

TEACHERS' INSTRUCTIONAL STRATEGIES IN INTEGRATED STEM EDUCATION

Yousef Alrashdi, Ph.D. Candidate, Purdue University, yalrashd@purdue.edu
Paul A. Asunda, Associate Professor, Purdue University, pasunda@purdue.edu

Abstract

Integrated Science, Technology, Engineering, and Mathematics (iSTEM) education has been regarded as a model that provides students with skills necessary for future careers and enhances the economy of nations. Although there is a considerable body of research on the effective educational approaches in iSTEM education including problem-based and project-based learning, the ways teachers implement these approaches remain ambiguous due to a paucity of consensus about how to effectively use iSTEM approaches in classrooms (Thibaut et al., 2018). Additionally, there is a need for further investigation to understand teachers' instructional strategies and practices in iSTEM education (Bush, 2019). To fulfill this gap and provide a better understanding of iSTEM education, this study aims to understand the instructional strategies used by iSTEM high school teachers in Indiana and the challenges they may encounter. It was conducted in the context of real world problem-solving as it is one of the fundamental tents of iSTEM education (Johnson et al., 2020).

Methodology and Findings

A generic (basic) qualitative approach was employed to understand iSTEM instructional strategies from teachers' perspectives and reveal the challenges teachers may encounter while teaching in their classrooms. Purposeful sampling was used to identify four high school 9th- and 10th-grade teachers who implement iSTEM in the context of real-world problem solving. Data focusing on pedagogy was collected through interviews, observations, and documents. The collected data was analyzed through thematic analysis. The findings are: (1) there is no single strategy used by iSTEM teachers, but it depends on the context; (2) asking questions and encouraging thinking are always the priorities of iSTEM teachers while focusing on "why"; (3) students should use their hands while working on groups; (4) students should feel they are independent by working individually, being aware, and do it on their own; (5) iSTEM teachers always build a learning environment that is flexible, engaging, and safe; and (6) timing and funding have always been challenges for iSTEM teachers. The findings of this study can help high school iSTEM teachers learn more about how they teach iSTEM and the difficulties they might face. They also provide stakeholders with insight into the instructional strategies and practices used by iSTEM teachers to implement changes, improvements, and professional development programs.

References

- Bush, S. (2019). National reports on STEM education: What are the implications for K-12? In *STEM Education 2.0* (pp. 72-90). Brill Sense.
- Johnson, C. C., Mohr-Schroeder, M. J., Moore, T. J., & English, L. D. (2020). *Handbook of research on STEM education*. Routledge.
- Thibaut, L., Ceuppens, S., De Loof, H., De Meester, J., Goovaerts, L., Struyf, A., . . . De Cock, M. (2018). Integrated STEM education: A systematic review of instructional practices in secondary education. *European Journal of STEM Education*, 3(1), 2.