the trial, showed more independence. He also took to using the scanning pen with his partner who encouraged him to use the pen more during lessons.

MM

She felt that it had not helped her much although she used it in geography, science and for a test paper. She suggested it helped her a bit because the dictionary was helpful but it hadn't made a difference to her reading or understanding. An improvement would be for a keyboard to be added on to the pen and for it to scan written words.

MH

Profile - Mariam was new to England and the language in Sept / Oct.

Very interested in the pen at first and used it a lot. She got a bit confused at the dictionary definitions that were being read out and it often brought up some questions about another word she didn't know the answer for that she couldn't scan. When encouraged she would use the pen at first.

J

Teacher reported that J used the pen quite a lot at the start of the project. She showed increased confidence and voluntarily answered more questions in class. She needed less support from the teacher. However, although the four weeks show steady growth in confidence and independent working, there are lapses when she slips back into asking more questions and by the end of the intervention she still does rely on working with a partner. However, she benefits from using her pen with her partner in which they look up certain words together.

## Overview of daily monitoring sheet:

P 10.1 to 6.3 25 sheets

Regular monitoring. Consistent pen use. Usually in 2 or sometimes 3 lessons, regularly in English 13 and predominantly in Science 7 or geography 12 although also used for own reading 4 times, other subject words 7 hw 1. Rated help from good to OK. Commented on reading worksheets, other stuff also a book and my work

Comment

P It helped me read – it helped me read out the sentences

F 2 sheets only. Used first week in English. the second (12/2/ noting it was lost)

A

I sheet only first week. Used for reading in English. Not much help. Helps because it reads the words.

MM

Only 2 monitoring sheets completed from week one and two where she used it in Science and to read a worksheet. She stated

*It is not helpful because not always we get printed sheets. It also does not scan the screen.*

MH

15 sheets completed – pen used 8 times – not needed for 7. Mostly used for English (6), Science (3) and for tests (2). MH did not feel it was very useful (10 /15) she complained that it was too slow , needed more words included.

*It needs to be in more languages*

*It cannot explain the question*

She found that it also worked on hand writing

J

No daily monitoring