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The Effects of Instructional Technologies on reading Comprehension of Students with Learning Disabilities: A Systematic Review

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Abstract

Students with learning disabilities (LD) typically experience recurrent difficulties with reading comprehension as a result of decoding, attention, and use of metacognitive strategies deficits. Instructional technologies have arisen as viable means of supporting literacy skills for this group of students in response to these difficulties. The purpose of this systematic review is to integrate recent empirical research on the efficacy of instructional technology interventions in improving students with LD reading comprehension. The review was PRISMA-guided and used the PICOS framework to maintain methodological consistency. Four main databases—ERIC, PsycINFO, Scopus, and Google Scholar—were searched using combinations of keywords like "instructional technology," "reading comprehension," and "learning disabilities." The inclusion criteria were on studies published in English from 2017 to 2025 with technology-based intervention and on measuring reading comprehension outcomes in formally diagnosed students with LD. From 223 initially screened records, 11 studies were included. Results show that technologies like text-to-speech (TTS) software (e.g., Kurzweil 3000), mobile applications such as COSMA, mind-mapping software, interactive digital books, and augmented reality environments are highly effective. They not only enhance understanding but also motivation, engagement, and autonomy of learners. Implications include the necessity of teacher preparation, technology-supported curriculum planning, and additional research on new technologies such as AI and virtual reality. The review emphasizes that instructional technology, when put into practice considerately, is essential in inclusive reading instruction for students with LD.

Keywords: Instructional Technologies, Reading Comprehension, Learning Disabilities, Systematic Review, Assistive Technology

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Introduction / Literature Review

Learning disabilities (LDs) are neurological disorders that impact the way people process information, commonly interfering with academic abilities like reading, writing, and math (Gersten et al., 2001). Of these, reading comprehension is still one of the most enduring and critical difficulties. LD students also commonly struggle with not just decoding and fluency but with comprehension and meaning making and interpreting, which sets back academic achievement and overall literacy progress. This is a challenge that needs to be addressed, as reading comprehension is the basis of academic achievement in all subjects.

Comprehension of reading is more than the mere recognition of words; it involves decoding, vocabulary, sentence processing, and higher-level thinking processes, including inference and synthesis. Students with LDs tend to have deficits in one or more areas and, as a consequence, struggle to build meaning from text (Okolo & Ferretti, 2020). Without careful intervention, these challenges can continue and expand the achievement gap for students with LDs with their peers who are typically developing. Therefore, helping these students become skilled in understanding of reading is not just a direct priority, but also an issue of equity and inclusion.

Directive technologies are placed as promising vehicles to meet students' special learning needs with LDS. Assistant technologies such as Text-to-Spich (TTS), Speech-to-Text, Multimedia and Mobile Learning App are becoming more common in the educational environment (Rough and Jabar, 2023). These technologies provide students with written information, processing and other ways of interaction, which help create understanding and motivation for difficulty areas. In addition, adaptive teaching environment and promoted reality (AR) spaces provide customized instructions and interactive elements that can enable effective learning experiences (Shaban and Mohammed, 2024).

Despite the increasing use of this type of devices, the efficacy of instructional technologies as a means of increasing the understanding of reading among students with LDS is an emerging line of study. Individual trials have yielded different outcomes, based on the nature of technology, age category, and the type of disability concerned (Svensson et al., 2021; Schmitt et al., 2019). The improvements range from immediate increases in understanding and participation to no, or delayed, effects. With this heterogeneity, teachers and policymakers need a good overall sense of what works best among technological interventions and under what circumstances.

Thus, this systematic review proposes to integrate available evidence concerning instructional technologies employed to facilitate reading comprehension among learning-disabled students. Through the integration of results of eleven peer-reviewed studies carried out across various contexts of education, this review attempts to emphasize patterns, gaps, as well as implications for research and practice. It also seeks to determine which forms of technologies—spanning from mobile applications and TTS software to AR environments and strategy-based programs—show the greatest potential for enhancing reading comprehension results.

The key research questions informing this systematic review are: (1) What forms of instructional technologies are presently being implemented to enhance reading comprehension in students with LDs? (2) How useful are such technologies in facilitating reading comprehension performance? (3) Can effectiveness differences be detected across age, education levels, or particular subtypes of learning disabilities? These queries are

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answered through a close examination of chosen studies that differ in methodology, populations sampled, and technological interventions.

The chosen articles depict a wide array of interventions and populations targeted. For instance, Jozwik and Douglas (2017) investigated a technology-supported strategy instruction program with English learners with LDs in elementary school, while Panopoulos and Drossinou-Korea (2024) investigated the integration of digital tools in teaching students with intellectual and developmental disabilities in secondary school. Likewise, Schmitt et al. (2019) contrasted continuous and discontinuous TTS technology among middle school students and Raffoul and Jaber (2023) presented meta-level analysis of TTS as a compensatory tool in the postsecondary education context. The various contexts provide added richness to the results of the review and supply broader insight into technological use.

A few studies in the review utilized experimental and quasi-experimental designs, for example, multiple baseline designs and control group comparisons, to assess the effectiveness of interventions. For example, Shaaban and Mohamed (2024) showed the remarkable improvement of early childhood students' reading comprehension with the use of AR technology, while COSMA (Comprehension Strategies Mobile App) improved comprehension and motivation for elementary students (Stearns, 2012). Some, such as Meta-Synthesis by Ruskind and Higgins (1999), provided theoretical models to classify their cognitive effects on students with directive techniques and dyslexia, dysgraphia and dyscalculia.

The review also explains how technical intervention students affect motivation, engagement and self-efficiency. Some studies indicated that students who had employed assistant technologies had high interest and inspiration for reading tasks (Svenson et al., 2021; Shaaban & Mohamed, 2024). These emotional benefits are important, as they result in long -term use and good educational achievement. In addition, the perspective of teacher and parents emphasized the need for business growth and available infrastructure in facilitating the effective use of these devices (Rough and Jabar, 2023; Gersten et al., 2001).

Research Objective

The purpose of this systematic review is to synthesize and review the recent empirical evidence about the efficacy of instructional technologies in improving reading comprehension among students with learning disability (LD).

Method

This systematic review followed Prisma (Preferred Reporting Items for systematic Review and Meta-analysis) guidelines for transparency and copy qualification. The purpose of the review was to synthesize the existing evidence related to the impacts of instructional technology intervention on the understanding of reading among students with learning inability.

Eligibility Criteria

The study selection was informed by predetermined inclusion and exclusion norms following the PICOS structure (participants, intervention, comparison, results, study design).

- Participants were students who were formally diagnosed with Learning Disabled (LD), which were involved, but were not limited to dyslexia, dysgraphia and other disorders related to reading understanding.

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- Interventions needed to include any type of instructional technology like computer-based instruction, mobile applications, text-to-speech (TTS) software, augmented reality, or assistive technologies specifically designed to support reading comprehension.
- Outcomes needed to include direct measures of reading comprehension ability (e.g., accuracy, rate, strategy use, performance on comprehension questions).
- Study designs were experimental (e.g., randomized controlled trials), quasi-experiments, and mixed-method studies that included empirical data on outcomes.
- Publication date was restricted to articles dating between 2017 and 2025, to include recent technology advancements.
- Language was limited to English.

Research that did not specifically address reading comprehension or did not include participants with learning disabilities were removed from the search.

Information Sources

Several databases were systematically searched to find relevant literature. These included:

- ERIC (Education Resources Information Center)
- PsycINFO
- Scopus
- Google Scholar

Besides, reference lists of included studies as well as other related reviews were hand screened in order to spot additional studies that fit the inclusion criteria.

