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Effectiveness of digital versus printed Arabic text on the literacy mathematics tasks of seventh- and eighth-grade students

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Abstract

Studies have demonstrated that use of digital rather than printed texts improve student literacy (reading comprehension of Problem solving in mathematics) and boosts motivation. The current study examines the effectiveness of digital versus printed media on the literacy of seventh- and eighth graders in Arab schools in Israel. This is the first time this topic has been examined in this setting. The study uses a quantitative methodology that involved 132 students and 77 teachers from middle-schools in the Arab sector in Israel. Two questionnaires, the first for students and the second for teachers were distributed and the data were analyzed using SPSS. The results reveal that both seventh- and eighth-grade students perform better using digital rather than printed material. No discernible gender difference was found.

Keywords: digital, literacy, printed, mathematics, text

Public Interest Statement

Digital Books rather than printed texts improve student reading comprehension of Problem-solving in mathematics and boost their motivation. Students in Arab schools in Israel were affected by using digital versus printed media. This reveals that both seventh- and eighth-grade students perform better using digital rather than printed material. No discernible gender difference was found.

Introduction

Literacy refers to the ability to read and write. It is an essential skill that empowers Students to communicate, comprehend information, and actively participate in society. Literacy encompasses not only the essential ability to understand and produce written texts but also the capacity to analyze and interpret information critically. It is a fundamental building block for personal development, education, and social engagement. In the same vein, Literacy in mathematics refers to the ability to read, interpret, and comprehend mathematical concepts, problems, and symbols. It involves understanding mathematical language, interpreting word problems, and effectively communicating mathematical ideas. Literacy in mathematics is essential for students to be successful in the subject and to apply mathematical concepts to real-world situations (Auzar, M. S. (2017).

Literacy (reading comprehension of Problem solving in mathematics), which in itself is a complex cognitive task is assessed by how well readers engage with text (Anderson & Pearson, 1984; Tov Li & Frish, 2014). According to studies, students' reading comprehension of mathematics Problem solving is affected by the type of text, the features of the text such as title, pictures, glossary and so on, and how the text is displayed (whether in printed or technological format) (Makhoul & Copti-Mshael, 2015). According to Liu, Z. (2005), the digital environment refers to the combination of hardware, software, networks, and data that make up the digital world in which we interact and operate. It encompasses everything from computers and smartphones to the Internet and digital communication platforms. It was found that a digital environment is more successful for achieving reading comprehension of Problem solving. Texts in this format are richer in images, handouts, videos, and context clues, whether the internet is available or not. In addition, a number of studies show the effect of the digital environment on the empowerment of students' motivation, so the use of computer programs for word recognition and reading contributed to improving student's motivation. Students' Motivation plays a critical role in approaching and solving mathematical problems. When students are motivated to understand and engage with math, they are more likely to persist through challenges and develop a deeper understanding of mathematical concepts. To conclude, motivation has a great impact on reading achievements and reading comprehension of problem solving in mathematics (Cobb, 2001; Wise et al., 1998; Ross, 2002; Lewin, 2000; Elbro, Rasmussen & Spelling, 1996). This research aims to examine the effect of digital formats as compared to printed text on the literacy of seventh- and eighth-grade students in Arab schools in Israeli society. The interest in this topic stems from the innovative teaching methods that are being introduced in Arab schools.

Literature Review

Literacy and Reading Comprehension of problem solving in mathematics

Literacy is the capacity to comprehend and use written language. Student readers are trained to interpret a variety of texts, read for enjoyment and participate in daily reading communities (Rama, June 2020). Without reading and writing skills, students' prospects for success in life are limited (Tov Li & Frish, 2014).

