



ICTs and Early Literacy: Spontaneous Insertions of Preschoolers during Reading, E-book versus Traditional Book

Triantafyllia Natsiopoulou^{1*}, Michael Vitoulis¹ and Maria Bletsou¹

¹Department of Early Childhood Care and Education, Alexander Technological Education Institute of Thessaloniki, Thessaloniki, Greece.

Authors' contributions

This research work was carried out in collaboration with the three authors. Author TN designed the study and wrote the protocol, while author MV contributed to the research framework, performed and managed the statistical analysis. The team of the three authors wrote the first draft of the manuscript, managed the analyses of the study, read and approved the final manuscript.

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ABSTRACT

Aims: The aim of the present study was to examine the active participation of preschool children during reading comparing their reaction between the traditional book and e-book.

Study Design: Cross-sectional study.

Place and Duration of Study: This study took place in Greece, during 2015-2016.

Methodology: The sample consisted of 69 children, aged 3-5 years, who read a traditional book and an e-book. They also participated 5 early childhood educators. At the end of the story the children were asked about their preference in the way of reading the story. Then the interaction of children was analyzed through the approach of "spontaneous insertions" of children based on a system of categories established by previous researches.

Results: It was found that in both reading practices, children made insertions regarding the content of the story, most of which were of low abstraction. In the traditional book reading children made

*Corresponding author: E-mail: tnatsiop@bc.teithe.gr;

significantly more insertions than in reading an e-book, to low abstraction categories (clarification, questions for clarification, names) and to high abstraction categories (relating to real life, recalling). It is noted that most children stated their preference to the electronic reading.

Conclusion: Based on these findings, it could be claimed that reading an e-book may be accompanied by behaviors that characterize the traditional book reading such as comments on the story and children's active participation to reading. Since neither of the two types of books does seem to prevail overall, it is deduced that the combined use of e-book with the traditional book, under early childhood education, could contribute both in children's language development and also familiarize them with digital learning environment.

Keywords: *E-book; traditional book; early childhood education; ICTs; children's insertions; reading; early literacy.*

1. INTRODUCTION

The rapid development of Information and Communication Technologies (ICT) and the need for the educational system to adjust to recent developments led to introduce New Technologies in schools [1]. Its introduction in kindergarten and nursery schools raises many issues. Many parents and educators have a positive opinion regarding the introduction of new technologies in nursery schools as they believe that, through this way, children will be prepared for the use of new technologies that will dominate their life in the future [2-4]. Others argue that computers have no place in preschool education [5]. There are different opinions regarding computers' ability to support young children's development. Other researchers believe that computer-based technologies in the classroom have the potential to facilitate children's learning [6] and others argue that computers are developmentally inappropriate for young children [7] and that they can affect the development of oral language and early literacy in a negative way. It is supported that language and literacy are social skills whose development is based on linguistic interactions with adults [8] and that the use of computers in preschool years can reduce the opportunities of children-adults conversation [4].

The use of e-book in preschool education raises a lot of concerns. E-book is a product of modern technological evolution. It is a print book that has been completely converted to or originated in a digital form [9]. It is a form of book that includes elements of the print book, e.g. pages turned as well as digital features such as oral reading, sound, music, dialogues and animations [10,11]. These features make the e-book very attractive, thus increasing its circulation and use [12]. According to the Association of American Publishers the publication of digital books in the year 2011 raised by 117% while Amazon sells

more e-books than printed ones [13]. Its dissemination in the preschool age led to research focused on whether the e-book can support language development and early literacy.

1.1 Traditional Print Book and Early Literacy Development

Since 1960, it has been observed that reading stories to children in the preschool age is associated with language development and early literacy [14,15]. A series of researches was conducted in which is investigated the relationship between individual characteristics of shared reading and the development of language and pre-reading skills.

First it was mentioned the importance of adults' mediation in the interaction of preschoolers with the books. It was found that adults' behaviors such as frequent reading to the child [16,17], the aesthetic reading, that is carrying out the activity in a warm, friendly atmosphere [18,19] and verbal exchanges between the adult and child during reading [20,21] are basic elements of the contribution of children's books in the development of language and literacy during the preschool years.

Several studies investigated the effect of the content of the book on the development of specific literacy skills which are supported through the verbal exchanges between the adult and child [22,23]. It is observed that reading alphabets books initiated questions and comments concerning letters and generally the phonological field of language, reading children's stories initiated questions and comments concerning the understanding of the history and the text reading with repetitions in the language or history motivated the child to read the repeated points [22].

