

CULTIVATING STUDENTS' READING LITERACY USING DIGITAL LEXILE-BASED READING IN A CHINESE PRIMARY SCHOOL

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ABSTRACT

This Macau study investigates the unwillingness of primary 5 Chinese native students to read in English on a Lexile® Framework based digital reading platform provided by their school, with visible negative consequences on their English reading literacy, and whether or not it is possible for teachers to help improve students' reading literacy by adopting specific instructional practices. The study, carried out in a school which uses Chinese (Cantonese) as medium of instruction, initially measured student's reading level and tried to identify possible reasons that deterred students from reading in a digital reading platform. The investigation was based on an action research model (to look, think, act) while a mixed method approach was deployed to collect data: numerical information from the platform which informed about students reading ability was treated with descriptive and inferential statistics and focus group interviews were conducted to allow a deeper understanding of students' attitudes towards reading. The findings revealed that students in general were not averse to reading, although they seemed to need someone to facilitate the process for them as well as to guide and encourage them to read. Extrinsic motivation strategies were found helpful and, by way of teacher's same intervention with all her students (group A), such as constant reminders to read, compulsory reading of a certain number of books per month, publicly praising students and granting them bonus points on their marks, meaningful improvement was achieved. These findings are discussed in relation to the significance of the teacher's intervention, in terms of providing constant support, facilitating the reading process and monitoring students' reading activity, by adopting varied instructional practices to appeal and motivate children to engage in reading.

KEYWORDS

Lexile®, reading literacy, children, motivation, digital reading platforms

1. INTRODUCTION

In Macau, reading in English for pleasure is not frequently seen, as most Chinese students do not read on their own initiative and they usually do not enjoy reading in a foreign language. Some of these reasons might have to do with: 1) not being their mother-tongue, hence struggling with new or difficult words which prove to be a challenge for them (Powell-Brown, 2006); 2) absence of the right motivation or boost to read; 3) lack of guidance to read – students are sometimes unaware of how to pick the right books; 4) lack of encouragement or the right stimuli/environment to engage in reading activities.

Helping Chinese students to increase their love for reading in English and instilling in them reading habits have not always been easy tasks, but are probably some of the most important responsibilities of a teacher, as gaining the habit of reading and understanding each text can help the child with comprehension, not only through their academic life, but also outside the classroom.

In terms of language acquisition, educators have recognized and accepted computer-assisted language learning in the field of English as a Second Language (ESL) and English as a Foreign Language (EFL) due to its potential and unique opportunities for developing L2 reading skills by allowing readers to access varied sources of extra information. These sources pave the way for a new concept of electronic literacy and, therefore, lead to a great deal of influence in the process of learning and teaching in the L2 (Al-Seghayer, 2016).

It is important, though, to state that according to Kahlid Al-Seghayer (2016), the ones responsible for adopting a computer-assisted reading platform are policymakers, school administrators and other stakeholders, yet educators and teachers are the ones implementing the adoption of technology and

integrating computer reading programs by using instructional practices in the classroom and determining and controlling the use and implementation of these practices.

Despite the fact that Portuguese and Chinese are the two official languages in Macau, English maintains a “de facto additional working language” status in the territory, especially in the field of education. In fact, the influence of English in education can be seen mostly through secondary and higher education, with 13.4% of Macau students enrolled in schools that use English as a medium of instruction (Moody, 2008). This happens because the growing use of English has increased since the handover in 1999 with the needs of the strategic economic development, particularly in the gaming and tourism industry. English is used as a bridge in business opportunities as well as a way to publicly present itself as an ‘international region’ (Feng, 2011).

The concept of literacy is not only confined to reading and writing, and is evolving continuously due to technological, cultural and social changes in contemporary societies. Literacy involves listening to, reading, speaking, writing and creating oral, print, visual and digital texts, by using and changing language in a variety of contexts and with different purposes (AARE - Australian Association for Research in Education, 2017).

According to Stenner (1996), reading comprehension is one of the most tested concepts in formal education. He argues that it is an indicator of success in higher education and job performance. The ability to read well and comprehend texts has gained importance, especially as a survival skill in the “information era”. Solid reading became necessary for continuing education, rapid changing technology and economical demands. Unfortunately, nearly 17% of the world’s adult population is still illiterate, being two thirds of them women. The illiteracy numbers among youth are no less disappointing: 122 million youth are globally illiterate, and 67.4 million children who are out of school are likely to come across great challenges in the future, “as deficient or non-existent basic education is the root cause of illiteracy” (UNESCO, 2016).

