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Methods, didactic strategies, and educational experiences with ICT for pre-reading in childhood

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Background: Learning pre-reading skills through formal education in early childhood is vital for a child's future personal and professional development. In this regard, integrating appropriate teaching methods and didactic strategies with the support of information and communication technologies (ICT) can facilitate this phase in the development of reading skills.

Aim: To conduct a systematic literature review (SLR) to investigate and analyse the scientific and academic production of methods, didactic strategies, and educational experiences with ICT applied to pre-reading development in children aged 3 years to 5 years.

Method: This study was carried out through an SLR, involving eight steps that enabled the systematic and structured selection, evaluation, and analysis of qualitative research located in Scopus and Google Scholar, using quality criteria systematically and structurally.

Results: The selected and analysed studies correspond to the period 2017–2022, responding to the research questions raised in this work. Notable methods include Global, Doman, Geempa, Montessori, and synthetic, among others. The integration of interactive stories, songs, images, role-playing, dramatisations, visual cards, and other strategies was highlighted to enhance pre-reading learning. Research demonstrates their importance in promoting pre-reading activities through the use of digital tablets, multimedia resources, e-books, and applications.

Conclusion: The utilisation of suitable didactic methods and strategies, coupled with the implementation of educational practices involving ICT, enhances the pre-reading process in preschool children.

Contribution: An amalgamation of methods, didactic strategies, and technological resources, transferrable to diverse contexts, facilitates the development of pre-reading skills in early childhood.

Keywords: early childhood education; early reading; ICT; method for reading; didactic strategies.

Introduction

The field of education as a science aims to explain various social phenomena. There is a growing demand for studying the holistic development of children at early ages, as well as the factors influencing it, such as social, cultural, emotional, and digital events (Black et al. 2017). It is highlighted that the comprehensive development of children is closely related to social and familiar elements reflected in harmony across various areas including health, language, cognition, and social and emotional interaction (Albuquerque & Alves-Martins 2016; Caycedo et al. 2005; Zabalza 2014).

It is essential to develop all capacities in early childhood to ensure future human performance. Thus, a milestone in learning is the pre-reading process in childhood, involving the ability to associate figures and symbols, and interpret texts to decode their message so as to solve everyday problems through language use (Lema, Tenezaca & Aguirre 2019). The application of an appropriate method for pre-reading mastery involves decoding pictograms, icons, short stories, rhymes and songs, and creating semantic fields of interest to the child.

However, it is also important to define reading. Araujo's definition (2019) emphasises it as:

> [T]he ability to progressively recognise, relate, and employ forms of written language [*letters, symbols, words, phrases, and sentences*] and correspond them with images, objects, and/or subjects relevant to them, as well as to reproduce and comprehend the meaning of language forms in their contextual reality. (p. 15)

Reading is indispensable for all formal education processes. In teaching reading, decoding or interpreting the text is crucial because 'If decoding is perceived as hard work, then both interest in the text and understanding of the text will suffer' (Sandberg & Norling 2020:301). In this context, an emphasis must be placed on the careful selection of teaching methodologies.

Thus, mastering language skill is fundamental for students' adequate development throughout their academic formation. However, the widespread enjoyment of reading is generally lacking, prompting ongoing efforts by experts to address this situation.

Given the complexity involved in early-age pre-reading development, selecting appropriate teaching methodologies and strategies, and incorporating information and communication technologies (ICT), becomes crucial for initiating the pre-reading process. Information and communication technologies comprise technologies such as computers, smartphones, laptops, digital tablets and applications (apps), through which texts, images, audio and videos are combined to enhance children's comprehension possibilities (Kriscautzky 2019).

Therefore, the current study aims to review the current state of methods and didactic strategies applied in the preschool stage within the pre-reading process. It was found that the Montessori method remains relevant, emphasising learning through the five senses, which leads to full concentration, motivation, and above all, self-control (Estrella, Garcés & Esteves 2020). The synthetic method encourages the use of phonological decoding strategies (Sellés et al. 2008), while the analytic method enhances the development of orthographic decoding strategies (Vélez & Macías 2022), and global analytic methods are more focussed on meaning.

Additionally, it was necessary to identify educational practices with ICT that foster pre-reading in preschool children to understand and analyse the benefits, possibilities and limitations. This provides a theoretical basis for the future development of didactic proposals to enhance the teaching-learning process of pre-reading in early childhood.

Methods

The literature review in this study was conducted using the systematic method proposed by Kitchenham (2004), known as systematic literature review (SLR), which enables the identification, evaluation and interpretation of scholarly works in a specific area of knowledge (García-Peñalvo 2022).