Moreover it is observed that reading non-fiction children's books caused more language exchanges of high level abstraction, as opposed to reading children's stories where discussions were more of low abstraction, as shown in Table 1. The low abstraction categories are mainly associated with questions and descriptions, made by the children, that are related to images (e.g. describe pictures and explain attitudes, clarifications, questions for clarification, names). The high abstraction categories are related to questions of clarification and justification, e.g. "Why ..." "How ...", on the one hand and questions, on the other hand, that correlate the story with their own experiences, or their own relevant provisions of the outcome of the story [20,24-26].

Other studies suggested that a child's active involvement in reading stories (before, after and during reading) is instrumental to first language learning and that makes children familiar with decontextualized language [27], which is essential to literacy. Studies on children's initiations in literacy activities such as reading and writing showed that children who asked more questions and made more comments in these activities were also more advanced in their language and literacy skills [28]. Children's participation in reading can be prompted by adults or can be spontaneous. During the prompted participation, the adult encourages children to participate in reading with questions and comments while, during the spontaneous participation children ask questions and make comments with their own initiative. Studies have shown that there is a reciprocal relation between adult-children extra textual interactions during reading. In kindergarteners it was observed that

teachers' personal involvement comments prompted children's personal engagement reactions, teachers' reenactment was followed by children's imitations of such reenactments and teachers' voice intonation elicited children's personal engagement comments. On the other hand, children's use of paralinguistic cues and personal engagement comments reinforced teachers' use of voice intonation and personal involvement comments [29]. Other studies have showed that children's participation in reading increased as children became familiar with the book [30]. Researchers believe that children's spontaneous participation in reading is more important than questions and comments addressed to them by adults, because this way children seek information for topics of their own interest, and adult's interference can simply interrupt the reading [31]. Forms of reading that promote children's active participation are the interactive reading style that is accompanied by a rich discussion between the adult and the child, especially the dialogic reading / telling where the child takes on the role of the narrator and the adult the role of the active listener, who answers questions addressed by the child, gives information and encourages with praises, repetition and extension of sentences in order to tell the story [27]. It was observed that dialogic reading contributes to vocabulary development, especially of younger children [32].

1.2 E-book and Early Literacy Development

In recent decades, the dissemination of the e-book in the preschool age led to investigations in order to determine whether the e-book can support language development and early literacy

Table 1. Categories of spontaneous insertions

1. Names	Children name objects, incidents, characters, e.g. "Duckling".
2. Questions about names	Children ask about names of objects, incidents and characters, e.g. "What are they;"
3. Clarifying	Children describe pictures and explain attitudes, e.g. "The fox is crying", "They are sleeping"
4. Questions for clarification	Children ask for explanations about incidents and attitudes, e.g. "Why did they duck?"
5. Relating the story to real life	Children relate incidents in the story to their own personal experiences, e.g. "Once I saw on TV a rabbit that went on an elephant and they flew together."
6. Recalling information	Children point out details in the story and give information, e.g. "He is standing like a swan"
7. Prediction	Children predict the development of the plot, e.g. "Here he wants to cook her."

the same way as the traditional print book. Many respond positively to this question indicating that the engagement of children in the e-book may be accompanied by behaviors that were observed in the use of the traditional book, such as the frequent and repeated reading of the same story which was declared to contribute to the development of language and early literacy [17,23]. It was found that the electronic book provoked and motivated children to engage with it [33,34]. Moreover, it offers the opportunity to those who were unable to read or had reduced reading ability to engage themselves in a pleasant way with the book. Thus children are encouraged to repeatedly read the same story and deal with the book more frequently than if they waited for someone else to read to them [35].

Regarding the question what form of book contributes more to the development of language and pre-reading skills, researches' findings vary. Some researchers who compared traditional and electronic reading found no differences in the form of the book to the understanding of the story [36,37], vocabulary [38] and the phonological awareness [38,39].

A number of researchers observed that the e-book was more effective than the traditional [40,41]. Other researchers [42], in a meta-analysis of the results of 43 studies, found that the e-book has a small but significant effect additional to that of the traditional book in the understanding of the story and the expressive vocabulary of children. However, in previous studies, it was found that the traditional book contributed more than the e-book in the understanding of the story [43] and the vocabulary development [36,43].

