

RESEARCH TITLE

Teaching Reading Comprehension in the Age of Artificial Intelligence: Integrating Classical Reading Theories with Intelligent Educational Tools

Rima Masri¹, Saeed Masri²

¹ An-Najah National University, Nablus Palestine. Email: reema.massri@gmail.com

² An-Najah National University, Nablus Palestine. Email: saeedmassri@gmail.com

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Abstract

Reading comprehension remains a cornerstone of academic success in EFL/ESL contexts, yet instructional and assessment practices often continue to emphasize outcome-based testing rather than the cognitive and metacognitive processes underlying effective reading. This conceptual paper reconceptualizes reading comprehension instruction in the age of artificial intelligence by integrating classical reading theories—such as schema theory, vocabulary depth, and strategic reading models—with emerging AI-driven educational tools. Drawing on contemporary research, the study argues that AI can function as a pedagogically informed intermediary across pre-reading, while-reading, and post-reading stages by providing personalized scaffolding, adaptive questioning, and formative feedback. The paper further highlights the potential of AI-supported analytics to shift assessment from product-oriented measures toward process-based and authentic evaluation of comprehension. Ethical considerations, including academic integrity, algorithmic bias, and data privacy, are examined as essential conditions for responsible AI integration. The study concludes that when grounded in evidence-based pedagogy, AI enhances reading instruction without diminishing the central role of the teacher, while simultaneously supporting differentiated learning and professional growth.

Key Words: Reading Comprehension; Artificial Intelligence in Education; EFL/ESL Instruction; Adaptive Assessment.

تعليم الفهم القرائي في عصر الذكاء الاصطناعي: دمج نظريات القراءة الكلاسيكية مع الأدوات التعليمية الذكية

المستخلص

يُعدّ الفهم القرائي ركيزة أساسية للنجاح الأكاديمي في سياقات تعليم اللغة الإنجليزية كلغة أجنبية أو ثانية، إلا أن الممارسات التدريسية والتقييمية السائدة لا تزال تركز في كثير من الأحيان على نواتج التعلم والاختبارات التقليدية، مع إغفال العمليات المعرفية وما فوق المعرفية التي تقوم عليها القراءة الفعّالة. تسعى هذه الورقة النظرية إلى إعادة تصور تعليم الفهم القرائي في عصر الذكاء الاصطناعي من خلال دمج نظريات القراءة الكلاسيكية—مثل نظرية المخططات المعرفية، وعمق المفردات، ونماذج القراءة الاستراتيجية—مع المستجدات في الأدوات التعليمية القائمة على الذكاء الاصطناعي. وتبين الدراسة أن الذكاء الاصطناعي يمكن أن يعمل وسيطاً تربوياً واعياً عبر مراحل ما قبل القراءة وأثناءها وبعدها، من خلال توفير دعم تعليمي شخصي، وأسئلة تكيفية، وتغذية راجعة بنائية. كما تناقش الورقة إمكانات التقييم المدعوم بالذكاء الاصطناعي في الانتقال من قياس الفهم بوصفه ناتجاً نهائياً إلى تقويمه بوصفه عملية معرفية مستمرة وأصلية. وتتناول الدراسة القضايا الأخلاقية المرتبطة بالنزاهة الأكاديمية، والتحيز الخوارزمي، وحماية البيانات بوصفها شروطاً أساسية للتكامل المسؤول للذكاء الاصطناعي. وتخلص الورقة إلى أن توظيف الذكاء الاصطناعي، متى ما كان مندمجاً في بيداغوجيا قائمة على الأدلة، يعزز تعليم الفهم القرائي دون المساس بالدور المحوري للمعلم، ويدعم في الوقت نفسه التعلم المتمايز والنمو المهني للمعلمين.

الكلمات المفتاحية: الفهم القرائي؛ الذكاء الاصطناعي في التعليم؛ تعليم اللغة الإنجليزية كلغة أجنبية/ثانية؛ التقويم التكيفي.

Introduction

Reading comprehension is arguably the leading avenue through which language learners access knowledge and connect to academic communities. Reading comprehension actually serves an even more important function in second and foreign language contexts, providing support for vocabulary development, grammatical consciousness, cultural information, and critical thinking. The reality is that many learners simply continue to struggle with comprehension because their linguistic resources are reduced and the strategies instruction they have experienced is minimal (this can occur at any stage).

