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Exploring the ICT integration in chemistry practical work

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Abstract

Over the years, the diagnostic report on the physical science matric results has indicated that the inability of learners to perform well in the Chemistry section came from the section of Rates of reactions as well as Chemical equilibrium. The challenges with the topic is the inability of learners to represent and interpret experimental data on the graphs. Literature shows that learners have an iconic misconception about graphs, as they view graphs as images and not scientific representation of relationship between variables. The challenge of learners indicate that they do not understand the concept well enough to make a relationship between an experiment and how the results of an experiment can be represented graphically. This implies that teachers may also be having the same challenge and could mean that pre-service teachers are unable to comprehend the relationship between experimental findings from the Rates of reactions and Chemical equilibrium.

This study sampled five (5) physical science pre-service teachers and one (1) teacher educator in the fourth year to collect data that provided some insight on factors that affect understanding of the link between practical aspects and interpretation of experimental data from these topics. Since data was collected during the lockdown due to the COVID19 pandemic, data was collected online when ICT resources were used for teaching and learning. This study explored how the integration of ICT incorporated in the teaching and assessment of practical tasks can affect preservice teacher's ability to interpret graphs on these topics. The PCK theoretical framework was chosen for this study aimed at examining the evidence of TPACK as an attempt to understand teacher educators' awareness of the technological knowledge, pedagogical knowledge and content knowledge complex interplay. Qualitative data was collected through online classroom observations, interviews and document analysis. During lesson observations the teacher educator delivered a lesson on rates of reactions and chemical equilibrium using videos. Interviews were conducted with both teacher educators and students to understand the usefulness of ICT integration in chemistry practical. Document analysed were practical booklets used by students to respond to questions on a practical task. These were used to examine students' practical work with purpose of tracking the adequacy of ICT integration in chemistry practical work particularly to the graphical interpretation related question.

The TPACK interplay allowed the study to understand if content taught links with pedagogy applied (practical work) and how these two are empowered by ICT, accordingly, determining the usefulness of ICT integration in students' graphical interpretations". Teachers became

aware of the interplay of technological knowledge, pedagogical knowledge, and content knowledge which enabled them to strategically use graphs as concepts were explained thereby improve in their understanding and interpretation of graphs. During interviews, preservice teachers admitted that the use of ICT provided a clear visual with clear readings, making it for them to identify independent, dependent variables and to analyse, compare, describe, interpret graphs. However, the minority claim conceptual understanding is rather a more crucial point toward understand and identifying. This study concludes that ICT is useful in graphical interpretation provided that teacher educators show awareness of TPACK, strategically exposing students to graphical related content. Revisiting basics for graphical related concepts is important as conceptual understanding is directly linked to graphical interpretation.

Key words: ICT integration, Chemistry, Rates of reactions, Chemical equilibrium. Graph interpretation