Search Strategy

The search strategy was intended to pick up a wide variety of studies of instructional technology and reading comprehension in students with learning disabilities. Boolean operators and keyword strings were employed. The following search string was utilized across databases:

- (("instructional technology" OR "educational technology" OR "assistive technology") AND ("reading comprehension") AND ("learning disabilities" OR "dyslexia"))

The search strategy was modified minimally for each database syntax. Search restrictions were applied to the years 2017–2025 and to the English language.

Study Selection

All records that were identified were imported into reference management software to eliminate duplicates. There were two stages in the study selection process

1. *Title and abstract screening:* Titles and abstracts were independently screened by two reviewers for relevance against the eligibility criteria.
2. *Full-text review:* Those studies that seemed to be relevant were searched in full text and assessed for eligibility.

Any disagreement among critics was resolved by discussing or bringing it to a third reviewer. The entire process is depicted in the PRISMA flow diagram (Figure), which shows the number of identified, investigations, excluded, and recorded records.

Table: PRISMA Flow Table

Phase	Details	Number of Studies
Identification	"Records identified through database searching"	214
	"Additional records identified through other sources"	9

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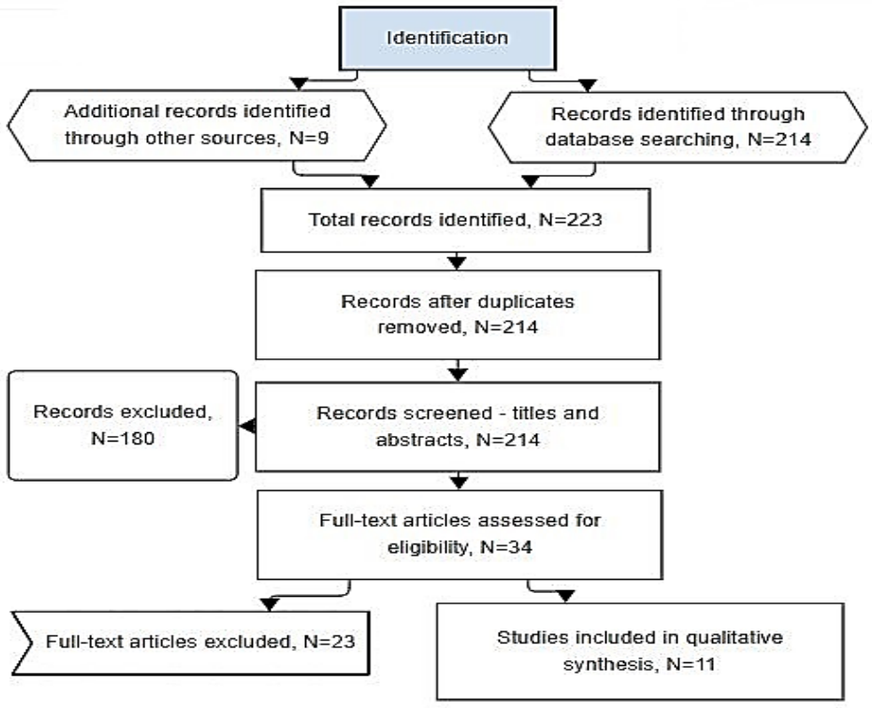
	Total records identified	**223**
Screening	"Records after duplicates removed"	214
	"Records screened (titles and abstracts)"	214
	"Records excluded"	180
Eligibility	"Full-text articles assessed for eligibility"	34
	"Full-text articles excluded"	23
Included	"Studies included in qualitative synthesis"	**11**

Diagram: Prisma Flow Diagram



Data Extraction

Systematic data extraction on the last set of studies covered in this systematic review was done using a well-predesigned data extraction form. This form was prepared in a way that ensured that the data captured were consistent and comprehensive in obtaining the essential critical information to be analyzed and synthesized. The data extracted included more than one important dimension per study to facilitate meaningful comparison and interpretation across different research designs and settings.

1. Initially, including the year of publication and writer (s), to enable and enable trekking by chronology of progress in the region, information of the book list was collected. For example, research differs from Jozwick and Douglas (2017), who examined the understanding of technology-assisted reading for disabled English learners, for more contemporary researches such as panopolos and Drosino-Korea (2024), who examined technical instructions among students with intellectual disabled.
2. Sample size and demographics were another important aspect. This included demographic information such as age group, clinical type (eg, learning disability, intellectual disability), and levels of study. For example, Ocolo and Ferreti (2020) surveyed a wide range of students with different age groups' learning disabilities,

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while Shaban and Mohammed (2024) focused on early childhood students, who were accompanied by learning disability. Other research, such as Swenson et al. (2021), there were large sample size (n = 149) with intensive details of severity of disability of reading and writing.

3. Subsequently, the nature of the technology used was systematically documented to determine special technical AIDS or interventions used. This technology category includes a wide range of instructional and auxiliary technologies such as Text-to-Spiches (TTS) software (TTS) software (Refool & Jeber, 2023; (Jozvik and Douglas, 2017). The variability in technical strategies reflects multidimensional nature of intervention reading for students with different requirements.
4. Information related to the study design and length also shone to determine the duration of functioning refinement and intervention. The study included many types of designs, such as several baseline single-subject design (Jojavik & Douglas, 2017; özbek & Ergül, 2022), Quasi-Experimental Designs (Shaban & Mohammed, 2024), and Meta-Society Review (Thapliyal & Ahuja, 2023). The length of the intervention was quite different, from a few weeks of brief sessions to the expanded intervention of several months, which reflects the difference in the research empire and implementation contexts.
5. For significant importance to this review, specific result measures were taken for the understanding of reading to assess the efficacy of intervention. They standardized and researchers-made understanding tests, for example, literal and inferiority questions accuracy (Jozvik and Douglas, 2017), reading rate and accuracy measures (Schmit et al., 2019), Comprehension Retail Task (özbek & Argül, 2022), and Strategy Use (Panalin-Daris), and Penalin-Ds. Panalin-Dra. Measures reflected both quantitative and qualitative information on the understanding of students' reading.
6. Finally, the major conclusions of each research were synthesized, highlighted the reported performance, motivational effects and strategy uses. For example, Jozvik and Douglas (2017) found that web-based tool integration and clear strategy guidance better understanding questions to improve accuracy and strategy usage. In a similar vein, Swenson et al. (2021) found that subsidiary technology use was added to authentic groups with increased motivation and equivalent reading progress. Shaban and Mohammed (2024) reported remarkable progress in reading the ability to read the reading ability using the enhanced reality interventions. The results of Rafol and Jabar (2023) highlighted the compensatory work of TTS software to increase self-efficiency and autonomous education.

Quality Appraisal

For any systematic literature review, it is important to evaluate the methodology of studies involved to determine the reliability and validity of synthesized evidence. To inform this review, strict quality assessment was well established, valid equipment, which are adapted to special study designs between articles involved. This process enhances the validity of review results and understands the students to learn to learn the students who are disabled to read in the field of reading, along with evidence-based exercise recommendations.

- For experimental and quasi-experimental research, which create a large percentage of studies involved (eg, Jojwik and Douglas, 2017; Shaban and Mohammed, 2024; özbek & Ergül, 2022), Pedro Scale were employed. The Pedro scale is a large-scale used scale that aims to assess the statistical reporting of internal validity and

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random controlled tests and semi-usage studies. Important criteria evaluated are random allocation, blind, comparison of base lines and intentions-to-healing analysis. Using the Pedro scale enabled critics to seriously assess whether intervention, e.g., technology-based reading intervention and promoted reality applications were tested under controlled experimental conditions and whether the results were reported transparently.

