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Explore the Relationship between Accelerated Reader Program and Secondary Learners' Reading Ability

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Abstract: Various explanations and remedies have been presented in relation to the effects of AR usage for students' reading in the UK over the last decade. This article explores the research on the usage of AR and designs an experiment with 46 grade 7 students in England to test the primary reasons of AR's influence on Year 7 students' reading achievement. The findings of this study will provide relative recommendations for AR software developers and schools in order to reduce the detrimental effects on students' learning.

Keywords: Reading ability, secondary learners, Accelerated Reader, educational technology

1. Introduction

Reading is a significant learning skill for all students. According to the indication of the Office for Standards in Education, Children's Services and Skills, many students come out of school without the confident literacy skills which are required to possess as adults [1]. The National Literacy Trust pointed out that a sixth of grown-ups' literacy levels are inferior to those expected of an eleven-year-old [2]. Meanwhile, the Department for Children, Schools, and Families reported that professionals who work with school leavers confirmed that these young people typically have negative school experiences [3]. Some of them may be due to a disdain for school, but others have been unable to engage with education owing to a lack of fundamental reading skills or learning challenges. On the other hand, pupils' reading performance in the secondary schools in the UK has remained unchanged [4]. The Program for International Student Assessment (PISA) revealed that the average reading levels of 15-year-olds in England have barely changed since 2006 [5]. Hence, the operation of promoting literacy, especially for reading across the secondary curriculum, is extremely imperative.

To solve this problem, there has been a growth of instructional approaches accessible to schools in the previous two decades, such as the use of technology, software, and scripted curriculum to enhance teaching, all of which aim to increase students' literacy [6]. However, Gorard demonstrated that schools might be misled by the guarantee of success when they are under pressure to generate outcomes [7]. It is significant for schools to comprehend which approaches are evidence-based to avoid many negative effects. On the basis of the Department for Education's report, Accelerated Reader (AR) has been proved as an effective computer-based intervention for pupils' reading progress [8].

The Accelerated Reader (AR) is a computerized reading program that aims to enhance pupils' reading abilities through their reading practice and by offering frequent feedback about pupils' progress to educators [9]. The AR program is gaining popularity internationally, and according to

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Renaissance Learning, AR was the most popular reading software in the world and was used in 60,000 schools in 2005. Furthermore, Sutherland reported over 7,000 schools in the UK and Ireland using AR, which covers over 1.6 million students [9].

2. Literature Review

2.1. AR logic model

The AR logic model developed by Renaissance Learning (RL), Education Endowment Foundation (EEF), National Foundation for Educational Research (NFER), and RAND Europe and University of Cambridge is depicted in Figure 1 [10].

