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| RESEARCH ARTICLE

Digital Reading among Children in Saudi Arabia

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| ABSTRACT

A sample of parents in Saudi Arabia was surveyed to find out the reading technologies that children under the age of 12 use, children's digital reading habits and interests, parents' roles in encouraging the children to read digitally, the effects of digital reading on children's reading ability, and to compare digital reading before, during and after the Pandemic. Survey results showed that all the children in the sample use a smart phone to access apps, games, cartoons, and YouTube videos. About 41% use an iPad or tablet and few use their parents or older siblings' laptops. None of the children in the sample uses an e-reader such as Kindle. 5% do not like to use an iPad/tablet and prefer to use their parents' smart phones. Children below the age of 6 use touch screen devices in reading the English and Arabic letters, numeracy and words. They enjoy reading on touch screens. 36% of the children in grades 1-3 use touch screen devices in learning to read and 64% use them for games and entertainment. Children in grades 4-6 mainly use touch screen devices to play games, soccer, car races and watch movies mostly in English and do not use those devices for reading purposes. Older children feel that educational and language learning and reading apps are boring. During the pandemic, children used technology intensively due to remote teaching and learning, i.e., more than before and after the Pandemic. About half of the parents do not share, nor supervise reading from touch screen devices with their children whether during, before or after the pandemic. Despite the advancements in digital reading, most parents and children in Saudi Arabia still prefer print books and stories. Mobile audiobooks, electronic reading games, storybooks, picture books and glossy magazines, reading lessons with a digital, human-like character, WhatsApp remote reading, online book clubs, and children's digital libraries are not used. Therefore, this study recommends the integration of digital reading in the school curriculum, raising parents and teachers' awareness of digital reading devices, reading apps and websites and designing mobile reading apps with interactive features to motivate older children to read Arabic fiction and short stories.

| KEYWORDS

Reading technologies, reading devices, touch screen devices, digital reading, e-books, Saudi children, leisure reading, reading apps, reading habits, digital reading skills.

| ARTICLE INFORMATION

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1. Introduction

Digital books are e-books, story apps, picture book apps, and interactive stories that can be read on a mobile phone, iPad, Tablet, computer screen, or an e-reader like Kindle. A digital book is similar to a paper book, but it has an electronic format, such as books on CD, e-books presented on touchscreens with multimedia and interactive features (Kucirkova, 2019).

Due to the importance and prevalence of digital reading by students of all ages, in many countries around the world, numerous studies in the literature investigated the types of technologies used in digital reading such as electronic storybooks (Savva, Higgins & Beckmann, 2022); digital audiobooks for students with reading disabilities (Esteves & Whitten, 2011); electronic picture books and digital glossy magazines (Guernsey, 2011); e-readers like the Kindle, Nook, and Sony e-Reader and internet resources to support comprehension (Wright, Fugett & Caputa, 2013; Guernsey, 2011); computers and smartphones (Yadav, Chakraborty, Meena & Yadav, 2022); the iPad (Wang, Christ & Mifsud, 2020); mobile games as Kes Sesi, to improve kindergarteners' recognition

of letter sounds (Samur, 2019); technology-based reading support to help rural learners in the early-grades in South Africa to make substantive gains in their schooling (Castillo & Wagner, 2019); online book clubs (Scharber, 2009); the international children's digital library (Lemmons, 2009); the Affable Reading Tutor (ART) to design online reading lessons with a digital, human-like character (virtual peer) that demonstrates the use of the "questioning" reading comprehension strategy to help improve the children's comprehension of expository texts (Kim, 2013); App Books Digital Affordances (Christ, Wang, Chiu & Strekalova-Hughes, 2019); WhatsApp remote reading recovery to promote literacy in Panama during COVID-19 (León, Svenson, Psychoyos, Warren, De Gracia & Palacios, 2022) and others.

A second line of research revealed the advantages of using digital reading by children. For example, Savva, Higgins and Beckmann (2022) found a low positive effect of e-books compared to print books on language and literacy development in children, a significant positive correlation between multimedia e-books and the development of code-related skills and a moderate positive effect on vocabulary learning.

In addition, comparisons of children's reading on the screen vs paper book reading revealed lower comprehension scores for digital books. Adult mediation during print book reading was more effective than story enhancements included in digital books during children's independent reading. However, with story-congruent enhancements, digital books outperformed paper books (Furenes, Kucirkova & Bus, 2021). In a study in Singapore, the use of digital technology in English and Chinese positively predicted the reading scores of seven-year-old Chinese children in both languages. Findings confirmed the role of digital technology and bilingualism in developing children's early reading skills (Haoning Mah, Hu & Yang, 2021). Listening to a professional narration and simultaneously reading the digital text with synchronized highlighting, using e-book tools and features supported sixth grade students' reading comprehension, vocabulary development, and reading motivation (Larson, 2015); children aged nine and ten years employed hyperlinks more often while reading from a smartphone than a computer (Yadav, Chakraborty, Meena & Yadav, 2022).

A third line of research investigated digital reading habits of children. Studies by Kucirkova and Littleton (2016), Kucirkova and Flewitt (2022), and Kucirkova and Flewitt (2022) surveyed young children's use of digital media and e-books, with a focus on children's reading for pleasure and shared reading with parents at home. Results of a survey with 1511 parents and 1510 children in the UK aged 0-8 years showed that most parents had concerns over children's use of interactive e-books which included the increase of screen time (45%); losing interest in print books (35%); exposing children to inappropriate content (31%), too much advertising (27%); negative effects on children's attention span (26%); reducing parents' ability to monitor what the children look at (22%), purchasing add-ons without parents' knowledge (21%); inhibiting learning (14%); and harming children's brains (10%). The parents added that they needed advice on interactive e-books particularly how e-books can be harnessed to support their children's learning (62%) and how they can be used to entertain their children (58%). The children preferred print books especially for reading for pleasure (76%) and educational reading (69%) over interactive e-books or simple e-book reading for pleasure and educational reading (15%). 52% of the parents preferred print books over e-books for reading for pleasure because their children like turning pages, the children like to own their print book (43%) and they like choosing books from the library (41%). 48% reported that their children preferred e-books because they enjoy using digital devices, 39% like to interact with the e-book and 35% like the additional features. Even highly digitised home environments used print books with their children. Although 73% of children and 92% of the parents considered themselves to be efficient technology users, only 19% used an e-reader daily and 57% never used an e-reader although they had one at home.

