

APPROACHES TO STEM TASK DESIGN: A REVIEW STUDY

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The equitable representation of the four STEM disciplines is one of the issues in the current STEM practices. Particularly, mathematics is least treated as one core discipline in STEM education research (Martin-Paez et al., 2019). In addition, the current STEM systematic reviews have focused on instructional practices, perceptions, gender differences, and trends in publications, educational levels, disciplines or countries. However, few review studies have characterized STEM tasks. In this oral communication, we will present one part of the results derived from a review study – that is, approaches to STEM task design and specifically attending to tasks explicitly integrating mathematics.

A search of Scopus database using the search terms "STEM education" or "STEM learning" or "STEM teaching" AND "task*" or "activit*" AND "mathematic*" was conducted on January 2, 2022 and returned to 266 published articles. The inclusion criteria: the article must provide exemplary task, focus on students, and include the integration of mathematics with other disciplines. After screening all of them, 20 articles were related to our review study. The approaches to STEM tasks can be characterized according to aims of tasks (Laveault, 2014), viewing on mathematics (Bishop, 1988), and design methods (Watson & Ohtani, 2015).

The result shows six kinds of task design approaches: mathematical modelling, engineering design process, problem-based, digital-tool-based, social issues-based, and construction-and-practice-based. For each approach including the aim, view and method, critical principles for task design will be identified.

References

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