Teaching comprehension has long been based on a traditional view of reading as a static skill, one that can be assessed by the number of correct answer on tests. Those are teacher-centered and time-bound approaches that leave struggling students out of the process. Comprehension is not a simple decode, and educational psychologists and reading researchers have claimed- and sometimes more than once- that comprehension is a construct involving the interaction of multiple cognitive processes, including active construction of meaning, integration of ideas, and metacognitive monitoring.

Over the past few decades, our classrooms became more and more digitalized, as these systems become more sophisticated, they are already mediating learning opportunities for many students in their day-to-day lives providing text generation, question answering, vocabulary translation, and learner performance analysis. Generative AI technologies have captured the imagination and raised the anxiety level of educators. In this paper, we will attempt to argue that the promise of AI presents a new horizon for the improvement of reading pedagogy through the provision of classical theories realized through better individualized applications by teachers.

Thus, the main purpose of this paper is to investigate how we can rethink reading comprehension so its instruction and assessment can be reimaged in EFL/ESL classrooms in the era of Artificial Intelligence.

2. Theoretical Background

2.1 Reading Comprehension as a Cognitive Process

Reading comprehension is not one skill- but a constellation of interacting cognitive skills. According to Cornoldi & Oakhill (2015), comprehension is a complex process that not only requires knowledge of words but also depends on syntactic processing, working memory capacity and the ability to generate inferences. Any deficiency in one or more of these components can prevent a learner from constructing a coherent mental representation of the text.

According to the Partnership for Reading, comprehension is “the process of making sense of a text.” This definition emphasizes that skilled readers make predictions, monitor their understanding, summarize, question, and evaluate. Comprehension, from a cognitive theoretic perspective, evolves over time through a greater exposure to a diversity of texts and specific instruction modeling effective reading strategies.

2.2 Schema Theory and Prior Knowledge Activation

Schema theory is arguably the most dominant account of comprehension. Readers create new meaning based on knowledge organization (schemata) that they previously possess, so this theory maintains. Barnett (1988) highlights that learners understand texts more successfully when their background knowledge is good, and this is especially true when the text is in a foreign language. Had a student not associated the text content to something familiar, they can misinterpret the main ideas.

Activating prior knowledge, according to Anderson (2003), is one of the most crucial components of good comprehension instruction. Activities that model the process of relating past experiences to a text, engaging in meaningful dialogue about the content as well as prompting predictions, encourage learners to approach texts with more confidence and strategy. In EFL contexts, schema activation is especially important because texts may contain unfamiliar cultural references.

2.3 Vocabulary Depth and Fluency

One of the most often cited predictors of success for comprehending material is related to vocabulary knowledge. Learners have to expend all energy on deciphering single terms, which means global meaning cannot be constructed when only limited vocabulary is known. Anderson (2003) notes that rich, contextualized vocabulary instruction promotes fluency and results in a greater reading rate.

Recent studies emphasize that both vocabulary size and depth of vocabulary knowledge influence comprehension. They need to know all the word meanings and inconveniences and the disclaimers up in writing. This theoretical principle is the basis for AI tools today that can deliver contextual explanations and examples and repeated exposure to students, if needed, in a manner that efficiently fosters understanding and retention (Chiu, 2023).

3. Pedagogical Framework: ACTIVE Strategies in AI- Supported Classrooms

3.1 ACTIVE Strategies Revisited

The ACTIVE model of Anderson (2003) has outlined 6 main strategies that effective teachers should develop. These strategies were the foundation before AI, and now they can become far more precise:

- **Activating Prior Knowledge:** AI chatbots can assist teachers in designing customized anticipation questions and brainstorming activities that cater to students' interests and readiness (Holmes & Tuomi, 2022).
- **Cultivate Vocabulary:** Natural language processing applications can automatically gloss difficult words in digital texts and offer personalized practice sets, making it easier for lower-proficiency readers to engage with real experts (Zhang & Graham, 2023).
- **Teach for Comprehension:** AI systems can produce leveled literal, inferential, and evaluative comprehension questions, permitting simultaneous differentiation in the same classroom (Lo, 2024).
- **Increase Reading Rate:** Adaptive platforms offer reading activities and immediate assistance that fosters fluency with reduced cognitive load (Chiu, 2023).
- **Verify Strategies:** AI tutors can stimulate learners to think about what strategies they applied and present comparison strategies, equally enhancing metacognitive knowledge (Chiu & Chai, 2024).
- **Evaluate Progress:** Using an AI analytics dashboard, teachers see how students are improving in speed, vocabulary, and comprehension trends so they can teach based on data-driven insights.

