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Virtual Laboratories in Chemistry Education: A Systematic Review of Primary and Secondary Schools

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ABSTRACT This review aims to provide an overview of the use of Virtual Laboratories (VLs) in chemistry for basic education (CBE). The focus was on the context in which CBE was used and its effects on chemistry learning. Fifteen studies from Scopus, EBSCO-ERIC, and ScienceDirect were considered for the review. It was discovered that few perceived difficult topics were covered, with software insufficiently used. Further, only few studies focused on science process skills, while most studies were conducted at secondary school level. Key teaching approaches were applied in the studies, although others were noticeably absent. VLs were found to have a positive effect on achievement, motivation, self-efficacy, acquisition of knowledge, practical skills, self-directed learning, higher-order thinking skills, and social interaction, although nothing was reported on their effect on the components of the community of inquiry in the CBE. Recommendations are made.

Lay Summary

- ♦ Some reviews have been undertaken in chemistry education, but less in basic education.
- ♦ This paper reviews the contexts in which VLs are used in CBE.
- ♦ It also highlights how VLs have been used by chemistry teachers to implement different teaching approaches and to influence the learning process positively.