SECOND LANGUAGE ACQUISITION THEORIES AND THEIR RELATIONSHIP TO AI TOOLS.

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Abstract:

This article studies the interconnection between second language acquisition theories (SLA) and Artificial Intelligence(AI) tools in modern language education. By analyzing key theories SLA - including Krashen's input hypothesis, Long's interaction hypothesis, Swain's output hypothesis, Schmidt's noticing hypothesis, and Vygotsky's sociocultural theory, it discusses how AI technologies can be designed to improve the process of language learning. The main focus is on adaptive educational environments, AI-mediated interactions, feedback mechanisms, and socio-cognitive support tools. As AI becomes more integrated into educational process, there is a growing need for theoretical aspects of education for ensuring ethical, effective, and pedagogically sound tool development.

Keywords: second language acquisition, artificial intelligence, input hypothesis, interaction, adaptive learning, language learning technologies

Introduction

Second Language Acquisition - it is a field, which investigates how people acquire languages, that differ from their native ones. For the last decades, the

number of theoretical models, which explain cognitive, social and emotional factors influencing language learning. At the same time, the recent achievements in the sphere of AI stimulate appearing of sophisticated educational tools, providing more opportunities for teaching languages and personalized learning. Integration AI tools to SLA theories provides a foundation for designing systems, which correspond to natural process how humans acquire languages.

The use of AI in second language teaching raises important questions: How can these tools support What kind of feedback should they offer? How can they adapt to individual differences? The article answer these questions, by connecting prominent SLA theories with practical AI applications.

Main Part

Krashen's input hypothesis and AI personalization

Stephen Krashen's Input Hypothesis (1985) claims that learners acquire language when they get a chance to comprehensible input—language that is slightly beyond their current level (i+1). This theory also emphasizes the importance of a low-anxiety environment, as stress can block input from being processed effectively. AI tools such as Duolingo, Rosetta Stone, and LingQ implement this theory by adjusting level of difficulty due to learner's performance. Natural Language Processing (NLP) algorithms assess lexical and grammatical complexity to provide learners with optimal content. For instance, adaptive reading platforms like Newsela modify articles to suit learners' reading levels, aligning with the "i+1" model.

Moreover, chatbots and AI tutors can lower the affective filter by offering private, non-judgmental environments. Virtual agents like ChatGPT or Google's Bard provide opportunities for safe practice, reducing performance anxiety and enabling learners to engage more freely in spontaneous language use.

Long's interaction hypothesis and AI conversational agents

Michael Long (1996) argued that interaction, particularly negotiation of meaning, is key to acquisition. When communication breaks down, strategies such as clarification requests, recasts, and confirmation checks facilitate understanding and promote linguistic development.AI-powered conversational tools can simulate these interactions. For example, AI speaking partners like ELSA Speak or Replika engage users in dialogues where errors prompt contextual feedback. When learners make mistakes, these systems might offer recasts rather than explicit corrections, keeping the conversation natural while providing learning opportunities.

These AI systems replicate authentic interaction patterns found in communicative classrooms, enabling consistent practice regardless of time or teacher availability. Some AI agents are even capable of multimodal feedback—combining text, speech, and visual cues—to enhance comprehension, aligning with multimodal learning theories.

Swain's output hypothesis and AI writing and speaking tasks

Merrill Swain's Output Hypothesis (1985) states that language production skills—speaking and writing is important for acquisition. Producing language encourages learners to notice gaps in their knowledge, test hypotheses, and start to understand the language deeper. AI platforms, such as Grammarly or Write & Improve by Cambridge University assist learners by finding errors and offering explanations, it makes people to think how language works.Voice recognition tools such as Google's Speech-to-Text or speech feedback in apps like Mondly help learners improve pronunciation and grammar.AI systems also support hypothesis testing through open-ended writing or speaking tasks where learners try new constructions and get feedback. This matches with formative assessment principles in education.