The variety of findings on supporting language and literacy by electronic or traditional book can be attributed to the quality and use of e-book conditions [38,41,43,]. Regarding quality, it was found that when the digital features of the e-book focused on understanding the text, they facilitated the understanding of the story, while when they concerned mainly the entertainment these features distracted children from the story and complicated its understanding [42,43]. It is argued that certain characteristics as animation, music and sound, can facilitate the comprehension of history and enrich the expressive vocabulary, while some interactive elements like hotspots, games and dictionaries may distract children from the text [42]. It has

been suggested that when children are guided by an adult during the use of the e-book, they perform better, have higher performance in reading words, better knowledge of the written language and phonological awareness than if they deal with it alone [41]. Also researches showed that children who were engaged with e-book through an adult they asked more questions and comments than when dealing with it alone.

Studies which examined the adult-child extratextual interactions showed that reading a e-book may be accompanied by behaviors that characterize the reading of the traditional print book [12,44]. However, between reading the traditional book with an adult and the child's involvement in the e-book through an adult, it was observed that children participated more in the reading of traditional books [33,46].

Regarding the issue of insertion's type of research findings vary. Some researchers have observed that, when reading traditional books, children showed more low abstraction level insertions (labelling) than while reading the e-book [33]. Others found that children, when reading the traditional book, showed more insertions of low abstraction than of high abstraction, while reading the e-book they showed more insertions of high abstraction than of low abstraction [45]. However, there have been researches in which no differences were observed in the level of abstraction of the verbal exchanges between adults and children during the traditional and electronic reading [44].

The goal of this research was both to investigate the quantity and type of spontaneous children's insertions in reading the same story from a traditional book and e-book and to examine the preference of children between the two types of books.

2. MATERIALS AND METHODS

This study took place in Greece, during 2015-26, in a self selected group of five different preschool centers. The sample consisted of 69 children from low-income families, aged 3-5 years, of which 33 were boys and 36 girls. It is a quasi-experimental design research that utilizes quantitative observation data while future research of high methodological quality is essential for improving our knowledge of effective uses of e-books in early childhood education. They also participated 5 early

childhood educators. The criteria for selecting the particular educators were to work for this preschool center in order to have familiarity with children, to be willing to participate in the research and to attend a seminar for the purpose of the research project. The adoption of other criteria such as education, experience, personality traits and other capabilities, is considered to create a research bias condition, since research interest focuses on the type of book rather than the teaching ability of the educator.

The materials used were two picture story books which were accompanied by CD. These books were: a) When the ladybug met the elephant by Christos Boulotis, editions A.A. Lebani and b) Pupo and Carlotta by E. Trivizas, editions Routledge. These books were selected because they are considered as developmentally appropriate for children of preschool age, while they are popular and their content is characterized by high quality. It is also considered that the e-BOOK fulfills certain quality requirements as the digital features of the e-book focus on understanding the text and not exclusively on children's entertainment. The level of quality is supported by certain digital characteristics as animation, music and sound which focus on understanding the text, facilitate the understanding of the story, with no exaggeration of the interactive elements which distract children from the text [41-43].

For the collection of the data the educators were asked to read to each child individually the same story, one time from the traditional book and some other day its online portrayal on the computer. The guidelines were to read the traditional book as they did in class and in the online reading, after they showed the children how to turn the pages by pressing the keys, to sit beside them to help them in case they have difficulties. The two forms of reading were performed in a quiet room of the nursery and were recorded by the educators. The order of the two types of reading was changing and it was not always the same so as not to affect the result by the order of reading type. After the second reading educators asked children when they liked the story the most (traditional or electronic reading), why and how they would like to present their story if they read it again.

After that, the two authors categorized the spontaneous insertions of children based on a system of categories established by previous

researches, who studied the level of abstraction (abstraction level) of extratextual interactions between parents and children reading stories from traditional books [20,46-47].

As "spontaneous insertions" are determined, all kinds of questions and statements constitute a reason for discussion.

The spontaneous insertions, after they were collected, they were coded and distinguished in seven categories as they shows in Table 1.

About the reliability of coding interventions the authors, firstly, categorized the extra-textual interactions of five readings. Then, they discussed with three colleagues, who had read the readings, about the categorizing and no different opinions expressed. The statistic analysis of the insertions was performed with the statistic software SPSS 21.00 and involves: a) descriptive statistics, b) frequency statistics, c) mean comparisons (independent samples t test, paired t test) and cross-tabulation statistics. As minimum level of significance the $p < 0.05$ was taken into account.

