

**The Effectiveness of Using Assistive Technology  
in Developing LD Primary Stage Pupils' EFL  
Reading Comprehension Skills**

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تهدف الدراسة الحالية إلى قياس فعالية التكنولوجيا المساعدة في تنمية مهارات الفهم القرائي لدى تلاميذ المرحلة الابتدائية ذوي صعوبات التعلم . تضمن البحث ١٠ تلاميذ بالمرحلة لإبتدائية من ذوي صعوبات التعلم و أعدت الباحثة أدوات الدراسة والتي تتضمن قائمة بصعوبات القراءة في المرحلة الإبتدائية وقائمة بمهارات الفهم القرائي واختبار قبلي بعدي لمهارة الفهم القرائي باللغة الإنجليزية التي تهدف الدراسة إلى تمهيتها بإستخدام أدوات التكنولوجيا المساعدة . تم تطبيق الدراسة في الفصل الدراسي الثاني من العام الدراسي ٢٠٢١/٢٠٢٢ . تم ملاحظة أداء التلاميذ باستخدام الاختبار البعدي حيث أثبتت النتائج وجود فرق ذات دلالة إحصائية بين نتائج الاختبار القبلي والاختبار البعدي لصالح الاختبار البعدي .

**الكلمات المفتاحية :** مهارات الفهم القرائي باللغة الإنجليزية – صعوبات التعلم – التكنولوجيا المساعدة

## Abstract

The current study aimed at developing EFL third grade LD pupils' reading comprehension skills via using assistive technology. A group of ten third year primary LD pupils (as one study group) from El Shaheed Khaled Allam primary school participated in the study during the academic year 2021-2022. They were chosen depending on Woxelar IQ test . The study group received reading comprehension through using assistive technology. The Instruments and materials of the study consisted of an LD checklist ,an EFL reading comprehension skills checklist, an EFL reading comprehension skills test and a teacher's guide. The participants were pre-post tested using the reading comprehension skills test. After treating data statistically, the findings revealed that using assistive technology was effective in developing EFL third grade LD pupils' reading comprehension skills. It is recommended that assistive technology be used in EFL LD classes in general and the reading class in particular.

**Key words** EFL reading comprehension, Learning disabilities, Assistive technology.

## Introduction

English, as a foreign language, is one of the most important means of communication among people around the world. EFL learners should possess highly communicative skills in order to use English well. Listening, speaking, reading and writing are language skills that individuals can use in everyday life. For the study purposes, these language skills are grouped into two types; oral (listening, speaking) and written (reading and writing). It is important to emphasize that written skills come after oral skills. Sometimes language skills are integrated and learnt holistically.

Reading is one of the four language skills. It is the fastest and simplest way to raise people's educational level. Reading provides a fundamental means for individuals to exchange information and success at school. According to Hung ( 2007), reading is like opening the door of understanding to humans, reinforces language skills, enhances organizational abilities, improves one's temperament, and provides strength to endure frustration.

Effective reading is essential for developing the foreign language. Reading is the basis of instruction in all aspects of language learning: using textbooks for language courses, writing, revising, developing vocabulary, acquiring grammar, editing, and using computer-assisted language learning (CALL) programs. Reading instruction, therefore, is an essential component of EFL curriculum.

Unfortunately, there are many pupils in schools who struggle with learning disabilities, this could lead to an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Ruffin (2015) stated that Learning disability is a disorder in one or more of the basic cognitive abilities involved in understanding or using spoken or written language. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, reading disabilities. It does not include pupils who have learning problems that are primarily the result of visual, hearing, or motor handicaps; mental retardation; emotional disturbance; or environmental, cultural, or economic disadvantage.

The National Dissemination Center for Children with Disabilities (NDCCD, 2004) asserts that pupils with learning disabilities are not dumb or lazy and that they can learn successfully with the right help. In fact, they usually have average or above average intelligence. Their brains just process information differently with the right help, pupils with LD can learn successfully.

According to Bhandari (2008), reading difficulties are observed among pupils with learning disabilities more than any other problem area of academic performance. It is the most prevalent type of academic difficulty for pupils with learning disabilities. Furthermore reading is the primary area of difficulty for 80% to 85% of pupils identified as having learning disabilities.

According to Pierangelo, Giuliani (2008), the common oral reading problems include the following:

- Omissions: The pupil skips individual words or groups of words.
- Insertion: The pupil inserts one or more words into the sentence being orally read.
- Substitution: The pupil replaces one or more words in the passage by one or more meaningful words.
- Gross mispronunciation of a word: The pupil's pronunciation of a word bears little resemblance to the proper pronunciation.
- Hesitation: The pupil hesitates for two or more seconds before pronouncing a word.
- Inversion: The pupil changes the order of words appearing in a sentence.
- Disregard of punctuation: The pupil fails to observe punctuation; for example, may not pause for a comma, stop for a period, or indicate a vocal inflection, a question mark, or an exclamation point

Wojcik and Douglas ( 2012) stated that the use of assistive technologies helps to improve the performance of the pupils by providing support, such as adapting content and activities of the curricula, specific to their needs within a minimum-restricted environment .Winter and O'Raw(2010) clarified that the use of AT serves as key tools for enabling students to access education, actively and independently participate in the

education process, interact with their peers and have control over their own learning experiences.

### **1.1. Background of the problem**

The problem of the current research emerged from different resources:-

-First, several studies e.g El-Koumy,(2016); Bhandari.,( 2008);Stewart, (2007); Politt (2004) revealed that learning disabilities have become one of the most dynamic and attractive areas in educational studies and above 80% to 85% of students identified as having learning disabilities .

-Second, A pilot study was conducted by the researcher where she made an interview with 16 EFL teachers, in different primary schools ,who teach LD pupils. There were asked about the problems such pupils encounter and how they could deal with them. Most of them (70%) stated that some LD pupils are in need of special care .They also needed some new technologies that could help them better deal with those pupils.

### **1.2. Aim of the study**

The current study aimed to develop 3<sup>rd</sup> primary LD pupils' reading comprehension skills through using assistive technology

### **1.3. Questions of the study**

To achieve the research aim, the current study attempted to answer the following main question:-

What is the effectiveness of using assistive technology on developing LD primary pupils' reading comprehension skills?

Out of this main question, the following sub- questions are derived:

1-What is the effectiveness of assistive technology on developing LD pupils' overall reading comprehension?

2- How can assistive technology help LD primary pupils skim for the main idea?

3-How can assistive technology help LD primary pupils scan for details ?

4- How can assistive technology help LD primary pupils' word meaning?

5-How can assistive technology help LD primary pupils' understand some grammatical rules and structures?

#### **1.4. Hypotheses of the study**

1-There is no statistically significant difference between the study group's main score on overall reading comprehension skills pre-post test.

2-There is no statistically significant difference between the study group's main score on skimming for the main idea pre –post test.

3-There is no statistically significant difference between the study group's main score on scanning for details pre –post test.

