



Effectiveness of incorporating a structured e-books programme to improve the outcomes for early struggling readers

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Abstract

Using a mixed study design of both qualitative and quantitative data analysis, this paper examined the implementation of Raz-Kids interactive electronic-books (e-books) levelled readers for shared reading in four preschool early literacy intervention classrooms (PELP) located at three different learning centres. The study looked at educational therapists' implementation of shared e-book sessions, projecting e-books onto a screen to extend the shared reading experience, and the impact this had on struggling readers' early literacy skills and comprehension. Participants included a diverse sample of 20 children and 5 Educational Therapists (EdTs). Following a brief training session to ensure consistency of approach across the sample, teachers conducted 10 e-book shared reading sessions, over a 10-week period. A pre and post informal curriculum-based measure was used and compared with a control group to assess learning. Results suggest that the use of Raz-Kids e-books had helped in improving pupils' comprehension skills and complement teaching, learning and reading engagement. It concludes that there is similar effect from shared reading using print books to shared reading using e-books, and that both support children's learning of discrete literacy skills, but may not be enough in helping them to become independent readers

Keywords: Struggling Learners, Preschool, Raz-Kids, Reading, e-books

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INTRODUCTION

While most children follow a typical trajectory in their development of early language and literacy skills, some show signs of struggle or gaps in their learning very early on, with initial difficulties being observed in children as young as 3 years of age (Government of Ireland, 2001; Shaywitz, 2004). Young children may fail to pick up reading skills due to a number of reasons. These reasons include, but are not limited to, a lack of exposure, developmental delay, and dyslexic-type difficulties. The prevalence of dyslexia from international studies amongst the school-going population is estimated to be between 4-10% (BDA, n.d.).

Most recent research emphasizes the importance of early intervention over a “wait-and-see” approach, suggesting that it is imperative to identify problems in early literacy delay, regardless of causation, and provide timely intervention (Torgesen, 2001; Greenwood et al., 2015; Bick and Nelson, 2016). This is necessary because the plasticity of the brain is at its maximum between the ages of 0 to 6 (Richards et al., 2000; Simos et al., 2002; Bick and Nelson, 2016). Support provided for children struggling in nursery can be effective from the age of 4, and sustainable over the next 18 months (Fawcett et al., 2014). The early years provide a golden window of opportunity for learning and therefore seeking effective ways to identify and improve children’s language and literacy skills and ultimately, their school readiness during this time is important (Greenwood et al., 2015).

Supporting the varied learning needs and learning styles of kindergarteners with literacy learning difficulties requires the use of a variety of specialised resources for teaching and learning. One such initiative by the DAS is the incorporation of Electronic Books (e-books), which provides a platform to enhance children’s language and literacy skills through technology (Larson, 2010). Computer-assisted reading support can be a particularly effective tool to support struggling readers (Ivey, 2000; Nicolson, Fawcett; Nicolson, 2000; Thompson, 2014). It has also been postulated by some that even the most reluctant readers enjoy reading using technology (Picton and Clark, 2015).

Dyslexia Association of Singapore (DAS) utilises smart technology to enhance children’s learning experiences (Shamdasani, 2018). The local curriculum / framework for preschool curriculum Nurturing Early Learners (NEL) allows for the incorporation of information Communication Technology (ICT) into its curriculum, subject to three guiding principles: that it complements learning, that it is facilitated, and that its benefits and drawbacks are carefully considered by teachers (MOE, 2012). It is hoped that such technological platforms may provide pupils who have learning difficulties with an additional avenue to access learning, support in narrowing gaps and may help instil the motivation in such children to want to explore books, listen to stories, read willingly, and read for enjoyment. A fundamental principle of Vygotsky's Social Constructivist Theory is that of the Zone of Proximal Development (ZPD), which supports the notion that difficult

tasks can be mastered with guidance from more-skilled peers or adults (Shabani, Khatib and Ebadi, 2010). Children with learning difficulties often do better with extra support and in many cases these children need quite extensive guidance from a more skilled adult or peer.

By listening to stories being read aloud, children can improve vastly as this process builds vocabulary, helps develop children's recognition of commonly used words, exposes them to the structure and grammar of the language and enhances their alphabet knowledge, all of which are important in learning to read (MOE, 2013). As emphasised by Sticht (2017), no matter how well children can read, it is their listening and speaking vocabulary which will support making sense and understanding. Shared reading, along with quality questioning techniques, builds pupils' comprehension, vocabulary, oracy, knowledge and higher-order thinking skills (Ng et al., 2019). During the Preschool Early Literacy Programme (PELP) intervention, shared reading is carried out for 30 minute sessions. Educational Therapists (EdTs) complement quality interactions through oracy and use various questioning techniques during shared reading. The books that EdTs use are alternated between conventional and e-books. The DAS PELP utilises e-books from Raz-Kids, also known as the Kids A-Z or Raz-Plus reading program.