- For studies of mixed-methods, which add qualitative and quantitative data to examine both effectiveness and relevant aspects (e.g., Okolo and Ferreti, 2020; Panopolos and Drosino-Korea, 2024), a significant assessment skills program (CASP) was used. The CASP tool allows for intensive evaluation of methods by inviting critics to consider the validity of the study, the suitability of mixed-method design, data collection and interpretation. It was the most relevant to studies that merged the empirical measurement of results with the teacher or student report in a way reading in reading in a way in reading intervention, allowing both threads of evidence to be seriously examined for quality and consent.
- Two independent critics assessed quality in each study to encourage fairness and reduce prejudice. Double-review method guaranteed various points and reduced the possibility of missing information or subjective error in the decision. Where there were discrepancies in evaluation scores or decisions, critics consulted to reach an agreement by consensus, ensuring a balanced and fair assessment process.
- In addition, to measure the level of consensus between the two reviewers and enhance the reliability of the appraisal, Cohen's Kappa coefficient was computed. The inter-rater reliability measure gave an empirical estimate of consistency in using the appraisal tools, whose values reflected substantial to near-perfect agreement. The measure justified the strictness of the quality appraisal process and increased confidence in the inclusion of just methodologically robust studies in the synthesis.

Overall, the consistent application of the PEDro Scale and CASP checklist, followed by independent dual-review and statistical measurement of inter-rater reliability, guaranteed that the methodological quality and limitations of the studies reviewed were clearly and extensively evaluated. This critical process underlined the validity of the review's findings on the effectiveness of different technology-assisted reading comprehension interventions for students with learning disabilities.

Results

Overview of Included Studies

This systematic review consisted of a total of 11 studies between 2017 and 2024, indicating the latest research trend regarding the application of technology-assisted interventions for enhancing reading comprehension among students with learning disabilities (LD). All the studies were conducted in different countries, i.e., the United States, Canada, Thailand, Turkey, Sweden, Greece, etc., representing a geographically wide interest in this area.

Table: Summary of Included Studies

Sr.	Title	Authors/Reference	Key Findings/Relevance
1	"Effects of a Technology-Assisted Reading Comprehension Intervention for English	Jozwik, S. L., & Douglas, K. H. (2017)	Positive effects of technology-assisted explicit instruction on strategy application and comprehension for ELs with LD,

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	Learners with Learning Disabilities"		using mind-mapping and interactive whiteboards.
2	"Technology and Its Impact on Reading for Students with Learning Disabilities"	Okolo, C. M., & Ferretti, R. P. (2020)	Review of theoretical perspectives and five key areas of technology (CAI, digital text mods, TTS, enhanced digital text, strategic regulation support) for reading in LD.
3	"Effects of assistive technology for students with reading and writing disabilities"	Svensson, I., et al. (2021)	AT (tablets with TTS/speech-to-text) improved reading ability and motivation for students with reading/writing disabilities, though gains were similar to control.
4	"Reading comprehension skills of students with intellectual and developmental disabilities: teaching practices with technological tools."	Panopoulos, N., & Drossinou-Korea, M. (2024)	Explored differentiated instruction and technological tools (e.g., educational games) to support reading comprehension for students with IDD in secondary education.
5	"The effects of two assistive technologies on reading comprehension accuracy and rate"	Schmitt, A. J., et al. (2019)	Compared continuous vs. discontinuous TTS for middle school students with reading LD; continuous TTS generally led to greater improvements in comprehension accuracy and rate.
6	"Text-to-Speech Software and Reading Comprehension: The Impact for Students with Learning Disabilities"	Raffoul, S., & Jaber, L. (2023)	Literature review on TTS: compensatory tool, improves reading/comprehension, increases motivation/self-efficacy, highlights need for training for all stakeholders.
7	"Exploring the effectiveness of augmented reality technology on reading comprehension skills among early childhood pupils with learning disabilities"	Shaaban, T. S., & Mohamed, A. M. (2024)	Augmented reality (AR) technology was effective in developing reading comprehension skills for early childhood pupils with learning disabilities.
8	"Effectiveness of Comprehension Strategies Mobile App (COSMA) on Reading	Özbek, A. B., & Ergül, C. (2022)	Mobile app (COSMA) showed positive impact on reading comprehension performance for students with LD, with high

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	Comprehension Performances of Students With Learning Disabilities"		student motivation and positive stakeholder opinions.
9	"Investigation of Instructional Design on Reading Comprehension Affect the Demand for Mobile Application for Students with Learning Disabilities"	Pannim, P., et al. (2018)	Examined factors affecting demand for mobile apps for reading comprehension in LD students, finding high motivation for stories, rewards, and mind maps integration.
10	"Development of reading comprehension skills among the students of learning disabilities"	Khasawneh, M. A. S., & Al-Rub, M. O. A. (2020)	A training program based on visual words composition techniques significantly improved reading comprehension skills for learning disabilities pupils.
11	"Underpinning implications of instructional strategies on assistive technology for learning disability: a meta-synthesis review"	Thapliyal, M., & Ahuja, N. J. (2023)	Meta-synthesis reviewing instructional strategies with AT for various LDs; noted that available ATs are often not learning disability-specific.

Study Designs and Sample Characteristics: The included studies employed a variety of research designs, such as multiple baseline single-subject designs (Jozwik & Douglas, 2017; Özbek & Ergül, 2022), quasi-experimental designs (Shaaban & Mohamed, 2024), randomized controlled trials with control groups (Svensson et al., 2021), and meta-synthesis reviews (Thapliyal & Ahuja, 2023). The participant groups ranged from small samples of 4 students with LD (Jozwik & Douglas, 2017) to larger groups such as 149 students (Svensson et al., 2021) and even over 400 students and teachers combined in mixed-methods designs (Pannim et al., 2018). The age range covered early childhood pupils (Shaaban & Mohamed, 2024) through middle and secondary school students (Panopoulos & Drossinou-Korea, 2024; Schmitt et al., 2019).

Focus of Interventions: Most studies centered on technology-based tools designed to scaffold reading comprehension, such as text-to-speech software (Raffoul & Jaber, 2023; Schmitt et al., 2019), mobile applications (Özbek & Ergül, 2022; Pannim et al., 2018), augmented reality (Shaaban & Mohamed, 2024), and general assistive technology (Svensson et al., 2021). These interventions commonly incorporated strategy instruction targeting skills like questioning, summarizing, inferencing, and self-regulation (Jozwik & Douglas, 2017; Okolo & Ferretti, 2020).

Table: Summary of Studies in Detail

Study (Author, Year)	Country	Study Design	Sample Size	Intervention/Technology Used	Key Findings
Jozwik & Douglas (2017)	USA	Multiple Baseline Design	4 students (4th	Tech-assisted explicit strategy instruction	Improved strategy use and

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			grade)		comprehension accuracy
Okolo & Ferretti (2020)	USA	Literature Review/Chapter	N/A	Various technology areas for LD reading	Technology supports reading comprehension
Svensson et al. (2021)	Sweden	Controlled Trial	149 students	Assistive tech with text-to-speech/speech-to-text	Supportive especially for severe reading disabilities
Panopoulos & Drossinou-Korea (2024)	Greece	Observational/Intervention	Secondary students	Assistive tech and differentiated instruction	Effective in heterogeneous groups
Schmitt et al. (2019)	USA	Alternating Treatments Design	4 middle school students	Continuous vs discontinuous text-to-speech tech	Continuous TTS improved accuracy and rate
Raffoul & Jaber (2023)	Canada	Literature Review	N/A	Text-to-speech software	Improved fluency, motivation, self-efficacy
Shaaban & Mohamed (2024)	Egypt	Quasi-Experimental	20 early childhood pupils	Augmented reality app	Significant improvement in reading comprehension
Özbek & Ergül (2022)	Turkey	Multiple Baseline Single Subject	4 students	Comprehension Strategies Mobile App (COSMA)	Increased comprehension performance and motivation
Pannim et al. (2018)	Thailand	Mixed-methods (Survey + Interview)	423 students + 36 teachers	Mobile app using visual language/mind maps	High demand for mobile apps with multimedia content
Khasawn	Jordan	Experimental	104	Visual words	Statistically

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eh & Al-Rub (2020)			students	composition techniques	significant improvement
Thapliyal & Ahuja (2023)	India	Meta-synthesis Review	N/A	Various assistive tools analyzed under PISC framework	Assistive tools not LD-specific, need customization

The selected studies collectively demonstrate a growing body of evidence supporting the effectiveness of technology-assisted interventions to enhance reading comprehension in students with learning disabilities. Despite variability in sample sizes and methodologies, there is a consistent trend showing that technology tools—especially text-to-speech software, mobile applications, and augmented reality—can facilitate improved reading strategies, comprehension accuracy, motivation, and engagement. However, studies also highlight the need for tailored approaches and proper training for users to maximize benefits.

