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Using AI to Activate Students' Prior Knowledge in Reading Comprehension Activities : Insights from Moroccan Classrooms

BELOUIZA Ouafaa[1], JAMIAI Abdelmajid[2]

[1]Ibn Tofail University, Faculty of Languages, Letters,and Arts (FLLA), Morocco, [2]Associate Professor of Applied Linguistics and Communication at the Faculty of languages, Arts & Human Sciences, Hassan First University of Settat, Morocco

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* *Corresponding author:*
Email: ouafaa.belouiza@uit.ac.ma

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Abstract

This Paper Explores the pedagogical potential of Artificial Intelligence (AI) in supporting the activation of surdents' prior knowledge as a means to enhance reading comprehension in English as a Foreign Language (EFL) classrooms. Grounded in Schemata Theory. It synthesizes recent international and regional research to examine how AI tools can assist Moroccan EFL teachers in designing pre-reading activities that tap into learners' background knowledge. In Moroccan classrooms, many students struggle to comprehend English texts due to unfamiliar cultural references and limited exposure to the target language. Activating prior knowledge has long been recognized as a key strategy for improving comprehension, yet its implementation remains largely traditional. This paper proposes how emerging AI applications—such as generative chatbots (e.g., ChatGPT), visual content generators, and adaptive pre-reading platforms—can be used to personalize schema activation, offer multimodal scafolding and enhance learner engagement. Drawing on recent literature, this paper highlights examples of classroom applications from different EFL contexts and discusses their relevance to Morocco. It also addresses challenges such as digital access, teacher preparedness, and the ethical use of AI-generated content. The session concludes with practical recommendations for Moroccan EFL educators and policymakers seeking to enhance reading instruction through AI-supported strategies, advocating for a blended approach that positions AI as a pedagogical aid rather than a replacement for teacher expertise.

Keywords: Artifitial Intelligence, Prior Knowledge Activation, Reading Comprehension, Schemata Theory, Moroccan EFL Classrooms, pre-reading activities, AI as pedagogy

استخدام الذكاء الاصطناعي في تفعيل المعارف السابقة للمتعلمين ضمن أنشطة فهم المقروء: رؤى من الفصول الدراسية المغربية

بلويزة وفاء[1] جامعي عبد المجيد[2]

جامعة ابن طفيل، كلية اللغات والآداب والفنون ،القنيطرة، المغرب[1]، أستاذ التعليم العالي في اللسانيات التطبيقية والتواصل، كلية اللغات والفنون والعلوم الإنسانية، جامعة الحسن الأول – سطات، المغرب[2]

ملخص

تستكشف هذه الورقة البحثية الإمكانات التربوية للذكاء الاصطناعي في دعم تفعيل معارف الطلاب السابقة كوسيلة لتعزيز فهم القراءة في فصول اللغة الإنجليزية كلغة أجنبية (EFL). تستند هذه الورقة إلى نظرية المخططات. وتجمع هذه الورقة بين أحدث الأبحاث الدولية والإقليمية لدراسة كيفية مساعدة أدوات الذكاء الاصطناعي لمعلمي اللغة الإنجليزية كلغة أجنبية المغاربة في تصميم أنشطة ما قبل القراءة التي تستفيد من معارف المتعلمين السابقة. في الفصول الدراسية المغربية، يواجه العديد من الطلاب صعوبة في فهم النصوص الإنجليزية بسبب المراجع الثقافية غير المألوفة وقلة التعرض للغة الهدف. لطالما اعتُبر تفعيل المعارف السابقة استراتيجية رئيسية لتحسين الفهم، إلا أن تطبيقها لا يزال تقليديًا إلى حد كبير. تقترح هذه الورقة البحثية كيفية استخدام تطبيقات الذكاء الاصطناعي الناشئة - مثل روبوتات الدردشة التوليدية (مثل ChatGPT)، ومولدات المحتوى المرئي، ومنصات ما قبل القراءة التكيفية - لتخصيص تفعيل المخططات، وتوفير هيكل متعدد الوسائط، وتعزيز مشاركة المتعلم. بالاستناد إلى أحدث الدراسات، تُسلّط هذه الورقة البحثية الضوء على أمثلة لتطبيقات صفية من سياقات مختلفة لتعليم اللغة الإنجليزية كلغة أجنبية، وتناقش أهميتها للمغرب. كما تتناول تحديات مثل الوصول الرقمي، وجاهزية المعلمين، والاستخدام الأخلاقي للمحتوى المُولّد بالذكاء الاصطناعي. وتختتم الجلسة بتوصيات عملية لمعلمي اللغة الإنجليزية كلغة أجنبية وصانعي السياسات المغاربة الساعين إلى تحسين تعليم القراءة من خلال استراتيجيات مدعومة بالذكاء الاصطناعي، وتدعو إلى نهج مُدمج يُوظّف الذكاء الاصطناعي كوسيلة تربوية بدلًا من أن يكون بديلًا عن خبرة المعلم.