4-There is no statistically significant difference between the study group's main score on vocabulary meaning pre -post test.

5-There is no statistically significant difference between the study group's main score on comprehending some grammatical rules .

#### **1.5. Significance of the study**

The current study might be significant to:

1- Primary School LD pupils: as it helps them to develop some reading comprehension skills through using assistive technology

2-EFL teachers:-It is expected that current study will be helpful to teachers, who are likely to develop their own skills of using assistive technology that enables them to develop their LD pupils' reading comprehension.

3-Curriculum designers:-It is expected that current study will attempt to draw Curriculum designers' attention to the importance of using (AT) in primary schools to develop EFL reading comprehension skills in addition to other language skills among LD pupils.

#### **1.6. Delimitations of the study**

1-A group of ten third year primary school LD pupils(n= 10) at El Shaheed Khalied Allam Primary School for boys and girls.

2-Some EFL reading comprehension skills including skimming ,scanning, word meaning and grammatical points.

3-The second semester of the academic year (2021-2022).

## 1.7. Definition of terms

### 1-EFL reading comprehension:

According to Jude (2012), reading comprehension is a process in which pupils can identify exact meaning of vocabulary used in the passage, read for information as well as their ability to give a paraphrase or summary of what they understand from the text .Volman (2010) defined reading comprehension as a process in which readers construct meaning by interacting with text through the combination of prior knowledge and previous experience, information in the text. The term is defined by the researcher as the ability of LD primary pupils to recognize ,indentify,and pronounce/read words in addition to reading for the main idea and for details

### 2- Assistive technology(AT):

Erdem (2017) defined AT as the equipment, devices , services, systems, processes and adaptations made to the environment that support and facilitate their functions, used by persons with special education needs. Also, AT defined by Cook (2014) as any device that makes it easier for a pupil to perform a function. It can help pupils either with learning or cognitive disabilities overcome obstacles. The term is operationally defined by the researcher as the use of some technologies ( e.g. text –to –speech ,optical character recognition ,graphic organizers and dictionaries ) that can assist LD 3<sup>rd</sup> primary pupils develop their reading skills.

## 2. Review of Literature

### 2.1. Reading Comprehension

#### 2.1.1 Nature of Reading Comprehension

Bulut (2017) mentioned that reading comprehension is referred to pupils' acts of thinking and constructing meaning in pre-reading, while reading and post-reading stages. It is one of the main language skills that require making inferences and understanding the details in written materials, and it is expected that it will be acquired by pupils at primary school. In fact, reading comprehension is placed at the heart of many school subjects as it plays a key role in the process of cognitive development.

Tennent (2014) stated that when the reader comprehends a text, there are five basic cognitive processes working together and complementing each other: These are as follows:

- a. Micro processes
- b. Integrative processes
- c. Macro processes,
- d. Elaborative processes, and.
- e. Metacognitive processes.

Ahmadi (2013) added that reading comprehension refers to the ability of readers to understand the surface and the hidden meanings of the text using meta-cognitive reading strategies. Reading comprehension is a complex process involving a combination of text and readers. It is widely reasonable that the three key types of reading are as; accuracy (involves phonological and orthographic processing), fluency (includes time), and comprehension.

### **2.1.2 Importance of reading comprehension**

The need for reading comprehension increases significantly when thinking about the negative effects of being unable to read in critical situations. For example, cannot read and understand dosing directions on a bottle of Medicine or warning on a bottle of hazardous chemicals can place people in a very dangerous situation that risks their health and their lives. If learners are unable to read successfully, they cannot easily find a job or live independently. The need for reading comprehension increases significantly when thinking about the negative consequences of being unable to read critically (Hoeh, 2015)

Clarke (2013) pointed out that pupils need skills in reading comprehension to be effective both in academic and personal life. In the academic lives of pupils, the basis for knowing all the academic material is reading comprehension. Across all academic subjects, the importance of reading comprehension increases dramatically as the students go through grades. Pupils need reading comprehension skills to successfully fulfill the

educational expectations at school and in the classroom. For example, to research topics in different academic areas, pupils are expected to understand what they are reading from multiple sources. Furthermore, being able to understand what they are reading allows students to locate relevant information quickly a key role in the process of cognitive development

### **2.1.3. The goal of the reading process**

Hsu (2016) pointed out that in the last few decades, reading gained considerable attention in English as a foreign language by both teachers and researchers due to its importance for pupils and professionals in several fields. This means one reason for reading is that understanding may not be total, but the best thing to understand what is said. This means that, reading is not the step by step process of building up letters into words, relating written words to their spoken, or joining words to form sentences.

On the contrary, reading is a highly complex interaction between the reader and the text, in which the reader makes sense of text by using both textual and non-textual clues. Hsu added that any language learning will be involved in a lot of reading, so does English learning. Those who are good at English, all have to read extensively. So, those who read a lot can master English effectively that they confirm the importance of reading from the perspective of an English expert.

### **2.1.4 Models of teaching reading.**

According to Ahmadi. (2013), reading comprehension has three important models that should be emphasized in the reading comprehension process. These models facilitate reading comprehension and help readers to figure out texts and solve their problems while reading. The bottom-up model shows that the reading process is supported by each word in the text and a learner decodes each word to understand the meaning.

On the other hand, the top-down model indicates that the reading process is supported mostly by a learner's background knowledge and prior experience. The last model of reading comprehension (interactive model)

refers to the reading process which is supported by an interaction between the text information and the learner's background knowledge as well as interaction between different types of metacognitive reading strategies .These three models of reading comprehension are discussed in detail as

### **1-Bottom-up Model**

Bottom-up Model is the oldest of these models as presented by Bloomfield in the 1930s. This model was the firstly presented by Gough (1972) who demonstrated that the reader starts with letter in the decoding; proceeds to words; and then, understanding sentences. Readers, according to Gough begin by translating the parts of written language (letters) into speech sounds, then put the sounds together to form individual words, then put the words together to construct an understanding of the author's written message.

### **2-Top-down model.**

In this model, the whole reading process is based on the words. Learners construct meaning from context by recognizing each word. This model teaches pupils to read by introducing them to literature as a whole. Instead of teaching pupils to read by sounding out each word in a sentence, the teacher reads whole passages of a text. Pupils begin to use context clues to decipher unfamiliar words. Top-down reading model is helpful to those learning a second language because they help pupils concentrate on the whole meaning of a passage.

### **3- Interactive model**

The interactive model is defined as a combination of the both bottom-up and top-down models and emphasizes the interrelationship between a reader and the text. Furthermore, the interactive model suggests that there is an interaction between the bottom-up and top-down processes .It indicates that neither bottom-up or top-down models can by themselves describe the whole reading process. Reading here is the process of combining textual information with the information the reader brings to a text. The interactive model stresses both what is on the written page and what the reader brings

to it using top-down and bottom-up skills so reading is the interaction between the reader and the text.

