Guest editorial: Developing learner agency in smart environments

Sheng-Shiang Tseng[1] and Yun Zhou[2*]
[1]Department of Education and Futures Design, Tamkang University, Taiwan // [2]Faculty of Education, Shaanxi Normal University, Xi'an, People's Republic of China // u9241346@gmail.com // zhouyun@snnu.edu.cn
[*]Corresponding author

ABSTRACT: Smart environments integrated with digital technologies have emerged as a powerful tool to support personalized, interactive, and adaptive learning experiences. The central objective of developing smart environment is to foster learner agency enabling learners to develop the ability to take ownership and manage their own learning process. However, developing learner agency presents a significant challenge. It requires researchers, practitioners, and system developers to understand the roles of teachers and students, the instructional design, and the affordances of technologies to transfer learners from passive recipients to active participants in their learning process. To address the need, this special issue collected twenty-nine articles which underwent a rigorous peer review process. The acceptance rate for this special issue was less than fifteen percent and only four papers were accepted and included. The four papers discuss the application of instructional approaches and various digital tools such as artificial intelligence, virtual reality, and mobile technologies to design smart learning environments which foster and evaluate learner agency.

Keywords: Learner agency, Smart learning environments, Self-regulated learning

1. Introduction

Learner agency is based on the sociocultural theory indicating that language learning takes place through active engagement in the construction of linguistic knowledge (Gao, 2010). It emphasizes the active role of language learners in the language learning process. Learners should take control over their language learning process by making choices and acting on these choices to achieve personal goals (Martin, 2004). Learner agency is especially essential for learning success in online learning environments where diverse multimodal and interactive digital resources such as Ebooks or language learning websites are provided for students to improve their language performance (Knight & Barbera, 2018; Moore, 2016). Only when students develop learner agency, they can select and tailor the online multimodal resources into personal learning needs and levels.

Developing learner agency is not an easy task as it involves a series of self-regulated learning tasks for students to undertake throughout the learning process, including reflection, evaluation, and planning for consecutive learning improvement (Randall, 1999). These self-regulated learning tasks entail time and efforts from students and the external supports from teachers to teach students to identify learning discrepancy, determine learning goals, arrange learning tasks, and construct clear standards and criteria of evaluation (Bown, 2009; Scanlon & Connolly, 2021). Challenges facing the students in these tasks consist of their low motivation to hold the responsibility over the learning process and insufficient instructional supports from teachers (Xia, 2014). Most students rely on teachers as capable ones to scaffold their learning process, while teachers found it difficult to provide instructional supports for students with diverse needs.

A possible approach to overcome the challenges of developing learner agency involves intergrating smart technologies into pedagogical practices. Technologies such as AI (Hu, 2021), intelligent tutoring systems (Oliveira et al., 2021), cloud computing, information and communication technologies (Hawedi & Abdullah, 2020), mobile or wearable devices (Kim et al., 2011), and visualization analytics (Hsiao et al., 2017) have been developed to create smart learning environments. In smart learning environments, multiple representations of learning resources and automatic feedback are provided to make learning comprehensible and allow students to self-adjust and adapt their learning performance (Spector, 2014). In addition, smart learning environments can gather information about student learning behaviors, learning preferences, learning styles, and learning discrepancy (Thomas et al., 2019). The gathered information can be transformed into a knowledge map or a learning path to provide students with personalized learning services to assist smart decision-making. However, the application of smart technologies to develop learner agency in language education remains underexplored as to instruction, the role of teachers, and the technologies in smart learning environments. Questions such as *how instructions and technology are combined to design smart environments to encourage self-directed learning? What tools can be used to evaluate the development of learner agency? What are the roles of students and teachers in smart learner environments have not been fully investigated in past research?*

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2. Contributions of the papers to this special issue

Four papers selected for this special issue present the application of instructional strategies and technological tools including mobile technologies, artificial intelligence, and virtual reality to provide insights into the development of learner agency in smart environments.

The first article, 3D Immersive Scaffolding Game for Enhancing Mandarin Learning in Children with ADHD, delved into the effects of a game-based 3D virtual world on the linguistic communication skills and learning behaviors of ADHD children. The game-based virtual world was designed with self-directed learning activities for the ADHD children to accomplish independently. Their learning process was further supplemented with prompts and immediate feedback to scaffold the ADHD children as they navigated and learn through the virtual world. Using a one-group research design, this study lasted for 17 weeks and involved two ADHD children. The findings showed that the ADHD children improved their linguistic communication skills including labeling, categorizing, defining, and reasoning. Moreover, the game-based virtual world demonstrated its effectiveness in facilitating ADHD children to regulate learning behaviors related to attention, concentration, and motivation. This study provides valuable contributions on special education. It unveils the potentials of applying 3D virtual worlds and game-based strategies in designing self-directed learning tasks to improve the language ability and learning behaviors of ADHD children.

The second article, *Personal Learning Material Recommendation System for MOOCs Based on the LSTM Neural Network*, focused on addressing the challenges faced by Massive Open Online Courses (MOOCs) in terms of low active participation levels and lack of personalized learning materials. To address these issues, this study proposes a personalized learning path for MOOCs based on Long Short-Term Memory (LSTM). AI-based recommendation systems (RSs) are leveraged to improve the acquisition of learning resources and provide personalized learning materials as study guides. The proposed system uses students' video-watching behaviors to identify those with similar learning behaviors through clustering. Based on the clustering results and the learning paths of each group of students, an LSTM model is constructed to recommend learning paths. These learning path recommendations aim to enhance the online participation of learners. The findings indicated that the system's learning path recommendations effectively improved the online participation of learners. Students who received these recommendations progressed from the slow-progress group to the medium-progress or fast-progress group. Furthermore, the findings from the learning attitude questionnaire showed that the proposed system not only motivated learners to continue learning and achieve high learning capacity but also supported their study planning based on their individual learning needs.

The third article, *A concept mapping-based mobile storytelling approach for promoting students' creative agency: An experimental study*, investigated the effects of a concept mapping-based mobile storytelling approach on creative agency via the self-regulation process. The study conducted a quasi-experimental design with 102 primary school students in English as Foreign Language classrooms where they produced micro-movies on a mobile storytelling system. The study highlighted the positive impact of the concept mapping-based approach on students' creative self-efficacy, self-regulation, and motivation to learn English. The concept mapping strategy provided students with clear goals, manageable rules, and a structured approach to integrate information, leading to the improvement of self-regulation and concentration. This article contributes to the literature on the use of mobile technologies and storytelling approach in language education. It also offers insights and practical guidance for educators seeking to promote agentic engagement, creativity, and self-directed learning in the English as Foreign Language classroom.

The fourth article, *Expanding the Learning Ecology and Autonomy of Language Learners with Mobile Technologies*, discussed the increasing prevalence of mobile phones among learners and the importance of incorporating mobile learning into educational contexts. Despite the abundance of publications on mobile learning in recent years, there are still uncertainties regarding when, how, and why learners choose to use mobile devices for learning. The disruptive nature of mobile devices has elicited mixed reactions from teachers. Some perceive them as distractions in the classroom, while others view them as tools that encourage learner autonomy and facilitate learning. To maximize the potential of mobile learning, it is crucial to understand the expectations of teachers, learners, and administrators. It is also important to leverage the affordances of mobile devices, consider the learning ecology, and align with learners' short-term and long-term goals. This work explored the role of mobile learning both inside and outside the classroom and examined its impact on formal and informal learning opportunities. It delved into the changing roles of teachers and learners in the context of mobile learning. Additionally, this study investigated the myths associated with technology in fostering motivation and autonomy in learning.

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