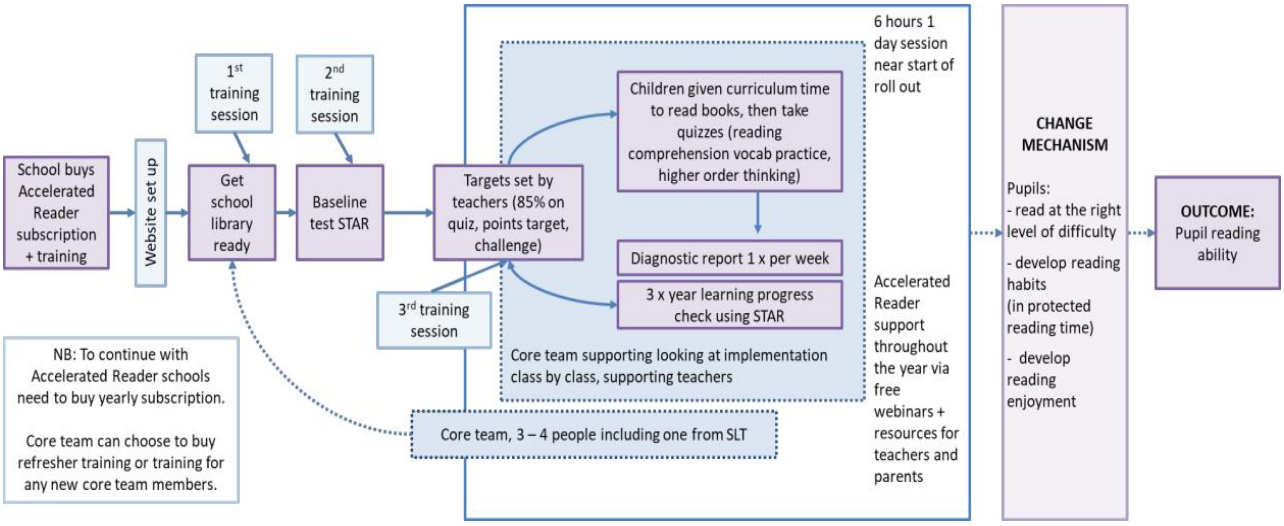

Figure 1: Accelerated Reader logic model

According to this illustration, the mechanism of AR can be seen as follows:

1. The school library is set up to match the AR program.
2. Pupils take a baseline exam (STAR Reading) to determine their reading levels and receive their ZPD score [11].
3. Teachers establish reading targets for pupils, which include quiz targets and hurdles.
4. Pupils are given book recommendations based on their reading age and interests. After reading, pupils can use a computer or tablet to complete quizzes on the books they have read and earn AR points based on their complexity. AR quizzes can provide immediate feedback for pupils and reports for teachers.
5. Teachers can use their Interactive Reading Dashboard to observe students' performance, which displays statistics at the class, group, and individual level.

2.2. Overview of the AR

AR is one of the most researched online interventions with a substantial research base [7]. Mathis indicated that AR did not have a significant effect on grade six pupils' reading comprehension [12]. Moreover, Huang revealed that when compared with students' without utilizing AR, there is no statistical significance in reading test scores for students who utilize AR [13]. When comparing middle school pupils who had used AR in primary school to those who had not, Pavonetti et al. discovered that there was no significant difference in reading quantity [14]. Additionally, Schmidt

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pointed out that reading has turned into a job, with a specified number of points for accomplishment in AR [15]. Hence, AR is not fostering a lifetime passion for reading.

Although the above-mentioned research demonstrates that AR might have no significant effect on promoting students' reading ability and attitudes towards reading, other researchers have had different opinions. Siddiqui, Gorard, and See conducted an evaluation of AR in Year 7 in England, which represented an effective intervention in pupils' reading with an effect size of +0.24 [16]. Furthermore, in Thorpedene Primary School in England, pupils who utilized the AR program achieved age-related expectations increased from 41% to 71% in 2019 [17]. Based on the WWC study, AR has a possible positive effect on reading achievement and a mixed effect on reading comprehension [9]. In general, the weight of evidence demonstrates that AR is a promising program [6].

2.3. Reasons for Efficacy of AR

To research the reasons for the effectiveness of AR, many scholars state different conclusions. Topping and Sanders discovered that the reading quantity and quiz scores were connected with the teachers' instruction [18]. Zwolak also found that teachers play a significant role in mentoring and motivating pupils in AR classrooms [19]. On the other hand, according to Guthrie, Klauda, and Ho, reading duration, attention on reading activities, and self-reported effort of AR all possess a substantial relationship with reading performance [20]. However, Clark& Cunningham's analysis for AR program represented that comparing with reading attitude, length, confidence and frequency, reading enjoyment is the only aspect that has strong affection for students' attainment [21]. Thus it can be seen that there are many research on the effective factors of AR, which are crucial in establishing theory and comprehension. Nevertheless, there have been no clear reasons for the effectiveness of AR program. Meanwhile, since AR is a multi component intervention which consists several steps, it is impossible to identify which aspects are the drivers [6]. Consequently, there is a requirement to have a clear understanding of reasons for the effectiveness of AR program through considering it as a whole to accelerate the reading achievement of secondary pupils.

3. Research objectives &questions

Based on the considerable acceptance of AR, relatively strong evidence of its effectiveness, and various reasons for its success, the main objective of this research is to conduct an experiment to test the main causes of AR's effects on Year 7 pupils' reading achievement in England. The secondary purpose is to explore and analyze the factors of AR that possess negative effects on students' reading ability. To these ends, this research will address these questions:

1. Based on the experiment, does the AR program have a significant effect on pupils' reading? According to the mechanism of the AR model, what are the main reasons for its effectiveness?
2. Is there any negative aspect of AR on pupils' reading achievement? How to solve or reduce these problems?
3. Are there any different effects for pupils with different characteristics, such as boys and girls, FSM and non-FSM, etc? What are the reasons for the result?