Other studies in the literature revealed that the digital contact habits of elementary school students during the Covid-19 pandemic were different from that before the Pandemic. The addiction rate increased during the COVID-19 as one out of every four children was digitally dependent (Kazaz & Dilci, 2022). Children exhibited no clear preference for any medium and no medium had any effect on text comprehension. Inferential comprehension was lower on the screen for lower levels of word reading skills, but similar for the two media as word reading increased. Results also showed that children who were beginners, those who used technology for learning, and those who were fast and accurate in word reading exhibited comprehension advantages in digital reading. The effects of the medium on beginner readers' text comprehension interact with fundamental reading skills and experience with technology (Florit, De Carli, Lavelli, Manuela & Mason, 2023). The receptive and expressive language scores of children aged 4 and 5.5 years in Turkey in a digital and traditional reading group slightly changed as a result of digital and dialogic reading. Teacher-children and children-children interaction was very limited in the digital and traditional reading group (Simsek & Isikoglu, 2021).

A fourth line of research focused on how digital reading is taught and the factors that affect digital reading. Lim and Toh (2020) indicated that reading is the act of deriving meaning from media on a digital screen. They proposed a taxonomy for teaching digital reading that included knowledge of linear and deep reading strategies; basic and critical information skills; and multimodal semiotic awareness. Aspects to pay attention to while students are engaged in digital reading and awareness of how the various semiotic modes make meaning are fundamental for effective digital reading.

Examples of teaching strategies include student participation in a digital collaborative storytelling activity (Liu, Yang & Chao, 2019); interactive digital book reading in families with refugee backgrounds (Cun, 2022); use of an interactive e-book learning system (Huang, Liang & Chiu, 2013); e-book interactivity designs (Wang & Yang (2016); technology-based reading support (Castillo & Wagner, 2019); organizing shared digital reading in groups (Hoel & Tønnessen, 2019); partnering with families to use screen time for supporting early language and literacy (Tatar & Gerde, 2023); interactional reading aloud by young children and parents, reading aloud by either a speaker using a preface, using a question or reading aloud from the screen with parent-child interactions (Davidson, Danby, Ekberg & Thorpe, 2021); narrative and informational linear texts (Florit, De Carli, Lavelli & Mason, 2023); and parent–child engagement, parents' verbal scaffolding, children's age, and the congruence between a book's narrative and its interactive and multimedia features (Kucirkova, 2019); the presence of an overview to facilitate reading comprehension for readers with lower prior knowledge, basic digital text features and accompanying comprehension questions (Fesel, Segers & Verhoeven, 2018); using digital peers to help children's text comprehension and perceptions (Kim, 2013); integrating audio and visual text information to improve standard read-aloud technology with gaze-contingency and self-adaptable techniques to personalize the reading experience (Schiavo, Mana, Mich, Zancanaro & Job, 2021); videotaping readings of one specific picture book app, with a focus on the strategies used by teachers in early childhood education to control children's access to the medium and the types of verbal engagement (Lim & Toh, 2020).

Regarding digital reading among children in Saudi Arabia, there is lack of studies that investigate the use of reading technologies by children in Saudi Arabia, their digital reading habits and teacher and parents' involvement in digital reading activities at home and in the classroom, or strategies of teaching and learning digital reading by children. Therefore, this study aims to explore the reading technologies that children under the age of 12 use, whether children in Saudi Arabia prefer digital reading or print book reading, their digital reading habits, interests, and motivation; parents' roles in encouraging and guiding the children to read digitally; the effects of digital reading on children's reading skill development as perceived by their parents; and digital reading by children before, during and after the COVID-19 Pandemic.

This study is highly needed because reading patterns have changed as a result of recent advances in technology, the extensive use of the internet, the use of various forms of reading materials, mobile apps, and the rising popularity of digital reading materials and devices. Results of the study will shed light on the recent changes in Saudi children's digital reading preferences, the media from which they read, and the reasons for adopting e-book reading or sticking to traditional paper books which are not currently fully known. Therefore, exploring the demographic and motivational differences between traditional print readers, digital readers, and those using both types of reading media has become a necessity.

Moreover, this study is significant because it is part of a series of studies that the author has conducted about reading technologies, digital reading, reading habits, interests and motivation by male and female adults, college and high school students such as digital reading among educated Arabs (Al-Jarf, 2023a); reading habits and motivation among educated Arabs in the age of social media and distractions (Al-Jarf, 2023c); educated Arabs' reading interests and preferences before, during and after the pandemic (Al-Jarf, 2022a); reading interests of university female students (Al-Jarf, 2022f); what college students read in the age of globalization (Al-Jarf, 2004b; Al-Jurf, 2004c); quality in teaching reading to high school students (Al-Jarf, 2019a); mobile fiction apps for enhancing EFL students' reading and appreciation skills (Al-Jarf, 2022e); collaborative mobile ebook reading for struggling EFL college readers (Al-Jarf, 2021a); teaching reading to EFL freshman students with mind-mapping software (Al-Jarf, 2021d); integrating online courses in college reading and writing for translation students (Al-Jarf, 2010); teaching reading to EFL Arab students online and maximizing freshman students' reading skills with online instruction (Al-Jarf, 2019b; Al-Jarf, 2009); reading in the app store (Al-Jarf, 2012); enhancing reading and speaking skills through multicultural children's short stories (Al-Jarf, 2015); integrating web-conferencing platforms such as Elluminate in reading instruction (Al-Jarf, 2014); enhancing students' performance with online reading and writing activities (Al-Jarf, 2013); and developing and testing reading skills through art texts (Al-Jarf, 2011).