3. RESULTS AND DISCUSSION

As it becomes obvious in Table 2, the majority of children's insertions in both reading formats were of low-level abstraction. Specifically, in the traditional book reading children made more interferences to categories clarifications, questions for clarification and names while reading e-book in the categories clarifications, questions about names and questions for clarification. It is also revealed that while reading the traditional book children made more insertions than when reading the e-book. In statistical adjustment level, it appears that children who did more low-level abstraction (low abstraction (type of 1-4, in both readings), tended to prefer the e-book ($X^2 = 17,307$, $p = 0,00$, $r = 0.41$) (Fig. 1). Also noteworthy is that children who did more interventions during the reading of the traditional book these when asked stated their preference in the e-book ($X^2 = 13,107$, $p = 0,03$, $c = 0.33$) (Fig. 2).

According to Table 3, children made significantly more insertions while reading the traditional book than when reading the e-book and in the categories names, clarification, questions for clarification, relating the story to real life and recalling.

Also it was found that children who said that they preferred the e-book while they made more interventions with questions listed in the name when reading traditional books ($X^2 = 8,908$, $p = 0,01$, $r = 0.49$) while reading the e-book, they went to more deterministic queries on names (Questions about names) ($X^2 = 3,337$, $p = 0,05$, $r = 0.62$) and further explanatory questions (Questions for clarification) ($X^2 = 1,946$, $p = 0,05$, $c = 0.54$). As a result, the reaction is consistent

with a preference between the traditional book and e-book.

Children's persistence was assessed by the educator with the alternative "Yes" or "No". The "yes" or "no" referred to the final judgment of educators on children's persistence and was based on a detailed descriptive assessment (Rubric), commonly followed by five educators. It is remarkable that the majority of children

Table 2. Number and percentage of children's insertions during books reading

Children's insertions	Traditional book		E-book	
	N	%	N	%
1. Names	50	16.72	14	10.52
2. Questions/name	31	10.36	31	23.30
3. Clarification	80	26.75	41	30.82
4. Questions/clarification	55	18.30	16	12.03
5. Relation to real life	34	11.38	11	8.28
6. Recalling	36	12.05	11	8.28
7. Prediction	13	4.35	9	6.77
Total	299	100	133	100
low versus high level abstractions				
low-level abstraction (1-4)	216	72,13	102	76,67
High-level abstraction (5-7)	83	27,77	31	23,33
Total	299	100	133	100

Table 3. Means and standard deviation of children's insertions during book readings

Children's insertions	Traditional book Means (SD)	E-book Means (SD)	t	P
Names	0.72 (1.34)	0.20 (0.47)	3.32	0.01
Questions/name	0.44 (0.93)	0.44 (1.78)	0.00	1.00
Clarification	1.15 (1.95)	0.59 (1.01)	2.15	0.03
Questions/clarification	0.79 (1.59)	0.23 (1.13)	3.38	0.00
Relation to real life	0.49 (0.79)	0.15 (0.40)	3.84	0.00
Recalling	0.52 (0.85)	0.15 (0.44)	3.51	0.00
Prediction	0.18 (0.52)	0.13 (0.41)	0.70	0.48
Total	4.36 (4.29)	1.92 (3.49)	4.55	0.00