With this in mind, this research design follows what Stenhouse (1983a) and Sturman (1999) defined as action research (AR). This concept refers to a classroom action research or school case studies undertaken by teachers who use their participant status as a basis on which they build skills of observation and analysis (Stenhouse, 1983b). As a result, the following three research questions were developed: 1) What is the role of teachers in implementing digital reading platforms at schools? 2) What are the effects of teachers’ guidance and instructional practices on students’ reading progress when using a digital reading platform? 3) What are the factors that impact students’ motivation for reading?

The study here reported was conducted to analyze Chinese students’ reading ability, their attitudes towards English reading and see whether teachers can help improve their reading literacy through a digital reading platform. Even though it would be important to follow up on these students’ progress after the end of the school year, this could not be investigated as the researcher was not able to monitor students’ reading activity once the school year was over. Certainly, this fact can be considered as one of the limitations of the study. Another drawback is the fact that the researcher is not Chinese-fluent. Having to communicate with Chinese native speakers in English during the focus group interviews only allowed for somehow limited dialogues between the children and moderator that could have been more descriptive if everyone was proficient in the same language.

The digital reading platform adopted by the school during the study was called Scholastic Literacy Pro Library, a browser-based eBook reader that allows students to select eBooks from its online library and read on it (Scholastic Inc., 2016). The platform had over 800 eBooks and students could access it with an individual username and password which let them see their own profile, their Lexile measure, books read and other reading information. The teacher could also monitor students’ progress and carefully select books for the students. However, just like any regular school library, it won’t be of any advantage if not visited frequently for reading purposes.

The key concept “Lexile” used within the digital reading platform refers to the Lexile® Framework for Reading, developed by MetaMetrics Inc. It is a scientific approach that measures reading ability and the complexity of texts by using a scale for measuring both readers’ skill level and the text difficulty of materials they encounter (MetaMetrics, 2017). This scale is translated into numbers and it is known as Lexile. A student receives a Lexile reader score after taking a reading test. Currently, millions of books and other texts have a Lexile measure that allows anyone to know about their complexity level and demand. When measures are used together, it helps matching the reader with a text that has an appropriate level of difficulty.

This introduction includes the study purpose, significance, some literature review, research questions and limitations. Section two addresses the methodology for data collection and analysis. The following section presents the results, while section four delivers a deeper discussion of the findings, that are stressed in terms of pedagogical and theoretical significance. Section five presents the answers to the research questions and suggestions for further studies.

2. METHODOLOGY

For this study, an action research was used. Stringer's (2007) interacting spiral model (Figure1) presents a collaborative approach to inquiry which allows teachers to take systematic action to resolve specific problems, after observing that students were not self-motivated to read. In fact, this model provides a basic action research routine that offers a simple powerful framework, Look-Think-Act, which enables people to initiate their inquiries in a straightforward manner and build detail into procedures as the complexity of issues increase.

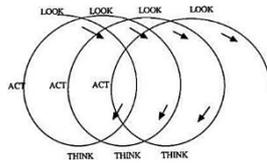


Figure 1. Stringer's action research interacting spiral

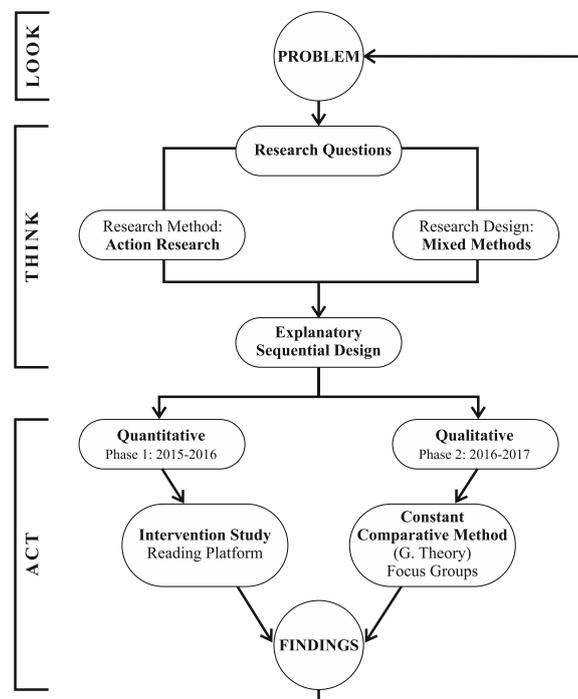


Figure 2. Adopted research framework.