### **2.1.5 LD Reading Comprehension Problems**

Gersten (2001) pointed out that reading comprehension is an important component of reading that all pupils need to ensure personal success. However, most pupils with learning disabilities face serious problems in knowing what they are reading. Even after they acquired and mastered the decoding skills necessary, pupils with learning disabilities often experience poor comprehension due to their failure to read strategically and to spontaneously monitor their understanding while reading. These pupils may encounter problems in: (A) using background knowledge appropriately; (B) decoding and word recognition; (C) vocabulary knowledge; (D) fluency; and (E) common knowledge of text structures.

#### **(A) Problems of using background knowledge appropriately**

Pupils with learning disabilities have greater difficulty in identifying the important information during their summarization and discussion of the text than pupils without disabilities. They have specific difficulty in getting the point perhaps because they build up less effective text representations through the use of background knowledge

#### **(B) Problems of decoding and word recognition**

According to Ann Logsdon (2020), pupils with learning disabilities in reading often have weaknesses in phonological skills, and this affects their ability to learn to decode with efficiency. They can often fully understand passages that are read to them, but they lose the meaning of passages when they attempt to read by themselves. To address this problem, struggling

readers often need repeated drill and practice of phonics and decoding activities over a longer period of time than non-disabled pupils.

### **(C) Problems of vocabulary knowledge**

Bryant (2003) stated that pupils with learning disabilities show slower rates of vocabulary growth than the same-age peers . The goal of vocabulary instruction is to facilitate students' ability to interact with language situations .As evidenced in studies that have found a relationship between vocabulary knowledge and comprehension is fundamental to comprehending text

### **(D) Problems of fluency**

According to Chard (2002), fluency is an essential skill for all students .It is dependent on word recognition skills, however, students with learning disabilities are at risk for presenting difficulties in fluency. Many students with learning disabilities (LD) struggle to develop their reading fluency, which affects reading comprehension.

### **(E) Common knowledge students with learning disabilities**

Pupils with learning disabilities have limited knowledge of the different types of textual organization and grammatical structure. In particular, they displayed a limited knowledge of the differences between narrative text structure (stories) and expository text structure (designed to inform or explain). Pupils with learning disabilities are less aware of passage organization and have more difficulty reorganizing disorganized passages than pupils without learning disabilities.In addition ,the researcher found that LD pupils have difficulty in reading for the main idea .She also found that they have problems in indentifying some details in the reading passage(s).

## **2.2. Learning disabilities**

### **2.2.1.Nature of learning disability**

Atanga(2020) pointed out that learning disabilities (LD) is one of the largest disability categories under the Individuals with Disabilities

Education Act (IDEA) with 38.6% (2,336,960) of all students aged 6 through 21 who are served under IDEA . Students with LD are primarily educated in the general education classroom, with 70.8% of students being served in general education for at least 80% of the school day. LD is manifested as an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations .However, reading disabilities are the most common disorders encountered by students with LD. Specifically, students with LD may struggle with reading accuracy, fluency, poor spelling, and decoding . Individuals with LD need to develop compensatory skills for circumventing difficulties that transcend ages and contexts .

Adebisi, Liman, and Longpoe (2015) pointed out the term learning disabilities includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, reading disabilities, and developmental aphasia. The term does not include pupils who have learning problems that are primarily the result of visual, hearing, or motor handicaps; mental retardation; emotional disturbance; or environmental, cultural, or economic disadvantage. Learning disabilities cannot be cured, but pupils with learning disabilities grow up with learning difficulties and with persistence of proper instructions and assistive tools, they could greatly improve and attain their potentials the most important tool is assistive technology (AT).

### 2.2.2.Characteristics of pupils with Learning Disabilities

Pierangelo (2008) revealed the general characteristics of pupils with learning disabilities as follows:

- 1-Hyperactivity:** the pupil involves in some kind of pointless motor action and shows a lack of response to environmental changes or acts slowly
- 2. Perceptual-motor impairments:** the pupil has trouble distinguishing forms and materials from one another without touching ,lack adequate visual-motor memory.
- 3. Social –Emotional behavioral problems:** the pupil shows ,inadequate social competence, difficulty in adjusting to changes,drastic,change in mood are noticed.

**4. Language Problems:** the pupil is delayed or has slow development of speech. Difficulty in formulation and syntax makes them unable to organize words to form phrases, clauses or sentences in the appropriate way.

**5. Auditory Perceptual Problems:** If the pupil has poor auditory discrimination he becomes unable to distinguish one sound from another, has poor auditory reception/comprehension, deficiency in auditory memory, poor auditory recognition and recall .

**6. Disorders of attention:** the pupil has short attention span-easily and is distracted by what is going on in the surrounding.

**7. Work Habits:** the pupil may organize work poorly, work slowly, and may frequently confuse directions or rush through work carelessly.

Trustošová (2006) added that learning disabilities (LD) are caused by differences in how a pupil's brain works and how the information is processed. Pupils with learning disabilities are not "dumb" or "lazy." However, they usually have intelligence on average or above-average. Their minds are actually storing knowledge differently .The right help may achieve high level of learning and can teach them ways to get around their learning disability. A pupil with a learning disability may have challenges with the following tasks :

- Learning the alphabet, rhyming words, or connecting letters to their sounds.
- Reading aloud, making a lot of mistakes and sometimes repeating and pausing.
- Spelling.
- Language acquisition, late picking and a limited vocabulary.
- Remembering the sounds of letters or hear small variations between words.
- Pronouncing words correctly or using the correct word when another sounds similar.

- Understanding what is read.
- Confusing math symbols and misreading numbers.
- Retelling a story in order (what happened first, second, third)

## 2.3 Assistive technology

### 2.3.1 Nature of assistive technology (AT):

According to Inman (2017) ,assistive technology is defined as any item, piece of equipment or system that helps people bypass, work around or compensate for learning disabilities. Assistive technology can be divided into two primary groups:

- 1- Hardware, which refers to equipment and software, which refers to programs that run on computers.
- 2- Software, which refers to these categories of word processing software, voice recognition software, text-to speech software and visual mapping software. This software is worked around particular deficiencies, and support LD pupils to achieve their full potential and live enriching lives.

Erdem (2017) stated that the term assistive technologies refers to the equipment, devices and the services, systems, processes and adaptations made to the environment that support and facilitate their functions, used by persons with special education needs. He added that assistive technology in education is any hardware, software or system of technical components and processes that enhances the capacity for all students to engage more effectively with the curriculum and their learning environment. This can range from "high tech" technology, such as electronic devices or power wheelchairs, to "low tech" devices such as a pencil grip, supportive seat or a simple switch.

According to Lancioni, Sigafos, O'Reilly, and Singh (2012), assistive technology refers to a variety of devices (and services related to their use) that aim at helping persons with disabilities and special education / rehabilitation needs to function better within their daily context and achieve a higher quality of life. Ruffin (2012), also added that assistive

technology is any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain or improve the functional capabilities of individuals with disabilities.