In this case, the aim was to locate methodologies, strategies and educational practices supported by ICT related to the pre-reading stage in children aged 3 years to 5 years in preschool.

In addition, the contributions of Okoli and Schabram (2010), who suggested eight steps for practically conducting a SLR were considered:

1. *Purpose of the literature review*: In this case, the purpose of the SLR is the drafting of a scientific article.
2. *Protocol and training*: This involves the planning of the SLR, in which research questions, information sources, inclusion and exclusion criteria were first defined, to then socialise them with the authors of this study for proper execution.
3. *Literature search*: Search strings were applied in Scopus and Google Scholar.
4. *Practical screen*: A Microsoft Excel sheet was created to filter research related to research questions with the support of inclusion and exclusion criteria.
5. *Quality assessment*: Through the quality criteria determined in Table 1, each of the selected research studies in the previous step was evaluated. This step is crucial because the final quality of the article depends on the quality of the primary resources analysed.
6. *Data extraction*: After completing the evaluation process, information from suitable studies for the Systematic Literature Review (SLR) was extracted. This was done using a matrix created in Microsoft Excel, structured according to the research questions.
7. *Synthesis of studies*: Once the data extraction matrix was created, the extracted information was combined to gain a comprehensive view of the located research. This step allows for categorisation, comparison, grouping and contrasting of the results obtained.
8. *Writing the review*: This is the final stage, where findings and results are drafted according to the research questions posed.

Review protocol

The protocol devised for the SLR began with defining research questions, search strategies, inclusion and exclusion criteria, and quality assessment criteria. This aimed to understand the current state of the art regarding methods, teaching strategies, and educational practices with ICT applied to the pre-reading stage in children aged 3 years to 5 years. Following are the aspects considered in the protocol:

Research questions

The research questions posed for this SLR were as follows:

1. *Which methods are applied in the pre-reading process in children aged 3 years to 5 years?*
2. *What teaching strategies are applied in the pre-reading process in children aged 3 years to 5 years?*
3. *What educational experiences have integrated ICT in the pre-reading process in children aged 3 years to 5 years?*

TABLE 1: Quality criteria for the selection of academic documents.

Rating	Criteria
1	They are descriptive bibliographic studies without greater depth.
2	Studies that incorporate strategies or methods for teaching pre-reading or reading that cannot be applied with ICT support.
3	Theoretical contributions that propose the definition of pre-reading or reading help to understand the teaching process in children aged 3 years to 5 years.
	These are theoretical contributions that propose new approaches or trends in terms of strategies or methods for teaching pre-reading or reading to children aged 3 years to 5 years.
4	Include proposals for the design and/or implementation of good educational practices with ICT duly substantiated.
5	In addition to what is contemplated in level 4, the studies evaluate the implementations, presenting clear and replicable results.

Source: Own elaboration based on Humanante-Ramos, P.R., García-Peñalvo, F.J. & Conde-González, M.Á., 2017, 'Entornos personales de aprendizaje móvil: una revisión sistemática de la literatura', *RIED: Revista iberoamericana de educación a distancia* 20(2), 73–92. https://doi.org/10.5944/ried.20.2.17692
ICT, information and communication technologies.

Search strategies

The information retrieval process was conducted electronically using two sources – Google Scholar and Scopus. These sources facilitated locating academic-scientific documents for analysis and inclusion in the SLR.

Regarding search terms, both English and Spanish terms were utilised to broaden the coverage of studies in both languages. Spanish terms were also employed because of the Hispanic nature of this work. Additionally, it is noteworthy that synonyms related to the established search terms were used to encompass more information.

In the selected information sources, the Boolean operators AND and OR were used, to construct a search string that guarantees to locate the greatest number of results according to the topic of interest. Thus, the search terms and their combinations were structured as described beneath.

Spanish:

- ('métodos de lectura') AND ('educación inicial' OR 'educación infantil' OR 'educación preescolar')
- ('Estrategias didácticas para la lectura') AND ('educación inicial' OR 'educación infantil' OR 'preescolar')
- ('Estrategias para enseñar a leer') AND ('educación inicial' OR 'educación infantil' OR 'preescolar')
- ('enseñanza de la lectura') AND ('educación inicial' OR 'educación infantil' OR 'preescolar') AND ('tabletas digitales' OR 'tablets')
- ('enseñar a leer') AND ('educación inicial' OR 'educación infantil' OR 'preescolar') AND ('tabletas digitales' OR 'tablets')

English:

- ('reading methods') AND ('initial education' OR 'early childhood education' OR 'preschool education')
- ('didactic strategies for reading') AND ('initial education' OR 'early childhood education' OR 'preschool education')
- ('strategies for teaching reading') AND ('initial education' OR 'early childhood education' OR 'preschool education')
- ('reading instruction') AND ('initial education' OR 'early childhood education' OR 'preschool education') AND ('digital tablets' OR 'tablets')
- ('teaching to read') AND ('early education' OR 'early childhood education' OR 'preschool education') ('digital tablets' OR 'tablets')

Inclusion and/or exclusion and quality assessment criteria

The number of resources initially obtained from the searches was 976 documents, corresponding to publications between 2017 and 2022. Duplicates and studies including homonymous terms from other areas of knowledge were eliminated.

