ONLINE LEARNING IN CHEMISTRY: DESIGN, DEVELOPMENT, ACCESSIBILITY, AND EVALUATION

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ABSTRACT

Online learning has played an integral role in delivering large-cohort chemistry courses in undergraduate degree programs. This study includes describing how a first-year chemistry course transitioned from traditional face-to-face teaching to blended learning using the Resource-Based Learning framework (Hannafin & Hill, 2007; Reyes et al., 2022a). Using this framework, different types of online learning resources were curated to deliver chemistry content. A variety of learning activities were also developed to enhance these resources guided by Laurillard's Conversational Framework (Laurillard, 2002). Considering that accessibility is a critical aspect to improve students' learning experience, the Universal Design for Learning (UDL) framework was integrated into the learning design of first-year chemistry (Rose & Meyer, 2002; Reyes et al., 2022b). The perceived utility of online learning resources enhanced with UDL-based features was evaluated through students' responses to surveys, interviews, and focus groups. Furthermore, learning analytics using temporal, sequence, and process mining analytical techniques were employed on students' trace data to evaluate course learning design and to understand students' engagement with learning resources and activities included in the course. Results of this study show the importance of careful development and implementation of learning design of the online learning component of chemistry courses, to enhance the students' learning experiences.

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