### **2.3.2 Importance of Assistive Technology in Education:**

Young (2017) mentioned that the use of assistive technology provides a bridge between student s' current skills and the tasks they must perform by supporting skills that they have not yet acquired. There is an evidence that some assistive technology tools can contribute to strengthening pupils' basic skills in decoding, comprehension, spelling and in reading and writing fluency as whole .He added that technological reading when used at least once per week and conducted for nearly a semester exhibited greater reading outcomes for students with learning disabilities.

Adebisi, Liman, Longpoe, (2015) pointed out that a pupil with a learning disability may need a computer program to learn to read .So, assistive technology for pupils with learning disabilities is more than an educational tool. It is a fundamental work tool that is comparable to pencil and paper for non-disabled pupils. AT has usually been applied to computer hardware and software and electronic tools. These tools help pupils with learning disabilities to, who struggle with reading, writing ,listening and mathematics to:

- Teach and enhance basic skills, and not replace them.
- Complete educational tasks, and participate on an equal basis with their peers in the regular educational environment.
- Develop their independence in academic and employment tasks.
- Participate in classroom discussion
- Gain access to peers and teachers
- Gain access to the full variety of educational options
- Secure high levels of independent learning
- Work side-by-side with peers.
- Master academic tasks that they find difficult.

- Participate in community and recreational activities , and lessen frustration, increase motivation, foster a sense of peer acceptance, and improve productivity in the classroom and at home.

Sydeski (2013) stated that AT allow LD pupils to reach a higher level of reading achievement than would not be possible without it. He added the results of some studies revealed that pupils not only read easier more accurately, but also demonstrated good reading comprehension with more difficult passages by using assistive technology in reading process.

### **2.3.3 Assistive technology tools:**

Hasselbring and Bausch (2005) indicated that the potentials of (AT) reading systems include options such as highlighting a word, sentence, or paragraph using contrasting colors. It enables pupils to select one word at a time that appears on the screen to improve the grasp of the material. Increasing the size of the text displayed on the screen as well as changing text color can increase reading comprehension for pupils with learning disabilities. ATs reading tools include software, hardware, and other devices designed to make text-based materials more available to pupils with reading disabilities, to help pupils successfully access grade-level/ appropriate texts to enhance and develop the overall reading skills . The assistive technology called text-reader software uses synthetic speech to read text aloud while a computer screen highlights the same text is more effective than other tools.

The current research concentrates on the most relevant tools in assistive technology which is designed to improve reading comprehension as follows:

#### **2.3.3.1.Text - to- speech(TTS):**

Beachum (2018) clarified that text-to-speech (TTS) lets pupils see text and hear it read aloud at the same time. To use this tool, pupils click on or highlight words, and the words are read by a computer-generated voice. TTS can be used with books, emails, web pages and any digital text. It can also be used to convert text files into audio files. Text-to-speech (TTS) lets pupils to see text and hear it read aloud at the same time. To use this tool,

you click on or highlight words, and the words are read by a computer-generated voice.

### **2.3.3.2 Optical Character Recognition (OCR) software:**

Adebisi, Liman and Longpoe (2015) stated that Optical Character Recognition (OCR) could be connected with speech synthesis by putting texts or words into the computer file shown on the screen, then changing the printed text from the scanner to computer text. The scanner converts the image to a text file, making the characters recognizable by the computer. The computer can read the words back using a speech synthesizer and simultaneously present the words on screen. OCR enables pupils to type printed text to the computer, while the speech synthesizer reads the text back and aloud for the child to hear and alongside see the text. This device also works with scanner that reads images and text from the written or printed materials.

### **2.3.3.3. Graphic organizers or visual representation:**

Riga and Papayiannis (2015) mentioned that pupils with learning disabilities have difficulty to organizing and integrating ideas while reading. Concept mapping software helps them to represent the ideas and concepts visually. These representations are presented in a physical manner and can be connected with arrows to show the relationship between ideas. These ideas can be linked, rearranged, color coded, and matched with a variety of icons to suit the need of the user.

### **2.3.3.4. Dictionaries and thesauri**

Another assistive tool to aid with reading is an electronic dictionary. Pupils can find meanings for unknown words by highlighting the word and clicking on a dictionary icon. Lange, McPhillips, Mulhern, Wylie (2006) pointed out that the use of dictionary seemed to improve the understanding of text compared to not using one. Dictionaries and thesauri allow pupils to look up words they don't understand when they read. One of the easiest differentiation tools for a reading passage is a software program that helped in using standard formatting features within the program. Using the

highlighting feature can help students focus on particular aspects of a text like parts of speech, or key elements of a paragraph. (Raskind,2000)

### **3. Method and procedures**

#### **3.1. Participants**

The participants of the study comprised 10 pupils. They were chosen depending on Woxelar IQ test from third primary pupils enrolled in El Shaheed Khalied Allam Primary School, Shebeen Educational Directorate, Menoufia governorate, during the second semester of the 2021-2022 scholastic year. The participants represented one group.

#### **3.2. Instruments and materials**

An LD checklist to identify the pupils' problems in reading,an EFL Reading comprehension skills checklist to identify the most important reading skills to be developed ,an EFL reading comprehension skills test,aTeacher's Guide.

#### **3.3. Description of the EFL reading comprehension skills test**

The test consisted of nine questions .Each part consisted of some items. The first question consisted of four questions where the pupils were asked to read and answer. The pupils were given four questions each question tests the pupils' ability to understand the text and answer. The second question consisted of three questions, where the pupils were asked to read and put (√) or (x).The pupils were given three questions the first of which tests the pupils' ability to understand the main idea. In the third question the pupils were asked to complete the dialogue using the words given to complete the mini-dialogue.

In the fourth question ,the pupils were asked to read the text and guess the meaning of the underline words. In the fifth question, the pupils were asked to read the words correctly. In the sixth question consisted of four questions: the pupils were asked to read the words correctly without reversing letter order.

In the seventh question, the pupils were asked to change the vowel to have a new word that matches the picture. The eighth and ninth questions tests their grammatical rules.

### 3.4 Validity of the EFL reading comprehension skills test

The test was validated by jury members in various faculties of education (n=5). Also, the internal consistency was used to determine the value of the correlation between the scores of each of the test items separately, and the test items as a whole. The results are shown in the following table:

**Table (1): Correlation between the sub-skills and the total sum of the test score**

Sub-skill	Correlation= r	sig
Skim For The Main Idea	0.814**	Significant at (0.01)
Scan For Details	0.850**	Significant at (0.01)
Vocabulary Meaning	0.806**	Significant at (0.01)
Comprehending Some Grammatical Rules	0.867**	Significant at (0.01)

\*\*Correlation is significant at the 0.01 level

Table(1) revealed the correlation between sub-skills and the total sum of the reading comprehension test scores. All correlations were found to be statistically significant. This shows that the test is internally consistent.

