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Understanding Teacher Learning Community as Support for Implementation of Computer-Based Modelling Using Open Source Physics for Conceptual Instruction

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KEY IMPLICATIONS

- Class time as an implementation constraint could be overcome through a FLIPPING approach, which stands for Flexible Environment, Learning Culture, Intentional content, Professional educators, Preparedness for learning, Infrastructural readiness, Novice-proof interface, and Guided pragmatism (Bo, Fulmer, Lee, & Chen, 2018).
- While the teachers were commendable to display student-centeredness in their attitudes and in their implementation, it also surfaced the issue of their stance on computer-based modelling as too difficult for their normal proficiency students.
- The intertwining relationship between teacher attitude and implementation posits changing teacher attitudes that effect changes in the implementation of computer-based modelling in classrooms.
- Building of teacher learning community requires a much longer runway, where legitimate core participation is needed in its infancy stage.

BACKGROUND

Though Open Source Physics (OSP) simulations in modelling-oriented science teaching promotes student involvement and deep learning, the steep learning curve combined with limited understandings on how teachers can effectively integrate OSP simulations into classrooms curtailed widespread and effective adoption. One-off training in OSP is inadequate to support the teachers' adoption of simulation infused teaching, where teachers' learning and active participation decline rapidly once it is remove.

FOCUS OF STUDY

This research explores teachers' adoption, integration and customization of OSP simulations, e.g. Tracker, for modelling-focused pedagogy. We provided support for interested teachers by initiating and building a teacher learning community (TLC). The research team adapted simulations for topics within secondary and pre-university science syllabi, and then conducted a progressive sequence of workshops where participants were recruited for the TLC.

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KEY FINDINGS

- In computer-based modelling implementation, class time, student proficiency, and tool usability matter.
- The TLC recruitment drive through a series of workshops was thwarted by teachers' heavy workload and timetable conflicts.
- Among the key challenges identified, the most dominant one was the lack of directive from school leaders, pointing to the need for legitimacy, that is formal acknowledgement, from school leaders and the MOE.

SIGNIFICANCE OF FINDINGS

Implications for practice

Teachers require continuous professional support that is ungratified by one-off courses. We recommend the building of TLCs that are linked with NIE fraternity to provide support.

Implications for policy and research

The provision of "legitimacy" at the core of TLC is critical to foster safe conditions for active teacher participation. Two suggestions are proposed to implement legitimate core participation: 1) to review existing teacher learning communities initiation approach; and 2) to legitimize the participation of those passionate volunteers to become part of the teacher learning community core.

PARTICIPANTS

A total of 24 teachers were involved in the study.

RESEARCH DESIGN

The study adopted the qualitative pragmatic approach to study the phenomenon through the perspectives and experiences of the participants. Semi-structured interviews were conducted and the data was analysed using thematic analysis.

REFERENCES

Bo, W. V., Fulmer, G. W., Lee, C. K. E., & Chen, V. D. T. (2018). How Do Secondary Science Teachers Perceive the Use of Interactive Simulations? The Affordance in Singapore Context. *Journal of Science Education and Technology*, 1-16.

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