Raz-Kids is multi-faceted and can be employed in different ways and on multiple devices (Thompson, 2014; Marchand, 2015). Raz-Kids Interactive e-books can read themselves to children (ear reading) as they follow along. Some books include animation as the story unfolds, and all have a voice-recording function that allows children to record and listen to their own voice as they attempt to read the text. Within Raz-Kids there are different genres of e-books available. The digital features of interactive e-books were employed during shared reading to further supplement teaching, learning of early reading skills, reading comprehension and foster reading engagement. It is not employed as a substitute to print books, more so as a complementary addition to the collection of books which may be designated.

Studies on the Raz-Kids program found it to be motivating children to read, and this included those who were reluctant to read print books (Widmyer, 2011; Thompson 2014; Marchand, 2015; Picton and Clark, 2015; Klein, n.d.). Korat and Shamir (2012) identified several educational tools in high level e-books design features for kindergarteners such as (a) oral reading with text highlights; (b) a dictionary option; (c) multiple choice questions strategically placed in the story line and; (d) a game mode separate from text mode.

Schneps et al. (2013), compared reading on paper and on a small handheld e-reader device for 103 high-school students with dyslexia and found that the e-reader significantly improved reading fluency and comprehension. It is possible that for some e-books offer accessibility options, that are impossible in print.

One of the first and largest researches into the impact of e-books on school reading attitudes was for the National Literacy Trust, spearheaded by Picton and Clark (2015). They measured pupils' attainment in 40 United Kingdom (UK) schools for a period of 10 months. The study concluded that using e-books can significantly raise literacy levels, improve engagement and change attitudes to reading for reluctant readers. Their study revealed more improvement for boys as compared with girls who also improved and findings correlated with positive changes in reading attitudes (Picton and Clark, 2015). Significant findings point to lifelong lasting ingrained positive attitudes towards reading enjoyment (Picton and Clark, 2015).

Several studies have shown that adults can facilitate children's understanding of stories by engaging them in discussions and by explaining events or making connections between books, events and the children's own lives, thus activating their prior knowledge (Bus and van IJzendoorn, 1995; Neuman, 1996; Lonigan, Shanahan, and Cunningham, 2008). Studies by Bus and van IJzendoorn (1995) and Neuman (1996), shows that comprehension can be facilitated through engaging children in discussions, explaining events, asking questions, and supporting children in making connections with their own world and experiences. Ministry of Education (2013), describes different levels of comprehension as literal, inferential, critical, application and appreciation that children should develop in order to make deeper and fuller sense of a text. Research has found that such reading experiences are highly beneficial for children and the benefits include fostering listening skills, building a strong foundation in literacy and language skills, delivering enriched language exposure, building vocabulary, and supporting reading comprehension (Bus and van IJzendoorn, 1995; Grimshaw et al., 2007; Lonigan, Shanahan, and Cunningham, 2008; Neuman, 1996; Sticht, 2017).

In an independent research summary on questioning in teaching conducted by The Singapore Kindergarten Impact Project (SKIP), it was revealed that kindergarteners should be asked questions at both the literal and inferential level, and that children's comprehension skills acquisition is not linear (Ng et al., 2019). It was concluded by Ng and colleagues (2019) that inferential questions engage children in critical thinking, and that teachers should be encouraged to ask a variety of questions that boost vocabulary building, higher order thinking and oracy. NEL's curriculum framework highlights the importance of using a dialogic, shared book approach, and asking levelled questions which to some extent challenge and complement a child's level of thinking and expression.

EdTs plan different levels of questions ranging from literal, to inferential to critical, which they ask throughout the shared reading experience. Children can choose to answer multiple-choice quiz questions projected on the screen, later given on a printed worksheet. With prompting and support from EdTs, pupils try to tackle specific comprehension skills such as main idea, recall of text details, retelling, character analysis, classification of information, cause and effect, comparing and contrasting, fact

or opinion, identifying problems and solutions, sequencing events, identifying reality or fantasy, making inferences and drawing conclusions, identifying story elements, and vocabulary (Marchand, 2015).

Research aims

The purpose of this study was to determine whether the interactive electronic books (e-books) that are part of the computer program, Raz-Kids, might assist in supporting early core literacy skills and comprehension for 5-6-year old children attending DAS PELP.

Research Questions

The study was designed to answer the following questions:

1. Does incorporating a structured, interactive e-books program as part of early intervention for early struggling readers improve their reading skills and levels of engagement?
2. What are the benefits and drawbacks of the e-books reading program within PELP as perceived by the teachers?

Professional Role and relationship to participants

The researcher's professional role in this research was as an educational therapist working with kindergarteners with weak literacy skills and as a key member of the PELP. The researcher guided and supported preschool therapists initially on using the Raz-Kids e-books reading programme within their classrooms. The therapists then began carrying out the e-books reading programme in their classroom.

Research Design

Stratified sampling was used for the purpose of this study to group the pupils based on the variables being measured. Pupils with any formal diagnosis were excluded from this study. The researcher then carried out a simple random sample from this group to obtain a stratum.

Participants

The quantitative study sample consisted of 20 children in kindergarten 2 aged between 5 years to 6 years old. They were split equally into the experimental group and the control group. The children had varied levels of literacy but all of them exhibited dyslexia-type tendencies. The experimental group consisted of 5 boys and 5 girls. They read 2.3 (SD= 2.1) books on average with their parents for 180 (SD=138.6) minutes weekly. The control

group consisted of 7 boys and 3 girls and read 3 (SD=2.36) books on average with their parents for 160 (SD=119.2) minutes weekly.