الكلمات الدالة: الذكاء الاصطناعي، تنشيط المعرفة السابقة، فهم القراءة، نظرية المخططات، فصول اللغة الإنجليزية كلغة أجنبية المغربية، أنشطة ما قبل القراءة، الذكاء الاصطناعي كمنهج تربوي.

INTRODUCTION

Reading comprehension remains a persistent and multifaceted challenge for many Moroccan EFL learners, particularly when they are confronted with texts that include culturally unfamiliar references, idiomatic expressions, or complex syntactic structures that fall outside their lived experiences and linguistic repertoires (Koumachi, 2020; Ebe, 2010). These obstacles are often compounded by a lack of shared background knowledge, which limits learners' ability to generate inferences, identify textual relationships, and engage in higher-order comprehension processes. Within this context, the activation of prior knowledge has been widely recognized in the literature as a fundamental cognitive and pedagogical strategy that significantly enhances learners' ability to process and interpret new textual information (Carrell & Eisterhold, 1983; Grabe & Stoller, 2013). According to schema theory, learners rely on pre-existing mental frameworks—schemata—to comprehend and make sense of new input, and activating these schemata is particularly critical in second language reading.

In light of recent technological advancements, Artificial Intelligence (AI) has emerged as a promising tool for enhancing pre-reading instruction by supporting the activation of learners' prior knowledge in more dynamic and personalized ways. AI-driven platforms can analyze students' profiles, linguistic levels, and reading histories to deliver contextually relevant prompts, pre-reading questions, and background information that align with each learner's cognitive needs and cultural context (Holmes et al., 2019). Additionally, AI tools equipped with natural language processing (NLP) and adaptive learning algorithms can scaffold learners by presenting culturally responsive explanations, visual aids, and vocabulary glossaries, thereby narrowing the gap between unfamiliar text content and the learner's prior knowledge (OECD, 2021). Such affordances not only enhance comprehension outcomes but also promote learner autonomy, engagement, and motivation.

However, while the integration of AI into EFL reading instruction offers considerable pedagogical benefits, it must be approached thoughtfully. Successful implementation requires careful alignment with curricular goals, teacher mediation, and culturally sensitive content to ensure that AI acts as a support mechanism rather than a substitute for effective instruction. When appropriately integrated, AI can serve as a powerful ally in activating and enriching students' prior knowledge, thus laying a stronger foundation for successful reading comprehension in foreign language classrooms.

BACKGROUND AND THEORITICAL FRAMEWORK

DEFINITION OF SCHEMATA

Anderson (1984) defines Schemta theory as "an abstract knowledge structure"(p.42), as a framework within which readers' preexisting conceptions force them to fit whatever they comprehend from the text. ccording to Anderson and Pearson (1984), "a schema is structured in the sense that it represents the relationship among its components parts" (p. 259). Similarly, McGee and Richgels in Moreillon (2007), a schema is "a mental structure in which people store all the information they know about people, places, objects, or activities. If people have no schema for a particular topic, they begin that encounter with an immediate loss of comprehension" (p. 20). In the same vein, Alderson (2000) defines schema as a "network of information stored in the brain. Similarlya, Murray(1980), for example, noted that the schema affects comprehension in a variety of ways. It has an impact on both recall and storage of information. Additionally, Anderson (1994) asserts that schemata help readers in inferring and incorporating information from the text.