4. Methodology

Since AR is a multi-component intervention which includes several non-negotiable aspects, it is complicated to find which part of the process causes the final effect [22]. Hence, to research the main reasons for the effectiveness of AR teaching, quantitative and qualitative methodologies will be employed to collect and analyze data in this research.

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4.1. Participants

This trial will be a two-arm, individually randomised controlled experiment in one secondary school in the UK for two terms, around 26 weeks. According to Siddiqui, Gorard, and See's finding that AR is a modestly successful method for students who have not passed the Level 4 test in Key Stage 2, a target group of 46 pupils in grade 7 with the same feature will be selected with the intention to treat [22]. Before the trial, a questionnaire, which is adapted from the student reading interests and habits questionnaire (Appendix 1) will be arranged to collect students' main information [23]. This questionnaire will consist of students' age, gender, FSM, reading frequency, parents' occupation, etc. The survey will be conducted after the randomization to guarantee an unbiased allocation.

4.2. Trial design

To recognize students' reading situation as a baseline, at the beginning of the trial, students will be pre-tested by the New Group Reading Test (NGRT) 3A before introducing experimental factors. NGRT is the third edition of the Group Reading Test (GRT) developed by GL Assessment and the National Foundation for Education Research, and 3A is appropriate for years 5 to 8 [24]. Then treatment will utilize AR for 26 weeks, and observation of each student's AR reading situation will be recorded by the researcher each month. On the other hand, the control group will be business as usual during this period. At the end of this trial, the result of the post-test by NGRT will be captured to calculate the effect size of the treatment and control group.

4.3. Data collection

According to the Accelerated Reader logic model, there are several core elements in AR, which are: the Standardised Test for Assessment of Reading (STAR), library resources, teacher's monitoring, book selection, independent reading time, and the AR quiz [10]. As a result, data that can be quantified, such as the number of books in the pupil's reading level and reading time in one week, will be directly recorded.The effectiveness of STAR and AR quiz will be reflected in the students' self-perception survey based on the National Literacy Trust reader self-perception survey (Appendix 2) [25]. The figures for these two aspects will be represented in the survey as the degree of recommended bibliography difficulty (on a scale of 1–10) and the difficulty of the AR quiz (on a scale of 1–10). For the book selection, library recordings and the recording of the AR quiz can be collected as data to analyze the type, lexile, length and so forth. Furthermore, the data for the teacher's monitoring will be gathered from semi-structured interviews with teachers, which allows gathering the data for the underlying reasons, perspectives, and problems of the AR [17]. Additionally, a monthly observation report for students' reading progress and attitude can be considered a complementary factor of this research.

4.4. Data analysis

After calculating the effect size of the treatment group and the control group, the pupils in the treatment group will be divided into two groups: group 1 is above the score of the control group, and group two is about equal to or under the score of the control group. Then the main reasons for the students' reading achievement will be acquired by analyzing group 1, and the causes of their negative influence will be investigated in group 2. The major statistical analysis in this research will be multiple regression, which will be used to identify significant reasons for AR effectiveness considering the six variables. Other quantitative analyses like t-tests and Pearson correlation analyses will also be utilized to determine the correlation between variables. Moreover, based on

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pupils' different backgrounds, pupils' data will be divided into different analysis groups (ex. boy and girl, FSM and non-FSM, etc.) to calculate the effect size and research reasons for their results.

5. Ethics

Prior to the research beginning, researchers will apply for the police background check and the approval to work with children. Then written parental consents are required to be collected before the children's observation and interview. Meanwhile, children are able to withdraw from any part of the research at any time. The process of data collection will be all at preschools and always under teachers' observation. Moreover, teachers and parents will be fully informed about the nature of the study and how their and children's personal information will be used. Participants' anonymity will be respected, and any data obtained will be utilized solely for the study's aims.