The qualitative study sample consisted of the above-mentioned children as well as 14 female preschool educational therapists who had worked an average of 4.5 years (SD=3.2) in the DAS. They filled out a survey, revealing their experiences with the use of Raz-Kids e-books during shared-reading within early intervention.

Procedure

Experimental group

DAS, PELP Educational Therapists (EdTs) applied the shared-book approach (SBA) to reading instruction by utilizing Raz-Kids e-books. During SBA for the experimental group, books were projected onto a big screen in the classroom whereas the control group received the traditional SBA with print books. The sessions were carried out for 30 minutes once a week for a duration of 10 weeks. The experimental group involved pupils listening (ear reading) to the online e-book, followed by a second round of eye reading-aloud along with the therapist. They were not allowed to access the play features during these sessions. In addition, pupils received instruction in small groups for guided reading and focused on improving oracy, reading fluency and comprehension skills. Fiction and non-fiction levelled stories were selected to teach specific skills such as:

- a) asking and answering questions about key details in text,
- b) retelling a story,
- c) making reasonable predictions and change predictions according to story's unfolding plot,
- d) using illustrations and details in a story to describe its characters, settings, and events and
- e) sequencing details in the story.

Pupils answered questions which facilitated comprehension, reading fluency, vocabulary, expressive, and receptive language skills.

Control group

For the control group consisting of 10 pupils, intervention did not incorporate assistive technology. Instead the children enjoyed conventional shared-reading experience with printed levelled books as selected by the EdT.

Experimental group

The experimental group, consisted of 10 pupils who enjoyed Raz-Kids e-books programme along with various downloadable activities for their pupils to work within the intervention classroom.

Data Collection Methodology

The research drew on several data collection methods in order to gather multiple perspectives satisfy the principle of triangulation and increase the likelihood of the data being both reliable and valid. A mix of quantitative and qualitative data collection methods were used. This combination method was used because it provides a better understanding on the use of e-books factually and insightfully.

Quantitative data was gathered through a curriculum-based assessment using the pre and post-test method. It took a total of 12 weeks to complete data collection and intervention. This began with pre-test at week 1, followed by 10 weeks of intervention, and after a week the post-test was carried-out. During the intervention, pupils were instructed using the Raz-Kids reading program described above for 30 minutes, once a week for 10 weeks. The post-test was administered after 10 weeks of intervention to record pupils' performance scores and comprehension quiz scores. For all the pupils the pre-and-post-test was administered by the EdTs on their respective pupils.

To gather further qualitative information, survey questions completed by the EdTs at the end of the study period were analysed. Further to this, the open-ended data received from EdTs open-ended feedback forms were thematically analysed, and coded. These data were subsequently analysed and evaluated at the end of the study period.

Assessment Tools for Quantitative Data Collection

The DAS Pre-and-Post Assessment Tested for six components:

1. **Letter Recognition – Letter Naming Fluency (LNF)** was included as an indicator of risk. Teaching letter names does lead directly to improvements in pupils reading outcomes (Allington, 2011).
2. **Letter-Sound Correspondence (LSC)**, this measure is a standardised, administrated test of the alphabetic principle including letter-sound correspondence in which letters represent their most common sounds.
3. **Nonsense Word Fluency (NWF)**- the NWF measure is a standardized, administrated test in which letters represent their most common sounds and the ability to blend letters into words.
4. **Sight Word** – Most of the words used were from Dolch Primer List (examples: do, good, have).

5. **Comprehension Quiz from Raz-Kids Level A**, book read for pre-test was "The Big Cat" and for post-test was "Maria goes to school". The control group did the printed copy of the book during testing and the experimental group did the e-book version. Both intervention groups were read out the questions from the quiz, pupils circled the correct answers on printed paper.
6. **The Yopp-Singer Test of Phoneme Segmentation** (Yopp, 1995) tests children's phonemic awareness, and is designed specifically for children in kindergarten, although it can also be used with older children. The test has twenty-two items that ask children to isolate and pronounce the individual phonemes in words. The Yopp-Singer Test (YST) has been extensively used in phoneme awareness research and its measurement of phoneme awareness is highly correlated (Torgesen, 2001).

Table 1: Educational Therapist feedback Questionnaire

EDUCATIONAL THERAPIST FEEDBACK (LIKERT SCALE)	
Q1	This is an acceptable programme to address reading concerns.
Q2	This programme is effective in improving my pupils' reading skills.
Q3	I would be willing to use this during the intervention regularly.
Q4	I would suggest the e-book readers to other teachers and parents.
Q5	This programme would not result in any negative effects for my pupils.
Q6	This intervention is a reasonable way to improve my pupils' reading skills.
Q7	I found the worksheets available in this structured e books reading programme useful.
Q8	I like the procedures used in this structured e-books reading programme
Q9	I found the e-books programme complementary to planning my literacy lessons.
Q10	Overall, this programme appears beneficial for my pupil.
EDUCATIONAL THERAPIST FEEDBACK (OPEN ENDED)	
Q11	Please describe the strengths of and/or what you liked about this intervention:
Q12	Please describe the limitations of and/or difficulties with implementing this intervention:
Q13	Was it reasonable to implement the intervention weekly? YES/NO Why or why not?
Q14	The interactive features of assistive technology complemented DAS Preschool Literacy Intervention? YES/NO. How or How not?
Q15	Are there any additional points you would like to add?