Fluency and accuracy are prerequisites for interpreting and comprehending written material (Nagy & Townsend, 2010). Reading comprehension of problem solving in mathematics is evaluated by the effectiveness of reader-text interactions. Perfetti, Landi and Oakhill (2005) point out that reading comprehension, text structure and presentation are closely related. Reading comprehension of mathematics problem solving appears to improve when learning from digital texts as opposed to printed (Ben-Yehuda, et al., 2018; Daniel & Woody, 2013). Moreover, deficiency in comprehension increases when time constraints are placed on reading (as opposed to free reading) and when content is informative (as opposed to narrative) (Ben-Yehudah et al., 2018) because the teacher focuses on coding and decoding and narrative content is easier to comprehend than informative.

The Effect of the Presentation of the Text and the Learning Environment

Learning in a digital environment refers to learning via online electronic means (Al-awawdeh & Kalsoom, 2022). Readers in a digital environment can navigate through links based on their interests and objectives. In order to utilize computers and digital applications, the educational system must both provide instructors and pupils with technical skills for manipulating the digital environment as well as assess their level of control and use (Avidov-Ungar & Amir, 2020).

Twenty-first century skills, such as "information literacy" or "information technology and communication literacy" are the foundation for access to the digital environment for both teachers and students learning to read and write via use of digital books, learning websites, computerized activities, etc. While the teacher creates and organizes a learning environment to accomplish certain goals, a technological study environment does not fully provide the conditions needed to acquire technical literacy for post-primary education pupils (Report of the Israel State Comptroller, 2021).

Visual and aural sources of information, and other active learning techniques are facilitated in a computerized setting. Online reading comprehension of mathematics problem solving tasks necessitate a combination of new digital literacy skills and offline reading comprehension techniques (Rama & June 2020). Reading printed and digital texts necessitates the skills of scanning the text, skimming the text, creating predictions for the text's continuation, and creating connections within the text using readers' prior knowledge (Duke & Pearson, 2002; Pressley, 2000). For this, the learner needs advanced language and cognitive skills including knowledge of vocabulary, syntax, and more.

Because the Internet is so easily accessible, reading comprehension of mathematics problem solving in a computerized setting can be more successful than printed text as texts in the digital environment are richer in animated images and handouts, videos, and the capacity to navigate between pages quickly beside the availability of all the knowledge stored on the Internet can benefit students and improve learning. These elements contribute to a more effective understanding of the text (Wise et al., 1998; Ross, 2002; Lewin, 2000; Elbro, Rasmussen & Spelling, 1996).

Teacher attitudes toward digital text

Teacher attitudes toward use of digital text are tied to both the individual teacher and to the learning institution. Integrating organizational change in the school should be tailored to the qualifications of the instructors and their position within the institution. Israel has recently made improvements to the educational environment, including integrating technology and computers into the classroom. As a result, more curricula use technology to support teaching and learning. The Ministry of Education has initiated a comprehensive Information and Communication technology (ICT) program entitled "Adapting the Educational System to the 21st Century" in response to the rapid cultural transformation created by the technological advances of the first decade of the 21st century. The key objectives of this government program include leading to the existence of innovative pedagogy at schools while incorporating ICT as well as teaching and learning content, where the content and knowledge learned are relevant to the changing reality (Eisenberg & Selivansky, 2019).

It appears that the Israeli educational system is having trouble keeping up with the times. There is a big gap between the reforms' declared goals and the actuality of what is being implemented in school classrooms. The transition from old standards to a system that meets future needs is challenging. Additionally, school administrators and teachers do not fully understand digitalization and teacher preparation programs do not adequately present cutting-edge teaching methods (Eisenberg & Selivansky, 2019).

Teachers face a dilemma when integrating digital teaching because apparently, they lose their power and exclusivity in the classroom, but in fact, their power increases when perceiving this integration from a systemic perspective, i.e. what the school decide as needed for the whole system. The rapid adoption of e-tools in the educational system may lead to changes in thinking, teaching, and learning styles and enable development of the best practices in pedagogy. This in turn will have an impact on the curriculum, the learner, the teacher, the learning environment, and the intended outcomes (Peled & Magen-Nagar, 2012). Yet, according to Peled and Magen-Nagar (2012), adopting new teaching approaches can be very challenging. The actual integration of information technologies in teaching is strongly influenced by teachers' attitudes, perceptions, skills, and beliefs toward digital environments.