With the resulting list, the inclusion and/or exclusion criteria were applied. These are described next.

Inclusion

- Studies that meet the criteria of topicality, in this case, as of 2017.
- The titles of the research papers should be related to the chosen keywords.
- The title, abstract, keywords, and objectives should be related to each other.
- The studies to be chosen may be theoretical, quantitative, qualitative, or mixed.
- The language of the study, in this case, is English or Spanish.

Exclusion

- Studies that have not been conducted in children aged 3 years to 5 years.
- The articles are not related to the process of encouraging reading.

After passing the first filter, 116 publications were selected and subjected to a quality assessment process. This process used a scale from 1 to 5 based on the criteria shown in Table 1. The evaluation was conducted by a team of four researchers, who are experts in the subject.

Information extraction and synthesis procedure

After this rating, averages were calculated based on the four contributions from each researcher in this study. This aimed to select only those studies that reached averages of three points or higher.

In all, 51 studies were chosen for the data extraction process. These studies were used to create an extraction matrix in Microsoft Excel, tailored to the research questions. The matrix included the following fields for each document: document code, research title, year of publication, authors, document type (article, thesis, book, etc.), objectives, methodology, results, conclusions, observations, and the researcher's analysis after reading the study.

Based on this information, a narrative synthesis was conducted. This involved combining data elicited from each document to obtain a comprehensive overview of the research and to qualitatively analyse how these studies contribute to addressing the posed research questions.

Review findings

The following outlines qualitatively selected methodologies in accordance with the initially posed research questions.

What methods are applied in the pre-reading process for children aged 3 years to 5 years?

The drive to improve pre-reading processes in preschool demands understanding and implementing various methodologies. These methods, ranging from innate approaches to analytic and global strategies, aim to familiarise children with reading. This familiarity involves deciphering the linguistic code to grasp its meaning. This section highlights diverse studies employing analytic, synthetic and global methods to ensure effective pre-reading learning in early childhood.

Building on this foundation, language teaching employs a constructivist method involving the comprehension and interpretation of the environment through holistic reading of colours, emotions and experiences, among others (Arlandis 2020). Additionally, interdisciplinary and cooperative approaches are sought for enhanced understanding. Thus, at the early education level, verbal and non-verbal interests, plastic expression, and musical and motor skills are encompassed.

Continuing this discussion, Tenorio's study (2019) cites Frih and Ehrl's reading learning theories, which share graphical, alphabetical and orthographic phases within a familial setting, subsequently expressed in the fluency and accuracy of word identification. Hence, the implementation of the TENSA programme, covering syllabic awareness, intra-syllabic awareness, phonemic awareness and perceptual processes, fortifies phonological awareness in preschoolers for pre-reading.

In a similar vein, Agudelo, Arango and Aristizábal (2019) assert that the reading instruction process is experiential. This is summarised as lived experiences. In their research, workshops meeting rigorous didactic standards and demonstrating efficiency in enhancing children's reading skills were implemented.

On the other hand, Rincón (2021) depicts initial dialogical relationships provided at home, such as babbling, idea exchange, sound imitation, orofacial exercises and book manipulation. This parent-child relationship manifestation is considered an initial method to commence the pre-reading process.

Further expanding on instructional models, García (2018) presents various models for pre-reading instruction, such as synthetic, phonological, phonetic, alphabetic, indirect, analytic and global. By applying a workshop programme that fosters phonological awareness in young children, favourable results were observed in reading and understanding words and pseudo-words from the tasks completed.

Similarly, Rivas (2018) builds on the contributions of Siemens, Yetta Goodman, and Bruner, who advocate for learning through exploration, interaction and discovery. This approach allows young children to acquire skills through various activities that develop language and communication. These contributions inspired the implementation of a proposal using Laptop XO. This proposal enabled children to draw, create graph, connect and interpret ideas from their experiences, thus advancing their literacy process.