6. Limitation

This research is limited in several aspects. Primarily, the sample size of this research is only one secondary school in England, so the outcomes of the study cannot be generalized as a whole. Meanwhile, pupils' and teachers' perspectives and self-reports in this research are individual and might not represent those of the entire pupils. To gather data from more pupils in England, a greater geographical range might be investigated, enabling more accurate and representative results to be generalized. Additionally, this study will only analyze the reasons for AR's effectiveness with short-term utilization and cannot reveal any reasons for the long-term influence of this intervention.

7. Conclusion

With the rapid development of educational technology and the revolution in teaching and learning, integrating technology with subject education has become a significant approach to enhance students' learning effects. It can be concluded that the objective of this mixed methods research is to investigate the key ingredients of AR for enhancing Year 7 students' reading ability in the UK and to research the aspects of AR that cause negative effects on students' outcomes to explore whether the AR program is a helpful tool for promoting literacy among Year 7 readers.

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Appendix 1

STUDENT READING INTERESTS AND HABITS QUESTIONNAIRE

First Name: _____ **Age:**___ **Year level:** _____ **Boy/Girl**

How much do you like reading?
(Tick one only)

- ❑ I enjoy reading a lot.
- ❑ I like reading sometimes.
- ❑ I don't like reading.

Which statements describe you as a reader?
(You can tick more than one)

- ❑ I prefer to read by myself.
- ❑ I like listening to stories or being read to.
- ❑ I like talking about what I've read.

How often do you read, view or use the following ... ?

	Almost every day	About once a week	About once a month	Never or hardly ever
Picture books				
Novels				
Non-fiction books				
Comics/Graphic novels				
Magazines				
Newspapers				
Websites				
Video games				
Social media (Facebook, Twitter, Instagram, etc.)				
Text Messages				
Apps				
Other				

At home, how often do you read for ...

	Almost every day	About once a week	About once a month	Never or hardly ever
Personal reasons: Fun and relaxation				
School reasons: To find things out for school				

Do you have a favourite book? What is it?	***Do you have a favourite website? What is it?***

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What do you enjoy reading? *(You can tick more than one)*

❑ Fantasy	❑ Science fiction	❑ Humour	❑ Real life
❑ Adventure/Mystery	❑ Horror/Suspense	❑ History	❑ Hobbies
❑ Books in series	❑ Biographies	❑ Sport	❑ Science
❑ In languages other than English	❑ Other … please list		

How do you choose what to read? *(You can tick more than one)*

❑ I choose myself.
❑ I read what my friends read.
❑ I read what my brothers or sisters recommend.
❑ Other:
❑ My parents recommend or help me.
❑ My teachers recommend or help me.

How do you get books? *(You can tick more than one)*

❑ I buy them myself.
❑ I get them as presents.
❑ I borrow them from the classroom library.
❑ I borrow them from the school library.
❑ I borrow them from the local library.
❑ I borrow them from friends.
❑ Other:

How often do you use a computer, laptop, mobile phone or iPad (etc.) for … ?

	Every day	Almost every day	About once a week	About once a month	Never or hardly ever
Playing games					
Texting					
Emailing					
Visiting websites					
Social media Facebook, Twitter, Instagram, etc.)					
Other					

How would you describe yourself as a reader?

Questionnaire developed by Paul Molyneux and Pam Macintyre
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Appendix 2

Are you a boy or a girl?
☐ Boy ☐ Girl

How old are you?
☐9 ☐10 ☐11 ☐12 ☐13 ☐14

Do you get free school meals? (Ask your teacher if you are unsure what this means)
☐ Yes ☐ No ☐ Don't know

Questions about you and your reading

1) Are you a reader?
☐ Yes ☐ No

2) On a scale of 1 – 10, how good a reader do you think you are? (Tick one box only)
Not a very good reader Average reader Excellent reader
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9☐ 10☐

3) Do you enjoy reading? (Tick one box only)
Very much ☐ Quite a lot ☐ Not very much ☐
Not at all ☐

4) Which of the following do you read outside of class more than once a month? (Tick as many boxes as you like)