### 3.5 Reliability of the test

The reliability of the reading comprehension test was measured through two methods:

#### A) Cronbach's alpha

To measure the reliability of the reading comprehension test, Cronbach's alpha of the scores of reading comprehension test was used. The following table reveals this

**Table ( 2 ):Reliability of the Test using Cronbach's Alpha**

Skill	Cronbach's Alpha *
Skim For The Main Idea	0.811
Scan For Details	0.817
Vocabulary Meaning	0.809
Comprehending Some Grammatical Rules	0.812
Over all EFL reading comprehension	0.819

**\*Cronbach's Alpha of the test = 0.819**

As illustrated in table ( 2) Accordingly, the previous value of the Cronbach's Alpha means the test is highly reliable. The previous results indicate that the test was reliable.

### **B) Test-retest method**

The test was administered ,then after two weeks it was re- administered the following table shows this

**Table ( 3 )Test –retest method**

Skill	Correlation
Skim for the main idea	0.842
Scan for details	0.819
Vocabulary meaning	0.781
Comprehending some grammatical rules	0.825
Overall EFL reading comprehension	0.873

As illustrated in table ( 3) the table shows that the test is reliable where  $r = 0.842, 0.819, 0.781, 0.825,$  and  $0.873$  for skim for the main idea, scan for

details, vocabulary meaning, comprehending some grammatical rules and overall EFL reading comprehension respectively.

## 4 Results and discussion

### 4.1. Hypothesis one:

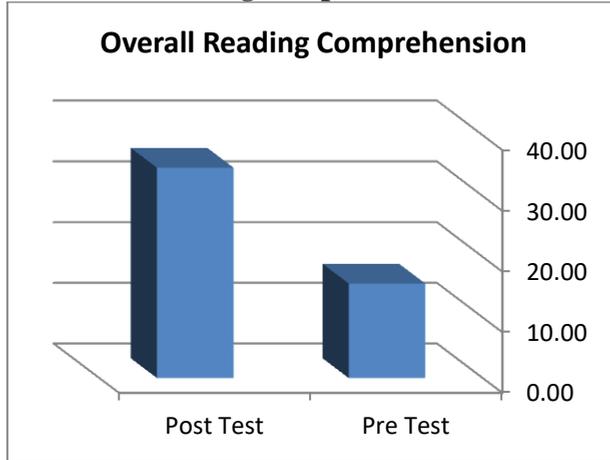
The first hypothesis states that” There is no statistically significant difference between the study group's mean score on overall reading comprehension skills pre-post test. To verify this hypothesis, data were treated statistically. Means, standard deviation, minimum and maximum scores are shown in the following table (4 )

**Table (4 ) Descriptive Statistics of the Pre -test and the Post -test on overall reading comprehension.**

Test	Group	N	Mean	Std. Deviation	Minimum	Maximum	Mean difference	total score
overall reading comprehension	Pre -test	10	15.60	1.65	13	18	19.05	40
	Post - test	10	34.65	2.60	31	38.5		

Table ( 4 ) shows that the value of overall reading comprehension mean score of the post –test which was (34.65) .It is higher than that of the pre - test which was (15.60). As table ( 7 ) shows the pre -test’s scores were higher than those of the pre -test on overall reading comprehension test. This is represented graphically in figure ( 1 )

Figure ( 1 ) Mean Scores of the Pre -test and the Post -test on overall reading comprehension.



To show the significance of the difference, non parametric test (Wilcoxon Signed Ranks Test) was calculated for the difference between signed ranks of the two administrations. This is illustrated in table (5):

Table ( 5 ) Wilcoxon Signed Ranks Test

Test	Sign	N	Mean Rank	Sum of Ranks	Z	Sig	R	Effectiveness
overall reading comprehension	Negative Ranks	0	0	0	2.812	Significant at (0.01)	1	Large
	Positive Ranks	10	5.5	55				
	Ties	0						

It is clear from table ( 5 ) that the calculated value of " Wilcoxon: Z" (= 2.812) which is significant at level "0.01". This reflects that the difference between the signed ranks of the two administrations reached the level of statistical significance.

To investigate the effectiveness of the results, the value of effect size (r) was calculated using the following equation:

$$R = \frac{4 T1}{N (N+1)} - 1$$

**T1 = Sum of Positive Ranks**

**N = The number of Pupils**

The effect size ( $r$ ) was = 1 which reflects that there was a large effect and educational importance of assistive technology on developing LD Primary Stage Pupils' EFL Reading Comprehension Skills .

#### 4.2. Hypothesis two:

The second hypothesis states that” There is no statistically significant difference between the study group's mean score on skimming for the main idea pre-post test

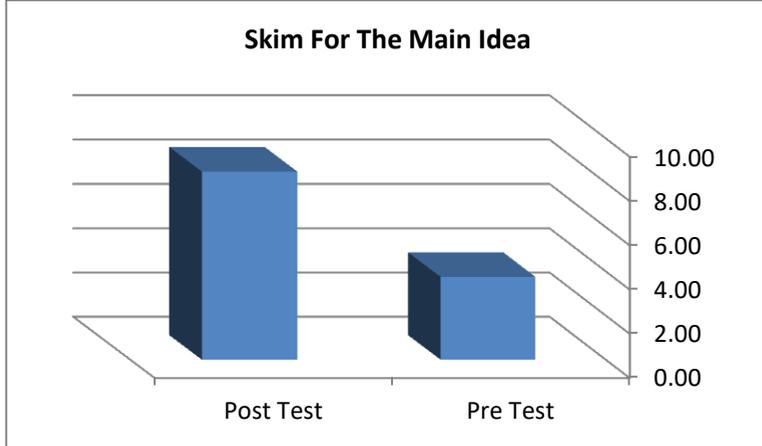
To verify this hypothesis, data were treated statistically. Means, standard deviation, minimum and maximum scores were shown in the following table (6)

**Table ( 6 ) Descriptive Statistics of the Pre -test and the Post -test on skimming for the main idea .**

Test	Group	N	Mean	Std. Deviation	Minimum	Maximum	Mean difference	total score
skim for the main idea	Pre -test	10	3.75	1.77	2.5	7.5	4.75	10
	Post -test	10	8.50	1.29	7.5	10		

Table (6) shows that the value of skimming for the main idea was (8.50) which is higher than that of the pre -test which was (3.75). As table ( 6 ) shows the pre -test's scores were higher than those of the pre -test on skimming for the main idea . This is represented graphically in figure ( 2 )

**Figure ( 2 ) Mean Scores of the Pre -test and the Post -test on skim for the main idea**



To show the significance of the differences, non parametric test (Wilcoxon Signed Ranks Test) was calculated for the difference between the signed ranks of the two administrations. This is illustrated in table (7)

**Table ( 7 ) Wilcoxon Signed Ranks Test**

Test	Sign	N	Mean Rank	Sum of Ranks	Z	Sig	R	Effectiveness
skim for the main idea	Negative Ranks	0	0	0	2.913	Significant at (0.01)	1	Large
	Positive Ranks	10	5.5	55				
	Ties	0						

It is clear from table (7) that the calculated value of " Wilcoxon: Z" (= **2.913**) is significant at level "0.01". This reflects that the difference between the signed ranks of the two administrations reached the level of statistical significance. The value of effect size (r) was calculated. It was = 1 which reflects that there was a large effect of assistive technology on developing skimming for the main idea.