THE ROLE OF SCHEMATA IN READING COMPREHENSION

(Anderson et al., 1977) argue that "comprehension of a message entails drawing information from

both the text and the internal schemata until sets are reconciled as a single schema or message" (p.187). This seems to highlight one of the basic assumptions behind the concept of schema theory. When we are presented with new information, schemata that are relevant to that information are immediately brought into play (or activated) to help us understand and make sense of it. As a result, what is often referred to as comprehension is the cognitive task of recreating the meaning of the text through the process of slots-instantiation (schema), employing concepts from both the reading text at hand and ideas previously present in our cognitive structure.

There have been several attempts by reading experts and scholars to provide concrete evidence of the important connection between schemata and comprehension. An example of this would be a series of experiments carried out by Carrell and Eisterhold (1988). They gave their students the reading passage "Story of a Policeman" who raised his hand and stopped the car. Students were asked to read the story and see what they could come up with. Following their 34 research, this story was found to have two fundamentally different interpretations depending on which schemata the readers activated. The most likely interpretation shows a traffic official waving the car driver to stop the car; therefore, the significance of schemata is evident because the meaning is shown by the writer and inferred by the subject rather than expressed explicitly in the story. The second reading is predicted on the superman paradigm according to which he "held up his hand and stopped the car without a driver". Despite its credibility, this interpretation was considered exceedingly unlikely. While the first interpretation looks to be more rational, likely, and familiar, the second appears to go a bit further. The reason why the second interpretation is regarded as fictional while the first is considered very familiar can be explained by the fact that we give more to the reading texts than we receive from them (Carrell & Eisterhold, 1988).

THE IMPORTANCE OF ACTIVATING PRIOR KNOWLEDGE IN TEACHING READING COMPREHENSION

Focusing on prior knowledge in teaching reading comprehension is crucial because it significantly enhances students' ability to understand, interpret, and engage with texts. This approach is grounded in schema theory, which posits that readers draw on existing knowledge structures (schemata) to make sense of new information (Carrell & Eisterhold, 1983). When learners activate relevant prior knowledge before reading, they are better able to predict content, infer meaning, identify key ideas, and retain information—all of which are critical for deep comprehension.

In the context of English as a Foreign Language (EFL), especially for learners who may lack cultural familiarity with certain texts, activating prior knowledge becomes even more important. Many Moroccan EFL learners, for example, struggle with reading comprehension when texts contain culturally unfamiliar references or vocabulary (Koumachi, 2020; Ebe, 2010). Helping students connect new content to what they already know reduces cognitive overload, makes learning more meaningful, and promotes engagement with the text (Grabe & Stoller, 2013).

Additionally, teaching strategies that activate prior knowledge—such as pre-reading discussions, visual prompts, KWL charts, and questioning techniques—enable students to build bridges between known and unknown concepts (Anderson & Pearson, 1984). This not only improves immediate comprehension but also supports critical thinking and long-term learning. Therefore, focusing on prior knowledge is not just a support strategy—it is a pedagogical necessity that aligns with how learners process and internalize information.

THE ROLE OF AI IN PRIOR KNOWLEDGE ACTIVATION

Activating prior knowledge is a well-established instructional strategy for enhancing reading comprehension. It allows learners to draw on their existing cognitive frameworks to interpret new information, make inferences, and connect concepts meaningfully. In recent years, the integration of Artificial Intelligence (AI) into educational settings has opened new possibilities for supporting this process. AI technologies can assist in assessing learners' background knowledge and tailoring instruction

to suit their specific needs, thereby promoting more personalized and effective reading experiences (Luckin et al., 2016).

One of the key affordances of AI lies in its ability to personalize learning. By diagnosing individual learners' prior knowledge, AI-powered tools can adapt reading materials, generate targeted scaffolding, and recommend strategies that align with students' cognitive readiness. Such adaptive systems help bridge the gap between known and new information, making reading more accessible and meaningful. For example, Intelligent Tutoring Systems (ITS) and AI-driven chatbots can simulate human-like interactions by engaging learners in pre-reading discussions or employing questioning techniques designed to activate schema and build engagement (Woolf et al., 2013).

Integrating AI into reading instruction, particularly in EFL contexts, offers promising avenues for individualized support. These technologies do not merely automate instruction but can enhance pedagogical practices by complementing teacher-led activities. When used thoughtfully, AI can serve as a dynamic partner in the learning process, providing culturally relevant prompts, feedback, and scaffolding that encourage learners to connect prior knowledge with new reading content, ultimately strengthening their comprehension skills.