These factors also play a significant role in assimilating these processes in teaching methods. The current research was conducted on Arab students in Israel, so it is essential to know their background before discussing the research methodology.

The Arabic Language and its Characteristics

The Arabic language is one of the most difficult languages, and this is due to its characteristics that make it difficult to be acquired. The diglossia, in which the spoken language (al-'Aamiyah) is utilized in daily life, while knowledge of literary Arabic (al-Fusha) is acquired in school, is the most noticeable aspect of the Arabic language. There are differences in vocabulary, phonology, grammar, syntax, linguistic forms, and modes of expression between spoken and literary Arabic (Ayari, 1996; Saiegh-Haddad, 2004). All Arabic speakers use al-'Aamiyah, which they pick up from their surroundings (Saiegh-Haddad, Gawi-Dekwar & Hanna-Arshid 2021; Ayari, 1996). It is comparatively late for Arabic-speaking children to be exposed to written literary Arabic when they first start school. Researchers argue that literary Arabic should be regarded as a second language (Ibrahim & Aharon-Peretz, 2005; Ibrahim, 2009; Saiegh-Haddad & Henkin-Roitfarb, 2014). The vocabulary used in textbooks and that used in everyday speech

are not compatible (Makhoul & Olshtain, 2018).

Both Arabic and Hebrew are spoken by the Arab community in Israel with Hebrew supplanting Arabic as the majority language. Arab-Israelis use Arabic as a second language. Although Arabic has lost its function in both the public and governmental sphere, Arab schoolchildren in Israel from the beginning of the school year until graduation, receive instruction in their native tongue. In addition to restricting the usage of Arabic, the Jewish ruling elite has caused Arabic to lose its status as Israel's official language. The Nationality Law ("Basic Law: Israel - The Nation-State of the Jewish People") passed on July 18, 2018 wherein Section 4 eliminates Arabic as an official language in the state (Adalah, July 16, 2018).

From the aforementioned, the following research questions can be formulated:

(1) Is there a difference in the rate of literacy when printed informational texts are the medium of instruction as compared to digital informational texts among either seventh- or eighth-grade students?

(2) Is there a difference in the rate of literacy using printed informational texts among seventh-grade students as compared to eighth-grade students? (3) Is there a difference in the rate of literacy using digital informational texts among seventh-grade students as compared to eighth-grade students? (4) Is there a gender difference in literacy in reading informational texts as a function of the presentation environment?

Methodology

Research Method

The study uses a quantitative research paradigm.

Research Sample

The first sample included 67 seventh-grade students (42 girls and 25 boys) and 65 eighth-grade students (36 girls and 29 boys), for a total of 132 students whose first language was Arabic. The students were chosen randomly. Two math literacy tasks in Arabic language, one printed and the other digital, from the Israeli PISA[1] test were given to the students. The print formats covered identical subject matter.

The second sample included 77 teachers from middle schools in the Arabic-speaking sector of Israeli society (22% were male, 78% were between ages 29 - 55, the number of years in teaching spanned 6- 31 (M=17; SD=6.4), 41% of teachers held master's degrees, the remainder held bachelor's degrees).

Research tool

To examine the effect of the printed text compared to texts presented on a digital platform on the level of literacy among seventh- and eighth-grade students in schools in Arab Schools in Israel, the researchers used:

(1) Literacy tasks from PISA exams in the Arabic language. A text was provided followed by questions related to the four levels of reading comprehension of mathematics problem solving: verbal, interpretive, implicit, and linguistic. There were both closed- and open-ended multiple-choice questions. A 100-point scoring system was used.

(2) A Questionnaire including twelve statements graded on a 6-point Likert scale ranging from 1 (not at all) to 6 (to a considerable extent) investigated student motivation and whether the students preferred learning in a digital as opposed to a print setting (Shumer, 2014).