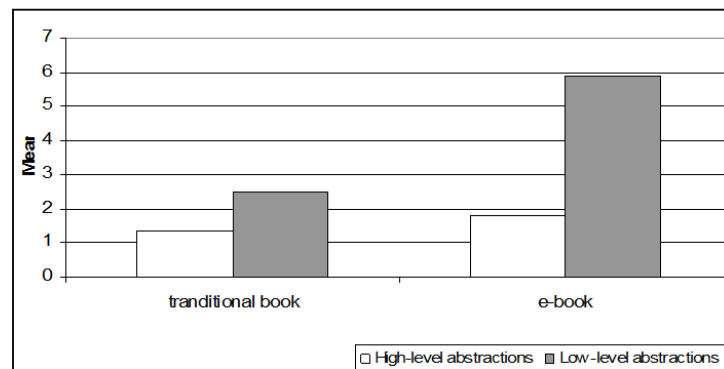


Fig. 1. Children's preference for book's form by "High/Low Level" abstractions

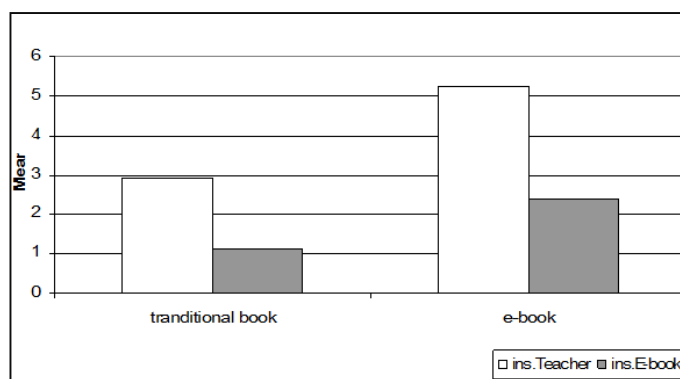


Fig. 2. Children's preference for book's form by interventions during the reading

showed caution in dealing with the e-book, as shown in Table 4. It should also be noted that the majority of the distinct percentage of children (26%) that did not pay attention, was girls. Furthermore, it was found that boys were more focused on reading history than were girls ($X^2 = 6,398$, $p = 0,00$, $c = 0.64$). Also, it is pointed out that children who showed bigger degree of attachment, preferred the e-book ($X^2=3,313$, $p=0,05$, $g=-0,46$).

According to Table 5, the majority of children preferred the electronic reading of the story, while many others preferred the reading to be done by the educator.

Table 4. Children's persistence during e-book reading

Persistence	Boys	Girls	Total
Yes	29 (87.90%)	22 (61.10%)	51(73.90)
No	4 (12.10%)	14 (38.90%)	18(26.10)
Total	33 (100%)	36 (100%)	69(100%)

$$X^2 = 6.39, df = 1, p = 0.01$$

Table 5. Children's preference for book's form

Book	Boys	Girls	Total
Print book	10 (30.3%)	16 (44.4%)	26 (37.7%)
E-book	23 (69.7%)	20 (55.6%)	43 (62.3%)
Total	33 (100.0%)	36 (100.0%)	69 (100.0%)

$$X^2 = 1.46, df = 1, p = 0.22$$

3.1 Discussion

It is argued that reading books is an important activity for the development of language, literacy and school success of children [17]. In the case of preschool children, adults' mediation is

required so that they can read books. The launch of e-books that combine features of traditional book with digital elements allow children who do not know how to read to listen to stories from the computer or other devices without the direct, visible presence of the adult who can read. This feature affects the child's behavior when reading, even with the mediation of an adult.

The purpose of the present study was to examine the active participation of preschool children during reading and particularly comparing their reaction between the traditional book and e-book. The results showed that in both types of reading children made insertions based on pictures which were relevant to the content of the story, a finding that is supported by previous research [48]. This finding was expected since it has been observed in previous studies where the traditional book was used that most of the children's insertions during reading picture books were related to images and that the children's stories as a genre referred to the commentary content of the story in order to understand it [22].

Also, it was found that while reading the traditional book children made more insertions than when reading the e-book. At this point our research agreed with researches which showed that the traditional reading caused more verbal exchanges between the adult and child compared to the online reading [33,45,49]. This observation supports the view that the e-book as a material serves better the listening of the story and so it causes less verbal exchanges between the adult and the child regarding the written word or text than the traditional book [45,50]. Regarding the kind of insertions, is concluded that in both traditional and online story reading, the majority of children's insertions were in the