Websites (general) ☐	Blogging/networking websites (such as MySpace) ☐	Newspapers ☐
Magazines ☐	Graphic novels or comics ☐	Emails ☐
Fiction books ☐	Poetry ☐	Factual books ☐
Manuals/instructions ☐		

5) How often do you read outside of school? (Tick one box only)
Every day or almost every day ☐ Once or twice a week ☐ Once or twice a month ☐
Never or almost never ☐

6) How does reading make you feel? (Tick as many boxes as you want)

Calm ☐	Stressed ☐	Nervous ☐
Intelligent ☐	Bored ☐	Curious ☐
Happy ☐	Sad ☐	

7) If you imagine someone who enjoys reading, what kind of person are they? Is she/he…. ? (Tick as many boxes as you like)

Happy ☐	Sociable ☐	Geeky/nerds ☐
Outgoing ☐	A private person ☐	Intelligent ☐
Someone who will do well in life ☐	Boring ☐	

8) In your opinion, what does a reader enjoy……? (Tick as many boxes as you like)

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Websites (general) ☐	Blogging/networking websites (such as MySpace) ☐	Newspapers ☐
Magazines ☐	Graphic novels or comics ☐	Emails ☐
Fiction books ☐	Poetry ☐	Factual books ☐
Manuals/instructions ☐		

9) Choose one of the following. Reading is: (Tick one box only)

More of a girl thing ☐ More of a boy thing ☐ For everyone ☐

10) a) Do you think that reading is more important than these activities at this moment in your life? (Please tick one box for each activity)

	Yes	No	Not sure
a. Television			
b. Sport			
c. Computers and computer games			
d. Hanging out with friends			
e. Listening to music			

11) Do you think that reading is more important than these activities to help you do well later in your life? (Please tick one box for each activity)

	Yes	No	Not sure
a. Television			
b. Sport			
c. Computers and computer games			
d. Hanging out with friends			
e. Listening music			

12) If someone said you were a good reader, what would that mean to you? (Tick as many as you like)

You can read long/difficult words ☐	You can read long books ☐	You read often ☐
You are good at reading aloud ☐	You read lots of different types of reading materials such as books, internet sites, magazines etc ☐	It would annoy me ☐

Questions about your family and reading

13) Does anyone in your family think you are a good reader? (Tick as many as you like)

☐ Yes,my mum (or step-Mum/carer)
☐ Yes, my dad (or step-Dad/carer)
☐ Yes, my brother or sister **(if you have more than one brother or sister, just choose one of them)**
☐ No, no-one
☐ Don't know

14) Does anyone in your family encourage you to read? (Tick as many as you like)

☐ Yes,my mum (or step-Mum/carer)
☐ Yes, my dad (or step-Dad/carer)

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☐ Yes, my brother or sister **(if you have more than one brother or sister, just choose one of them)**
☐ No, no-one
☐ Don't know

Questions about your friends and reading

15) In general, are your friends readers?
☐ Yes ☐ No ☐ Don't know

16) What do your friends read?
(Tick as many boxes as you like)

Websites (general)	☐	Blogging/networking websites (such as MySpace)	☐	Newspapers	☐
Magazines	☐	Graphic novels or comics	☐	Emails	☐
Fiction books	☐	Poetry	☐	Factual books	☐
Manuals/instructions	☐				

17) Do your friends think reading is for people who are: (Tick as many as you like)

Happy	☐	Sociable	☐	Geeky/nerds	☐
Outgoing	☐	Private	☐	Intelligent	☐
Want to do well in life	☐	Boring	☐		

18) Do your friends think you are a good reader?
☐ Yes ☐ No ☐ Don't know

19) Do your friends encourage you to read?
☐ Yes ☐ No ☐ Don't know

Questions about your school and reading

20) Does your teacher think you read well?
☐ Yes ☐ No ☐ Don't know

22) Does your teacher encourage you to read the following?
(Tick as many boxes as you like)

Websites (general)	☐	Blogging/networking websites (such as MySpace)	☐	Newspapers	☐
Magazines	☐	Graphic novels or comics	☐	Emails	☐
Fiction books	☐	Poetry	☐	Factual books	☐
Manuals/instructions	☐				