Types of Instructional Technologies Used

Instructional technologies utilized in interventions directed at reading comprehension among learners with learning disabilities (LD) vary and can be broadly classified into various categories depending on their functional approach and the technological features. The main categories identified are text-to-speech (TTS) software, interactive software, gamified tools, and mobile apps.

Text-to-Speech (TTS) Technology: TTS technology is among the most commonly utilized aids to assist students with LD, especially students with reading disabilities. The technology translates written text into oral words, enabling students to read while listening as they follow along. For example, Schmitt et al. (2019) contrasted continuous TTS software such as Kurzweil 3000 with discontinuous TTS tools such as reading pens. Their results showed that uninterrupted TTS software enhanced reading comprehension accuracy and rate more than silent reading or interrupted TTS, rendering it an effective accommodation for students with decoding and fluency difficulties. Likewise, Raffoul and Jaber (2023) also emphasized TTS as a compensatory strategy that enhances reading fluency, comprehension, and motivation of students.

Interactive Software and Web-Based Tools: Various studies have applied web-based interactive tools to augment comprehension strategies. Jozwik and Douglas (2017) used mind-mapping software, weblogs, and interactive whiteboards to support strategy application like questioning, relating, and coding. These tools encourage active participation and peer collaboration that is essential for comprehension growth.

Gamified Tools and Augmented Reality (AR): AR and gamification are new technologies that boost motivation and create multisensory learning. Panopoulos and Drossinou-Korea (2024) talked about using educational games designed specifically for students with intellectual and developmental disabilities to aid reading comprehension with stimulating story-based content. In a similar vein, Shaaban and Mohamed (2024) established the efficacy of AR apps in early childhood learners, resulting in comparative enhancements in comprehension skills through interactive and immersive reading experiences.

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Mobile Applications: Specific reading Comprehension Apps on mobile devices have become increasingly popular due to their access and ease of flexibility. Özbek and Ergül (2022) assessed the understanding strategies mobile app (COSMA) and stated that it improved the understanding and inspiration of students' reading. Panim et al. (2018) highlighted the need for mobile applications connecting Mind maps and reward techniques to support understanding among primary students with LD.

These directive technologies integrate many components - such as text growth, hearing aid, interactive improvement, and inspiring components - to meet the diverse requirements of students with LD, facilitate a more individual and effective reading understanding intervention.

Effects on Reading Comprehension

Despite the literature technology type, length of intervention and variability according to the participating characteristics on the impact of instructional technologies on increasing the understanding of reading in students with learning inability, the conclusions presents encouraging conclusions.

Gain in Comprehension and Associated Skills: Several studies reported a statistically important benefit in reading the reading score after technology-based interventions. Jojwik and Douglas (2017) indicated that strategy instructions using technologies promoted students' understanding strategies and the use of literal and inferior accuracy. Schmid et al. (2019) recognized that TTS technology continuously improving the accuracy and rate of reading effectively, some students have shown a very strong impact, up to 0.99 effect size for some skills.

Shaban and Mohammed (2024) clarified how AR programs dramatically improved the questions of improving the ability of childhood students, reducing the meaning of the word, and reading the text, how to improve the usefulness of technology in building founding capabilities. Similarly, Andzbek and Argle (2022) explained how a mobile application emphasized understanding strategies that the students' performance and inspiration increased, which reflects the importance of interactive interfaces.

Vocabulary and Fluency Improvements: Raffoul and Jaber (2023) stated that TTS not only enhances understanding but also enhances vocabulary learning and reading fluency. Svensson et al. (2021) found that assistive technology interventions transferred to general reading skill and improved motivation, especially for children with severe disabilities.

Effect Modifiers: Effectiveness differed depending on the type of learning disability, age, and intervention duration. For instance, the improvements posted by Svensson et al. (2021) were more significant in students with profound reading challenges, implying that assistive technology might be offering essential scaffolding where conventional instruction fails. Intervention length is also a factor; longer and continued use of technology was associated with stronger improvements (e.g., 24 sessions in Svensson et al., 2021). Age variance is realized in the work of Shaaban and Mohamed (2024), where AR was very effective for early childhood learners, thereby calling for developmentally suitable resources.

Statistical Significance: Most studies utilized strong designs that validated significant positive results. For instance, Khasawneh and Al-Rub (2020) discovered statistically significant gains in reading comprehension upon applying visual word composition strategies. Jozwik and Douglas (2017) also applied a multiple baseline design to validate causality in strategy use gains.

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In total, the combined evidence warrants that instructional technologies can improve reading comprehension by enhancing strategy use, fluency, and motivation, albeit with the degree of impact varying as a function of matching the technology to learner needs and quality of implementation.

Quality of the Evidence

The quality of evidence in studies investigating instructional technologies for reading comprehension in students with LD varies, which mirrors variations in research design, sample sizes, and methodological quality.

Study Designs and Sample Sizes: Some studies utilized strong experimental or quasi-experimental designs with suitable control groups and pre-post measurements. For instance, Svensson et al. (2021) implemented a large-scale study involving 149 participants with a controlled intervention design. Shaaban and Mohamed (2024) employed a quasi-experimental design with pre- and post-tests, and Schmitt et al. (2019) utilized an adapted alternating treatments design. Yet, a few studies had limited samples, e.g., Jozwik and Douglas (2017) with four participants only, hampering generalizability.

Risk of Bias and Limitations: Some limitations mentioned across studies are small sample sizes, absence of long-term follow-up, and variation in intervention fidelity. Svensson et al. (2021) reported difficulty in assessing the assimilation and communication of text despite interventions. Raffoul and Jaber (2023) emphasized the need for training and technology support to ensure maximum effectiveness, an aspect usually underreported in studies. Some studies did not use randomization or blinded assessment, thereby risking bias.

High-Quality vs. Low-Quality Studies: High-quality studies like Svensson et al. (2021) and Schmitt et al. (2019) frequently combined quantitative indicators with strong design and included larger samples, thereby improving the validity of results. By contrast, lower-scale studies or single-subject design-based studies like Özbek and Ergül (2022) and Jozwik and Douglas (2017) had rich, detailed knowledge but with impaired external validity.

Overall Conclusion: Although the field shows increasing empirical evidence supporting instructional technology interventions, the evidence base can be improved with more rigorous randomized controlled trials involving heterogeneous populations, longer follow-up outcomes, and systematic reporting of implementation fidelity and training of end-users. The existing evidence is encouraging but must be viewed with caution due to some methodological constraints.