Likewise, this study is part of a series of studies conducted by the author on the use of technology and teaching and learning English and Arabic languages and reading to Saudi children such as the differential effects of the iPad on Arabic and English language acquisition by Saudi children during the pandemic (Al-Jarf, 2021b); the effect of the iPad on Saudi young children in the home environment (Al-Jarf, 2021c); learning English by kindergarten children in Saudi Arabia (Al-Jarf, 2023b); English language education at the elementary school level in Saudi Arabia (Al-Jarf, 2022b; how parents promote English and Arabic language proficiency in elementary school children in Saudi Arabia (Al-Jarf, 2022c); teaching English to children under the age of six (Al-Jarf, 2020; Al-Jarf, 2005); Arabic websites for preschool children (Al-Jarf, 2004a); first, second and third grade students' word identification difficulties (Al-Jarf, 2018; Al-Jarf, 1994); classification of word identification and reading comprehension questions in elementary basal readers (Al-Jarf, 1992; Al-Jarf, 1989) and others.

Results of the current study will help teachers, and parents to effectively integrate digital reading at home and in the classroom, by introducing them to reading devices, reading apps and digital reading formats. The results will guide the development of future

devices and applications to better meet Arab children's digital reading needs. They are also useful to professionals who develop e-contents, e-resources and a variety of e-learning and reading interfaces and apps for younger and older children.

2. Methodology

2.1 Subjects

The subjects consisted of 178 parents and their 218 children. Analysis of the demographic data showed that 6% of the parents in the sample have a Ph.D., 30% have an MA and 64% have a B.A. degree. 77% of the mothers are working and 23% are not working. Parents in the sample are specialized in IT, education, social work, English literature, linguistics, translation, business, home economics, library science, Islamic studies, biology, law, physical therapy, and pharmacy.

The children's sample was divided into 3 subgroups: (i) 38% of the children were between 1-6 years old (in kindergarten, and preschool), (ii) 31% were between 7-9 years old (in grade 1-3), and (iii) 31% between 10-12 years (in grade 4-6).

2.2 Data Collection and Analysis

Parents answered open-ended questions sent to them via WhatsApp. They were asked about their children's age, grade level, which reading devices and reading apps they use, to give examples of English and Arabic language apps used by the children that promote their reading skills (alphabet, pronunciation, vocabulary, spelling, reading comprehension… etc.); whether the parents help and supervise their children while using technology, the kind of help they provide and what they think about reading English and Arabic using reading technologies.

Furthermore, the author interviewed 30 children to find out in what ways the use of technology affects their reading in Arabic and/or English, which reading skills they have developed more and which apps they find the most useful in reading and language learning.

Parents and children's responses were compiled and sorted out according to the questions asked. The percentages of parents and children giving the same responses were computed. Parents and children's points of view are reported qualitatively as well.

As a reliability check, the author tallied, classified, and quantified parents and children's responses twice with a 2-week interval between them. Variations in analyses were corrected.

3. Results

3.1 Status of Digital Reading by Children in Saudi Arabia

Parents' responses to the questionnaire-surveys showed that almost all the children in the sample use a smart phone to access apps, cartoons and YouTube videos, with older children having their own smart phone. About 41% use an iPad or tablet to access apps, games, cartoons and YouTube. Few use their parents or older siblings' laptops. None of the children in the sample uses e-readers such as Kindle, Nook or Sony eReader. 5% of the children do not like to use an iPad or tablet and prefer to use their parents' smart phones.

Data analysis showed that 75% of the parents believe that touch screen devices (the mobile phone, iPad, and tablet) have a positive effect on children's reading development (6% believe that touch screen devices have a positive effect on learning Arabic only; 13% think they have a positive effect on learning to read in English only; 56% believe that they have a positive effect on learning to read in both languages); 2% indicated that the mobile touch screen devices have some effect on their children's reading skill development; and 23% pointed out that the touch screen devices phone have no effect on children's reading development.

Interestingly, parents indicated that technology is more effective in helping children under the age of 6 in their reading activities than older children. In general, 23% of the children under the age of 6 use apps for learning to read the Arabic Alphabet; 16% use apps to learn to read the Quran; 13% use apps to learn numeracy and arithmetic; and another 13% use animal apps. The rest use miscellaneous apps. The children use apps to learn to read the Arabic alphabet, numbers, names of animals, animal sounds, shapes, fruits, vegetables, colors, body parts, clothes, and seasons. They learn to read and spell Arabic words through watching their favorite TV channels on touch screen devices such as: افتح يا سمسم *(Open Sesame),* طيور الجنة *Tuyoor Al-Jannah (Heaven's Birds T.V. Channel),* براعم *(Bara'em Kids' T.V. Channel),* برنامج عدنان *(Adnan for learning to read Arabic and the Holy Quran).* Parent also gave examples of apps that their children use to learn to read Arabic such as: معلم الحروف *(Alphabet Teacher);* الحروف العربية *(The Arabic Alphabet);* حروفي المرحة *(My Fun Letters);* معلم الأرقام *(Numeracy Teacher);* مقاطع يوتيوب لأناشيد تعليم الحروف *(Alphabet songs on YouTube);* صوت وكلمة *(Sounds & words);* قصص الأطفال *(Children's Stories);* قران ربي *(God's Quran);* نبي الرحمة *(Prophet of Mercy);* صح ام خطأ *(True or False);* and قصص الحيوان *(Animals' Stories).*