A mixed methods procedure was adopted to enrich the present action research, as shown in Figure 2, allowing a combination of qualitative and quantitative data collection. According to Creswell (2012), the mixed methods use of both quantitative and qualitative methods provides a better understanding of the research problem. The explanatory sequential design (Creswell & Clark, 2011) was found to be the most appropriate method (quantitative and qualitative data are sequentially collected in two phases, with one form of data collection following/informing the other). According to them, this is perhaps the most popular form of mixing methods in educational research and consists of first collecting quantitative data to get a general picture of the research problem and then qualitative data to elaborate and explain the general picture.

In the first stage, students' numerical data was retrieved from the digital platform to track their Lexile growth, so a quantitative approach was found more suitable as the Lexile® Framework primarily uses a numerical system to measure progress. In addition, the data extracted from the platform allowed generating numerical statistics for several types of analysis.

In the second part, a qualitative approach was used; students’ opinions towards reading in general and the platform were heard to assist in understanding how the platform was being used and the reasons behind the usage given by learners. By hearing students’ descriptions and narrated words, data previously collected could be enriched and; therefore, attain higher credibility with the research results, by combining both methods.

3. DATA ANALYSIS

3.1 Quantitative Results

This study was conducted with 106 students who were subject to the same intervention (group A) in the school year of 2015-2016. Also from primary 5 level, 115 students were not subject to the intervention (group B). For students to be included in this study, they had to be enrolled in the school where the study was conducted in the school years of 2014-2015 for primary 4, 2015-2016 for primary 5 and 2016-2017 for primary 6.

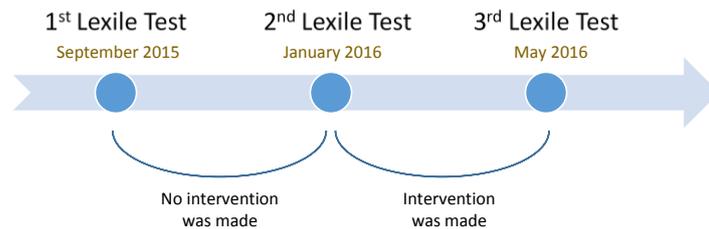


Figure 3. Intervention timeframe

Between their 1st and 2nd Lexile tests, no measures were taken. The purpose of this first cycle was to observe students’ attitudes and their willingness or unwillingness to read in the digital platform. At this time, it was still possible to observe students’ online reading activity which was taking place randomly. Having completed their 2nd Lexile test, students from group A were exposed to the following educational strategies: 1) Book selection: books were selected and assigned by the teacher to guarantee that the reading process would not be hindered by the uncertainty of what to read or the amount of books to choose from; 2) Monthly goals: students had to read at least five Lexile-appropriate books every month: three connected to their favourite reading topics, one connected to the current General English study unit and the remaining one was a general topic, students would have to complete an online comprehension quiz and pass to ensure that they were actually reading and comprehending the texts; 3) Bonus points: 2 to 5 p.p. bonus points on performance scores were granted to students who were reading on a regular basis. This acted as an extrinsic motivation reward for students; 4) Public praising: students who had the highest monthly reading activity were publicly praised, and reading achievements would be displayed on a notice board.

Table 1. Descriptive statistics for group A

School Year	N	Range	Minimum	Maximum	Mean	Std. Deviation
2014-2015	106	638	-240	398	105.98	128.854
2015-2016	106	549	-96	453	159.64	115.870

The relevant findings about the descriptive statistics for the Lexile growth of group A (see table 1) are: 1) By the end of the intervention, minimum negative growth (-96L) was less severe than in the previous school year (-240L); 2) By the end of the intervention, maximum positive growth (453L) was better than in the previous school year (395L); 3) By the end of the intervention, the mean Lexile growth (159.64L) was considerably higher than in the year before the intervention (105.98L).

Regarding group B, as seen in table 2, it is not possible to infer the same pattern as for group A, since findings do not reveal different outcomes in terms of minimum nor maximum growth. A result worth mentioning is that the mean Lexile growth in the school year 2015-2016 (159.42L) was not significantly high when compared to the previous year (133.77).