Schmidt's noticing hypothesis and AI-enhanced attention

Richard Schmidt (1990) suggested that conscious attention to language forms is essential for acquisition. It is important to notice linguistic features in coming information to analyse language effectively.AI technologies use visual highlights (e.g., bolding verb forms or highlighting prepositions) to draw attention to specific structures. Systems like Netex Learning or Edmodo integrate such features into learning materials. Additionally, intelligent systems can interrupt a session with a mini-lesson if this system finds a consistent pattern of learner error—a just-in-time feedback approach.Visual analytics and heatmaps are include in AI platforms that track learner attention and help educators understand where learners focus most, offering data-driven insights into what learners notice or ignore.

Vygotsky's sociocultural theory and AI mediation

Vygotsky's sociocultural theory (1978) emphasizes that learning occurs through social interaction and mediation by more knowledgeable others. Learning is most effective within the Zone of Proximal Development (ZPD) tasks learners can perform with guidance.AI systems act as mediators by providing scaffolding through hints, prompts, and examples. For instance, Write & Improve offers example responses for writing prompts, enabling learners to model their answers.

In virtual collaborative platforms like Classcraft or Microsoft Teams for Education, AI tracks group dynamics, supports cooperative learning, and provides personalized support based on group performance.While AI cannot fully replicate human mentorship, its ability to adjust in real time allows it to perform a similar scaffolding role. Some researchers (Lantolf & Thorne, 2007) argue that such tools represent a new class of cultural artifacts mediating second language development.

Ethical considerations and limitations

Despite the promise of AI, several challenges remain. Ethical concerns include data privacy, potential biases in AI feedback, and overreliance on technology. Moreover, while AI can simulate interaction, it lacks true empathy and cultural understanding that human teachers provide.It is also crucial to maintain teacher presence and human interaction in AI-enhanced classrooms. AI should support, not replace, human educators. Theories of SLA help ensure that AI design remains learner-centered, pedagogically sound, and responsive to real developmental needs.

The role of AI in learner autonomy and self-regulation

One significant contribution of AI tools to SLA is their support for learner autonomy and self-regulated learning—concepts rooted in sociocognitive theories of language development. According to Benson (2011), learner autonomy involves the capacity to take control of one's learning process, including goal setting, strategy use, and self-assessment. AI-enhanced language platforms offer personalized learning paths, immediate feedback, and progress tracking, enabling learners to make informed decisions about their study patterns.For example, applications like Lingvist and Busuu analyze learners' weak points and adapt vocabulary review accordingly, encouraging metacognitive reflection. AI systems also allow for just-in-time learning, where learners can access explanations or translations as needed, promoting independence and fostering strategic learning behaviors. This aligns with Zimmerman's (2002) model of self-regulated learning, where monitoring and reflection are key stages facilitated by adaptive technology.

AI and data-driven language pedagogy

Another emerging field at the intersection of SLA and AI is data-driven learning (DDL), where learners explore corpora or large text data sets to discover patterns in language use. Tools such as Sketch Engine or AntConc are increasingly incorporating AI-based enhancements, including semantic analysis and automatic

error tagging. These tools encourage learners to analyze real-life usage examples, aligning with inductive approaches to grammar and vocabulary learning.According to Boulton and Cobb (2017), DDL fosters learner noticing and hypothesis formation, key aspects of Schmidt's Noticing Hypothesis and Swain's Output Hypothesis. When AI facilitates pattern recognition or highlights collocations and grammatical structures, it effectively bridges SLA theory and practical application. Moreover, teachers can use AI-generated learner data to inform lesson design, creating a formative feedback loop supported by SLA research.

Conclusion

Second language acquisition helps evaluate and guide the designing of AI-tools in language teaching.The input hypothesis is crucial in adapting material to the level of the learner. The interaction and output hypotheses build the foundation for communicative and productive tasks. The noticing hypothesis explains how important it is to pay attention to language forms. The sociocultural theory emphasizes the importance of real communication.

AI is able to improve the foreign language learning process, creating a comfortable, calm and productive environment. However, it is significant to ensure that these technologies are ethically acceptable and reliable.

In the future, researchers have to keep searching for approaches how AI can assist for better understanding and developing the process of second language acquisition.

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