What Do Children Favor as Embodied Pedagogical Agents?

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Abstract. Embodied Pedagogical Agents (EPA) are increasingly employed in educational applications, for a variety of users and purposes. However, studies have shown that visual appearance, communicative style, and pedagogical roles of agents impact their acceptance, trust, and user interaction [1, 2, 3, 4]. In this paper, we present a study where 86 primary school children (aged 7-11) chose an EPA to ‘accompany’ them in their learning of multiplications in the ITS application, MultipliTest. The children used two versions of the software, one with an instructor EPA, and another with a learning companion EPA. Additionally, the children selected a visual appearance for each EPA: simplified or detailed, and naturalistic (humanoid-shaped) or stylized (smiley-shaped). Investigations of the possible relationships between pedagogical roles and visual appearance with respect to user preference are outlined, along with the study limitations, and considerations for future work.

Keywords: Embodied Pedagogical Agent; visual style; pedagogical role; realism; naturalism.

1 Introduction

EPAs can be found in educational software in increasing numbers, and under different visual representations, different communication styles, or adopting one or more different pedagogical roles, within the same application. EPAs are “visually represented, computer-generated characters in pedagogical roles, such as virtual instructors, mentors, or learning companions” [3], usually embedded within the software to aid social and communicative features, [5, 6]. They are used in computer-assisted learning applications for users ranging from children to elderly people, to help them in software navigation, usability, or in learning content or development of meta-cognitive skills [2, 7].

However, studies showed that visual appearance, communicative style, and pedagogical roles of agents impact their acceptance and trust, and change the way people interact with them [1, 2, 3, 4].

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Consequently, there is sufficient research interest and rationale for investigating the effect of design characteristics of EPAs on users. Research on the user interface design of agents, and in the design of comics over the past twenty years, has focused on the impact of the degree of detail and naturalness of the EPA. These factors affect their processing and interpretation by users [8, 9], in addition to self-identification processes, and engagement level with the EPA [10, 11]. Other studies have investigated the impact of ‘instructional roles’ on learning and motivation for particular age groups [4]. A range of pedagogical roles used in EPAs worldwide, have been classified in Haake & Gulz [3] on the dimension of authority. In Haake & Gulz [3], three EPA factors were studied with children aged 12-15: visual static appearance, communicative style, and pedagogical role. Some interesting and potentially unexpected results were found, such as when female students chose ‘learning companions’ they preferred more stylized, visual characters. However, as children grow, their interests change. This impacts their ability [12] and willingness [13] to use intelligent environments. Therefore, there is value in investigating user’s preferences according to their age and cognitive developmental stage.

In this paper, we present a study where 86 primary school children (aged 7-11) chose an EPA to ‘accompany’ them in their learning of multiplications in the ITS Multipliotest. The children used two versions of the software, one with an instructor EPA, and another with a learning companion EPA. The children selected a visual appearance for each EPA: simplified or detailed, and humanoid-shaped (naturalistic) or smiley-shaped (stylized). At the end of the session, they were asked to choose which type of EPA they preferred, and the reason why. Section 2 illustrates all aspects of the experimental study (study goal, EPA design characteristics, experimental design, participants, and research hypothesis). The results (section 3) are illustrated with their analysis (section 4) as to the possible relationship of pedagogical visual appearance with respect to user preferences. Finally, section 5 describes limitations of the study, and considerations for future work.

2 Design of the Experimental Study

2.1 Goal of the Study

In this section, the experimental study performed on June 10th 2007 with three French classes from the school ‘Jean Zay’ in France, is presented. The goal of the study was to investigate users’ choice of EPA with respect to their visual appearance and pedagogical role. In particular, possible relationships between these variables were investigated with regards to user preferences.

2.2 Participants

86 children aged 7-11 (46 girls, 40 boys) from a French primary school participated in the study. The students came from three classes of two levels (one class of CE1, one class CE1/CE2, and one class of CE2). The majority of students had no familiarity with pedagogical agents comprised of embodied computer characters, but they were all familiar with the pictorial representation of naturalistic characters.