Table 2. Descriptive statistics for group B

School Year	N	Range	Minimum	Maximum	Mean	Std. Deviation
2014-2015	115	810	-187	623	133.77	147.464
2015-2016	115	703	-174	529	159.42	138.201

For both groups, we can statistically assert that the hypothesis of Normality distribution is accepted (Sig>0.05) for a level of confidence of 95%. Since these are respectively two random samples of 106 and 115 from the 3,000 students of this Chinese school, this means both datasets comply with the Gaussian requirements in order to apply all parametric statistics methods. For quantitative analysis purpose, a null hypothesis (H0) and an alternative hypothesis (H1) are considered, namely:

- H0: Students do not exhibit a higher rate of Lexile growth when more exposed to teachers' guidance and instructional practices in the usage of a digital reading platform.

- H1: Students exhibit a higher rate of Lexile growth when more exposed to teachers' guidance and instructional practices in the usage of a digital reading platform.

Regarding group A, it is possible to confirm in table 3 that, with a 95% level of confidence, the mean of the Lexile growth results between the academic year 2014-2015, with no intervention, and 2015-2016, with intervention, is significantly lower [Sig (2-tailed) = .004] than the standardized acceptance value of Sig. (2-tailed) > 0.05, hence H0 is rejected. This test shows that the Lexile growth does not follow the same pattern between years. One can assume that the intervention had an impact in the students' Lexile growth.

Table 3. Paired samples test for group A

Paired Samples	Mean	Std. Deviation	95% Confidence Interval		t	Sig. (2-tailed)
			Lower	Upper		
S1: 2014-2015 S2: 2015-2016	-53.66	188.25	-89.92	-17.41	-2.935	.004

The Paired Samples Correlations for Group A, (N) = 106, Correlation= -.181, Sig = .063, demonstrated a negative correlation between both years. Although it is not a perfect negative correlation (close to -.20), it reveals that there is still a slight relationship between variables for a 95% interval of confidence, as theory would dictate.

Table 4. Paired samples test for group B

Paired Samples	Mean	Std. Deviation	95% Confidence Interval		t	Sig. (2-tailed)
			Lower	Upper		
S1: 2014-2015 S2: 2015-2016	-25.65	216.19	-65.589	14.28	1.272	.206

As for group B, it is possible to scrutinize from table 4 that, with a 95% level of confidence, the mean of the Lexile growth results between the academic year 2014-2015 and 2015-2016 (both with no intervention) is significantly higher [Sig. (2-tailed) = 0.206] than the acceptance value of Sig. (2-tailed) > 0.05, hence H0 is accepted. This test shows that the Lexile growth follows a similar pattern between years, with no significant differences between years in the group of students that were subject to intervention.

3.2 Qualitative Results

In this section, the analysis of data is made according to the focused interviews carried out in the school year of 2016-2017 with students subject to intervention and other students not subject to intervention in the previous year, using the constant comparative method which revealed several patterns useful for analysis.

It was possible to observe some similarities as well as differences in students' reading habits and behaviors. Both groups hold in common the fact that all children suggest they enjoy reading in general, including English books, being quite aware of the benefits of reading for the gain of knowledge, language acquisition and further development. Both groups also mentioned reading as an activity that they use as entertainment to overcome boredom. However, the students subject to intervention conveyed the impression of having more reasons to believe that reading in English is especially important in terms of language, by mentioning about their future and career prospects, and by emphasizing the fact that English is considered an international language.

Both groups revealed that they are used to reading in the two common formats, i.e. eBooks and paper books, and that they are equally prepared to deal with both book formats with ease. Both groups also mentioned that they like selecting their own books on the platform, although they recognized that the teacher was a precious help in choosing the right texts (suitable level) for them and therefore avoid the hassle of having to browse among hundreds of books and wasting their time.

For both groups, the teacher is their biggest source of motivation. During the intervention, students from group A read more regularly and had a goal to achieve every month. They also said that the teacher frequently gave them advice about reading, explained how they could select books on the platform and, in general, gave a considerable amount of encouragement to read (even outside the platform). They mentioned that they started reading as it was given as homework. Nevertheless, the teacher facilitated the process for them. As for the children who didn't go through any reading intervention, the teacher still was a big source of motivation, although this would only happen if and when their teacher decided to choose and assign something for the children to read on the platform, which was mentioned to happen with no specific regularity. These children would do it as it would be assigned as a homework (compulsory) activity.