As for the reading-writing process, Pérez (2017) outlines several models for literacy instruction, such as holistic, skills-based and integrated, each with its unique characteristics but sharing the common goal of fostering reading and writing in children. Evaluation sheets were used to identify undeveloped skills in children, thus addressing such deficiencies. For this, indicators such as phonological awareness, initial vowel-syllable reading and reading comprehension were considered.

Moreover, Vélez and Briones (2021) describe several methods for the early education level, including the Montessori method, Decroly's holistic approach, Malaguzzi's workshop method and the development of basic functions by Codemerín, aiming for comprehensive infant development. One aspect of this comprehensive development is fostering learning in pre-reading, for which the researcher believes virtual environments, combined with the described methods, enable preschoolers' participation in sensorimotor actions such as completing, connecting, selecting and painting.

Following this, González and Orozco (2020) implemented a literacy programme based on the Geempa method with logographic and phonetic phases, grounded in a psychogenetic approach with the mediation of ICT to facilitate necessary interaction between the child and the targeted learning.

Additionally, Cedeño (2017) collects several contributions on reading instruction methods, including analytic, synthetic, eclectic and Montessori, each with its distinct features. The functionality of play and everyday activities is described as a methodological strategy at the initial level to consolidate linguistic skills necessary for fluency, vocabulary richness and overall academic achievement.

Moreover, Pinzón (2020) applied the Doman method, characterised by clarity, intensity, and frequency in handling programme phases. This included a first phase with words alone, and a second phase with word pairs, which employed reflection and evaluation to verify efficiency. Field anecdotal records evidenced potential teaching-learning processes in language, demonstrating motor, cognitive and socio-affective

improvements in children's interactions with peers, teachers and parents.

Continuing with the exploration of literacy programmes, the implementation of the LETRA programme conducted by Gutiérrez (2019), proposes a curriculum-based measurement (CBM) and reading measurement components. These are international standards verifying fluency, phonological awareness, alphabet knowledge and word reading. The dynamic indicators of basic early literacy skills (DIBELS) were used, focussing on sound and letter recognition, rhymes and initial letters. Another applied test was the Reading Progress Indicator (RPI), featuring image and word reading, riddles and letter recognition by shape and sound.

On the other hand, the contribution of Fuentes, Calderín and Pérez (2017) refers to teachers' beliefs about the teaching-learning process of reading. In this study, they used various methods, including synthetic, syllabic, phonetic, alphabetic and global. The study highlighted factors like environment perception, teaching approach and learning attitude. These factors are linked to teachers' attitudes towards reading. In preschool, dynamic, playful and collaborative pedagogy is crucial for fostering engagement and enhancing learning outcomes.

Furthermore, the intervention of the LESIFO programme, applied by Fernández (2018), demonstrates a structured approach with activities aimed at developing syllabic, phonemic and lexical awareness to enhance children's reading abilities. To strengthen these skills, the LESIFO programme involves exercises where children delete, add, and change letters, sounds, syllables and phrases. The study showed positive results in the reading process, confirming that an orderly, sequential and consistent programme improves children's reading skills.

In addition, the findings by Fernández, Valtin and Mascia (2021) emphasise the importance of describing two trends in early learning to read, as it contrasts the relevance of each of these. Thus, the first approach considers the position of the European Literacy Policy Network (ELINET), aiming to improve literacy policies in member countries to reduce low literacy rates among children, youth and adults in Europe. It also explores the vision of Wolf, a recognised researcher, who studies the importance of dialogic contact in promoting short and long-term memory, responsiveness and increased vocabulary through interaction. Furthermore, it raises possible benefits and concerns of introducing infants to digital tools associated with reading.

Building on these perspectives, Hoven (2021) contends that socio-economic inequality impacts learning during school age, particularly in the early levels where reading processes pose challenges. To address this, a programme named DR is implemented, based on the CROWD technique (Complete; Remember, W questions), which pertains to skills such as completing, remembering and answering story-related questions sent to parents via WhatsApp. Consequently, an

improvement in reading-related skills such as vocabulary expansion, text comprehension and interaction with parents was observed.

What didactic strategies are applied in the pre-reading process for children aged 3 years to 5 years?

In the broad pedagogical practice, various didactic strategies are established to foster reading habits from an early age. This section considers several studies applying communicative strategies (such as iconographic cards) and playful activities. These methods are highly regarded in preschool education, receiving strong approval from teachers and high acceptance among children. All this aims to enhance and support the development of essential metalinguistic skills necessary for the pre-reading process.

In line with this, the study by Bonett and Pedraza (2018) notes that, designing and implementing didactic strategies based on interactive stories (digitised narrations with animations) for the development of literacy processes in preschoolers aged 3 years to 5, fosters motivation and a desire to communicate, express opinions and feelings. Teaching and learning literacy is one of the most crucial processes to initiate in early childhood education, as it enables effective communication in everyday life.

