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Stimulating and sustaining interest in a language course: An experimental comparison of Chatbot and Human task partners

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ABSTRACT

Novel technology can be a powerful tool for enhancing students' interest in many learning domains. However, the sustainability and overall impact of such interest is unclear. This study tests the longer-term effects of technology on students' task and course interest. The experimental study was conducted with students in foreign language classes ($n = 122$): a 12-week experimental trial that included pre- and post-course interest, and a sequence of task interest measures. Employing a counterbalanced design, at three week intervals students engaged in separate speaking tasks with each of a Human and "Chatbot" partner. Students' interest in successive tasks and in the course (pre-post), were used to assess differential partner effects and course interest development trajectories. Comparisons of task interest under different partner conditions over time indicated a significant drop in students' task interest with the Chatbot but not Human partner. After accounting for initial course interest, Structural Equation Modelling indicated that only task interest with the Human partner contributed to developing course interest. While Human partner task interest predicted future course interest, task interest under Chatbot partner conditions did not. Under Chatbot partner conditions there was a drop in task interest after the first task: a novelty effect. Implications for theory and practice are discussed.

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1. Introduction

At the heart of becoming competent in any domain stands the necessity for persistence. While there is a broad range of theories modelling how such persistence is achieved, developing interest in the domain is one approach, which is supported by both research (Ainley, Hidi, & Berndorff, 2002; Tobias, 1995) and common-sense. As a result, supporting and, where necessary, stimulating students' interest is an implicit part of every educator's belief.

The question is how interest might be stimulated most effectively. Two approaches that have received considerable attention are the role of perceived value (e.g., Hulleman, Godes, Hendricks, & Harackiewicz, 2010) and of curriculum tasks (Guberman & Leikin, 2012; Hanus & Fox, 2015). In the context of foreign language learning, there is a longstanding focus on the importance of

creating tasks that support sustained learning (e.g., Lightbown & Spada, 1994). Recently, research attention both in the area of language learning and general education, has focused on the potential of technological tools to enhance classroom motivation and thereby learning. One technology that has been suggested as a potentially powerful tool for enhancing students' language learning efforts is the area of Chatbots (Goda, Yamada, Matsukawa, Hata, & Yasunami, 2014; Stickler & Hampel, 2015; Fryer & Carpenter, 2006, Fryer & Nakao, 2009; Coniam, 2008). Chatbots are software avatars with limited, but growing capability for conversation with human beings.

However, in the context of technology-based educational interventions, current research (e.g., Chen et al., 2016) has raised concerns regarding the potential for novelty effects to mask the real impact of technological interventions. As a result, the only confident means of assessing the potential of Chatbots as a tool for enhancing interest in language learning courses is an experimental trial. In the current research an experimental trial was conducted to compare the influence of Chatbot and Human partners on both task interest and later course interest. This study was undertaken within

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the context of a university language course using a framework that distinguishes interest for task, for course and for domain (Fryer, Ainley, & Thompson, 2016) when modelling interest development.

1.1. Interest development

From its transition across philosophy to psychology, to its strong empirical impact on reading research, our understanding of interest as a psychological construct has a considerable history (see e.g., Hidi, 1990). It has long been recognised that there are at least two different types of interest; situational and individual. The labelling of these types has varied over time and between researchers. However, these two types have generally been identified as an early stage or phase which is transitory and chiefly affective. This early stage, sometimes separated into an emerging situational interest and a stabilized situational interest (Krapp & Prenzel, 2011), is then potentially followed by a stage that is longer-lasting, and includes additional value and epistemological components (Schiefele, 1991).

One widely-cited framework for understanding the development of interest is the Four-Phase Model of Interest Development (Hidi & Renninger, 2006; Renninger & Hidi, 2011). This model describes the potential development of an individual's interest from initially stimulated interest in a topic - triggered situational interest. If interest is sustained, and allowed to grow, then triggered situational interest develops into the second phase of maintained situational interest. The later two phases of development in this model are described as emerging individual interest and well-developed individual interest.