### **4.3. Hypothesis three:**

The third hypothesis states that "There is no statistically significant difference between the study group's mean score on scanning for details .To verify this hypothesis, data were treated statistically. Means, standard

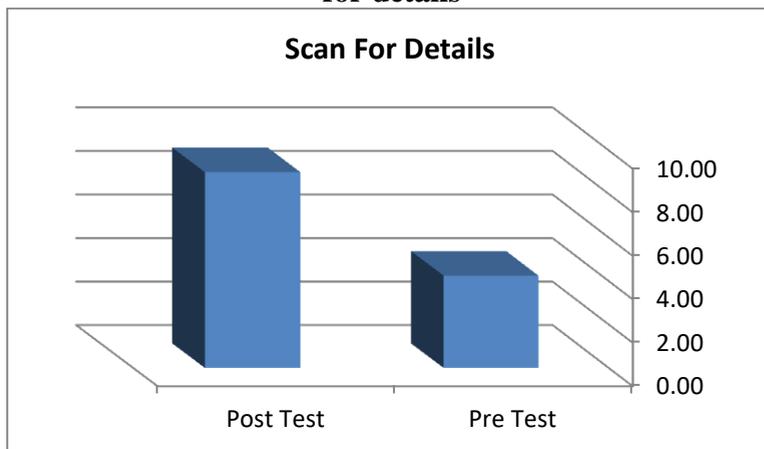
deviation, minimum and maximum scores were shown in the following table (8) .

**Table ( 8 ) Descriptive Statistics of the Pre -test and the Post -test on Scanning for details.**

Test	Group	N	Mean	Std. Deviation	Minimum	Maximum	Mean difference	total score
Scan For Details	Pre -test	10	4.25	1.69	2.5	7.5	4.75	10
	Post -test	10	9.00	1.29	7.5	10		

Table ( 8 ) shows that the value of scanning for details mean score of the post -test was (9) which is higher than that of the pre -test which was (4.25). As table ( 8 ) shows the pre -test's scores were higher than those of the pre -test on scanning for details. This is represented graphically in figure ( 3 )

**Figure ( 3 ) Mean Scores of the Pre -test and the Post -test on scanning for details**



To show the significance of the differences, non parametric test (Wilcoxon Signed Ranks Test) was calculated for the difference between signed ranks of the two administrations. This is illustrated in table ( 9 )

**Table ( 9 ) Wilcoxon Signed Ranks Test**

Test	Sign	N	Mean Rank	Sum of Ranks	Z	Sig	R	Effectiveness
Scan For Details	Negative Ranks	0	0	0	2.850	Significant at (0.01)	1	Large
	Positive Ranks	10	5.5	55				
	Ties	0						

It is clear from table ( 9 ) that the calculated value of " Wilcoxon: Z" (= 2.850) is significant at level "0.01". This reflects that the difference between the signed ranks of the two administrations reached the level of statistical significance.

To investigate the effectiveness of the results, the value of effect size (r) was calculated. The effect size (r) was = 1 which reflects that there was a large effect of assistive technology on developing scanning for details.

#### 4.4. Hypothesis four:

The fourth hypothesis states that " There is no statistically significant difference between the study group's mean score on vocabulary meaning.

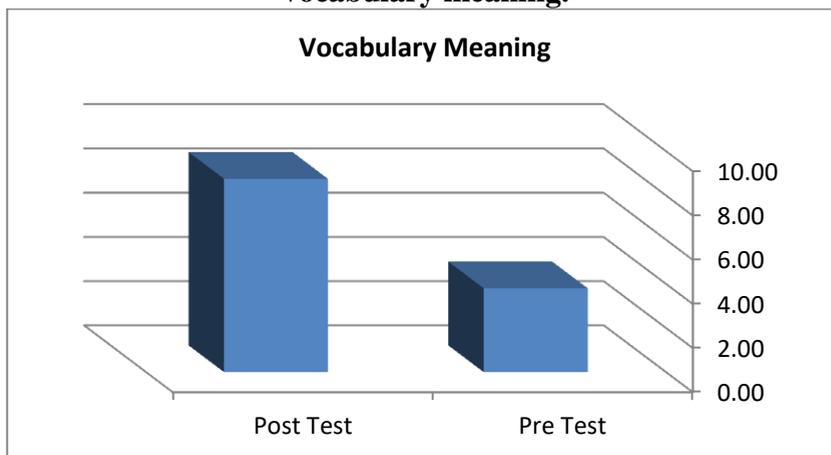
To verify this hypothesis, data were treated statistically. Means, standard deviation, minimum and maximum scores were shown in the following table ( 10 )

**Table ( 10 ) Descriptive Statistics of the Pre -test and the post -test on vocabulary meaning.**

Test	Group	N	Mean	Std. Deviation	Minimum	Maximum	Mean difference	total score
Vocabulary Meaning	Pre -test	10	3.80	1.01	2.5	5.5	4.95	10
	Post -test	10	8.75	0.54	8	9.5		

Table ( 13) shows that the value of vocabulary meaning mean score of the post -test was (8.75) which is higher than that of the pre -test which was (3.80). As table ( 10 ) shows the pre -test's scores were higher than those of the pre -test on vocabulary meaning . This is represented graphically in figure ( 4 )

**Figure ( 4 ) Mean Scores of the pre -test and the post -test on vocabulary meaning.**



To show the significance of the differences, non parametric test (Wilcoxon Signed Ranks Test) was calculated for the difference between Signed Ranks of the two administrations. This is illustrated in table ( 11):

**Table ( 11 ) Wilcoxon signed ranks Test**

Test	Sign	N	Mean Rank	Sum of Ranks	Z	Sig	R	Effectiveness
Vocabulary Meaning	Negative Ranks	0	0	0	2.869	Significant at (0.01)	1	Large
	Positive Ranks	10	5.5	55				
	Ties	0						

It is clear from table (11) that the calculated value of " Wilcoxon: Z" (= 2.869) which is significant at level "0.01". This reflects that the difference between the signed ranks of the two administrations reached the level of statistical significance.

To investigate the effectiveness of the results, the value of effect size (r) was calculated. The effect size (r) was = 1 which reflects that there was a large effect of assistive technology on developing vocabulary meaning.

#### 4.5. Hypothesis five:

The fifth hypothesis states that "There is no statistically significant difference between the study group's mean score on comprehending some grammatical rules.