Expanding upon this notion, Arruda, Batista and Schmidt (2020) analysed that using explicit word teaching strategies, that is, clearly and phonologically conscious words without ambiguity, led to children learning the target words. These authors suggest that employing didactic strategies to expose children to information related to words found in stories and different situations allowing interaction with these words, in expressive and receptive domains, can aid language development by facilitating learning processes.

Furthermore, reading comprehension is an interactive process between the reader and the text, offering the possibility to construct new meanings. Condo (2020) highlights deficiencies in all three measurement dimensions related to processing information in reading comprehension at the early level: (1) retrieval, (2) interpretation, and (3) evaluation. This situation can be addressed by incorporating workshops containing stories implemented with various strategies and culminating in the theatrical interpretation of a work.

In tandem with these approaches, Zavala and Vallejo (2019) emphasise the importance of reading animation at early ages, considering the role that reading plays in a person's technical, social and emotional development. This strategy helps children discover values in books, identify themselves with characters, draw lessons and invent new stories based on their family and social reality. The interplay between family and school is seen as a catalyst for this skill. This interplay prompts workshops involving parental engagement in reading approaches using picture books. Such workshops,

characterised by image-rich structures complementing the text, yielded promising outcomes for implementation and dissemination.

In an effort to improve students' low reading levels, Angulo-Alava et al. (2019) assert that all three levels of reading – literal, inferential and critical – must be applied. They also assert that it is important to develop reading activities, in which the game is used as a creative technique. It is also imperative to carry out group and individual activities as well as search for different kinds of texts. All these strategies allow children to be more dynamic and active.

Along the same lines, Moreno Medina (2017) states that implementing reading techniques through a guide of didactic strategies encompassing all three levels of reading comprehension fosters meaningful and intellectually enriching learning in students. These reading techniques also allow apprentices to build competencies, interests and reading skills that enhance their oral expression and communication. Moreover, employing dynamic and motivating activities such as role-playing, dramatisations, debates, oral expression workshops, dialogues, conversations, recitations, among others, fosters imagination, creativity and sound critical judgement.

Another strategy to enhance reading criticism in children, that is, the ability to analyse, understand and convey a message, is documented by Nguyen (2021). Her findings revealed that children could engage in reflexive interactions during anti-bias read-aloud sessions. Children also demonstrated complex comprehension of race and gender issues.

To further illustrate, Loo Gil, Rodríguez Mendoza and De la Cruz Barriga (2021) show macro-rules strategies to improve reading comprehension. These strategies include omission, construction, integration and generalisation. They help readers better understand what authors are saying by cutting out unnecessary details. This makes reading less boring and more engaging.

Parra and Bustos (2018) argue that children raised in families that encourage reading, gain an edge when they start school because of their inherent motivation. They emphasise how exposure to reading experiences shapes a person's life, highlighting the crucial role of reading mentors. These mentors not only aid in learning to read but also help children symbolise their world and life experiences through reading. Families and schools play a pivotal role in nurturing this interest and meaning in reading, emphasising its enjoyment and guiding students to understand its constructive aspect.

Supporting this viewpoint, DeVries (2021) underscores parental involvement both at home and in preschool classrooms for emergent literacy growth. The author suggests a lesson approach to develop specific knowledge related to interactive read-aloud, phonological awareness, alphabet knowledge, emergent writing and print concepts.

In a related context, Way Warti (2021) demonstrated that teaching words displayed on cards or cardboard is a method that enhances reading ability and vocabulary expansion, as well as improving physical coordination. Kindergarten students should engage their bodies in learning. The author recommends incorporating songs and dance movements when teaching frequently used visual words.

Furthermore, Borja Padilla's study (2020) allowed him to identify strengths and weaknesses in the development of pictographic reading initiation. In other words, this reading aids effective communication using images to form words or ideas in 4 to 5-year-old children, and the recognition of main characters in legends, stories and orally transmitted texts in general. His findings serve to compare skill development in the reading process and motivation toward cultural identity. Enjoying reading through pictography and utilising ICT in the new technological era constitute an innovative approach for both teachers and children.

Lastly, Morales and Guamanquispe (2019) assert that the development of didactic strategies such as the use of visual cards, pictographic images and interactive stories is based on three components: lexical, syntactic and semantic. These aid children initially in expanding their vocabulary through activities involving cards, pictograms, among others. In the lexical component, activities are designed to relate images to words; in the semantic part, the activity involves formulating written sentences with their own codes, meaning the child organises, interprets and comprehends the text read.