Assessment Tools for Qualitative Data Collection

Educational Therapist Feedback

In order to answer the second question on the benefits and drawbacks of the e-books reading program within PELP as perceived by the teachers, likert scale feedback forms were given to 14 DAS Educational Therapists to get constructive feedback on use of the Raz-Kids e-books. The Likert scale feedback form for the EdTs showed a scale of 1-5, 1 indicated Strongly Disagree (SD) and five indicated Strongly Agree (SA). There are a total of 10 Likert scale questions, followed by a open-ended questions section for the teachers to give additional comments, as sometimes this generates the most useful feedback, covering areas not touched on by the presented scale.

RESULTS

To investigate the differences between the experimental and control group in the six literacy areas listed above, an independent samples t-test of the differences between pre and post-tests was conducted.

To further investigate the improvements each group made a paired samples t-test comparing the pre and post-tests was carried-out individually for the experimental and control groups.

Qualitative data collection was followed a systematic analysis and organisation of data, including the EdTs feedback forms and open-ended questions. The organised data was gathered and grouped together on similar themes. It was analysed from various perspectives, and subsequently interpreted. From this, some conclusions were drawn. This analysis is now presented in the following section.

Data Analysis

Quantitative Data Analysis

An independent samples t-test was performed comparing the mean differences between comprehension scores between the experimental and control group over 10 weeks as seen in table 2. The experimental group ($M = 1.60$, $SD = 0.97$, $N = 10$) showed significantly more gains than the control group ($M = 0.80$, $SD = 0.42$, $N = 10$), $t(12.31) = 2.40$, $p = 0.03$, two-tailed. This indicated a large effect size ($d = 1.07$) and shows a greater impact on comprehension scores for the experimental group.

An independent samples t-test was performed comparing the mean differences in the reading scores on nonsense word fluency between the experimental and control group over 10 weeks as seen in table 2. The control group ($M = 3.20$, $SD = 2.48$, $N = 10$)

Table 2 – Independent samples t-test

Measure	Group	N	Mean	SD	t	df	sig
Letter Naming	Exp	10	8.4	11.63	0.24	16.75	0.81
	Cont	10	7.3	8.78			
Letter Sound Correspondence	Exp	10	10.5	5.64	-0.84	16.67	0.41
	Cont	10	13	7.54			
Sight words	Exp	10	7.2	4.69	-0.64	16.44	0.53
	Cont	10	8.8	6.4			
Nonsense Word Fluency	Exp	10	1.1	1.3	-2.37	13.5	*0.03
	Cont	10	3.2	2.5			
Yopp-Singer Test	Exp	10	1.1	1.5	-2.22	18	*0.04
	Cont	10	4.8	5.1			
Comprehension	Exp	10	1.6	0.97	2.4	12.31	*0.03
	Cont	10	0.8	0.42			

* indicates statistical significance at the $p < 0.05$ level

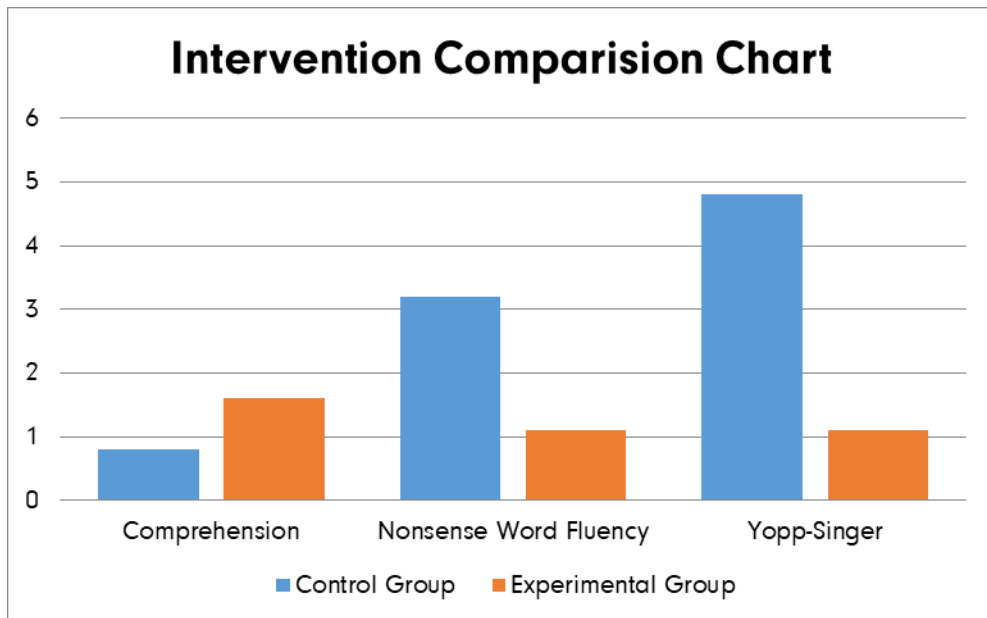


Figure 1. Comparison between groups

showed significantly more gains than the experimental group ($M = 1.10$, $SD = 1.29$, $N = 10$), $t(13.5) = -2.35$, $p = 0.03$, two-tailed. This indicated a large effect size ($d = 1.06$) and shows that the intervention had a great impact on nonsense word reading scores for the control group.