Furthermore, 46% of the children under the age of 6 use touch screen devices to learn English more than Arabic because they go to international kindergartens; they lived abroad when their parents were studying in an English-speaking country; their parents are English teachers; and the parents want their children to know English and read in English. The parents indicated that the touch screen devices help their children learn English from YouTube videos, Ames and Barney videos very easily. They learn English songs, nursery rhymes and words from flashcards. They learn the English alphabet, names of colors, fruits, vegetables, animals and the continents from special apps. Apps help them develop their ability to discriminate sounds and improve their pronunciation. They recognize the shapes of English words as a whole and practice inferring the meanings of English words from pictures associated with them. Some learn how to construct sentences. They memorize some English sentences and phrases which they can use in certain situations later on. Examples of the English language learning apps which the children use are: *LETTER School, ABC Song, ABC Letter Tracing, Endless ABC, First Words Sampler, and Read Me Stories.* Some parents wrote:

> **Johara**: *I noticed a difference in my 3-and 5-year-old children's ability to read in Arabic and English before and after using the iPad. Their ability to read Arabic and English has improved a lot.*
>
> **Maha**: *My daughter is 2 years old and he has learnt the Arabic letters, words, pronunciation, and she recognizes the shapes of whole words used in downloading, opening, and closing apps. In English she can read simple words like "yes, no, one, two, only, no more".*
>
> **Suzan**: *My daughter is 5. He learnt to read animal names such as "crocodile, lion, monkey" by watching animal video clips in English on YouTube.*
>
> **Lana**: *My 4-year-old son learnt to speak from the Pappa Pig English Episodes app although it is a pig family. He can read the names of all animals even difficult ones such as (Peacock, hippo, rhino).*
>
> **Lamia**: *I have a 2-year-old son. He knows some English letters and can connect the spoken sound and the written form in English. He knows a variety of words. He sings songs about the healthy food, family, how to brush teeth. He also knows the numbers, shapes in Modern Standard Arabic.*

For children in grades 1-3, 36% use touch screen devices in learning to read and 64% use them for games and entertainment such as watching movies, and T.V. series, soccer matches, wrestling and others. More children use touch screen devices in learning to read English than Arabic because their parents believe that kids do not need to learn to read Arabic as it is their native language and can learn to read it easily and spontaneously.

Since Arabic is diglossic, i.e., has a Standard form used in education, the media and formal situations, and a Colloquial form used in daily conversation with family members, friends and people in the community, the children benefit from the touch screen devices in pronouncing Standard Arabic words correctly, learning new Standard Arabic vocabulary and expressions, and new slang words from movies, cartoons and games such as اشعر بالحزن *(I am sad),* ارجوك *(please/I beg you),* (store), أحمق *(idiot),* اركض *(run),* غبي *(unintelligent),* سكة *(path, railway),* فديتك *(I adore you),* names of Arabic clans and football players. Moreover, they read some Suras from the Holy Quran and some stories about the Prophets. They learn to read, write, and spell by trial and error in order to communicate with their relatives and friends on WhatsApp.

In English, children in grades 1-3 read some English words that very frequently occur in games such as "*play, cancel, quit, download, start, end, finish, game*" and learn general English vocabulary such as "*delicious, amazing, good job, funny, sad, happy, good morning, good afternoon, good night, impossible*". They also learn English opposites. Some parents said:

> **Abdullah**: *My child asks me how read this word and that word and the meaning of some sentences.*
>
> **Amal**: *My daughter learnt to read English words that she encounters in games so that she can download apps, read instructions and turn the network on and off.*
>
> **Sara**: *My daughter has been using new Arabic words that I never used with her. She can express herself orally in Standard Arabic. She has learnt how to correctly pronounce words that she used to mispronounce in the past, although I never corrected her. She can tell the difference between correct and incorrect pronunciation. She uses Standard Arabic words and expressions such as "please, thank you, good job, ladder, fireman, you are a short-tempered mommy".*
>
> **Nada**: *My children only play games on the iPad, but they have memorized the shapes of some English words which they see very often in English games. They know their meaning even though they do not know how they are pronounced as "play, start, game, end, finish, cancel, quit, download."*

By contrast, older children in grades 4-6 mainly use touch screen devices to play games, soccer, car-races and watch movies mostly in English and do not use those devices for reading purposes. Children in this category also feel that educational and language learning and reading apps are boring.

3.2 Digital Reading Before, During and after the Pandemic

During the COVID-19 pandemic, there was a sudden shift from face-to-face teaching and learning to online teaching and learning even at the kindergarten and elementary school levels. The children were using a special platform called Madrasati run by the Ministry through which they could access and attend their online classes. They could respond, read, write and communicate with the teacher through the platform. 56% of the parent reported that during the COVID-19 Pandemic, they used to attend their children's online classes to supervise them, follow them up and make sure they are attentive and are not busy with something else during the online class session. After online classes, they would clarify the points that are difficult for the child, and make sure the children were doing their assigned reading and homework. Those parents helped their children in using the platform and other technologies involved such as the digital textbooks. During online tests, those parents would read the test questions for younger and struggling children. Some parents mentioned the following:

> ***Samia:*** *Some children need technical help such as clicking links, changing from the platform to an application, and changing some settings.*
>
> ***Nadia:*** *I used to attend my son's online classes to help him with information and skills that could not be taught online such as penmanship skills. To locate a page or exercise or help him in decoding difficult vocabulary.*
>
> ***Mashael:*** *some children need help with their digital coursebooks such as locating a page or exercise.*

Regarding parents who did not attend their children's online classes, they wanted their children to be independent and handle everything on their own or they could not do so because they were busy and had many commitments.