Discussion

Summary of Key Findings

Systematic review of current research shows that instructional technologies have a positive and large effect on the reading comprehension abilities of students with learning disabilities (LD). With widely varied interventions and technologies, results consistently reveal that technology-based tool integration into literacy instruction facilitates comprehension development through compensation for decoding, attentional, and cognitive processing deficits. For instance, Jozwik and Douglas (2017) documented significant gains in comprehension when English learners with LD were instructed in reading strategies through a mixture of explicit instruction and technology in the form of mind-mapping software, web-linked text, and interactive whiteboards. These technologies allowed for strategic involvement and joint meaning-making by students.

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Text-to-speech (TTS) technologies proved to be among the most powerful tools. A number of studies (e.g., Raffoul & Jaber, 2023; Schmitt et al., 2019) validated that TTS software improves reading fluency, accuracy, and understanding, specifically if it is simultaneous listening and reading. Discontinuous TTS tools such as Kurzweil 3000 markedly outperformed silent reading and discontinuous TTS tools (e.g., reading pens) in the improvement of comprehension accuracy and speed. Also, apps like COSMA (Özbek & Ergül, 2022) and augmented reality apps (Shaaban & Mohamed, 2024) demonstrated positive results through heightened student engagement and metacognitive strategy utilization, which are among the best indicators of comprehension success.

Instructional technologies were also revealed to be extremely useful for students with more complex learning needs. Svensson et al. (2021) noted that assistive technology-enabled reading improvement was equivalent to the yearly improvement of the general population in students with severe reading disabilities, without any conventional reading instruction. In the same manner, Panopoulos and Drossinou-Korea (2024) put emphasis on differentiated instruction enabled by assistive technology in managing diverse learning needs among secondary students with intellectual and developmental disabilities.

Overall, the most promising tools and strategies noted are:

- Text-to-speech software (e.g., Kurzweil 3000)
- Strategy-based mobile apps (e.g., COSMA)
- Mind-mapping and visual aids
- Augmented reality technologies
- Interactive digital texts and games

These tools not only improve comprehension but also enhance student motivation, engagement, and independence—key contributors to sustainable academic progress for learners with LD.

Interpretation in Light of Literature

This review's findings are consistent with and an extension of previous scholarly literature that highlighted the emancipatory power of instructional technology for individuals with learning disabilities. In line with Okolo and Ferretti (2020) review of the way five areas of technology—TTS and digital text modifications being among them—aid struggling readers, the present review reaffirms that such technologies are most effective. Okolo and Ferretti also highlighted the need for strategic regulation of reading comprehension, which echoes through a number of studies in the current review that highlight the value of instruction of metacognitive strategies alongside technology (e.g., Jozwik & Douglas, 2017; Özbek & Ergül, 2022).

From a theoretical perspective like Universal Design for Learning (UDL), the review results support the need to provide multiple means of representation, engagement, and expression. UDL encourages variability in the presentation of information and in the means of demonstrating learning. Tools such as TTS, AR, and apps are perfect examples of UDL principles, as they allow students to receive texts aurally, engage visually, and respond in a variety of formats. Such tools enable teachers to make instructions individuals based on learned profiles - especially LD are relevant for students that usually require customized support.

In addition, self-regulated learning (SRL) theory, as quoted in Rafol and Jabar (2023), offers an explanatory account of the effectiveness of interventions involving target setting, strategy uses, and performance monitoring. Mobile apps such as COSMA and

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Mind-Mapping Application Class Understanding Strategies help to make such SRL processes scaffolded by making them solid and visually presentable.

This combination also follows the cognitive load theory, proposes that reducing the external cognitive load is capable of release the memory working for the work of more advanced understanding. Assistant technologies such as continuous TTS reduce decoding requirements so that students can reserve more cognitive ability for lesson understanding and analysis, as indicated by Schmidt et al. (2019).

It is worth noting that the review creates more recent techniques on existing literature such as the promotional reality (Shaban and Mohammed, 2024) and the structure with the visual composition software (especially and al-rab, 2020), providing interesting and reference-rich settings for deep learning convenience. These technologies present evidence that technological accommodations are changing from being compensatory tools to forming part of inclusive instructional design.

The results of this review validate and build upon prior research. They support the pivotal role played by instructional technology in preventing reading comprehension difficulties for students with LD. The blend of theory-driven instructional techniques and contemporary technological resources creates a solid platform for the development of inclusive, effective, and motivating literacy interventions. Future studies should continue to investigate the nexus of technology, pedagogy, and student diversity to facilitate equal access to literacy for all students.

Practical Implications

The incorporation of teaching technology to enhance reading comprehension among learners with learning disabilities has a number of significant implications for educators, schools, and curriculum developers. As illustrated through research like that by Jozwik and Douglas (2017), technological interventions such as mind-mapping software, web-linked texts, and interactive whiteboards not only improved students' application of comprehension strategies but were also viewed in a positive light by the learners. Likewise, research by Özbek and Ergül (2022) and Panopoulos and Drossinou-Korea (2024) also stress the importance of individualized, differentiated teaching facilitated with the help of education apps and technology tools. These reports point out that teachers need to be trained to use a range of technologies—from text-to-speech software (Raffoul & Jaber, 2023) to comprehension strategy apps such as COSMA—within organized instruction settings in order to optimize learner interest and outcomes.

Course design, in particular, instructional materials require more inclusive and technology-focused. For example, to include a mobile application that stories visible story stories proposed by Panim et al. (2018), or promoted reality platforms (Shaban & Mohammed, 2024), can meet the needs of various learners who are beyond the print-based course. To accommodate various learner profiles to schools, you can adopt Universal Design (UDL) principles by incorporating accessories such as Kurzweel 3000 and Reading Penn (Schmid et al., 2019) in the reading course. To enable this change, teacher training programs should emphasize technical flow, educational adaptability and evidence-based strategies to implement directive technologies. Teachers should also be aware of how various technologies consider courses for learning objectives and assistance to metacognitive skill acquisition (Rafol and Jabar, 2023).

Also, schools must fund professional development workshops that address single categories of technology (e.g., AR, mobile apps, TTS software) and provide teachers with

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time to practice, test, and reflect on implementation. Most importantly, effective implementation involves a supportive infrastructure that not only includes devices and software but also technical support and accommodating policies that promote equitable access for all students, including those from resource-limited environments.

Limitations of the Review

Although this systematic review illuminates a range of technology-based interventions for students with learning disabilities, some of its limitations need to be acknowledged. One such limitation is related to the breadth of the literature search. The review was primarily based on English-language, peer-reviewed literature published between 2017 and 2025. Therefore, potentially useful information from non-English literature or grey literature (e.g., reports, dissertations) might have been lost, and language and publication biases introduced. This restricts the generalizability and completeness of the findings, particularly with a view to global relevance.

The second limitation exists in the diversity of study quality and methodological styles among the chosen articles. While some of the studies used stringent experimental or quasi-experimental methods (e.g., Schmitt et al., 2019; Shaaban & Mohamed, 2024), others were more exploratory or descriptive in design (e.g., Thapliyal & Ahuja, 2023). Large-scale surveys (e.g., Panim et al., 2018) makes small, single-case studies (e.g., Jojwik and Douglas, 2017) varies in size of samples, making similar conclusions or making meta-analysis even more difficult. In addition, it is difficult to compare the effectiveness of intervention in the measures of results ranging from incompatible-rubric scores to self-report and understanding of understanding.

Finally, most studies limit the knowledge of the long -term effects of the use of short follow -up duration technology. For example, however, in most examples, post -gain intervention was observed, studies such as Svensson et al. (2021) A year later found no meaningful difference between intervention and control groups, highlighting the importance of caution when interpreting short -term effects. Lastly, the majority of studies were carried out in Western school settings, which prevents cross-cultural generalizability and may overlook sociocultural processes that affect technology uptake in schools.