CLASSROOM-BASED APPLICATIONS OF AI FOR ACTIVATING PRIOR KNOWLEDGE

The integration of AI-driven tools in classroom settings offers promising avenues for activating students' prior knowledge in ways that are interactive, culturally responsive, and pedagogically grounded. By leveraging technologies such as ChatGPT, AI quizzes, and adaptive learning platforms like Edpuzzle and Nearpod, teachers can design targeted pre-reading activities that prepare learners cognitively and emotionally for engaging with texts.

For instance, tools like ChatGPT can be used to generate culturally relevant prompts or discussion starters tailored to students' backgrounds. This is particularly valuable in EFL contexts, such as Moroccan classrooms, where learners may encounter texts embedded in unfamiliar cultural frameworks. Teachers might ask students to interact with the chatbot to explore themes or concepts related to the reading material. For example, before introducing a story set in a Western urban environment, learners can be prompted to describe their own cities, compare daily routines, or explore similar themes in their local contexts. This type of AI-facilitated dialogue activates relevant schemata and fosters personal connections to the upcoming text (Carrell & Eisterhold, 1983 ; Ebe, 2010).

AI-based quizzes also offer a means of assessing students' familiarity with a topic prior to reading. These tools can be designed to adapt in real-time based on student responses, offering hints, follow-up questions, or additional resources to support understanding. By identifying gaps or misconceptions early, teachers can adjust instruction or provide supplementary materials that build necessary background knowledge before moving into the text. This approach aligns with Mayer's (2009) cognitive theory of multimedia learning, which emphasizes the importance of activating relevant knowledge structures to facilitate the integration of new information.

Moreover, platforms like Edpuzzle and Nearpod allow educators to embed formative assessments within multimedia content, turning passive viewing into active learning. For example, before reading an expository article on natural disasters, students might watch a short video clip or documentary segment on earthquakes. Embedded AI features can track students' responses to comprehension questions, measure engagement through interaction logs, and generate individualized feedback. This helps teachers determine whether students are ready to comprehend the reading or require additional scaffolding. By linking visual, auditory, and textual stimuli, these tools help students construct mental models that improve both comprehension and retention (Mayer, 2009).

In sum, AI tools, when thoughtfully integrated into classroom instruction, can enhance the pre-

reading phase by diagnosing prior knowledge, stimulating relevant associations, and scaffolding learning in a culturally sensitive manner. These applications not only support comprehension but also foster student agency and engagement in the reading process.

BENEFITS OF AI-SUPPORTED ACTIVATION

Integrating AI into reading instruction offers several pedagogical benefits that can significantly enhance the learning experience, particularly in EFL classrooms. One notable advantage is its capacity to increase student engagement, motivation, and curiosity. Through interactive, personalized content, AI tools can spark interest in reading topics by making materials more relevant and accessible to learners' experiences (Holmes et al., 2019). Furthermore, AI encourages learner autonomy by allowing students to engage with pre-reading activities at their own pace, explore unfamiliar vocabulary, and access explanations or examples when needed—fostering a sense of control and responsibility over their own learning process (Luckin et al., 2016; OECD, 2021).

Furthermore, AI technologies support differentiated instruction in mixed-ability classrooms by tailoring learning experiences to meet the unique needs of each student. Adaptive learning algorithms can assess students' prior knowledge, linguistic proficiency, and reading history, then modify instructional inputs accordingly. This personalization enables teachers to assign texts, generate vocabulary previews, and design pre-reading tasks that are appropriately challenging and culturally responsive for each learner (Luckin et al., 2016). In doing so, AI mitigates the limitations of uniform instruction and fosters inclusivity by ensuring that all students—regardless of background or ability—can meaningfully access and engage with reading materials.