An independent samples t-test was performed comparing the mean differences in the Yopp-Singer test (YST) of Phoneme Segmentation scores between the experimental and control group over 10 weeks as seen in table 2. The control group ($M = 4.80$, $SD = 5.05$, $N = 10$) showed significantly more gains than the experimental group ($M = 1.10$, $SD = 1.52$, $N = 10$), $t(10.63) = -2.22$, $p = 0.05$, two-tailed. This indicated a large effect size ($d=0.99$) and shows that the intervention had a great impact on YST for the control group.

Quantitative Data Experimental Group

A paired samples t-test was conducted to assess differences between pre and post-test in the experimental group. The results indicated that the experimental group made significant improvements in Letter Sounds Correspondence, sight words, nonsense word fluency and the Yopp-Singer Test of Phoneme Segmentation as seen in Table 3.

Control Group

A paired samples t-test was conducted to assess differences between pre and post-test in the control group. The results indicated that the control group made significant improvements in Letter Naming Fluency, Letter Sounds Correspondence, Sight words and Nonsense Word Fluency as seen in Table 3.

The implications of these results are discussed in the next section.

Qualitative Data Educational Therapist Feedback

The EdTs feedback form as seen in table 1 was on a 5 point Likert scale where 1 indicated strongly disagree, 5 indicated strongly agree. Fourteen EdTs provided feedback to ten questions on the use of Raz-Kids e-books. The feedback as shown in the chart below (refer to figure 2).

For question 4, all of the EdTs either 'strongly agreed' or 'agreed' that they would recommend shared reading with e-books to other teachers and parents. In question 2 and 6, there were sizeable neutral answers indicating these EdTs may have felt that in addition to e-books, print books are also reasonable ways to improve their pupils' reading skills. In question 7, which had the least 'strongly agree', it may be possible that the worksheets available within Raz-Kids e books reading programme were sometimes very useful and at other times not. It is also significant to note that none of the EdTs answered with a 'disagree' or a 'strongly disagree' to all 10 questions. In addition to the

Table 3. Paired samples t-test

Measure	Pre/ Post	N	Mean	SD	t	df	sig
EXPERIMENTAL GROUP							
Letter Naming	Pre	10	28.4	15.42	-2.12	9	0.063
	Post	10	36.4	7.88			
Letter Sound Correspondence	Pre	10	6.3	7.01	-5.89	9	*0
	Post	10	16.8	8.7			
Sight Words	Pre	10	5.3	11.41	-4.86	9	*0.001
	Post	10	12.5	13.7			
Nonsense Words Fluency	Pre	10	1.1	3.48	-2.7	9	*0.024
	Post	10	2.2	4.57			
Yopp-Singer Test	Pre	10	1.3	4.11	-2.28	9	*0.048
	Post	10	2.4	5.25			
Comprehension	Pre	10	2.9	1.29	-1.94	9	0.085
	Post	10	3.9	0.99			
CONTROL GROUP							
Letter Naming	Pre	10	31	11.27		9	*0.027
	Post	10	38.3	6.17			
Letter Sound Correspondence	Pre	10	11.2	7.6	-5.45	9	*0
	Post	10	24.2	2.94			
Sight Words	Pre	10	8.9	11.53	-4.32	9	*0.002
	Post	10	17.7	12.89			
Nonsense Words Fluency	Pre	10	1.7	1.64	-2.98	9	*0.016
	Post	10	4.5	3.95			
Yopp-Singer Test	Pre	10	6	7.12	-1.25	9	0.245
	Post	10	8.6	9.06			
Comprehension	Pre	10	3.4	0.7	-1.5	9	0.168
	Post	10	3.8	0.92			