Recommendations for Future Research

Future studies on instructional technology interventions for learners with learning disabilities should cover the areas highlighted in this review to strengthen the strength and relevance of evidence. To begin with, there is an evident need for longitudinal studies that assess the long-term effect of interventions. Since short-term gains might not necessarily become long-term academic achievements, research like that of Svensson et al. (2021) shows the need to analyze retention, transferability, and learner independence in applying assistive technology outside the intervention period.

Second, subsequent studies must use larger, more representative sample sizes to increase external validity. Several studies (e.g., Jozwik & Douglas, 2017; Özbek & Ergül, 2022) employed small participant samples, and as a result, results cannot be generalized. Increasing demographic diversity and educational levels in research populations—such as incorporating rural or disadvantaged populations of students—can produce more representative and inclusive data.

Third, cross-cultural studies are needed to investigate how sociocultural, language, and infrastructural differences affect the adoption and effects of technology interventions. While some papers offered rich insights from non-Western environments (e.g., Pannim et

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al., 2018 from Thailand), most were based on Western education systems. Cross-cultural studies could provide best practices for being sensitive to local requirements and educational systems.

Last but at least, researchers need to examine relatively unwanted or new techniques for use in classes. For example, the decorated reality (Shaban and Mohammed, 2024) and gamified learning-integrated mobile apps (Panopolos & Darocino-Korea, 2024), for example, are potentially, but still comparatively less comparatively detected than installed devices such as TTS. Similarly, adaptive reading systems based on Artificial Intelligence (AI) and Interactive Virtual Reality (VR) environment can provide new avenues for individual reading instructions. These areas require more research, especially on how they map on educational paradigms and cognitive profiles of students. In summary, by dealing with these directions - through sound, inclusive, and creative research design - can build specially on technology knowledge and application to help students with potential studies learning disabled.

Conclusion

Technology plays a key role in supporting students with learning disabilities (LD) in reading development, overcoming barriers that other teaching methods cannot break. As revealed across the literature examined here, students with LD will often present with difficulties with decoding, fluency, vocabulary, and comprehension, all of which are foundational skills in reading proficiency. The use of assistive and instructional technologies presents compensatory routes that enable such learners to gain access to, process, and comprehend written information more meaningfully, thus enhancing education equity and inclusion.

One of the main takeaways from this systematic review is the recurring finding that technology, if implemented carefully, supports reading comprehension in students with LD. A number of tools such as text-to-speech (TTS) software (Raffoul & Jaber, 2023; Schmitt et al., 2019), mobile apps such as COSMA (Özbek & Ergül, 2022), and augmented reality solutions (Shaaban & Mohamed, 2024) have reported significant improvement in reading capacity, reading speed, and learner interest. Research such as Jozwik and Douglas (2017) evidenced that the conjoining of strategy instruction with web-based technology can help students co-construct meaning and utilize comprehension strategies more independently. Likewise, the research work by Okolo and Ferretti (2020) highlighted the advantages of different technological interventions from computer-aided instruction to augmented digital text as necessary accommodations to fit the reading deficit challenges of LD students.

In addition to this, a paper by Svensson et al. (2021) finds that utilisations of assistive technology will result in attainment of reading improvements on par with non-disabled peers, specifically for the most impaired. This indicates that AT is not always necessarily superior to regular instruction alone but as a supplementation or substitution method is priceless—specifically in terms of developing learner autonomy and motivation.

In contrast to the potential of these tools, the review also suggests that their effectiveness relies heavily on evidence-based implementation. Utilization effectively needs guided instructional design (Pannim et al., 2018), ongoing training for students, educators, and caregivers (Raffoul & Jaber, 2023), and the integration of personalized goals and adaptive content (Panopoulos & Drossinou-Korea, 2024). Notably, Thapliyal and Ahuja (2023) highlight that the students' cognitive strengths need to inform the choice and

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utilization of assistive technologies, equating teaching strategies with the nature of their learning challenges.

Summing up, technology integration in reading instruction for learners with learning disabilities is not something that can be considered optional or auxiliary but as an integral part of inclusive education. To truly close the literacy gap, educators and policymakers must commit to evidence-based, accessible, and sustainable technological interventions. Investments in research, training, and infrastructure will be essential to ensure that all students, regardless of their learning challenges, have the opportunity to develop strong reading skills and succeed academically.

References

Atanga, C. (2017). *Promoting assistive technology (AT) in classroom reading instruction for students with learning disabilities*. Texas A&M University-Commerce.

Bryant, D. P., Bryant, B. R., & Ok, M. W. (2014). Assistive technology for individuals with learning disabilities. In *Assistive technologies for people with diverse abilities* (pp. 251-276). New York, NY: Springer New York.

Caraballo, G. (2012). *The effect of the use assistive technology on english reading comprehension of students with learning differences*. University of Puerto Rico, Rio Piedras (Puerto Rico).

Cheung, A. C., & Slavin, R. E. (2013). Effects of educational technology applications on reading outcomes for struggling readers: A best-evidence synthesis. *Reading Research Quarterly*, *48*(3), 277-299.

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.

Higgins, E. L., & Raskind, M. H. (2004). The compensatory effectiveness of the Quicktionary Reading Pen II on the reading comprehension of students with learning disabilities. *Journal of special education Technology*, *20*(1), 31-40.

Jozwik, S. L., & Douglas, K. H. (2017). Effects of a technology-assisted reading comprehension intervention for English learners with learning disabilities. *Reading Horizons: A Journal of Literacy and Language Arts*, *56*(2), 4.

Khasawneh, M. A. S., & Al-Rub, M. O. A. (2020). Development of reading comprehension skills among the students of learning disabilities. *Universal Journal of Educational Research*, *8*(11), 5335-5341.

Lewis, R. B., & Lewis, R. B. (1998). Assistive technology and learning disabilities: Today's realities and tomorrow's promises. *Journal of learning disabilities*, *31*(1), 16-26.

Okolo, C. M., & Ferretti, R. P. (2020). Technology and its impact on reading for students with learning disabilities. In *Handbook of educational psychology and students with special needs* (pp. 625-654). Routledge.

Özbek, A. B., & Ergül, C. (2022). Effectiveness of comprehension strategies mobile app (COSMA) on reading comprehension performances of students with learning disabilities. *Journal of Special Education Technology*, *37*(2), 297-309.

Pannim, P., Suwannatthachote, P., & Numprasertchai, S. (2018, November). Investigation of Instructional Design on Reading Comprehension Affect the Demand for Mobile Application for Students with Learning Disabilities. In *Proceedings of the 2018 2nd International Conference on Education and E-Learning* (pp. 104-108).

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Panopoulos, N., & Drossinou-Korea, M. (2024). Reading comprehension skills of students with intellectual and developmental disabilities: teaching practices with technological tools. *European Journal of Special Education Research*, *10*(4).

Raffoul, S., & Jaber, L. (2023). Text-to-speech software and reading comprehension: The impact for students with learning disabilities. *Canadian Journal of Learning and Technology*, *49*(2), 1-18.

Raskind, M. H., & Higgins, E. L. (1999). Speaking to read: The effects of speech recognition technology on the reading and spelling performance of children with learning disabilities. *Annals of Dyslexia*, *49*, 251-281.

Schmitt, A. J., McCallum, E., Hawkins, R. O., Stephenson, E., & Vicencio, K. (2019). The effects of two assistive technologies on reading comprehension accuracy and rate. *Assistive Technology*, *31*(4), 220-230.

Shaaban, T. S., & Mohamed, A. M. (2024). Exploring the effectiveness of augmented reality technology on reading comprehension skills among early childhood pupils with learning disabilities. *Journal of Computers in Education*, *11*(2), 423-444.