categories names and questions for clarification, which are considered low-level abstraction as they are related to evidence brought by images [20, 46]. This behavior of children is supported by previous studies where parents read traditional books to their children [47]. This strengthens the view which argues that, children's books that narrate stories cause linguistic exchanges between the child and the adult, which is more low-level abstraction [47,51,52]. This study observed that children made more insertions during traditional reading than in electronic reading, both at low abstraction categories, such as names and questions for clarification, and to high abstraction categories such as linking the story with their personal experiences. These findings are partly consistent with observations by other researchers [33,49]. According to Moody, Justice, & Cabell [33] when children were reading traditional books made more insertions in the category names than when reading e-book, and found no differences in high abstraction categories. On the contrary, Parish-Morris et al. [49] observed that children aged 3-5 years made more high abstraction insertions (connection of story with personal experiences) with the traditional reading of the story and found no differences in low abstraction insertions (related story). However, other researches have shown that children made more insertions, both overall and in individual categories in the electronic reading of the story [38,45]. Kim & Anderson [45] found that when reading traditional books children made more low abstraction insertions than of high abstraction, while when reading the e-book they made more insertions of high abstraction than of low abstraction. Some researchers attribute these differences in the quality of the content of the e-book [53]. Moreover, even in studies where there was a greater contribution of the e-book than that of the traditional book in language development and literacy, the e-book was designed to support the development of language and literacy [38] or was used by a child with an adult [41]. However, generally speaking we have not fully clarified the requirements and the contribution of the electronic book in the language and pre-reading skills. What could possibly help the development of such skills is the application of techniques and behaviors used for the reading of traditional books to the reading of the e-book such as adult questions to the child, clarification, feedback, expansion of children's phrases, praise. According to Roskos & Burnstein, [12] the above mentioned practices caused the improvement in the enrichment of vocabulary. In this study it

appears that children can actively participate in the electronic reading of a story making insertions of low and high abstraction, which are considered important for the development of language and early literacy.

In some studies it has been supported that children paid more attention to the story when reading it from the e-book than reading the traditional book [10,33]. In this research children attended the whole reading process of the traditional book as a normal activity. However, during reading the e-book, children's behavior changed. Although most of the children attended with enhanced attention, mainly girls, some were losing their concentration and were facing some difficulties. These difficulties associated with problems such as synchronizing the page they saw and the text they heard. Therefore, it is concluded that the use of e-book requires children's additional skills than those needed for the traditional book. [12,54].

Regarding the preference for traditional or electronic reading, most children said that they prefer to hear the story from the computer because «it's nicer that way», "because there is music", "it is bright and I like", "because it has buttons", "it's bigger" and "because I like playing on the computer ". However, other children preferred to hear the story from the educator because "the book is closer," "I like to touch the book", "that book has pretty pictures", "because I can't ask the narrator in the computer", "this is the way my mom reads rather than from the computer."

Highlighted, as a research limitation which should be taken into account when generalizing research results, is the relatively small number of the sample and the specific socio-cultural conditions in Greece, as well as the particular characteristics on digital literacy that characterize Greece versus other "advanced countries".

4. CONCLUSION

Children today are raised in a rich technological environment. The expansion of new technologies in all aspects of human activities has caused many changes in learning processes. More specifically traditional and digital techniques such as print and digital media, print and digital texts are used in the literacy today. Regarding the possibility of digital support of oral language and early literacy, studies do not give clear answers.

However, they suggest that the digital support is possible under consideration.

Firstly, appropriate technology should be used. It was observed that when digital devices were appropriate for preschool age, children learned quickly how to use them and happily engaged with computer based literacy activities [55]. However, when they faced technical difficulties they were disappointed and left the activity [4].

The educators should choose and use quality e-books, appropriate for the support of early literacy. Studies of e-book design show that many children's e-books are mediocre at best, offering low level multimedia, interactivity and literature [12]. According to researches' results, e-books with animated pictures related with elements and included in the texts, were appropriate for the development of the vocabulary and the understanding of the story. On the contrary, when the animated pictures were unrelated with elements on the text, they removed children's attention from the text and it was possible that the e-book would not contribute to the development of the vocabulary and the story's comprehension [42,56].

Alongside with the quality of e-books, attention should be paid in the adults' mediation during its use. Current research identifies adult's interactions when shared e-book reading is scarce [35]. However, researches' results suggested that adult's support might provide additional benefits beyond the digital features in e-books [45,53]. It seems possible that educators who consider the functions of digital features and then intentionally pair a reader with a book based upon specific scaffolding supports will achieve higher levels of early literacy development [57]. Based on what is mentioned above, it could be accepted that the e-book can contribute in the development of language and literacy in the preschoolers but it cannot substitute the adult's involvement [35].

Along with traditional shared reading and read aloud activities, educators can use e-books in order to enrich the reading experiences of the children [12].

Modern technological developments lead to the establishment of an environment where the electronic speech will be equally, if not more important, to the printed one. The use of electronic books, in preschool age, alongside with the traditional ones could support the development of language and literacy, while it

could also prepare children for the digital environment of their subsequent training.

CONSENT

All authors declare that "All parents of children who participated in the investigation were informed. No objection has been expressed about it".

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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