In short, didactic strategies applied in pre-reading animation processes for 3 years to 5-year-old children are fundamental according to existing studies. It is evident that the potential of children should be capitalised on to develop imagination, creativity and critical thinking. Early childhood and elementary teachers should rely on these variety of strategies to achieve meaningful learning in the reading process.

What educational experiences have integrated information and communication technologies into the pre-reading process in children aged 3 years to 5?

The advent of ICT in education has led to changes in the teaching-learning process. However, these changes have not yet been fully conducted because of various factors that result in the underutilisation of these resources. Therefore, it is important to describe studies on the influence of technology in promoting pre-reading skills in children aged 3 years to 5 years.

To address this, Pulgar-Calvo et al. (2018) aimed to enhance reading and reading comprehension through ICT with 17 preschoolers. They detected reading deficiencies through observation and, subsequently, employed action research to design activities utilising children's stories and didactic videos. Through field journals, they noted improvements in reading levels, facilitated by collaborative learning and

continuous feedback to ensure equal participation among all children.

Building on this approach, Gómez Contreras (2022) conducted research with a group of 12 children (aged 5 years–6 years) using the global reading method, supported by a video and digital tablet. Progress was noted in grapheme, phoneme, word and phrase recognition during the proposed activities, inspiring and exciting the participating children to continue learning. Consequently, the author emphasises the importance of integrating video and digital tablets because of the creative visual and auditory stimuli they provide to enhance communication skills. The incorporation of these devices enables children to listen, read, visualise and interact.

Similarly, Infante and Naranjo (2019) implemented a didactic strategy with ICT (audio stories), based on the global method and multimodal tools (My Story Book) to improve reading and writing processes. The results obtained in the study allowed them to identify an expansion of knowledge through playful and participatory learning that was generated in children. They also strengthened children's creativity, imagination and motivation for them to continue learning autonomously and cooperatively.

Following this, Pérez Saucedo (2018) developed a didactic strategy using technology on mobile devices (iPad). The author outlined key characteristics for developing reading-oriented learning materials: (1) Selecting engaging readings suitable for the age group; (2) Implementing optimal instructional design; (3) Effectively integrating technological resources as motivational factors; (4) Assessing both the activity and the materials used; and (5) Evaluating student performance. As a result, the study observed improved performance among students, alongside heightened motivation to sustain the activity.

In another related study, Sanhueza (2017) conducted an activity based on the Doman method, integrating digital tablets and an application ('The Journey of the Blah'), aiming to assess its impact on the development of phonological awareness in preschool children. The study confirms that the inclusion of digital tablets and the app indeed facilitates the achievement of expected learning outcomes, particularly concerning phonological awareness competence. However, it emphasises the need for improvement in the methodological aspect, usability, and device performance of ICT for comprehensive learning processes. Moreover, teachers must possess digital competencies because technology does not function on its own.

On the other hand, Goncalves Ferreira (2018) focussed on evaluating the effectiveness of a phonological awareness programme designed to address limitations in Fumaca schools by employing tablet-based games. The study involved children aged 4 years to 5 years, yielding notably positive results. The experimental group attained a 68% improvement in reading and a 48% increase in writing

compared to the control group, serving as a reliable predictor of student performance in standardised assessments. These findings were documented in the third phase of the research, which involved administering a post-test to participants. Furthermore, children enjoyed learning through play, a scenario conducive to enhancing students' reading skills.

Continuing this trend, Lozano Triana and Peña Garavito (2017) implemented a multimedia teaching strategy 'Chavelo' to determine the impact on the development of reading and writing skills. The results obtained showed a remarkable improvement in the initial processes of language and writing. In fact, the involved participants could recognise words and their meanings, understand sentences in context, formulate and answer questions, and expand their vocabulary. The strategy also boosted interest, attention and interaction among all 13 students in a fun and engaging manner.

Similarly, Shirley (2018) compared the reading scores of children using iPads versus printed books. In this action research involving a sample of 10 students, 9 demonstrated higher reading comprehension scores when using iPads compared to printed books. Additionally, using iPads increased motivation and interest, encouraging continued engagement with the technological resource for entertaining activities.

Further expanding on this topic, Kucirkova et al. (2021) investigated the impact of shared reading with personalised and non-personalised digital books on children's vocabulary learning. In this work, they also found no difference between using personalised and non-personalised pages in relation to vocabulary learning. Besides, a very low learning rate was recorded. These findings led the authors to reflect on the potential cognitive overload that digital books may generate.

Moreover, Ohle (2018) conducted research on the use of digital books by teachers to promote early literacy and preserve native languages. The study found that the use of electronic media did not significantly alter the teaching process. The author suggests enhancing teachers' skills to effectively integrate ICT, as it may hinder its proper use.