Stearns, S. C. (2012). Integration of technology into the classroom: Effects on reading comprehension. *Southern Illinois:: Southern Illinois University Carbondale*, *1*(248), 1-45.

Svensson, I., Nordström, T., Lindeblad, E., Gustafson, S., Björn, M., Sand, C., ... & Nilsson, S. (2021). Effects of assistive technology for students with reading and writing disabilities. *Disability and Rehabilitation: Assistive Technology*, *16*(2), 196-208.

Thapliyal, M., & Ahuja, N. J. (2023). Underpinning implications of instructional strategies on assistive technology for learning disability: a meta-synthesis review. *Disability and Rehabilitation: Assistive Technology*, *18*(4), 423-431.

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Annexure

1. Title: Effects of a Technology-Assisted Reading Comprehension Intervention for English Learners with Learning Disabilities

Authors/Reference: Jozwik, S. L., & Douglas, K. H. (2017). Effects of a technology-assisted reading comprehension intervention for English learners with learning disabilities. *Reading Horizons: A Journal of Literacy and Language Arts*, *56*(2), 4.

Abstract: This study integrated technology tools into a reading comprehension intervention that used explicit instruction to teach strategies (i.e., asking questions, making connections, and coding the text to monitor for meaning) to mixed-ability small groups, which included four English Learners with learning disabilities in a fourth-grade general education classroom. We used a multiple baseline design across participants to evaluate the effects of instruction on strategy application as measured through comprehension rubrics (Keene, 2006) and on comprehension-question answering as measured through researcher-developed literal and inferential comprehension questions. Results showed that participants applied comprehension strategies and improved their percentage accuracy with answering comprehension questions after being introduced to explicit strategy instruction, a mnemonic to facilitate strategy application, web-based tools, and peer collaboration to co-construct meaning from text. Participants perceived the instructional technology tools (i.e., mind-mapping applications, web-linked text, weblogs, and an interactive whiteboard recording application) and reading comprehension strategy instruction as helpful. Implications for future research and practice are discussed.

Title: Technology and Its Impact on Reading for Students with Learning Disabilities

Authors/Reference: Okolo, C. M., & Ferretti, R. P. (2020). Technology and its impact on reading for students with learning disabilities. In *Handbook of educational psychology and students with special needs* (pp. 625-654). Routledge.

Abstract: Data from international, national, and state assessments converge on the conclusion that many American students struggle with reading. Students with learning disabilities (LD) score at the very bottom on many of these assessments, and their learning trajectory is significantly constrained by their poor reading skills. Technology can help ameliorate the reading difficulties experienced by many of these students. In this chapter, we first review theoretical perspectives that have had the strongest influences on the understanding of reading and LD, as well as on instructional practices for these students. We then describe specific reading problems experienced by students with LD and discuss how the affordances of technology can address these problems. Our discussion focuses on five areas of technology that we believe have the strongest potential for improving the reading of students with LD: (a) computer-assisted instruction, (b) modifications to digital text, (c) text-to-speech technology, (d) enhanced digital text, and (e) technology support for strategic regulation of reading comprehension. In each of these areas, we review the research relevant to students with LD. We conclude with a discussion of the implications of this research and offer recommendation for future research and practice.

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Title: Effects of assistive technology for students with reading and writing disabilities

Authors/Reference: Svensson, I., Nordström, T., Lindeblad, E., Gustafson, S., Björn, M., Sand, C., ... & Nilsson, S. (2021). Effects of assistive technology for students with reading and writing disabilities. Disability and Rehabilitation: Assistive Technology, 16(2), 196-208.

Abstract: Assistive technology has been used to mitigate reading disabilities for almost three decades, and tablets with text-to-speech and speech-to-text apps have been introduced in recent years to scaffold reading and writing. Few scientifically rigorous studies, however, have investigated the benefits of this technology. The aim was to explore the effects of assistive technology for students with severe reading disabilities. This study included 149 participants. The intervention group received 24 sessions of assistive technology training, and the control group received treatment as usual. Both the intervention and control groups improved as much in 1 year as the normed population did. However, gains did not differ between the groups directly after the intervention or at 1 year of follow-up. The use of assistive technology seems to have transfer effects on reading ability and to be supportive, especially for students with the most severe difficulties. In addition, it increases motivation for overall schoolwork. Our experience also highlights the obstacles involved in measuring the ability to assimilate and communicate text. Assistive technology (AT) can be useful for children with reading disabilities to assimilating text as well as boosting their reading. Children with reading disability using AT increased reading performance as much as a norm group, i.e. the students enhanced their reading ability despite no training in traditional reading remediation. Children's and adolescents' motivation for schoolwork can be boosted when using AT as a complement for those with reading and writing disabilities.

Title: Reading comprehension skills of students with intellectual and developmental disabilities: teaching practices with technological tools.

Authors/Reference: Panopoulos, N., & Drossinou-Korea, M. (2024). Reading comprehension skills of students with intellectual and developmental disabilities: teaching practices with technological tools. *European Journal of Special Education Research*, *10*(4).

Abstract: Students with intellectual and developmental disabilities exhibit heterogeneity in their learning readiness and reading skills in secondary education. Special education teachers are tasked with addressing their multiple needs by leveraging both their abilities and teaching strategies at their disposal. The purpose of this study is to present applied teaching practices utilizing differentiated instruction, teaching techniques, and technological tools to support reading skills in heterogeneous groups of students attending secondary education. The design of teaching practices involves the application of the methodology of observation and intervention in the context of a targeted, individual, structured, integrated program of special education and training. Students' skills regarding learning readiness and reading abilities are recorded with specific objectives, and activities are defined with certain pedagogical materials. In the conclusions of this study, a discussion is attempted regarding the implementation of differentiated teaching methods in secondary education, which allow for the utilization of teaching techniques through assistive technology. Additionally, emphasis is placed on the use of educational games for understanding school subjects, such as literature.

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Title: The effects of two assistive technologies on reading comprehension accuracy and rate

Authors/Reference: Schmitt, A. J., McCallum, E., Hawkins, R. O., Stephenson, E., & Vicencio, K. (2019). The effects of two assistive technologies on reading comprehension accuracy and rate. *Assistive Technology*, *31*(4), 220-230.

Abstract: This study compared the effectiveness of two assistive technologies to accommodate the word reading skills of four middle school students with reading learning disabilities. Kurzweil 3000 is a continuous text-to-speech (TTS) computer software program that allows students to follow along on a computer monitor while passages are read aloud. A reading pen is a discontinuous TTS assistive technology (AT) device that allows students to scan and hear selected words read aloud. An adapted alternating treatments design was implemented to compare the effects of listening-while-reading using continuous TTS AT, discontinuous TTS AT, and silently reading without accommodation on reading comprehension accuracy and rate. Results indicate that in three of the four participants, continuous TTS technology led to the greatest improvements in both comprehension accuracy and rate when compared to silent reading with effect sizes reaching 0.70 and 0.99, respectively. The fourth participant demonstrated the highest comprehension accuracy and rate in the discontinuous TTS condition. The discontinuous TTS condition led to the lowest comprehension rates across all four students. Additionally, participants generally found the continuous TTS AT to be the more acceptable of the two accommodations. Discussion focuses on possible theoretical explanations for the results and implications for future research.

Title: Text-to-Speech Software and Reading Comprehension: The Impact for Students with Learning Disabilities

Authors/Reference: Raffoul, S., & Jaber, L. (2023). Text-to-speech software and reading comprehension: The impact for students with learning disabilities. *Canadian Journal of Learning and Technology*, *49*(2), 1-18.