* indicates statistical significance at the $p < 0.05$ level

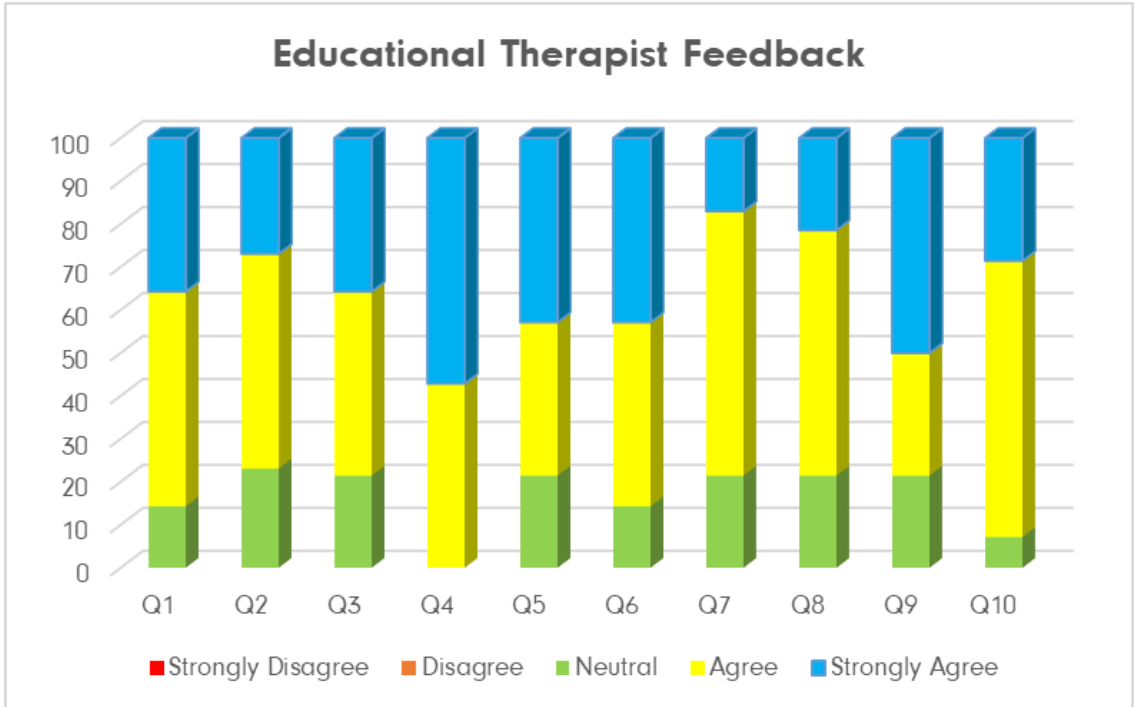


Figure 2 Educational Therapist Feedback

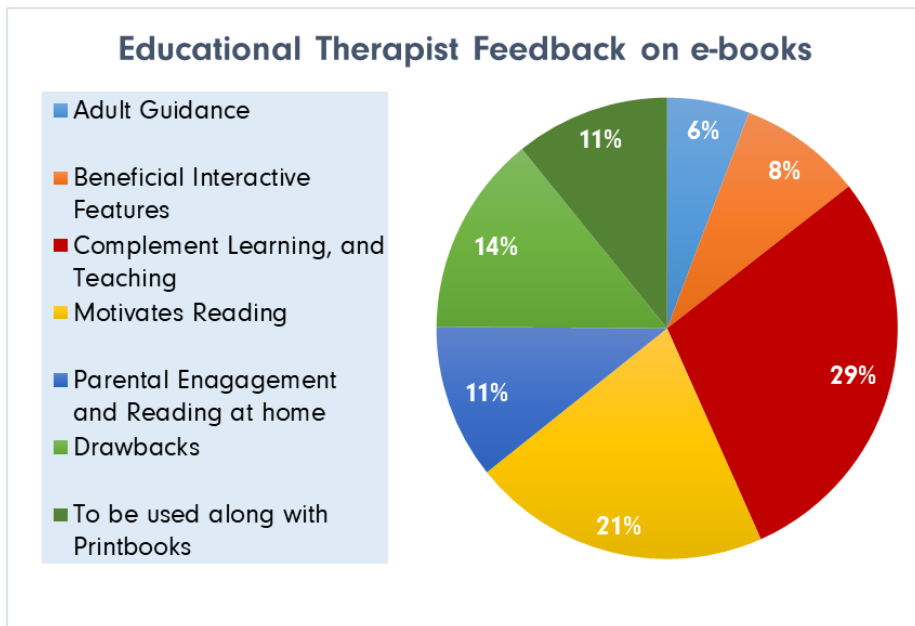


Figure 3 Educational Therapist Feedback thematic analysis

likert scale questions, the EdTs filled in the blanks and gave substantial answers to five open-ended questions. The researcher described, interpreted and classified the data from the EdTs answers through a six step thematic data analysis.

Braun and Clarke's (2006), guided the thematic analysis through their 6-step framework approach which are:

1. becoming familiar with the data, 2
2. generate initial codes,
3. search for themes,
4. review themes,
5. define themes and
6. write-up.

During initial coding, the first stage, line-by-line coding was carried out, in the second stage 102 'free codes' were organised into related areas, which constructed 139 more 'descriptive themes' and at the third stage 10 'analytical themes' were developed and reviewed. Lastly, 7 themes emerged and they are :

1. Adult Guidance,
2. Beneficial Interactive Features,
3. Complement Learning and Teaching,
4. Motivates Reading,
5. Parental Involvement and Reading at home,
6. Drawbacks
7. To be used with print books.

These themes as presented below in according to the percentage of responses that they represent (See Figure 3). These themes are a refinement of feedback, and in essence reveal the EdTs thoughts and first-hand experience using Raz-Kids e-books.

Out of seven, five main themes emerge about Raz-Kids e-books as pointed-out by the EdTs and they are:

1. complements teaching and learning (29% of codes),
2. motivates children to read (21% of codes),
3. gives children an opportunity to read at home and is an opportunity for parental engagement (11% of codes), and
4. some draw-backs were raised (14% of codes), 5) e-books to be used as a resource along with print books (11% of codes).