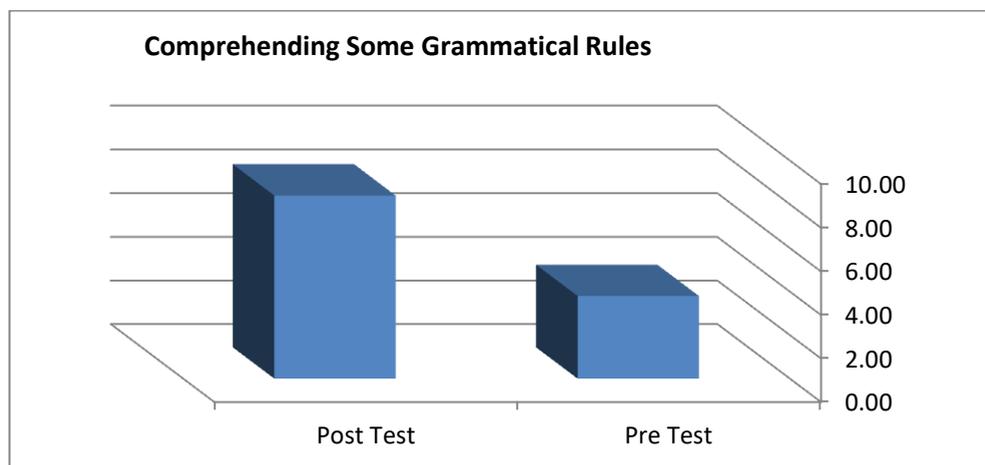
To verify this hypothesis, data were treated statistically. Means, standard deviation, minimum and maximum scores were computed. This is shown table (12).

**Table ( 12) Descriptive Statistics of the Pre -test and the Post -test on Comprehending some grammatical rules .**

Test	Group	N	Mean	Std. Deviation	Minimum	Maximum	Mean difference	total score
Comprehending Some Grammatical Rules	Pre -test	10	3.80	0.92	3	5	4.60	10
	Post -test	10	8.40	0.70	7	9		

Table (12) shows that the value of comprehending some grammatical rules in the post -test was (8.40) which is higher than that of the pre -test which was (3.80). As table (12) shows the pre -test's scores were higher than those of the pre -test on comprehending some grammatical rules. This is represented graphically in figure (5)

**Figure ( 5) Mean scores of the pre -test and the post -test on comprehending some grammatical rules**



To show the significance of the differences, non parametric tests (Wilcoxon Signed Ranks Test) was calculated for the difference between signed ranks of the two administrations. This is shown in table ( 16 ):

**Table ( 16 ) Wilcoxon Signed Ranks Test**

Test	Sign	N	Mean Rank	Sum of Ranks	Z	Sig	R	Effectiveness
Comprehending Some Grammatical Rules	Negative Ranks	0	0	0	2.812	Significant at (0.01)	1	Large
	Positive Ranks	10	5.5	55				
	Ties	0						

It is clear from table ( 16 ) that the calculated value of " Wilcoxon: Z" (= 2.812) which is significant at level "0.01". This reflects that the difference between the signed ranks of the two administrations reached the level of statistical significance.

To investigate the effectiveness of the results, the value of effect size (r) was calculated. Effect size (r) was = 1 which reflects that there was a large effect of assistive technology on developing comprehending some grammatical rules.

**Table ( 8 ) Wilcoxon Signed Ranks Test**

Test	Sign	N	Mean Rank	Sum of Ranks	Z	Sig	R	Effectiveness
overall reading comprehension	Negative Ranks	0	0	0	2.812	Significant at (0.01)	1	Large
	Positive Ranks	10	5.5	55				
	Ties	0						

It is clear from table ( 8 ) that the calculated value of " Wilcoxon: Z" (= **2.812**) which is significant at level "0.01". This reflects that the difference between the signed ranks of the two administrations reached the level of statistical significance.

To investigate the effectiveness of the results, the value of effect size (r) was calculated using the following equation:

$$R = \frac{4 T1}{N (N+1)} - 1$$

**T1 = Sum of Positive Ranks**

**N = The number of Pupils**

The effect size (r) was = 1 which reflects that there was a large effect and educational importance of assistive technology on developing LD Primary Stage Pupils' EFL Reading Comprehension Skills .

#### **4.6 Discussion of the results:**

The results of the first hypothesis revealed that there is no statistically significant difference between the study group's mean score on overall reading comprehension pre-post test. The study participants showed more development in reading comprehension skill in the post-test than the the pre-test. Such development proved and supported the first hypothesis. Such development can be related to using assistive technology.

The results of the second hypothesis revealed that there is no statistically significant difference between the study group's mean score on the skimming for the main idea .The study participants showed more development in skimming in the post than the pre-test test.Such development supported the second hypothesis. Such development can be related to using of assistive technology.

The results of the third hypothesis revealed that there is no statistically significant differences between the study group's mean score on scanning for details. The study participants showed more development in scanning in the post test than the pre-test. Such development supported the third hypothesis. Such development can be related to using of assistive technology.

The results of the fourth hypothesis revealed that there is no statistically significant differences between the study group's mean score on vocabulary meaning pre-post test. The study participants showed more development in vocabulary meaning in the post test than the pre-test .Such

development proved and supported the fourth hypothesis statistically. This development can be related to using of assistive technology.

The results of the fifth hypothesis revealed that there is no statistically significant differences between the study group's mean score on comprehending some grammatical rules. The study group showed more development in comprehending some grammatical rules in the post test than the pre-test .Such development supported the fifth hypothesis. Such development can be related to using of assistive technology.

The results showed that there is no statistically significant difference between the study group's mean score on overall reading comprehension , and each of the skimming ,scanning ,vocabulary meaning and some grammatical rules too . The significance was not only statistical, but educationally important as well. The results of the present study revealed that the LD pupils were developed after using of assistive technology. Accordingly, the hypotheses of the present study were accepted. As a result it was found out that assistive technology was effective in developing reading comprehension skill.

## 5. conclusion

The conclusions of the study were as follows:

- 1-Assistive technology (AT) plays a major role in developing the EFL reading skills in general and reading comprehension skills in particular.
- 2- AT helps LD pupils/ students in the various educational stages.
- 3-Using assistive technology resulted in meaningful learning and motivated LD pupils to take part positively in the classroom activities effectively.

## 6. Recommendations

- 1-EFL teachers should increase the LD students' roles in reading classes and minimize their own role.
- 2- EFL reading comprehension skills should be given more attention in EFL classes. More time and efforts should be exerted to develop the main reading skill and its sub-skills.
- 3- LD pupils should be aware of the different reading comprehension subskills that have to be mastered.