Abstract: This literature review examines the use of text-to-speech (TTS) software as an accommodation for students with learning disabilities and its impact on improving reading comprehension. As the development and availability of TTS tools and assistive technologies have increased over the past decade, it is significant to explore how they are used to accommodate students at all levels of education to promote a universal design of learning. Based on a review of the current literature and utilizing self-regulated learning theory as a framework, four significant themes have emerged: (a) TTS being seen as a compensatory tool; (b) improving reading abilities and comprehension; (c) increasing student motivation and self-efficacy; and (d) the need for training for students, educators, and parents. Findings of this literature review revealed that overall, TTS software is commonly used as a compensatory tool (mainly at the postsecondary level), has assisted in students improving reading speed, fluency, and content retention, resulted in increased student self-efficacy in reading abilities and independent learning, and that there is a significant need to allocate training and technological resources to support students. As there are various directions for future research, exploring this area can contribute to schools promoting inclusive and accommodating learning environments.

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Title: Exploring the effectiveness of augmented reality technology on reading comprehension skills among early childhood pupils with learning disabilities

Authors/Reference: Shaaban, T. S., & Mohamed, A. M. (2024). Exploring the effectiveness of augmented reality technology on reading comprehension skills among early childhood pupils with learning disabilities. *Journal of Computers in Education*, *11*(2), 423-444.

Abstract: Early years learners with learning disabilities experience several challenges while learning English language skills, particularly reading comprehension skills. Using augmented reality (AR) in this manner can assist instructors to integrate real proofreading comprehension skills, including video modeling, and give more opportunities for individual practice. Also, it expands the breadth of interaction and mental expression in early childhood students with learning disabilities. The study adopted a quasi-experimental design and the within-subjects design and applied the chi-square test to compare observed and expected outcomes. The current study discusses how to utilize a specific AR application to develop reading comprehension skills for early childhood students with learning disabilities. A purposive sample of twenty early childhood students (n = 20) with learning disabilities who had difficulty with reading comprehension was chosen from a primary school. Pre- and post-tests were administered to participants to assess reading comprehension. Three questions containing five items each tested three reading skills: answering questions, guessing meaning from context, and scanning. The findings show that the sample improved significantly in the post-test, which indicates the effectiveness of AR technology in developing reading comprehension skills.

Title: Effectiveness of Comprehension Strategies Mobile App (COSMA) on Reading Comprehension Performances of Students With Learning Disabilities

Authors/Reference: Özbek, A. B., & Ergül, C. (2022). Effectiveness of comprehension strategies mobile app (COSMA) on reading comprehension performances of students with learning disabilities. *Journal of Special Education Technology*, *37*(2), 297-309.

Abstract: The aim of this study is to investigate the effectiveness of the Comprehension Strategies Mobile App (COSMA) on the reading comprehension performance of students with learning disabilities. Four students with learning disabilities (three boys, one girl) participated in the study. The experimental process of the study was carried out according to the multiple baseline across participants model of single-subject experimental designs. Reading comprehension performance of students was assessed with multiple-choice tests and retells. Students' use of strategies was evaluated with on-task metacognitive interviews. Findings showed that COSMA has a positive impact on students' reading comprehension performances. It was determined that the students' motivation to use the mobile app was high, the opinions of families and teachers of the software were positive and they observed an increase in students' reading skills. Findings are discussed further.

Title: Investigation of Instructional Design on Reading Comprehension Affect the Demand for Mobile Application for Students with Learning Disabilities

Authors/Reference: Pannim, P., Suwannatthachote, P., & Numprasertchai, S. (2018, November). Investigation of Instructional Design on Reading Comprehension Affect the Demand for Mobile Application for Students with Learning Disabilities. In *Proceedings of the 2018 2nd International Conference on Education and E-Learning* (pp. 104-108).

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Abstract: This research aims to investigate the current teaching methods for reading comprehension that affect the demand for mobile application for students with learning disabilities (LDs). This research examines the factors that significantly impact on the application of visual language - mind maps with stories and Thai traditional folk tales for teaching reading comprehension via mobile application. The instruments used in the study are questionnaires and semi-structured interviews. The collected samples consist of 423 students with LDs at elementary level (grades 4-6), and 36 teachers in teaching Thai, from 17 schools located in Bangkok, Thailand. All of them are respondents to the questionnaires and 17 teachers were invited to attend semi-structured interviews. The findings show that students have the greatest need for learn with stories and Thai traditional folk tales, with an average of 4.55. Secondly, students are motivated using rewarding technique with the mean of 4.17, followed by using mind maps to summarize stories with the mean of 4.05. These values are consistent with the teacher's point of view. Additionally, the results from semi-structured interviews suggest that the new instructional design should integrate mind maps into multimedia folk tales application. Consequently, the findings emphasize the need for mobile applications in order to improve reading comprehension skill for students with LDs in learning Thai language.

Title: Development of reading comprehension skills among the students of learning disabilities

Authors/Reference: Khasawneh, M. A. S., & Al-Rub, M. O. A. (2020). Development of reading comprehension skills among the students of learning disabilities. *Universal Journal of Educational Research*, *8*(11), 5335-5341.

Abstract: The objective of this study was to investigate the impact of a training program based on the visual words composition techniques on the development of reading comprehension skills. The sample of the study consisted of (104) learning disabilities pupils. A questionnaire that was developed by the researcher was used as a measuring instrument. The results indicated that there were statistically significant differences between the mean of performance of the experimental and the control groups in the reading comprehension skills development posttest in favor of the experimental group that was taught using the training program based on the visual words composition techniques. Students with learning disabilities in the current study were given organized and ordered learning tasks and assignments as the instructional program was based on visual picture techniques in presenting the targeted words. Also, the instructional program included well-defined and achievable objectives, learning activities, teaching tools and instruments, and evaluation tools taking into consideration students' ability levels and had the same effect on students from both genders. The study concludes that visual words composition techniques should be integrated with the Arabic language curriculum to develop the language skills among students with learning disabilities generalization of findings is highly related to the size of the study sample.

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Title: Underpinning implications of instructional strategies on assistive technology for learning disability: a meta-synthesis review

Authors/Reference: Thapliyal, M., & Ahuja, N. J. (2023). Underpinning implications of instructional strategies on assistive technology for learning disability: a meta-synthesis review. *Disability and Rehabilitation: Assistive Technology*, *18*(4), 423-431.

Abstract: This article reviews the instructional strategies used by assistive technologies and maps their problem manifestation and effectiveness for children with learning disabilities. The objective of this article is to investigate the most common types of assistive tools used in learning to study their attributes, limited to the needs of learners with the condition of dyslexia, dysgraphia and dyscalculia. It studies currently available low, mid and high-level assistive learning technologies available to deal with problems faced by these learners. Assistive tools studied in this article range from simple hardware tools to multi-sensory software. A simple analytical framework by interlinking, Problem Manifestation, Underpinned Implication, Instructional Strategy and Cognitive Strength Developed (PISC) is formulated to examine the tools. Five assistive tools types (non-electronic products, low-tech products, mid-tech products, high-tech products apps and learning software) for each learning disability are identified, analysed and associated learning implication is studied under PISC framework. This helps to map the problems and learning style of learning disabled and analyses the underpinned implication along with the corresponding development of skills (cognitive, affective or psychomotor) by these assistive technologies. Performance of identified assistive tool types using PISC framework is analysed. Findings are reported and discussed. Available assistive tools are not learning disability specific. So, in order to differentiate the learning path of a Learning Disabled learner from that of a Non-Learning Disabled learner, study is conducted under four attributes of PISC framework: Problem Manifestation, Underpinned Implication, Instructional Strategy and Cognitive Strength.