1 The Programme for International Student Assessment is a global study conducted by the Organization for Economic Co-operation and Development in member and non-member nations to evaluate educational systems by measuring the academic performance of 15-year-old students in mathematics, science, and reading.

(3) The teacher questionnaire created specifically for this study and had twelve statements graded on a 6-Point Likert scale from 1 (not at all) to 6 (very much) investigated instructors' opinions on the usage of electronic informational texts. The Alpha Cronbach dependability coefficient for the questionnaire is $\alpha = 0.81$.

Findings

To examine the effect of printed versus digital text upon the literacy in math of seventh- and eighth- grade students in Arab Schools in Israel, the researchers using Descriptive statistics and Statistical inference to analyze the data.

A t-test examining differences in the scores for printed informational texts versus digital informational text among seventh graders is found in Table 1.

Table 1 Seventh-grade literacy using printed informational texts and digital informational texts as the instructional medium

	Digital		**Printed**		***t***	***p***
	Mean GPA	SD	Mean GPA	SD		
Verbal	91.87	12.21	81.02	11.02	4.12	0.011
Interpretive	82.91	26.02	79.91	11.93	1.01	0.371
Implicit	100.00	0	76.85	16.83	5.72	0.001
Linguistic	-	-	-	-	-	
Comprehensive	87.19	9.04	77.92	9.11	2.69	0.013

As can be seen from Table 1, the performance of seventh-graders who used digital informational texts as the instructional medium is better in all aspects of literacy than the performance of seventh-graders who used printed informational text. Overall, grade-point averages were higher among those instructed using digital text as compared to printed text.

Table 2: Eighth-grade literacy using printed informational texts and digital informational texts as the instructional medium

	Digital		**Printed**		***t***	***p***
	Mean GPA	SD	Mean GPA	SD		
Verbal	64.98	49.02	92.31	16.32	2.31	0.041
Interpretive	78.63	9.51	78.03	12.09	0.052	0.959
Implicit	71.89	18.91	85.88	26.98	1.92	0.081
Linguistic	88.49	7.02	44.93	44.92	4.51	0.001
Comprehensive	83.12	7.01	80.33	12.92	0.41	0.731

As can be seen from Table 2, the performance of eighth-grade students instructed using digital informational text is better as compared to a similar group instructed with printed informational text. A significant difference exists at the level of verbal, implicit and linguistic knowledge. At the implicit level literacy using printed text scored higher than digital text.

Table 3: Differences in literacy between seventh- and eighth-grade students instructed using printed text

Printed Media	**Seventh**		**Eighth**		***t***	***p***
	Mean	SD	Mean	SD		
Verbal	81.02	11.02	92.31	16.32	3.84	0.001
Interpretive	79.91	11.93	78.03	12.09	0.71	0.580
Implicit	76.85	16.83	85.88	26.98	0.98	0.301
Linguistic	-	-	44.93	44.92	-	-
Overall	77.92	9.11	80.33	12.92	0.31	0.768

As can be seen from Table 3, the literacy of eighth-graders is better than that of seventh-graders instructed using printed informational texts except at the interpretive level. The t-test reveals highly significant differences at the verbal level with eighth-grade scores (M = 92.31) exceeding seventh-grade scores (M = 81.02).

Table 4: Differences in literacy between seventh- and eighth-grade students instructed using digital texts

Digital Media	**Seventh**		**Eighth**		**t**	**p**
	Mean GPA	SD	Mean GPA	SD		
Verbal	91.87	12.21	64.98	49.02	2.39	0.031
Interpretive	82.91	26.02	78.63	9.51	1.21	0.259
Implicit	100.00	0	71.89	18.91	6.38	0.001
Linguistic	-	-	88.49	7.02	2.20	0.039
Overall	87.19	9.04	83.12	7.01	2.51	0.020

As can be seen from Table 4, literacy among seventh-graders using digital informational texts is better in every category than it is among eighth-graders.