1.1.1. Related educational principles

The Four-Phase Model of Interest Development suggests to educators a broad path that learners might travel from initial triggering of interest to a sustainable personal interest in a domain of study. Hidi and Renninger (2006) emphasise that the length of each phase is variable and that an individual's interest development might cease at anytime. The instructional environment plays a role in triggering situational interest through a range of novel and social activities. The maintenance and deepening of interest across the remaining three phases consists chiefly of supporting personal involvement, knowledge development and increasing value of the domain.

1.2. Interest development in formal education

When the focus is on understanding the development of interest in domains across specific university courses, a model of interest development that distinguishes three levels has been suggested (Fryer et al., 2016). The first level relates to the specific tasks which represent learning events such as lectures, group projects, independent reading, watching videos, and doing experiments. The second level relates to students' interest in the course itself. The final level is their interest in the broader study domain. Some initial research using this framework on interest development reported that course interest mediated the relationship between students' interest in tasks and their interest in the broader study domain. This result makes stimulating and sustaining course interest of substantial importance if university instructors are seeking to encourage students to continue with further studies in the domain. Essentially, these results suggest that tasks matter because they directly build interest in courses which can directly impact interest in study domains. Hence, further research into task features that stimulate and sustain interest is warranted.

In the current environment where much of the educational innovation is technology orientated, an important direction for research is to assess the potential for technological learning tools to

enhance students' interest in curriculum tasks.

1.3. Technology for enhancing interest and learning

The growing use of technology has long been heralded as a means to dramatically shift our understanding of education, however not always in the ways we might expect (Naisbitt & Cracknell, 1984). Futurists, just a few decades ago, pointed to skills we would need in a world filled with omnipotent computers, while others underlined the importance of the growing constructivist movement for meaningful learning in any age (Nickerson, 1988). Few trends in educational technology have been more closely watched than the steady growth of intelligent tutors within the field of artificial intelligence (AI). In the broad array of roles intelligent tutors are able to perform, they are at the cutting-edge of human-technology interaction. Arising out of Computer Assisted Instruction (CAI), early attempts at intelligent tutors (e.g., Carbonell, 1970) initially aimed to anticipate rather than interact with learners. Since the time of the initial attempts at CAI, many educational researchers have collaborated with technologists in the relentless pursuit of smart education. From virtual tutors and coaches to virtual environments and the broad appeal of game based learning, intelligent tutors seem here to stay. Early studies (e.g., Lester et al., 1997) pointed to the positive effect that basic "life-like" agents could have on learners' perceptions of learning environments. Steady progress in the design of these educational agents coupled with research into their effectiveness has both provided support for their broad motivational benefits and refined our understanding of how they support learning. Keystone research in this field by Mayer and colleagues (e.g., Mayer, Dow, & Mayer, 2003; Moreno, Mayer, Spires, & Lester, 2001) has demonstrated that for university students working with physics problems, the intelligent agent was more effective when explanations to the student were in the form of speech rather than on-screen text. Furthermore, this research by Mayer and colleagues found that visual representations of the intelligent tutor did not significantly support increased learning outcomes. More recent phenomenological (Veletsianos & Miller, 2008) and experimental (Veletsianos, 2010) research examining conversational and pedagogical agents have posed a more nuanced set of questions regarding visual interaction between digital agent and human participant. These questions now go beyond considering intelligent tutors as instructive tools, to questions of how humans might interact and carryout meaningful communication with the intelligent agents.

From an educative perspective, the step from agents that support learning to agents that communicate with humans opens up possibilities in the area of language learning. In few areas of education have the advances of technology been more acutely felt than second and foreign language-learning (Blake, 2013). While the audio/visual support that technology provides is important for all education, the possibility of conversational interaction with an intelligent agent is at the heart of technology's potential contribution to language learning. It is widely acknowledged that massive amounts of comprehensible language input and practice are essential for meaningful language learning to take place. Across Asia, for example, the low number of native speakers of English puts a premium on opportunities for students to practice when learning this new language. One technological response to this problem is the potential of "Chatbots" or intelligent agents for conversational practice, which are online software capable of carrying on a conversation with interested humans.

Consistent with much of the intelligent tutor research (Johnson & Lester, 2016), students have reported motivational benefits with Chatbots during a classroom task (Fryer & Carpenter, 2006). This early text-based study suggested that many students were more

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