Additionally, McMahon-Morin et al. (2021) measured the effectiveness of interactive books in developing inference skills (comparing, classifying, describing, and identifying). They worked with two experimental groups (G1: interactive book intervention and G2: traditional model with interactive book intervention) and one control group (traditional model). They found a greater effect in groups G1 and G2 compared to the control group regarding improved inference comprehension, with significant differences between G1 and the control group. Therefore, interactive reading activities with digital media are considered effective for 5-year-old children, even in low socioeconomic environments.

Exploring further, Hoel, Stangeland and Schulz-Heidorf (2020) investigated the possibilities and limitations of illustrated print books and illustrated book apps for pre-reading

development in children. The authors identified the importance of digital books in the pre-reading phase. They believe teachers have several options to capture students' attention and activate prior knowledge, as well as the opportunity to create new teaching methods using digital media.

Building on this theme, Korat, Tourgeman and Segal-Drori (2022) investigated the usage of e-books in a natural learning environment and with the same classroom teachers. In this work, they determined that the participating children who used the technological resource with additional features and the teacher's accompaniment achieved a greater comprehension of the story than the children who read through the e-book independently. The authors also state the importance of integrating appropriate books containing images and audio, accompanied by the education professional, to increase the development of reading comprehension at an early age.

Along the same lines, Enciso and Escalante Marín (2022) implemented a virtual learning object (OVA) via the design of an app to strengthen the reading and writing process in preschool children. Through the application of the OVA, the participants showed significant progress between the initial and final tests in reading and writing comprehension, as well as increased motivation and interest to continue learning.

In another related study, Müller-Brauers et al. (2020) analysed the importance of animations in books through apps in shared digital reading processes. The authors concluded that the use of narrative animations can be beneficial to involve the child in the story and thus improving comprehension. However, they suggest that app developers integrate the proportion of illustrative and auditory animations moderately and coherently, as saturation can lead to cognitive overload.

Moreover, Vieira Araújo and Gerling Moro (2021) analysed the shared reading of children's literature on digital devices in 5-year-old children who read the book Blá Blá. At the end of the study, they determined how important and necessary the accompaniment of an adult is, whether at home or school when using digital texts. However, they consider that the use of tablets facilitates the child's interaction, in addition to increasing their confidence, autonomy, and above all their interest in reading.

Additionally, Neumann (2020) studied shared reading processes with apps and printed books in a group of 13 children with a teacher. Regarding the results, the author mentions that the formats provoked similar cognitive assimilation. However, he points out that the digital format provided greater interaction both affectively and technically, because of the multimodal and audio features provided by the app.

Expanding on this, Wang et al. (2019) analysed the learning possibilities that children have when reading in dyads, triads and individually, through books in apps. The results revealed that children achieved higher scores in generating meaning for new vocabulary and developing critical thinking when reading with a partner compared to reading individually. However, when reading in triads, they obtained lower scores among the three options. The authors emphasise the importance of supervised activities and suggest that app developers design books specifically for paired reading.

Similarly, Hermansson (2017) analysed the process of shared reading with a fiction e-book among a group of 13 children using an affective methodology. The study, conducted in an open space, revealed that the environment, children's physical engagement, and cultural perspectives positively influence electronic reading. Additionally, the digital voice emerged as a potential factor in fostering commitment, interest, and most importantly, enjoyment in experiencing their emotions and thoughts as readers on digital devices. The author suggests that this study prompts a reconsideration and response to the prevailing cognitive and metacognitive discourses on reading comprehension.

Furthermore, Syarah et al. (2019) investigated the effectiveness between e-comics and printed books in a quasi-experimental study. The results showed that the mean scores obtained by the experimental group (use of digital devices) were higher compared to that of the group that employed printed books. In addition, there was evidence of children's preference to work with electronic comics and increased interest in learning about marine conservation, which had an impact on reading motivation.

Analogously, Pegrum et al. (2020) analysed the influence of the Aan Khmer application through a mobile learning experience in first graders. The study revealed that students who utilised the application demonstrated improved reading outcomes. Consequently, the author suggests that literacy through mobile devices holds significant potential, particularly when incorporating games and multimedia elements, as they enhance learning outcomes.

On a different note, Gaudreau et al. (2020) investigated the incidence of video chat on the comprehension of stories and the learning of new vocabulary in 4-year-old children. They used three different media to generate the experience: (1) The use of a video chat; (2) The use of a pre-recorded video; and (3) Live reading by an experimenter. The results show that all three formats facilitate student learning and comprehension. However, participants were more responsive to questions during the pre-recorded video compared to video chat and live reading sessions.