Also, no significant difference between boys and girls was found in the t-test examining gender difference in literacy as a function of the presentation media. The male scores were M = 10.21, (SD = 20.01) and female scores were M = 4.65 (SD = 21.28). The T-test score comparing digital text to printed text was = 0.91; p = 0.411.

Additional tests

Table 5: Linear regression predicting a relationship between literacy and t-test scores for digital and printed text test

	t	***p***	β	***SE B***	***B***
Overall score (digital)	1.41	0.201	-0.220	0.172	**-0.219**
Overall score (Printed)	1.43	0.182	0.218	0.231	**0.301**

A linear regression was performed to examine the predictive relationship between literacy and scores on the t-test for digital versus printed text. No predictive relationship between literacy and the scores for use of digital or printed text was found (Table 5).

Analysis of the student and teacher questionnaires

A t-test was performed to test the average difference between students' answers on the questionnaire regarding items relating to digital text versus printed text (Table 3). It was found that students responded more positively to the digital text test (M = 5.31) than the test of printed text (M = 3.62).

Upon examining teachers' attitudes toward the use of informational text in the classroom, the findings reveal that the average of the questionnaire investigating teachers' positions was 3.8 out of a maximum of 5 indicating that the teachers' response to use of digital informational texts was overwhelmingly positive (Table 6).

Table 6: Teachers' attitudes toward use of digital informational texts in the classroom

Item	Mean	SD
To what extent do you use computer applications in class	3.40	.900
To what extent do you agree with the implementation of the ICT project	3.65	.833
What is your level of proficiency in teaching digitalization?	3.45	.769
To what extent do you see the application of digital informational text enhancing the learning process	3.60	.841
To what extent do you see the application of digital informational text improving the development of students' learning abilities	4.05	.814
To what extent do you see the application of digital informational text enhancing capability	4.25	.735
To what extent do you see the application of digital informational text enhancing classroom communication	3.62	1.169
To what extent do you build lesson plans based on digital informational text	3.70	1.007
To what extent are your tasks based on digital informational text	4.12	.911
To what extent do you see that lesson plans based on digital informational text develop students' ability in general	4.20	.777
To what extent do you see that applying digital informational text enhances students' cognitive ability	4.07	.828
To what extent do you see that applying digital informational text improves students' level of academic motivation	3.40	.955
Overall	3.8	

Discussion

This research examines the effect of digital versus printed text on seventh- and eighth- grade literacy in Arab schools in Israel. The study questions as to whether there is a difference in the level of literacy in seventh-and eighth-grade in Arab schools when digital informational texts are used as the medium of instruction as opposed to printed informational texts were answered positively. The preference was for digital texts. The seventh-grade subjects showed an overall advantage in reading comprehension of mathematics problem solving for users of digital text as well as a difference in all higher levels of thinking. With eighth-grade subjects the findings show a significant advantage for digital text for linguistic knowledge only. The results for verbal comprehension were much greater for printed text than for digital media.

In order to explain the differences between the seventh- and eighth-grade scores, we need to examine all aspects of the learning experience. According to Eisenberg & Selivansky (2019), reading comprehension of printed text requires cognitive and linguistic knowledge (vocabulary, syntax, and meta-linguistic knowledge as a whole). Skills such as: scanning, setting goals, constructing a prediction for the continuation of the text to interpret the text and building connections within the text combined with the reader's prior knowledge (Duke & Pearson, 2002; Pressley, 2000).