DISCUSSION

Förster, Kawohl and Souvignier (2018) stated that studies on reading achievement on any age group indicate large inter-individual differences. This is a somewhat comparable situation within PELP, despite best placement efforts, the pupils' pace of learning and developmental stages follow an idiosyncratic trajectory. As a consequence, EdTs are faced with varying levels of challenge for differentiation, with more or less levels of heterogeneity within each classroom. Explicit steps were initiated with the intent of making intervention consistent in this study. However, within this structure, flexibility was allowed for the EdT to pace the lessons and use variations that provided scaffolding to meet an individual child's learning needs. Even though there were standardisation across teaching during the shared-reading instructions, variations between EdTs during teaching has been acknowledged.

The first research question was to determine if incorporating Raz-Kids e-books within PELP improved reading skills and reading engagement. The experimental group made significantly more gains than the control group on the test for comprehension quiz scores, with a large effect size. Similar to studies by Ciampa (2012), results in this study indicate that e-books with embedded comprehension quizzes increased comprehension for pupils. Comprehension is an important skill necessary for skilled reading (Roberts and Scott, 2006). Therefore, to answer the first question, the results support that the use of Raz-Kids e-books had helped in improving pupils' comprehension skills. Since skilled reading is an interdependent process between both word recognition (decoding) and language comprehension (Roberts and Scott, 2006), children from the experimental group will continue to require intervention for independent reading to take place.

Results also indicated that the control group did better for word reading (nonsense words) and phonemic awareness. The control group were brand new pupils just starting in the programme whereas the experimental group were pupils who started with DAS end of the year, they may have had exposure outside of the DAS. A ceiling effect may have occurred since a number of participants, in this case those in the experimental group, may have been at the top end of the scale for most of the measures hence making discriminations between measures impossible (Garin, 2014). Therefore, the ceiling effect may have impacted the experimental group's reading skills measures and progress in measures such as comprehension were more apparent. PELP (Sathiasilan and Wong, 2018) and the OG instructional approach demonstrate educationally significant outcomes for struggling readers (Hwee and Houghton, 2011; Lim and Oei, 2015). It is also possible that the outcomes measured in this study are from the combination of phonological based instructions and shared-book reading (Roberts and Scott, 2006).

One of the findings, from the current study is the evidence for associations between measures of phonological-based instructions and shared-book reading. Progress

analysis within groups, which is the difference between pre-and-post test scores within the experimental group and within the control group helps to interpret this data from a different angle. Results indicate that each group markedly made significant progress. Similarly, both groups made progress in sight word knowledge, nonsense word fluency and letter sound correspondence. On the contrary, the experimental group made significant improvements in the Yopp-Singer Test of Phoneme Segmentation. Whereas, the control group instead made significant progress in letter naming. This indicates progress in different areas, and that inter-individual differences are apparent.

Salaschek, Zeuch and Souvignier (2014), point out that the inter-individual differences include, among others, level of achievement and different growth trajectories. Förster, Kawohl and Souvignier (2018), also revealed that it is expected for pupils with lower reading skills to obtain higher growth in basic reading skills. This is obvious as the progress analysis shows control group significantly improved in letter naming skills (a basic pre-reading skills) and experimental group significantly improved in Yopp Singer Test of Phonemic Awareness (initial reading skills). This may also be because, even though the intervention hours were similar, the control group was assessed in the beginning of the year and the experimental group was assessed at the end of the year, therefore pupils in the experimental group may have had more time to grow.

Pupils from the control group begun in the beginning of the year and may have begun with lower reading skills. This may explain why the control group made progress in letter naming (lower reading skills) and the experimental group made progress in Phoneme Segmentation (higher reading skills) (Förster, Kawohl and Souvignier, 2018). Progress analysis within groups indicates that all pupils benefited in accordance to their distinct profile.

The comparison of data, across control-group and experimental group shows that shared-reading with e-books autonomously is not enough in helping children to become skilled readers. However, the progress analysis of data within each group shows that shared-reading with e-books alongside structured evidence based synthetic phonics programme complemented pupils in acquiring reading skills according to a child's level. Therefore, the partial answer for question one is that this study found that incorporating Raz-Kids e-books within PELP improved comprehension for early struggling readers and that there is similar effect from shared reading using print books to shared reading using e-books, and that both support children's learning of discrete literacy skills, but may not be relied on autonomously in helping pupils to become independent readers (Rose, 2009).

Educational Therapist's experience and perceptions in incorporating e-books is critical into helping to figure out how to effectively use Raz-Kids e-books to support pre-schoolers in bridging their early literacy learning gaps. From qualitative data, the theme 'Motivates Reading' received codes that directed to reading engagement and these codes were 1)

children were interested during lessons, 2) it encouraged pupils to read, 3) children started to read independently, 4) children read more books at home and 5) it made reading fun. Overall, EdTs revealed that the interactive features were beneficial (8%) and motivated reading (21%) thereby fostering reading engagement (29%). Data from the EdTs, answers the second part of research question one, that Raz-Kids e-books foster reading engagement.