The use of digital reading whether through the platform, digital textbooks, accessing the platform through touch screen devices or a laptop computer was higher and more intensive during the Pandemic than before the Pandemic as online leaning was mandatory due to the lockdown and school closure. Technology and digital reading were used intensively. Every child had to access the online learning platform, listen to the teacher, read what is on the screen, read from a paper or a digital textbook during and after the online class. Before the pandemic, use of digital reading was optional. Technology, such as touch screen devices and computers, was optional, and varied from school to school and child to child. The children used paper textbooks. After the pandemic students continued to attend occasional classes online in cases of emergency. More digital reading from the screen or digital textbooks is involved. Shared reading, interaction, questioning, discussion and follow-up between the children, especially young ones, and their parents were higher during the Pandemic than before and after the Pandemic. Even during the Pandemic, many children and parents preferred print textbooks and face-to-face instruction than online remote instruction.

3.4 *How Parents Promote Reading Skills in Children*

In Saudi Arabia, parents worry about their children's proficiency level in English rather than Arabic and they promote their children's learning of English and reading in English more than Arabic. The results revealed that 22% of the parents encourage their children to read; 33% use English educational and entertainment apps/websites; 12% buy books suitable for the children's grade level; 5% do extra readings and assignments with their children related to what they study at school. Some mothers stated:

- *Mobile and iPad/tablet apps help my children develop their English-reading skills.*
- *My son reads Harry Potter.*
- *I encourage my children to read English and Arabic road signs while in the car.*
- *Every weekend, I print worksheets to read and answer comprehension questions with my daughters.*
- *I compare Arabic and English words so that my children understand their meaning in both English and Arabic so that they do not think they are used in Arabic in the same way.*

On the other hand, to promote Arabic language acquisition, 50% of the parents read Arabic material with their children on the *"I Read Arabic"* Platform and *"Iqra eLibrary"* daily. 20% hire an Arabic language tutor to teach the children to read Arabic and the Holy Quran. Some encourage their children to read Arabic print stories. Others require their children to read the Holy Quran and short stories in Standard Arabic. Some mothers declared:

- *I demand that they read children's stories in Arabic, make sure that they pronounce Arabic sounds correctly, focus on spelling, and writing paragraphs in Arabic from memory.*

4. Discussion

Results of the currents study showed that children below the age of 12 mainly use mobile phones, iPads, and tablets. None of the children in the sample use e-readers such as Kindle, Nook, and the Sony e-Reader. This finding is partially consistent with findings of other studies in the literature. Electronic storybooks, digital audiobooks, mobile reading games, electronic picture books and digital glossy magazines, online book clubs, children's digital library, reading lessons with a digital, human-like character, App Books Digital Affordances, WhatsApp and other social media remote reading as mentioned in studies by Savva, Higginsand Beckmann (2022), Esteves and Whitten (2011); Guernsey (2011); Wright, Fugett and Caputa (2013); Guernsey, (2011); Samur (2019); Scharber (2009); Lemmons (2009); Kim (2013); Christ, Wang, Chiu and Strekalova-Hughes (2019); León, Svenson, Psychoyos, Warren, De Gracia and Palacios (2022) are not used by children, their parents or teachers in Saudi Arabia.

A second finding is that a high percentage of Saudi children (75%) in the present study use the touch screen devices for gaming, because iPads, tablets and smart phones are easy to use, and the Google Play and Apple Stores have a multitude of free game apps which are tailored to young children's interests and preferences. Older children in grades 4-6 mainly use mobile phones, iPads and tablets for entertainment, i.e., to play games, watch movies and cartoons and not for reading and educational purposes. Only younger children under the age of 6 use mobile devices to learn the alphabet, numeracy and names of fruits, vegetables, colors, animals and so on. This finding is also consistent with findings of a study by O'Connor and Fotakopoulou (2016) who found a high percentage of children under the age of 3 in middle-class families in the UK and four European countries play games on touch screen devices. In another study, very small children can use touch screen devices easily and independently. Ackermann (2017) added that children regularly associate tablets with gaming and social media.

A third finding is that more than half the parents in the sample leave their children with the mobile phone, iPad or table, i.e., they children use those devices on their own, without supervision, to access YouTube videos, cartoon, mobile apps, songs and others. None of the children reads interactive e-books, digital audiobooks or digital children's short stories. 21.88% of the children in all age groups use apps for learning the Arabic Alphabet; 15.6% use apps to learn to read the Quran; 12.5% use apps to learn numeracy and arithmetic; and another 12.5% use animal apps. In addition, Parent's responses showed that 30% of the children use touch screen devices to learn English, play English games and use English entertainment apps. These results are partially consistent with results of a study by Kucirkova and Littleton (2016) who reported that half parents reported that their children read alone for pleasure; 51% read print books alone every day or almost every day, 7% read interactive e-books and 5% read simple ebooks alone every day or almost every day. Most parents read with their children because the children enjoy it (56% read print books and 6% read e-books almost every day). The parents consider their children's age before introducing digital books. Parents believe that the best time to start reading with their children is at age: 0-1 year for print books; 2 years for interactive e-books and 3 years for simple ebooks. 6–7-year-old children read print books less and e-books more than younger children. They use print resources less often than children in the other age groups. 14.5% reported the use of simple ebooks several times a week in younger children and 21.1% by 6–7-year-old children.

A fourth finding is that older children especially those in grades 4-6 consider educational and reading apps boring and feel that touch screen devices should be used for entertainment, not serious studying or reading. On the contrary, younger children enjoy learning the alphabet and reading words on touch screen. These findings are partially consistent with findings of a study by Kucirkova and Littleton (2016) who found that digital media are fun to use (60% of the children often use digital media for entertainment such as playing games and watching T.V. compared to 42% who use them for learning). 44% use media independently in order for parents can get things done.