By contrast, a digital environment allows the learner to use visual and audio sources of information, flip reading and animated films, sound effects and links that move us from one text to another in an interesting way (Ben-Yehudah et al, 2018). On a digital platform, young readers can move from place to place through online networks links at any time according to their preferences and goals. This allows readers to be exposed to the different processes of reading comprehension of problem solving in mathematics as content can be presented in different formats (Eisenberg & Selivansky, 2019). It has been argued that the findings can be attributed to the fact that texts in a digital environment are richer in illustrations, videos, clues and allow moving between pages easily. These things contribute to a more effective understanding of the text. The findings of this study are consistent with those of Hartas & Moseley (1993) and Elbro, Rasmussen & Spelling (1996), who indicate that digital texts accompanied by voice reading reduces the cognitive effort invested in deciphering the text and thus the reader can concentrate more fully on the comprehension process. Answers can be checked via corrective feedback and immediate assessment is also possible. These days because the Internet is so accessible and because all the information on it can help make reading more efficient, the learning process is facilitated. Researchers, such as Cobb (2001) and Roth & Beck (1997) argue that motivation has a profound effect on reading achievement and that computer programs for word recognition and reading have greatly increased student motivation.

Finally, while the digital environment has been found to contribute to raising achievement among seventh-graders, it negatively affects eighth-grade reading ability. It may be that seventh-graders are more concerned about their achievement in literacy because it is one of the critical factors influencing acceptance into a good upper division. Therefore, seventh-graders invest more effort in reading comprehension in mathematics problem solving as compared to eighth-graders who are in the upper division already.

The study also inquiries into whether there is a difference in literacy using printed informational text between seventh- and eighth-grade students. The level of literacy using printed informational text was higher among eighth-graders than it was among seventh-graders. With regard to differences in literacy between seventh- and eighth-graders using digital informational texts, it was found that the level of literacy was higher eighth-graders.

The findings show significant differences in the class scores at each of the higher levels of knowledge, application, and thinking and overall score using digital text. The seventh-grade grade point average was higher with respect to levels of knowledge, application and overall grade. On the other hand, the grade point average of eighth-graders in the higher levels of thinking was higher. **Regarding the findings of Questions Three and Four** it is not possible to reach a single interpretation or draw conclusions because the two populations are different and studied in different environments.

With regard to whether a gender difference in literacy exists in reading informational text as a function of the presentation environment, it was found that there is no significant difference between boys and girls in relation to scores in digital text compared to printed text. This is due to the fact that students of both genders are attracted to this environment because they were born and raised in the period of technological advancement.

With respect to teachers' attitudes regarding the use of digital informational text in teaching, two issues arise: The first relates to the desire on the part of teachers to use innovative tools and teaching methods and the second refers to reluctance of teachers who have difficulty using these tools. The use of digital text by teachers is the basis for creating an alternative teaching methodology based on technological advances that is different from traditional teaching. Ertmer & Ottenbreit-Leftwich (2010) and the State Comptroller (2021) argue that these technological processes should be based on prior knowledge and intelligent use. It is hoped that implementation of digital learning instruction will lead to teachers adopting student-centered methods: experimentation with authentic research processes that build knowledge independently and encouragement of collaborative activity among students. This result rises sharply and seriously in the research findings, but there is a stage of preparation and operation of this system that is not sufficiently clear, which was very prominent in the current research findings.

Conclusions

The study's results demonstrate the significance of digitization of the educational environment, promoting internalization of the study material in more practical and relevant ways than does conventional instruction. Moreover, there are benefits and cognitive incentives in using digital tools to foster thinking. The results of the current study can be used as a tool for an education-based intervention program and an applied tool for school instructors. This can help teachers gain a deeper understanding of how children think. It should be noted that empowering learners and connecting them to the ideal learning platform so they can improve their mental processes is one of the key objectives of the learning process. On a digital platform, teachers need to be aware of the cognitive stage that students are at in order to modify their instruction and achieve several crucial objectives, such as understanding and assimilation of concepts in the chosen field of knowledge, improvement of accuracy skills, and installation of habits and abilities for following instructions using digital tools.

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Biographies

Yousef Methkal Abd Algani was born in Nahif, Israel, 1981. He graduated from the Department of Software Engineering, Technion in 2002, and another degree in Mathematics and Computer Science in 2008, In addition, he graduated with an M.Sc. in Mathematics and Computer Science with a thesis in the field of Algebraic Topology, Haifa University, Israel, in 2012. Abd Algani completed his Ph.D. in Mathematics education in 2021and in 2022 a Post-Doctoral Student. Abd Algani has worked as a lecturer in The Arab Academic College for Education in Israel, in the Department of Mathematics.

