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Intelligent assistants in language learning: an analysis of features and limitations

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Intelligent assistants in language learning: an analysis of features and limitations

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Abstract. Learning a second language is a challenging endeavour which requires various degrees of support. The proliferation of smart technologies includes chatbots and conversational agents which have the potential to 'assist' language learners (Kukulska-Hulme, 2019). However, whilst a growing number of researchers and developers are working on such intelligent assistants across different disciplines, little is known about their application to language learning. The aim of this project was to review relevant research literature over a ten-year period (2010-2020) in order to uncover the capabilities and limitations of Intelligent Assistants (IAs) in relation to language learning. Results suggest that IAs can assist learners in a variety of ways, including provision for conversation and pronunciation practice. These tools can also fail to comprehend meaning or accented pronunciation. The analysis highlighted gaps in research around skills development, task design, pedagogy, and the use of chatbots in virtual worlds.

Keywords: mobile learning, chatbots, voice assistants, smart assistants, avatars.

1.   Introduction

Today, the ubiquity of laptops, smartphones, wearables, and smart home devices has given rise to a proliferation of readily available smart technologies that can support language learners wherever they wish to learn. These include chatbots, avatars, and conversational agents such as Siri and Alexa. It has been suggested that these IAs – to use a generic term – serve as resources which learners can draw on in a flexible manner, as a means to obtain additional or alternative forms of 'assistance' (Kukulska-Hulme, 2019). As a result of these developments, the idea

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of personal assistance, which echoes a bygone era of 'personal digital assistants', has re-emerged in recent years and requires reinterpretation for the age of IAs. On the basis of a multidisciplinary literature review of research studies reporting on developments and trialling of IAs in education and related fields over ten years, this paper highlights the features and limitations of IAs and relates them to current and potential support for language learning in today's digital landscape.

2.   Method

Our aim in this project was to review research literature on IAs across a range of disciplines published in the period 2010-2020, to discover what claims had been made about their capabilities and limitations that would be relevant to language learning. To scope the literature, we generated a list of words related to IAs and another related to language learning and teaching. We combined these in a matrix and then conducted a systematic series of searches using the Web of Science database with the 'topic search' option, which searches titles, abstracts, and author keywords. We captured the 193 references and tagged each one with our search terms. We then read each abstract and made a judgement as to its relevance to language learning/teaching, removing 76 items that turned out not to be relevant. This resulted in a working bibliography of 117 items: 56 journal articles, 60 conference proceedings, and one book chapter. We read the papers and coded them using a content analysis approach in order to extract information about IAs' characteristics with respect to support for language learning/teaching, and research trends. Due to space constraints in this paper we report only on findings from the journal articles.

3.   Results and discussion

Whilst communicative language teaching remains a dominant paradigm within many classrooms, learners still struggle to speak for reasons which might include limited classroom contact hours, the cost of tuition, and problems such as speaker-related anxiety. It has been suggested that the use of chatbots can serve as a way to enable conversation practice in the 'mobile age' (Fryer, Nakao, & Thompson, 2019). Conversely, participants in a longitudinal study lost interest in interacting with the chatbot over the human task partner (Fryer et al., 2017).

Research into interaction with conversational agents has covered a range of theoretical and affective issues: learning experiences, interest, and competence

(Fryer et al., 2019); willingness to communicate (Ayedoun, Hayashi, & Seta, 2019); mitigation of anxiety (Bao, 2019); and evaluation of different chatbots in terms of suitability for second language support (Coniam, 2014). Developers have become more aware that they should address issues which relate directly to learners' needs. For example, Ayedoun et al. (2019) proposed a model for an 'embodied conversation agent', programmed to deploy communication strategies and affective backchannels when learners struggled to communicate. Affective aspects of learning such as how to address speech-related anxiety for staff in a company were addressed utilising chatbot technology, concluding that this shows promise (see Bao, 2019). An evaluation of *Gengobot,* a chatbot-based grammar dictionary application that was integrated with the popular instant messaging platform *LINE,* showed how users could get support with grammar without having to leave the platform (Haristiani, Danuwijaya, Rifa'i, & Sarila, 2019).

Few studies have chosen to address the role of the teacher. However, Coniam (2014) conducted a study to enable a teacher to converse with five chatbots to evaluate their suitability for learning English. Whilst the chatbots were able to produce grammatically acceptable responses, they struggled to take account of meaning. The use of the intelligent assistant Alexa was also found to offer opportunities which 'extend the reach of the classroom' (Moussalli & Cardoso, 2019, p.1). A case study of Alexa (Dizon, 2017) explored the assistant's ability to understand L2 utterances whilst asking learners to reflect. Findings demonstrated that Alexa could comprehend around half of the utterances; with participants noting that the limitations of the technology did not allow them to draw on their L1. However, learners commented on the assistant's ability to provide implicit feedback on pronunciation issues when Alexa had failed to understand them. Moussalli and Cardoso (2019) questioned whether 'accented' L2 learners could be understood by IAs but also wondered whether learners could comprehend the 'accented' speech of Alexa. In adopting this stance on research into IAs, derogatory and out-dated comparisons between native and non-native versions of English can hopefully be partially mitigated.

We found that relevant research on interaction within virtual worlds such as Second Life has tended to focus on the learner or teacher assuming an avatar identity, rather than the exploitation of machine-driven avatars as assistants. Our analysis also highlighted gaps in research, since studies did not address impacts on pedagogy, development of more targeted skills (e.g. encouragement for learners to notice grammatical patterns within the context of their chatbot conversations), or task design. Wider limitations and critiques in the literature include issues of privacy; IAs' typically feminine, native speaker identity; and

the risk of prejudicial or false content generated through automated responses from the IA.

4. Conclusions

From our analysis, it seems that IAs have much to offer language learners in terms of more extensive conversation and pronunciation practice, mitigation of anxiety, reflection on learning, and communication support. Conceptualising these resources as 'assistants', rather than tutors, may ensure that they are exploited in a flexible manner which can be strategically integrated with opportunities to interact with human interlocutors. The use of these technologies potentially offers advantages because learners can access a conversation partner 24 hours a day who will never tire of the necessity for learners to repeat and modify language. However, there is little known about strategic forms of task design or the types of guidance required from teachers. IAs could be usefully exploited to help learners build confidence when they suffer from anxiety when speaking in their L2, with developers now addressing learner needs. We consider that there may be potential advantages in teachers encouraging learners to use IAs. These assistants can support learners to practise skills whilst freeing up classroom time for more personalised and targeted forms of input which cannot be generated by a machine.

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