A fifth finding is that during the COIVID-19 Pandemic, children in Saudi Arabia were using the distance learning platform, touch screen devices, laptop computers and digital reading more intensively than before and after the Pandemic. This finding is similar to findings of a study by Kazaz and Dilci (2022) who revealed that digital contact habits of elementary school students during the Covid-19 pandemic was different from that before the Pandemic and that the addiction rate increased during the pandemic as one out of every four children was digitally dependent. Results also showed that children who were beginners, those who used technology for learning, and those who were fast and accurate in word reading exhibited comprehension gains.

5. Recommendations and Conclusion

Results of the current study revealed inadequate use of digital reading whether for intensive or extensive reading purposes by Saudi children under the age of 12. To enhance children's utilization of touch screen devices and other reading technologies, and different types of digital texts such as audiobooks, ebooks, e-magazines, digital fiction and short stories for children, and text enhancements, this study recommends that Arabic mobile reading applications and audiobooks be integrated in reading instruction at the kindergarten and elementary school levels, where the students choose the audiobooks and e-biiks that they like to listen to, read and discuss their content with their peers, teacher and parents orally or in writing. The students can be encouraged

to read digital texts and books in various disciplines such as fiction, multicultural children's literature and stories to develop the students' global awareness and reading comprehension skills (Al-Jarf, 2022d; Al-Jarf, 2021e; Al-Jarf, 2015; Al-Jarf, 2012).

This study also recommends raising parents' awareness of the technologies and reading apps that can be used in digital reading in Arabic by older children. At first, the parents read with their children and discuss the story. Teachers can combine digital listening and reading activities using mobile audiobooks and may combine digital reading and writing activities using WhatsApp and social media pages. They can use collaborative and interactive digital reading activities with each other and with parents, older siblings or other adults in the community. Interactional reading aloud by young children and parents, reading aloud by either a speaker using a preface, using a question or reading aloud from the screen with parent-child interactions and having interactive features can facilitate reading, comprehension and enjoyment.

Ebooks and digital reading can be made part of the school curriculum together with print books with marks allocated for both types of media. Digital libraries for children can be created, where children can access books of interest to them and read online individually, in pairs or small groups. Digital reading contests among children can be held at the school, national and international levels. Teachers and parents can introduce children to text-to-speech software to develop their ability to decode words correctly, i.e., develop their phoneme-grapheme correspondence skills (Al-Jarf, 2022g; Al-Jarf, 2022h).

In teaching reading, a variety of technologies can be used such as blogs, mind-mapping software, online courses, web-conferencing software, online courses, social media pages and others.

Finally, to promote research on digital reading by children in Saudi Arabia, this study recommends that future researchers assess the effects of digital reading on children's reading skill development in comparison with the effect of print books and materials on reading and vocabulary skill development.

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References

[1] Ackermann, S. (2017). To swipe or not to swipe, that is the question: The iPad in a preschool setting. *Art Education, 70*(3), 43-49.

[2] Al-Jarf, R. (2023a). Digital reading among educated Arabs: A Twitter-based study. *Journal of Computer Science and Technology Studies, 5*(3), 1-12. DOI: 10.32996/jlds.2023.3.2.3. ERIC ED629247. Google Scholar.

[3] Al-Jarf, R. (2023b). Learning English by kindergarten children in Saudi Arabia: A mothers' perspective. *Journal of Learning and Development Studies (JLDS), 3*(2), 15-32. DOI: 10.32996/jlds.2023.3.2.3. Google Scholar

[4] Al-Jarf, R. (2023c). Reading habits and motivation among educated Arabs in the age of social media and distractions. *Journal of Psychology and Behavior Studies, 3*(1), 32-44. DOI: 10.32996/jpbs.2023.3.1.4. Google Scholar

[5] Al-Jarf, R. (2022a). Educated Arabs' reading interests and preferences before, during and after the pandemic. *Journal of Learning and Development Studies*, *2*(3), 23-37. DOI: 10.32996/jlds.2022.2.3.4. Google Scholar

[6] Al-Jarf, R. (2022b). English language education at the elementary school level in Saudi Arabia: A parents' perspective. *British Journal of Teacher Education and Pedagogy (BJTEP), 19*(30, 31-44. DOI: 10.32996/bjtep.2022.1.3.4. ERIC ED622945. Google Scholar

[7] Al-Jarf, R. (2022c). How parents promote English and Arabic language proficiency in elementary school children in Saudi Arabia. *Journal of Psychology and Behavior Studies (JPBS),* 2(2), 21-29. DOI: 10.32996/jpbs.2022.2.2.4. ERIC ED622131. Google Scholar

[8] Al-Jarf, R. (2022d). *Parental attendance of children's online classes from the perspective of parents and teachers in Saudi Arabia.* 18th International Scientific Conference eLearning and Software for Education (eLSE), Bucharest, Romania. Google Scholar

[9] Al-Jarf, R. (2022e). Mobile fiction apps for enhancing EFL students' reading and appreciation skills. *International Journal of Linguistics Studies*, *2*(2), 15-23. ERIC ED623334. Google Scholar

[10] Al-Jarf, R. (2022f). Reading interests of university female students in Saudi Arabia. *Eurasian Arabic Studies, 5*(4), 50-75. DOI: 10.26907/2619-1261.2022.5.4.50-75. Google Scholar

[11] Al-Jarf, R. (2022g). Text-to-speech software as a resource for independent interpreting practice by undergraduate interpreting students. *International Journal of Translation and Interpretation Studies (IJTIS), 2*(2), 32-39. DOI: 10.32996/ijtis.2022.2.2.3. ERIC ED621859. Google Scholar

[12] Al-Jarf, R. (2022h). Text-to-speech software for promoting EFL freshman students' decoding skills and pronunciation accuracy. *Journal of Computer Science and Technology Studies (JCSTS), 4*(2), 19-30. DOI: 10.32996/jcsts.2022.4.2.4. ERIC ED621861. Google Scholar

[13] Al-Jarf, R. (2021a). Collaborative mobile ebook reading for struggling EFL college readers. *IOSR Journal of Research and Methods in Education, 11*(6), 32-42. DOI: 10.9790/7388-1106023242. ERIC ED618023. Google Scholar