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Authorship and Level of Contribution

Both authors have participated substantially in the manuscript's conceptualization, drafting, revision, and final approval.

References

Adalah – The Legal Center for Arab Minority Rights in Israel. (16 July 2018). Adalah's Position Paper: Proposed Basic Law: Israel - The Nation State of the Jewish People. (Retrieved 13.7.2021) https://www.adalah.org/uploads/.

Al-Awawdeh, N., & Kalsoom, T. (2022). Foreign Languages E-Learning Assessment Efficiency and Content Access Effectiveness During Corona Pandemic in University Context. *Theory and Practice in Language Studies*, *12*(10), 2124-2132.

Anderson, R. C., Pearson, P. D. (1984). "A Schema-Theoretic View of Basic Processes in

Reading Comprehension". In P. D. Pearson (Ed.), Handbook of Reading Research. New-York: Longman, pp. 255-291.

Auzar, M. S. (2017). The relationships of reading comprehension ability with the ability to understand the questions of mathematical word problems. *Mediterranean Journal of Social Sciences*, *8*(4-1), 145-151.

Avidov-Ungar, U., Amir, A. (2020). "What Hinders the Integration of Technology in Teaching? The Case of first language teachers". Dapim 73, pp. 143-163.

Ayari, S. (1996). Diglossia and Illiteracy in the Arab World. *Language, Culture and Curriculum*, 9, pp. 243-253.

Ben-Yehuda, G., Ackerman R., Delgado P., Vargas K., Salmaron L. (2018). "A Comparison of Print-Based and Digital-Based Reading Comprehension: A Meta-analysis." Learning in the Technological Era. (Editors: Yoram Eshet-Alkalay, Ina Blau, Avner Caspi, Shir Etgar, Nitza Geri, Yoram Kalman, Vered Zilber-Verod). The Open University, pp. 34-39.

Eisenberg, E., Selivansky, O. (2019). Adapting Israel's Education System for the Challenges of the 21st Century. Jerusalem: The Israel Democracy Institute.

Elbro, C., Rasmussen, I., Spelling, B. (1996). Teaching reading to disabled readers with language disorders: A controlled evaluation of synthetic speech feedback. Scandinavian Journal of Psychology, 37, pp. 140-155.

Ertmer, P., Ottenbreit-Leftwich, A. T. (2010). "Teacher Technology Change: How Knowledge, Confidence, Beliefs and Culture Intersect". *Journal of Research on Technology in Education*, 42, pp. 255-284.

Hartas, C., Moseley, D. (1993). 'Say that again, Please': A Scheme to Boost Reading Skills Using a Computer with Digitised Speech". In: Support for Learning Vol. 8 NO. 1, pp. 16-21.

Ibrahim, R. (2009). The Cognitive Basis of Diglossia in Arabic: Evidence from a Repetition Priming Study within and between Languages. Psychology Research and Behavior Management, 12, pp. 95-105.

Ibrahim, R., Aharon-Peretz, J. (2005). Is Literary Arabic a Second Language for Native Arab Speakers? Evidence from a Semantic Priming Study. The Journal of Psycholinguistic Research, 34, pp. 51-70.

Lewin, C. (2000). "Exploring the Effects of Talking Book Software in UK Primary Classrooms". Journal of Research in Reading, 23, pp. 149-157.

Liu, Z. (2005). Reading behavior in the digital environment: Changes in reading behavior over the past ten years. *Journal of documentation*, *61*(6), 700-712.

Magen-Nagar, N., Rotem A., Inbal-Shamir T., Dayan R. (2014). "The Effect of the National ICT Plan on the Changing Classroom Performance of Teachers". In: Learner in the Technological Era. Y. Eshet-Alkalei, A. Caspi, N. Geri, Y. Kalman, V. Zilber-Verod, Y. Yair (eds.). Raanana: The Open University, pp. 104-111.