In terms of their opinions towards the reading platform, students from group A appeared to know the platform very well and were able to point out several positive aspects, which surpassed the negative aspects that they mentioned. They were able to tell in what ways the platform would be helpful in their daily routine and showed that they really took advantage of the positive features. The majority of students pointed out that they intended to carry on reading after the end of school year, but that they would do it outside the platform. It seemed that children relate the digital reading platform as school work, so even though they plan to engage in reading activities, they affirmed that they would use other sources to do so.

On the other hand, students from group B gave very limited opinions about the platform, and only pointed one very general advantage, being its convenience, and their given disadvantages exceeded the positive aspect. They showed that they had very little connection to this reading tool and appeared not to be taking advantage of it to its full potential. Some group B students also confessed that they would never read on the platform unless a teacher assigned them reading tasks. Others admitted only reading occasionally. This shows the importance of the teacher monitoring and following up on children's reading habits.

4. DISCUSSION

As for the quantitative analysis, several relevant findings were made. The most important one shows that there is a direct connection between the teacher's guidance and monitoring, and students' Lexile growth, which translates into reading skills improvement. Although some students subject to the intervention kept having a decrease in their Lexile level, such decrease was substantially lower than before the intervention. Also, students who historically grew their Lexile level had an even higher growth after the intervention. Statistically speaking, it is possible to assert that the intervention caused a higher than expected average Lexile growth of 51% in group A, when compared with the previous year, while the students not subject to the intervention, group B, had a significantly lower Lexile growth of 19%.

The statistical Paired Samples Test brought additional light into this analysis and the intervention effectiveness. In a nutshell, it was found that group A presented positive statistical discrepancies in the Lexile

growth between the pre-intervention and post-intervention periods that were relevant to the analysis. Although the Correlation Tests were not conclusive, the Paired Samples Tests, along with other metrics used, was sufficient to reject H0.

If analyzed in terms of gender (no statistics are presented here due to the 8 pages restriction), the findings are even more interesting, since it is shown that, in the group of students subject to intervention, females, who had a significantly lower Lexile than males in the year before the intervention, grew their Lexile level by 120% while males grew 15%. These results show that the female students from this group had a slower Lexile growth when not exposed to the instructional practices included in the intervention, and when exposed to said practices had a sharp increase in the Lexile growth and even surpassed the males' results. Moreover, data showed that when the intervention stopped, females from the intervention group resumed a lower Lexile growth than males. This indicates that female students from the group subject to intervention were more sensitive to the teacher's guidance or lack thereof.

Also, it appears that the effects of guidance and instructional practices were still visible in the year following the intervention, as the 2016-2017 growth results between the first and second Lexile tests, which took place in the first and second terms, show undoubtedly that, in average, group A has improved and keeps improving much more than group B. In perspective, group A came from an initial reality where their average growth was 21% lower compared to group B. Immediately after the intervention, their average growth happened at the same pace, with a 0% mean variance between groups, and lastly, in the year following the intervention, group A had an average growth 32% higher when they took the second Lexile test of the year. This systematic growth pattern backed up by all other statistical tests positive results was the proof that the researcher was looking for the idealized study.

Concurring with Watkins & Biggs (2001) that intrinsic motivation is not applicable in Confucian Heritage Culture (CHC) because it plays a minor role in CHC classrooms and Moneta & Siu (2002) that has shown through research that students who are intrinsically motivated end up presenting lower levels of achievement than extrinsically motivated ones, during the interviews, both groups clearly admitted that the reason why they were reading or ever read at all was because the teacher assigned books and asked them to read as homework. This also restates what Lee (1996) argued that CHC societies are known not only for showing respect for education, but also for highly respecting and valuing teachers' instructions.

From the conversations with students, it was found that the teacher is their biggest source of reading motivation. Before the intervention, the lack of clear and regular educational practices from teachers, as well as lack of encouragement for reading and monitoring their reading activity, may have contributed for the low Lexile level of students. Thus, most of the students in primary 5 were Below Basic readers and had a weak reading ability before intervention.

Even though most of the children voiced out that they prefer to choose the books they read, those who were subject to intervention recognized that when the teacher chose books for them, it was indeed helpful and a trigger for them to read more online, again showing the importance of the teacher's role in the reading process of these children.

Another positive outcome from the intervention is that students who were subject to the researcher's practices and instructions were more comfortable using the platform and more aware of the advantages of such tool. Additionally, with the opportunity to read regularly in the platform, as their reading activity was being followed by the teacher researcher, improvement was achieved. The target of the intervention was to help students progress more than historically expected, rather than achieve a predetermined level or score.