[14] Al-Jarf, R. (2021b). *Differential effects of the iPad on first and second language acquisition by Saudi children during the Covid-19 pandemic.* The 17th International Scientific Conference eLearning and Software for Education (eLSE), Bucharest, Romania. 1, 96-105. DOI: 10.12753/2066-026X-21-013. ERIC ED616919. Google Scholar

[15] Al-Jarf, R. (2021c). Impact of the iPad on Saudi young children in the home environment as perceived by their mothers. *International Journal of Research in Engineering, IT and Social Sciences (IJREISS), 11*(2), 26-35, (FEB). ERIC ED613057. Google Scholar

[16] Al-Jarf, R. (2021d). Teaching reading to EFL freshman students with mind-mapping software. *Journal for Research Scholars and Professionals of English Language Teaching (JRSP-ELT), 24*(5), 1-12. https://doi.org/10.2139/ssrn.3825817. ERIC ED618184. Google Scholar

[17] Al-Jarf, R. (2020). Should we teach English to children under the age of six? *Eurasian Arabic Studies, 9,* 65-97. https://cyberleninka.ru/article/n/should-we-teach-english-to-children-under-the-age-of-six. Google Scholar

[18] Al-Jarf, R. (2019a). Quality in teaching reading to high school students. *Eurasian Arabic Studies, 5,* 36-62. Google Scholar

[19] Al-Jarf, R. (2019b). Teaching reading to EFL Arabic students online. *Eurasian Arabic Language Journal, 6,* 57-75. ERIC ED613084. Google Scholar

[20] Al-Jarf, R. (2018). First, Second and third grade students' word identification difficulties. *Eurasian Arabic Studies, 8,* 22-93. Google Scholar

[21] Al-Jarf, R. (2015). *Enhancing reading and speaking skills in EFL through multicultural children's short stories*. 7th International Conference, Building Cultural Bridges (ICBCB) titled: Integrating Languages, Linguistics, Literature, Translation, and Journalism into Education.Suleyman Demire lUniversity, Almaty, Kazakhstan. April 23-24. **ERIC ED**610158. Google Scholar

[22] Al-Jarf, R. (2014). Integrating Elluminate in EFL reading instruction. The 10th International Conference on eLearning and Software for Education (eLSE). Issue 3, p19-26. Bucharest, Romania. DOI: 10.12753/2066-026X-14-142. Google Scholar

[23] Al-Jarf, R. (2013). Enhancing freshman students' performance with online reading and writing activities. 9th eLearning and Software for Education Conference (eLSE). Bucharest, Romania. 2, 524-530. DOI: 10.12753/2066-026X-13-193. Google Scholar

[24] Al-Jarf, R. (2012). *Reading in the app store*. 22nd Annual IATEFL-Hungary Conference, Eger, Hungary. October 5-7. Google Scholar

[25] Al-Jarf, R. (2011). Developing and testing reading skills through art texts. In S.V. Lobanov, S. V. Bulaeva, S.V. Somova, N.P. Chepel (Editors), "Language and Communication through Culture". Pp. 168-176. Ryazan State University. Russia. Google Scholar

[26] Al-Jarf, R. (2010). Integrating RCampus in college reading and writing for translation students. Touchpoint International Conference on Technology in Education. Manila, Philippines, March 5-6. ERIC ED609048. Google Scholar

[27] Al-Jarf, R. (2009). Maximizing ESL freshman readers' skill with online instruction. In Roger Cohen (Ed.) Explorations in Second Language Reading. Pp. 133-144 TESOL. ERIC ED523349. Google Scholar

[28] Al-Jarf, R. (2005). *Should English be taught to Saudi children under the age of six*. 10th International Congress for the Study of Child Language, July 25-29. Berlin, Germany. https://www.researchgate.net/publication/361200484. Google Scholar

[29] Al-Jarf, R. (2004a). *Arabic websites for preschool children: Current status and future perspectives*. Saudi Educational and Psychological Association. Google Scholar

[30] Al-Jarf, R. (2004b). *What college students read in the global age*. Globalization and Educational Priorities Conference. King Saud University, College of Education. Google Scholar

[31] Al-Jurf, R. (2004c). *What our youth read in the age of globalization*. Symposium of Globalization and Priorities of Education, King Saud University, Saudi Arabia. Google Scholar

[32] Al-Jarf, R. (1994). Analysis of Saudi first, second and third grade students' errors in word identification. *Journal of Contemporary Education, 9*(61), 88-147. Google Scholar

[33] Al-Jarf, R. (1992). *Classification of word identification exercises in elementary school basal readers*. Third Yearbook of the Saudi Educational and Psychological Association. Pp. 73-108. Google Scholar

[34] Al-Jarf, R. (1989). Classification of reading comprehension questions in elementary basal readers in Saudi Arabia. Center for Educational Research, King Saud University. Google Scholar

[35] Castillo, N. & Wagner, D. (1019). Early-grade reading support in rural South Africa: A language-centred technology approach. *International Review of Education, 65*(3), 389-408.

[36] Christ, T., Wang, X., Chiu, M. & Strekalova-Hughes, E. (2019). App books' affordances are related to young children's reading behaviors and outcomes. *AERA Open*, *5*(2).

[37] Cun, A. (2022). Interactive digital book reading in families with refugee backgrounds. *Journal of Research in Childhood Education*, *36*(4), 648-662.

[38] Davidson, C., Danby, S., Ekberg, S. & Thorpe, K. (2021). The interactional achievement of reading aloud by young children and parents during digital technology use. *Journal of Early Childhood Literacy*, 21(4), 475-498.

[39] Esteves, K. & Whitten, E. (2011). Assisted Reading with Digital Audiobooks for Students with Reading Disabilities. *Reading Horizons*, 51(1), 21-40.