## References

- Adebisi, R. O., Liman, N. A., & Longpoe, P. K. (2015). Using Assistive Technology in Teaching Children with Learning Disabilities in the 21st Century. *Journal of Education and Practice*, 6(24), 14-20.
- Adebisi, R. O., Liman, N. A., & Longpoe, P. K. (2015). Using Assistive Technology in Teaching Children with Learning Disabilities in the 21st Century. *Journal of Education and Practice*, 6(24), 14-20.
- Adebisi, R. O., Liman, N. A., & Longpoe, P. K. (2015). Using Assistive Technology in Teaching Children with Learning Disabilities in the 21st Century. *Journal of Education and Practice*, 6(24), 14-20.
- Ahmadi, M. R., Ismail, H. N., & Abdullah, M. K. K. (2013). The Importance of Metacognitive Reading Strategy Awareness in Reading Comprehension. *English Language Teaching*, 6(10), 235-244.
- Ann Logsdon (2020) in <https://www.verywellfamily.com/understanding-reading-decoding-2162765>
- Atanga, C., Jones, B. A., Krueger, L. E., & Lu, S. (2020). Teachers of students with learning disabilities: Assistive technology knowledge, perceptions, interests, and barriers. *Journal of Special Education Technology*, 35(4), 236-248.
- Beachum, F. D., & Obiakor, F. E. (2018). *Improving educational outcomes of vulnerable children*. Plural Publishing.
- Bhandari, A., & Goyal, G. (2004). Learning disabilities: Nature, causes and interventions. *Counselling: Theory, Research and Practice*, 163-187.
- Bryant, D. P., Goodwin, M., Bryant, B. R., & Higgins, K. (2003). Vocabulary instruction for students with learning disabilities: A review of the research. *Learning Disability Quarterly*, 26(2), 117-128.
- Bulut, A. (2017). Improving 4th Grade primary school students' Reading comprehension Skills. *Universal Journal of Education Research*, 5(1), 23-30.
- Chard, D. J., Vaughn, S., & Tyler, B. J. (2002). A synthesis of research on effective interventions for building reading fluency with elementary

- students with learning disabilities. *Journal of learning disabilities*, 35(5), 386-406.
- Clarke, P. J., Truelove, E., Hulme, C., & Snowling, M. J. (2013). *Developing reading comprehension*. John Wiley & Sons ,USA
- Cook, A. M., & Polgar, J. M. (2014). *Assistive technologies-e-book: principles and practice*. Elsevier Health Sciences.6/7
- El-Koumy, A.(2016). *Teaching English as a Foreign Language to Students with Learning Disabilities at the Intermediate and Advanced Levels: A Multiple-Strategies Approach*. Revised Edition (February 20, 2020). Published by Dar An-Nashr for Universities, Cairo, Egypt, Revised Edition.
- Erdem, R. (2017). Students with special educational needs and assistive technologies: A literature review. *Turkish Online Journal of Educational Technology-TOJET*, 16(1), 128-146.
- Erdem, R. (2017). Students with special educational needs and assistive technologies: A literature review. *Turkish Online Journal of Educational Technology-TOJET*, 16(1), 128-146.
- Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of educational research*, 71(2), 279-320.
- Hasselbring, T. S., & Bausch, M. E. (2005). Assistive technologies for reading. *Educational Leadership*, 63(4), 72.
- Hoeh, E. (2015). *Mapping a path to understanding: Supporting the comprehension of narrative text for students with learning disabilities and typically developing peers (Doctoral dissertation )* State University of New York at Buffalo.
- Hsu, K. C. (2016). *Social gamification in multimedia instruction: assessing the effects of animation, reward strategies, and social interactions on learners motivation and academic performance in online settings (Doctoral dissertation )* University of Kansas.In

[https://books.google.com.eg/books?hl=en&lr=&id=Msx32CmmHGgC&oi=fnd&pg=PR9&dq=Bender,+W.+N.+\(2001\).+Learning+disabilities:+Characteristics,+identification,+and+teaching+strategies+\(4th+ed.\)&ots=XO\\_6Vl6Lj6&sig=5NU-5WBMdGrpQZRdDuYW18rztQc&redir\\_esc=y#v=onepage&q&f=false](https://books.google.com.eg/books?hl=en&lr=&id=Msx32CmmHGgC&oi=fnd&pg=PR9&dq=Bender,+W.+N.+(2001).+Learning+disabilities:+Characteristics,+identification,+and+teaching+strategies+(4th+ed.)&ots=XO_6Vl6Lj6&sig=5NU-5WBMdGrpQZRdDuYW18rztQc&redir_esc=y#v=onepage&q&f=false).

- Hung, D. (2007). Orthographic variations and visual information processing. *Psychological Bulletin*, 90(3), 377.
- Inman, J. R. (2017). Exploring the Use of Technology to Support Literacy of Sixth Grade Students with Reading Disabilities. (Doctoral dissertation) University of Missouri-Saint Louis.
- Jude, W. (2012). Literal level of student's comprehension in Nigeria: A means for growing a new generation African scholars. *Journal of Education and Practice*, 3(7), 120-129.
- Lancioni, G. E., Sigafoos, J., O'Reilly, M. F., & Singh, N. N. (2012). Assistive technology: Interventions for individuals with severe/profound and multiple disabilities. *Springer Science & Business Media*, 4/2
- Lange, A. A., McPhillips, M., Mulhern, G., & Wylie, J. (2006). Assistive software tools for secondary-level students with literacy difficulties. *Journal of Special Education Technology*, 21(3), 13-22.
- Pierangelo, R., & Giuliani, G. (2008). Teaching students with learning disabilities: A step-by-step guide for educators. Corwin Press.
- Pierangelo, R., & Giuliani, G. (2008). Teaching students with learning disabilities: A step-by-step guide for educators. Corwin Press.
- Politt, R. (2004). Day-to-day dyslexia in the classroom. Routledge.
- Raskind, M. (2000). Assistive technology for children with learning difficulties. San Mateo: Schwab Foundation for Learning.
- Riga, A., & Papayiannis, N. (2015). Investigating the impact of Concept Mapping Software on Greek students with Attention Deficit (AD). *International Journal of Education and Development using ICT*, 11(3).
- Ruffin, T. M. (2015). Assistive technologies for reading. *The Reading Matrix*, 12(1).

- Stewart, R. (2007). Three-Tier models of reading and behavior. *Journal of Positive Behavioral Interventions*, 9(4), 239-253.
- Sydeski, R. T. (2013). A study of special education teachers' knowledge of assistive technology for children with reading difficulties. (Doctoral dissertation ) Duquesne University.
- Tennent, W. (2014). Understanding reading comprehension: Processes and practices. *Understanding Reading Comprehension*, 1-224.
- Tlustošová, P. (2006). Teaching English to children with specific learning difficulties. Brno, 42 *Universal Design for Learning*. Turkish Online Journal of Educational Technology-TOJET, 13(2), 18-23.
- Volman, M. (2010). Scaffolding in teacher–student interaction: A decade of research. *Educational psychology review*, 22(3), 271-296.
- Winter, E., & O’Raw, P. (2010). Literature review of the principles and practices relating to inclusive education for children with special educational needs. National Council for Special Education. Trim, Northern Ireland.
- Wojcik, B., & Douglas, H. (2012). Illinois Assistive Technology Guidance Manual. Special Education Assistive Technology Center, Illinois State University.
- Young, M. C. (2017). The Effects of Text-to-Speech on Reading Comprehension of Students with Learning Disabilities. Illinois State University.