On the other hand, during the interviews, students who were not subject to intervention showed they were less prone to reading in the platform. Students stated that they never read online or, if it happened, it would be occasionally or when their teacher assigned them eBooks.

Another important finding is that students who were subject to intervention expressed that they intended to continue reading even after the school year ended. Another objective of the intervention was for students to gain a reading routine. Even though most of the measures were to externally motivate students to read as they were found not internally motivated, this corroborates what Vygotsky (1978) suggested with the ZPD (Zone of Proximal Development) that, provided with scaffolding or support from a more able person, students would then be able to perform certain tasks alone after a period of time. Basically, extrinsic measures were used in a tentative way of creating reading habits in students, even after intervention.

	Complete School Year Comparison			Parcial School Year Comparison		
	Timeline: Before Intervention	End of Intervention		End of Intervention	1 Year After Intervention	
School Year:	2014-2015	2015-2016		2015-2016	2016-2017	
Grade and Term:	P4 Term 1-3	P5 Term 1-3	P4 to P5	P5 Term 1-3	P6 Term 1-2	P5 to P6
Average:	-21%	0%	▲	0%	32%	▲
Maximum:	-36%	-14%	▲	-14%	-6%	▲
Minimum:	-28%	45%	▲	45%	2%	▼
Standard Deviation:	13%	16%	▲	16%	-1%	▼

Figure 4. Lexile growth variance between group A and group B (a positive percentage indicates that group A had better results than group B. A green upward arrow represents an increase in percentage between the years, which in turn indicates that group A had better results than group B)

5. CONCLUSIONS

1. What is the role of teachers in implementing digital reading platforms at schools? This research and its results are absolutely conclusive about how important the role of teachers is in implementing digital reading platforms at schools. Teachers play a key part in this process, as many would say and one would expect. Not only the school environment and resources act as a means to motivate children into being interested in literacy, but especially teachers who directly contact and establish rapport with them every day. According to Methe & Hintze (2003), teachers are the most influential agents in students’ social environment. The role of teachers in implementing a digital reading platform also encompasses the need to act as a role model, i.e., the teacher holds a vital role in modelling reading behavior. Confirmed by Bussey & Bandura (1984), children replicate the behavior of powerful models, such as teachers.

2. What are the effects of teachers’ guidance and instructional practices on students’ reading progress when using a digital reading platform? The effects of teachers’ guidance and instructional practices on students’ reading progress seem to be quite high and revealed themselves to be fairly easy to measure with the use of the Lexile-based online reading platform. Considering that the Lexile® Framework is a renowned metric system for reading, the accuracy of the results and findings of this study is undeniable. In the findings, it is clear that students react in a very positive way to guidance and instructional practices when it comes to reading progress.

3. What are the factors that impact students’ motivation for reading? It is possible to conclude that children are more inclined to respond to external reading stimuli rather than internal ones that still may exist, but in a much subtle form, since Macau students are strongly influenced by CHC. This culture is more motivated by external factors, as schools don’t seem to reward internally motivated students (Moneta & Siu, 2002). For this reason, children responded well to intervention strategies where teacher granted points in their performance score for books they would have completed each month. A marks-driven society consents children to think that they will be rewarded for their outcomes rather than for the learning process itself. Another extrinsic aspect is their social motivation (Biggs, 1995). Publicly awarding the top 3 students who had more reading activity, placing their names and reading achievement on a board on a monthly basis also helped boost their reading interest as they would be acknowledged in front of the whole class and showed contentment when their work was recognized in front of their peers. It is still possible to identify minor internal factors that may trigger children’s interest for reading (such as students’ interest topics) even though they were not found sufficiently strong to sustain reading habits for a long time without other mechanisms.

Considering that the intervention took place in a short period of time and with participants who belonged to one level only, it is suggested the same study to be carried out with different levels to find out the teacher’s role in implementing digital reading platforms with children of different ages, as well as to see if the motivating aspects that encourage children to read in those platforms are the same across levels. The intervention can also be planned to take place in a full school year, thus requiring 3 complete school years to

observe, intervene and evaluate results. Another suggestion would be to assess the impact of a study like this in their reading habits, for a full year after the intervention. A similar study can also be planned to include paper books alongside the digital platform which will require for the school library books to be properly Lexile-measured and labelled as well as to perform changes in the schools' reading curricula to include more activities such as book sharing, book clubs, buddy reading activities and in-class reading time for leisure. This will allow to understand if, by extending the instructional practices and strategies to paper books, the effects of an intervention are even higher.

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