[40] Fesel, S., Segers, E. & Verhoeven, L. (2018). Individual variation in children's reading comprehension across digital text types. *Journal of Research in Reading*, *41*(1), 106-121.

[41] Florit, E., De Carli, P., Lavelli, M. & Mason, L. (2023). Digital reading in beginner readers: Advantage or disadvantage for comprehension of narrative and informational linear texts? *Journal of Computer Assisted Learning*, *39*(2), 432-445.

[42] Furenes, M., Kucirkova, N. & Bus, A. (2021). A comparison of children's reading on paper versus screen: A meta-analysis. *Review of Educational Research*, *91*(4), 483-517.

[43] Gehlot, L., Al-Khalaf, H. & Gehlot, H. (2020). Evaluation of the reading habits of indian students (reading aloud and reading silently) from low, middle and high class schools. *Educational Research and Reviews*, *15*(2), 41-51.

[44] Guernsey, L. (2011). Are Ebooks Any Good? *School Library Journal*, *57*(6), 28-32.

[45] Haoning Mah, G., Hu, X. & Yang, W. (2021). Digital technology use and early reading abilities among bilingual children in Singapore. *Policy Futures in Education*, *19*(2), 242-258.

[46] Hoel, T. & Tønnessen, E. (2019). Organizing shared digital reading in groups: Optimizing the affordances of text and medium. *AERA Open*, *5*(4), https://doi.org/10.1177/23328584198838

[47] Huang, Y., Liang, T. & Chiu, C. (2013). Gender differences in the reading of e-books: Investigating children's attitudes, reading behaviors and outcomes. *Educational Technology & Society*, *16*(4), 97-110.

[48] Kim, Y. (2013). Digital peers to help children's text comprehension and perceptions. *Educational Technology & Society*, *16*(4), 59-70.
[49] Kucirkova, N. & Littleton, K. (2016). The digital reading habits of children. *A National Survey of parents' perceptions of and practices in relation to children's reading for pleasure with print and digital books*, Book Trust. pp. 1-72.
[50] Kucirkova, N. & Flewitt, R. (2022). Understanding parents' conflicting beliefs about children's digital book reading. *Journal of Early Childhood Literacy*, *22*(2)157-181.
[51] Kucirkova, N. (2019). Children's reading with digital books: Past moving quickly to the future. *Child Development Perspectives, 13*(3), 199-279. https://doi.org/10.1111/cdep.12339
[52] Larson, L. (2015). E-books and audiobooks: Extending the digital reading experience. *The Reading Teacher, 69*(2), 169-177.
[53] Lemmons, K. (2009). The international children's digital library enhances the multicultural collection. *School Library Media Activities Monthly*, *25*(7), 28-30.
[54] León, M., Svenson, N., Psychoyos, D., Warren, N., De Gracia, G. & Palacios, A. (2022). WhatsApp Remote Reading Recovery: Using Mobile Technology to Promote Literacy during COVID-19. *IAFOR Journal of Education*, *10*(3), 107-125.
[55] Lim, F. & Toh, W. (2020). How to teach digital reading? *Journal of Information Literacy*, *14*(2).
[56] Liu, C., Yang, C. & Chao, P. (2019). A Longitudinal Analysis of Student Participation in a Digital Collaborative Storytelling Activity. *Educational Technology Research and Development*, 67(4), 907-929.
[57] O'Connor, J. & Fotakopoulou, O. (2016). A threat to childhood innocence or the future of learning? Parents' perspectives on the use of touch-screen technology by 0–3-year-olds in the UK. *Contemporary Issues in Early Childhood, 17*(2)235-247.
[58] Samur, Y. (2019). Kes Sesi: A Mobile Game Designed to Improve Kindergarteners' Recognition of Letter Sounds. *Journal of Computer Assisted Learning*, *35*(2), 294-304.
[59] Savva, M., Higgins, S. & Beckmann, N. (2022). Meta-Analysis Examining the Effects of Electronic Storybooks on Language and Literacy Outcomes for Children in Grades Pre-K to Grade 2. *Journal of Computer Assisted Learning*, *38*(2), 526-564.
[60] Scharber, C. (2009). Online Book Clubs: Bridges between Old and New Literacies Practices. *Journal of Adolescent & Adult Literacy*, *52*(5), 433-437.
[61] Schiavo, G., Mana, N., Mich, O., Zancanaro, M. & Job, R. (2021). Attention-Driven Read-Aloud Technology Increases Reading Comprehension in Children with Reading Disabilities. *Journal of Computer Assisted Learning*, *37*(3), 875-886.
[62] Simsek, Z. & Isikoglu Erdogan, N. (2021). Comparing the Effects of Different Book Reading Techniques on Young Children's Language Development. *Reading and Writing: An Interdisciplinary Journal*, *34*(4), 817-839.
[63] Tatar, B. & Gerde, H. (2023). Partnering with Families to Use Screen Time for Supporting Early Language and Literacy. *Reading Teacher*, *76*(4), 439-450.
[64] Wang, P. & Yang, H. (2016). The impact of e-book interactivity design on children's Chinese character acquisition. *Interactive Learning Environments*, *24*(4), 784-798.
[65] Wang, X., Christ, T. & Mifsud, C. (2020). 'iPad has everything!': How Young children with diverse linguistic backgrounds in Malta and the U.S. process multimodal digital text. *Early Child Development and Care*, *190*(16), 2563-2580.
[66] Wright, S., Fugett, A. & Caputa, F. (2013). Using E-Readers and Internet Resources to Support Comprehension. *Educational Technology & Society*, *16*(1), 367-379.
Yadav, S., Chakraborty, P., Meena, L. & Yadav, D. (2022). Children's Ability to Read from Computers and Smartphones. *Journal of Educational Technology Systems*, *50*(4), 521-5