The second research question is on the benefits and drawbacks of the Raz-Kids e-books reading program within PELP as perceived by the teachers. EdTs found various benefits and some drawbacks while using the Raz-Kids program. The benefits were mainly directed to complementary teaching and learning, children who were motivated and engaged to read, and the intervention that was extended to the home environment and was an avenue for parent engagement. For parent engagement, there were also ample feedback that it was challenging to get a number of parents to follow-up by using Raz-Kids at home. Research has shown that having as few as 25-50 books at home (both electronic and print) improves reading test scores and directly impacts children's academic achievement (Evans et al., 2014). Hence, EdTs naturally felt strongly about extending reading to the home environment.

Similar to results from Allington (2011) and Picton and Clark (2015), it was revealed within the theme 'motivated reading', that some of their reluctant readers enjoyed reading using technology and a few pupils appeared to be more engaged during e-books read aloud sessions compared to conventional methods. The theme 'adult guidance' (8%) referred to adult facilitation, and adult supervision. It was revealed that adult supervision was necessary for pupils reading e-books independently as the in-built reward features distracted them from truly listening, reading and completing the online comprehension quiz. These findings are consistent with other studies that found certain features of e-books to be distracting to some children (de Jong, and Bus 2002; Zucker, Amelia and McKenna, 2009), and suggested for the need for adult supervision to complement e-book reading (Marchand, 2015).

EdTs also pointed out other drawbacks such as that e-books 1) depends on wifi to work, 2) glitches with technical issues do arise, 3) storyline being less captivating. The storyline of the Raz-Kids e-books compared to the print books may not be as interesting. This was also suggestive by some pupils during their feedback. This can be managed when an assortment of different format books is being used purposefully (Kamil, Intrator and Kim, 2000; Kucirkova, Littleton and Cremin, 2016). Using print books along with e-books was also a theme which emerged from EdTs feedback and the literature review in this study also backs this up. It is possible that for some, e-books offer accessibility options, that are impossible in print (Schneps et. al., 2013). It is necessary to provide children with an assortment of book formats, as well as cater to the different learning needs of children.

Overall, similar to the study by Marchand (2015), it is found that Raz-Kids program when used during shared-reading by a skilled EdT, would be beneficial as a supplement to reading instruction and small group guided reading instructions for early struggling readers. This study also received mixed reviews about e-books distractive features, and it concludes that e-books interactive features such as the incentives feature can be both distracting and a motivating factor, as such this should not be a barrier to utilising e-books, especially since these distractions can be tackled with adult facilitation and deactivation (Roskos and Burstein, 2012).

There were several limitations in this study. First and foremost, the results of this study cannot be generalised due to the small sample size, and the pupils in this study form a varied profile since they've been identified with early literacy learning difficulties. The small sample size of 20 limited the amount of data that could be collected to determine if the Raz-Kids program was successful as a reading intervention for kindergarteners with literacy learning difficulties. Secondly, the intervention group and control group pupils were evaluated during different times of the year. This was due to unforeseen circumstances which resulted in change of control group pupils part way through the intervention. Therefore, the experimental group was evaluated end of the year and the control group was evaluated at the beginning of the year.

Thirdly, the study took place over a short period of ten weeks. There were also some inconsistencies between the pupils and the amount of time spent on the program. Some pupils were absent from class and were not able to complete all of the sessions. Interruptions in the school calendar and staff deployment were also factors, for example, public holidays, and change of class educational therapist due to redeployment, and maternity leave.

In a replication of this study, the variables may be better controlled and results can then be compared. Such as, the sample size in this study is relatively small, therefore it would seem essential to extend this study to a larger population and to discern and analyse trends across various child profiles. It would also seem necessary for standardisation across intervention for both control and experimental groups, such as using identical e-books/books during the intervention, comparable timelines, along with controlling consistency in teaching by using just one experienced EdTs to teach both the control and the experimental group. Employing just one assessor with the least bias, who the children are familiar with across all the pupils will increase assessment reliability and validity.

It is also recommended to utilise universally recognised measurement tools to look at children's reading skills, especially comprehension e.g. The Developmental Reading Assessment (DRA) could be considered.

Future research might also look at parent engagement, and home intervention, which is not examined in this study, as all PELP pupils have access to Raz-Kids and have been encouraged to access it with adults at home. A multi-tiered support approach is key in helping struggling readers (Greenwood et al., 2014) to incorporate guided parent tutoring alongside school-based efforts to extend and improve the quality of learning (Kupzyk et al., 2011). When parents take an active role in their child's reading growth, reading attitudes and reading performance improves (Fredericks and Rasinski, 1990; Kupzyk et al., 2011). Parents' general feedback on the Raz-Kids programme may be presented for future research.

CONCLUSION

This study has contributed to existing literature that Raz-Kids e-books with adult facilitation compliments comprehension, teaching and learning, fosters reading engagement, and supports early readers with an additional avenue to access books. The main findings in this paper after thorough evaluation of all the data gathered, suggest that children from both the control group and experimental group profited from the structured early reading intervention and that both print and e-book readers were a beneficial part of early reading intervention for struggling readers. This study concludes that explicit types of e-books such as the Raz-Kids reading programme may, when used wisely, complement both teaching and learning for young learners, especially those who are struggling to access reading.

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