Chapter 8
Intelligent Tutoring Systems for Filipino Learners: Current Research, Gaps, and Opportunities

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ABSTRACT

Intelligent tutoring systems (ITS) research is not a new field of study. Despite its pedagogical value, very few ITS are developed intended for Filipino learners. The dearth of ITS research in a local setting discounted the fact Filipino learners might need a different learning approach. This chapter presented the state of ITS research in the Philippines. Readers would be informed that there is a need for multidisciplinary studies relating to Filipino learners that could serve basis for the development of culturally-related ITS. It also described Filipino learners in terms of culture, and it will attempt to link these descriptions as design considerations for the development of ITS. Finally, it provided insights and directions on how to develop an ITS for Filipino learners.

INTRODUCTION

Intelligent tutoring system (ITS) is a computer- or mobile-based software which has the capabilities to teach or assist learners. It is capable of providing individualized and immediate feedback, which may be very difficult to provide in a class with varying

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academic capabilities. It has become a helpful supplementary material for teachers, especially when they handle a large class. Students benefit from this educational technology since it adapts to their academic needs and abilities. Recently, ITS is now incorporated in mobile devices which greatly transform and challenge the traditional form of learning. Students now learn at their own phase, space, and time.

Capturing the attention of scholars and researchers in the field of education around the world, ITS has become a vibrant field of research that calls for multidisciplinary approaches. International societies (e.g., Artificial Intelligence in Education), journals (e.g., International Journal of Artificial Intelligence in Education), and numerous published articles dedicated to ITS research are indications that it is a growing and evolving field. One of the advances in this field is the cultural considerations in the design of the ITS.

Mathematics education benefitted from the applications of artificial intelligence (AI). Matsuda et al. (2012) maintain that students may learn the procedural and conceptual knowledge through a peer tutor. Likewise, Pareto (2014) states that a pedagogical agent (PA) can engage students to learn arithmetic concepts and reasoning. In addition, as revealed in a study by Bringula, Alvarez, Evangelista, and So (2017), a mobile-assisted mathematics learning system that provides different forms of hints is able to help students solve algebraic problems without the intervention of a human teacher. Thus, it is apparent that artificial intelligence advances teaching and learning mathematics.

Relatively, very few studies of ITS research in the Philippines have been conducted. While there are attempts to develop an ITS in the Philippine setting (e.g., Bringula et al., 2017; Bringula, Fosgate, Garcia, & Yorobe, 2018; Lagud & Rodrigo, 2010), very little is known on the cultural basis of ITS development. Consequently, these impede the advancement of ITS research and educational system in the Philippines. In light of these constraints, this paper intends to investigate the state of ITS and mathematics learning studies conducted in the Philippines. Specifically, this chapter aims to 1) present the current state of ITS research in the Philippines, 2) present current studies of mathematics teaching in the Philippines, 3) identify the problems arising from the current state of ITS and mathematics research in the Philippines, and 4) propose unexplored research topics as possible solutions to these gaps.

BACKGROUND

For the last 50 years, intelligent tutoring systems had been a valuable educational resource for teachers, educational institutions, and students (Kulik & Fletcher, 2016). With intelligent tutoring systems (ITS), students' specific learning needs in large classes are addressed appropriately. With ITS, students are given equal opportunities

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