In a related study, Sánchez Guerrero and García Herrera (2017) analysed the relationship between immersive learning and traditional strategies of literacy initiation in early childhood education. The study involved an experimental group and a control group, enabling the authors to conclude that the utilisation of immersive virtual worlds notably enhances children's literacy levels. Moreover, it increases

interest, attitude, motivation, and the rate of development of reading-writing habits.

Correspondingly, Monroy Vega (2018) analysed the incidence of the software 'Leo con Grin' in the learning of literacy in 5-year-old children. During the intervention, a positive impact on students was evidenced. This encouraging impact deals with enhancing the literacy process and improving children's motivation, oral expression skills, comprehension, interpretation, and reading of words and images. Consequently, the study recommends that teachers incorporate didactic strategies utilising this type of software to achieve significant learning outcomes in students.

Furthermore, Martínez Ramírez, Escalante Castilla and López Mosquera (2022) implemented a pedagogical strategy based on Ardora for the development of reading and writing in 5-year-old children. The activities implemented in this study led to notable achievements, including increased interest, attention, and enthusiasm for reading, as well as improved phonological awareness through dynamic learning. Nonetheless, at the beginning of the project, researchers faced some difficulties, as some children were confused and had problems handling the RED in Ardora.

Based on the research question, it can be stated that educational practice with ICT can assist the pre-reading development of preschool children. Technological resources employed in the related studies include digital tablets, videos, interactive stories, digital books, immersive virtual worlds, multimodal tools, apps and mobile device games, among others. Through these, children enhanced aspects such as communicative skills, creativity, imagination, attitude, motivation and literacy habits.

Conclusion

This study presents the current state regarding methods, didactic strategies and educational practices involving ICT to enhance pre-reading processes in children aged 3 years to 5 years. A SLR was conducted using research sourced from Scopus and Google Scholar.

In the studies found, different methodological processes and various didactic strategies for teaching pre-reading were recorded. Additionally, most studies demonstrated the potential benefits of technological resources in pre-reading teaching-learning processes, with few highlighting limitations.

Thus, the localised studies show the application of analytical, synthetic and eclectic methods for approaching the reading and writing process. At the initial level, methodologies like the global approach enable children to perceive phrases and words holistically, fostering reading. Essential actors in learning, such as parents and teachers, guide this process with innovative approaches that motivate and encourage reading. In addition, integrated methods include supplementary activities like music, art and motor workshops, which

complement the sensory-perceptual and pre-operational thinking of children at this age.

Research shows the importance of working on pre-reading methods at the initial level as they lay the foundations for reading comprehension, interpretation, association and cognitive processes essential for learning. In the same way, early reading activities also enhance responsiveness, problem-solving skills, and short and long-term memory, among other benefits.

In addition, several studies establish the need to incorporate in the reading process computer tools that promote and encourage the child to interact with the purpose of learning. Gamification, in particular, offers real opportunities to engage children's interest in deciphering and decoding written or iconographic language.

As to the didactic strategies for pre-reading process, existing studies assert the necessity of incorporating diverse and suitable strategies, particularly playful ones, to harness children's inherent potential. This approach aims to foster imagination, creativity and sound judgement by employing the three levels of reading comprehension: literal, inferential and critical. Additionally, integrating certain strategies with the use of ICT also enhances teaching practices, encouraging innovative attitudes to achieve meaningful learning outcomes within the reading process.

Concerning the integration of ICT in pre-reading processes for children aged 3 years to 5 years, conducted research reveals numerous benefits in the teaching-learning process. These benefits include the expansion of vocabulary, creativity, imagination, concentration, confidence, self-learning, critical thinking, problem-solving abilities, decision-making skills, and notably, motivation and interest in continuous learning.

However, other studies point out the limited contribution of ICT in pre-reading processes, suggesting a balanced integration with traditional methods to avoid cognitive overload, distractions and lack of commitment. In addition, these studies emphasise the need for improvements in methodology, usability and the performance of electronic devices. They also highlight the low level of digital competence among some teachers, which hinders educational innovation.

The ICT tools used in these studies include educational videos, video chat, multimedia software, multimodal tools, electronic comics, immersive learning, open educational resources, and apps and books accessed via digital tablets. These tools facilitated collaborative and cooperative learning, playful and participatory learning, and productive cognitive interactions and experiences, all related to fostering pre-reading skills.

In conclusion, some studies suggest that interactive reading activities using digital and multimodal media can be effective

for young children. These activities adapt well to various educational needs and learning styles.

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G.H.O.C., M.LA.O., N.I,U.P., and O.I.I.C. all contributed equally to this work.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

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