AI augmenting ACTIVE to be individual-specific instead of one-size-fits-all whole-class routines

3.2 AI Integration across Reading Stages

AI tools can find a systematic incorporation throughout the phases of contents delivery.

Pre-reading: AI-generated background summaries, visual prompts, and culturally relevant guiding questions for teachers. That helps to make learners ready and motivated to read high-order texts (Holmes & Tuomi, 2022).

While-reading: Annotation systems powered by AI provide the means for learning to markup unfamiliar sentences (and annotate), ask for clarification questions, and obtain instantaneous clarification. This interaction encourages strategic breaks and comprehension repairs, which are important cognitive features of reading (Chiu, 2023).

Post-reading: The writing stage is supportable with AI too: summaries, comparisons across texts and reflective responses can easily follow. To ensure that students remain engaged in the learning process and that output is not copied, teachers will have to find a way for students to assess AI outputs with a careful eye (Chiu & Chai, 2024).

4. Assessment of Reading Comprehension in the AI Era

To better understand what the learners need and evaluate whether the instruction is effective, assessing comprehension is essential. Powell (1989) suggested that authentic assessment be used to measure actual understanding, rather than isolated test performance.

4.1 AI-Supported Assessment Approaches

Process-Oriented Assessment

AI platforms and analytics can monitor and capture very specific behaviors of learners whilst reading. Teachers get better diagnostic evidence from data of what students focus on and how long they spend on parts of the text, as well as their responses to prompts (Chiu, 2023). This enables assessment to sample the reading process itself.

Adaptive Questioning

Dynamic question generation is possible from the same content and content can be adapted to different levels of difficulty in real time (Lo, 2024). That sort of adaptive assessment, adapting to individual learner proficiency level, improves reliability and helps match evaluation to knowledge.

Multimodal Demonstrations of Comprehension

An authentic assessment as suggested by Dutcher (1990) required performance-based tasks. AI now enables learners to demonstrate comprehension through:

- AI-assisted written summaries.
- Oral explanations evaluated by speech-recognition tools.
- Automatically-generated cloze tasks from texts.

These varied demonstrations reflect a greater understanding, deeper comprehension and tactical awareness.

Immediate Feedback

With immediate corrective feedback and even explanations, assessment can be integrated into the learning process rather than being a fully separable summative event (OECD, 2021).

4.2 Ethical Considerations in AI Assessment

Despite all the advantages, AI integration raises ethical concerns. The excessive dependence on automated scoring, the possibility of algorithm bias, and data privacy issues could endanger fairness. If so, teachers could maintain the interpretive power of human professional judgment by treating AI-generated assessment data more as propositional signs rather than definitive ones (Chiu & Chai, 2024).

5. Implications for Teacher Education and Practice

While AI can potentially support and complement well-established principle on effective reading instruction, new forms of professional competence will need to be developed by teachers to use AI successfully as a part of reading instruction. Teacher qualification programs must include AI literacy among their compulsory subjects. They must figure out how to choose relevant AI tools, align them with curricular goals, and do so ethically.

In classroom practice, AI can assist in:

- Designing differentiated tasks.
- Supporting struggling readers.
- Generating authentic assessment activities.
- Providing formative feedback.

Still, the teacher remains the meaningful decision maker and directs the intelligent technologies to meaningful pedagogical goals.

Conclusion

Modern EFL/ESL contexts call for an evolution of reading comprehension instruction. Now, in the age of AI, we have opportunities to operationalize these centuries-old theories and strategies in ways that allow true personalized scaffolding and authentic assessment. When applied responsibly and ethically, AI technologies augment motivation, autonomy, fluency and comprehension performance of learners. The process still centers around the teacher giving informed guidance.

Authors Contributions

The manuscript was developed collaboratively. Both Rima Masri and Saeed Masri were responsible for the study design, theoretical background, manuscript writing and academic progress. The two authors both read and approved the final version.

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