Makhoul, B., Copti-Mshael, T. (2015). "The Development of Sociolinguistic Diglossic Knowledge in Oral-Literacy Mismatch Situations: Preliminary Findings from Palestinian Arabs". Psychology, 6, pp. 1168-1179.

Makhoul, B., Olshtain, E. (2018). Language Development among Speakers of Arabic in a Multilingual Society. Raanana: Mofet Institute.

Nagy, W., Townsend, D. (2010). Words as Tools: Learning Academic Vocabulary as Language Acquisition, 47, 1, pp. 91-108.

Perfetti, C. A., Landi, N., Oakhill, J. (2005). "The Acquisition of Reading Comprehension Skill". In M. J. Snowling & C. Hulme (Eds.), Blackwell Handbooks of Developmental Psychology. The Science of Reading: A Handbook. Malden: Blackwell Publishing, pp. 227-247.

Peled, B., Magen-Nagar N. (2012). "Characteristics of Teachers in Computer-Based Learning Environment". In: Learning in the Technological Era. Y. Eshet-Alkalei, A. Caspi, S. Eden, N. Geri, Y. Yair, Y. Kalman (Eds.). Raanana: The Open University, pp. 212-221.

Pressley, M. (2000). What Should Comprehension Instruction be the Instruction of? In: M. Kamil, P. Mosenthal, P. Pearson, & R. Barr (eds.), Handbook of Reading Research (Vol. III, NJ: Lawrence Erlbaum, pp. 545-561.

Rama, (June 2020). "International Study to Assess Reading Literacy of Eighth Graders". PIRLS, 2016 - Progress in International Reading Literacy Study, (Retrieved 14.7.2021): https://meyda.education.gov.il/files/Rama/PIRLS_2016_REPORT.pdf

Ross, C. S. (2002). Reading in a Digital Age. In G. E. Gorman (Ed.), The Digital Factor in Library and Information Services (pp. 91-111). International Yearbook of Library and Information Management 2002/2003, London: Facet Publishing.

Roth, S. F., Beck, I. L. (1997). Theoretical and Instructional Implications of the Assessment of Two Microcomputer Word Recognition Programs. Reading Research Quarterly, 22, pp. 197-218.

Saiegh-Haddad, E. (2004). "The Impact of Phonemic and Lexical Distance on the Phonological Analysis of Words and Pseudowords in Diglossic Context". Applied Psycholinguistics, 25, pp. 495-512.

Saiegh-Haddad, E., Henkin-Roitfarb, R. (2014). "The structure of Arabic language and orthography". In E. Saiegh-Haddad & R. M. Joshi (eds.), Handbook of Arabic Literacy. New York: Springer, pp. 3-28

Saiegh-Haddad, E., Gawi-Dekwar A., Hanna-Arshid H. (2021). "When Diglossia Encounters Developmental Disabilities: The Effect of the Phonological Distance between Spoken Arabic and Normal Arabic on Language and Reading Impairment". In F. Nasser-Abu Alhija and M Israelashvili (eds.). Education in Arab Society in Israel. Mofet Institute, pp. 71-103.

State Comptroller. (2021). "The learning Environment in Post-Primary Schools as an Infrastructure for Imparting 21st Century Skills". (Annual Report 71b). Jerusalem, (Retrieved 27.7.2021): https://www.mevaker.gov.il/sites/DigitalLibrary/Documents/2021/71B/2021-71b-103-Labor-Market-Skills.pdf

Tov Li, A., Frish, Y. (2014). The Literary Journey. Kiryat Shmuel Haifa: Sha'anan Religious Academic College For education.

Wise, B. W., Olson, R. K., Ring, J., Johnson, M. (1998). "Interactive Computer Support for Improving Phonological Skills". In J. L. Metsala, & L. C. Ehri (eds.). Word Recognition in Beginning Literacy. NJ: Lawrence Erlbaum Associates, pp. 189-208.