CHALLENGES AND ETHICAL CONSIDEARATIONS

While AI offers promising opportunities for enhancing reading comprehension, several challenges and ethical considerations must be addressed to ensure its responsible integration into educational contexts. One key concern is the risk of over-reliance on AI, which may inadvertently reduce opportunities for meaningful teacher-student interaction and collaborative meaning-making—both of which are essential to language development and critical thinking (Williamson & Eynon, 2020). When AI systems assume too much instructional responsibility, learners may become passive recipients of information, diminishing their engagement, creativity, and willingness to participate openly in classroom discourse (Binns, 2018). This over-automation can particularly affect language learners, whose progress often depends on authentic, dialogic classroom exchanges guided by teachers (Rose & Meyer, 2002 ; VanLehn, 2011)

Moreover, pedagogical decision-making must remain in the hands of educators, as AI systems are not equipped to navigate the nuanced cultural, emotional, and interpersonal dynamics of the classroom (Holmes et al., 2019). There is a risk that AI-generated content may fail to reflect cultural appropriateness or relevance, potentially alienating learners or misrepresenting contexts, especially in diverse or multilingual settings such as Moroccan EFL classrooms (Ebe, 2010). Therefore, AI should be positioned as a complementary tool, designed to enhance rather than replace the human elements of teaching—particularly the teacher's role in scaffolding comprehension, promoting inquiry, and nurturing a supportive learning environment (Zawacki-Richter et al., 2019).

PEDAGOGICAL IMPLICATIONS

The integration of Artificial Intelligence (AI) into reading instruction demands a strategic and pedagogically sound approach, beginning with teacher training. Educators require targeted professional development that goes beyond technical proficiency to focus on the instructional and ethical dimensions of using AI during the pre-reading stage (Zawacki-Richter et al., 2019). Such training should equip teachers with the knowledge to meaningfully embed AI tools into their lesson design while preserving

learner agency and critical engagement (Feng et al., (2021) ; Holmes et al., 2019 ; Selwyn, (2019).

One promising area of application involves the design of AI-enhanced warm-up activities that activate learners' prior knowledge in engaging and interactive ways. Examples include smart quizzes that assess topic familiarity, image or keyword generators aligned with the reading theme, and interactive story-builders that prompt students to draw connections between their own experiences and the upcoming text. These tools create cognitively rich entry points into reading by making abstract or unfamiliar content more relatable (Bransford et al., 2000 ; Luckin et al., 2016; Mayer, 2009).

Moreover, effective implementation requires a blended approach, integrating traditional instructional strategies with AI-driven personalization. For instance, a teacher might initiate a lesson with a classic think-pair-share discussion to encourage peer collaboration and idea exchange, followed by an AI-supported diagnostic quiz that adapts in real time to student responses and recommends personalized vocabulary support or thematic scaffolding (Woolf et al., 2013). This kind of hybrid model ensures that AI supplements—rather than replaces—human pedagogy.

Finally, there is a growing need to foster critical thinking around AI-generated knowledge. Rather than accepting AI outputs uncritically, learners should be guided to reflect on, compare, and evaluate such content. Teachers can design reflective tasks in which students analyze AI-generated responses alongside human ones, identify potential biases or inaccuracies, and consider the reliability and relevance of various sources (Williamson & Eynon, 2020; Binns, 2018). This cultivates not only reading comprehension but also digital literacy and metacognitive awareness, which are essential in 21st-century learning environments.

CONCLUSION

Artificial Intelligence (AI) presents promising opportunities for enhancing reading comprehension instruction, particularly through the activation of learners' prior knowledge during the pre-reading phase. By offering adaptive, personalized, and interactive support, AI has the capacity to bridge gaps in background knowledge, scaffold comprehension processes, and foster deeper engagement with texts. These affordances are especially valuable in English as a Foreign Language (EFL) contexts, where learners often encounter linguistic and cultural barriers that hinder their ability to make meaningful connections with reading materials (Luckin et al., 2016 ; Holmes et al., 2019).

However, the successful implementation of AI in educational settings requires thoughtful and context-sensitive integration. Factors such as cultural relevance, infrastructure availability, and teacher preparedness must be carefully considered to avoid reinforcing existing inequities or introducing inappropriate content (Ebe, 2010; Zawacki-Richter et al., 2019). As such, the role of the teacher remains indispensable. Educators must be actively involved in the design, facilitation, and evaluation of AI-enhanced instructional practices to ensure that learning remains learner-centered, culturally appropriate, and pedagogically sound (Williamson & Eynon, 2020).

AI should be understood not as a replacement for human instruction, but as a complementary tool that supports and extends teachers' capabilities. As Luckin et al. (2016) emphasize, the ultimate value of AI in education lies in its ability to augment—not supplant—human teaching. Therefore, a balanced and critically informed approach is essential, one that situates AI within a broader pedagogical framework aimed at fostering meaningful, inclusive, and reflective learning experiences.

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