Review of: "Implementing Simulation Software to Develop Virtual Experiments in Undergraduate Chemical Engineering Education"

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Potential competing interests: No potential competing interests to declare.

The article focuses on implementing virtual laboratories in undergraduate chemical engineering education through simulation software like UNISIM, DWSIM, and MATLAB/SIMULINK. It presents a shift from traditional teaching methods to a learner-centric approach that enhances student engagement in experimental design and process optimization. Integrating virtual experiments benefits student learning by reducing equipment-related anxiety and improving teamwork and self-efficacy. The study also introduces an effective assessment methodology for educational outcomes. It highlights the positive impact of virtual labs on students' problem-solving skills, teamwork, and communication abilities, particularly emphasized during the COVID-19 pandemic. From my point of view, while the paper effectively demonstrates the value of virtual labs in engineering education, future studies could further explore comparative analysis with traditional labs and long-term impacts on career readiness.

Introduction: satisfactory

Methods:

A more detailed comparative study between virtual and traditional laboratories could enrich the findings.

Investigating the long-term effects of virtual lab training on career readiness and professional competence could be of benefit.

The authors have to address potential technical issues, such as software accessibility, user interface improvements, and system requirements.

Results: Satisfactory and representative

Discussion:

The following points could enforce the discussion and elaborate on the study's effectiveness :

Discuss how virtual labs are effective in preparing students for real-world engineering challenges.

Explore the possibility of incorporating virtual labs with up-to-date emerging technologies (e.g., AI, IoT) in engineering education.

Present the limitations and challenges of the study.

Provide the practical implication of the study.

Conclusion: Rephrase the conclusion according to the recommended points that will be added to the discussion