8th International Academic Conference on
Education, Teaching and Learning
10 - 12 July 2025
Helsinki, Finland

Effects of a Professional Development Program for the Integration of Phylogenetic Software in Biology Class on Professional Knowledge of Teachers

Kerstin Röllke, Maren Panhorst, Norbert Grotjohann
Bielefeld University, Germany

Abstract

To promote young talents in STEM careers and enhance students' scientific literacy, more than 460 out-of-school student labs have been established across Germany. In these non-formal places of learning students conduct experiments using authentic laboratory equipment—resources often unavailable in regular school settings. Many of these labs also contribute to teacher education by offering courses to students and to teachers at university. Despite ongoing digitalization, many teachers still lack digital competencies. The project "LFB Labs digital" addresses this gap by leveraging the expertise of out-of-school student labs to further develop teachers in digital learning settings. In the professional development program 'Working with Phylogenetic Software - Integrating Genetics and Evolution' teachers learn about the digital tool MEGA while connecting Genetics and Evolution, which is considered to be beneficial for learning. This tool enables phylogenetic analyses of genetic data based on DNA.
The effects on teachers' media skills were examined using the TPACK model, which integrates content knowledge, pedagogy knowledge, and technology knowledge. Changes in teachers' academic self-concept were measured using a validated self-assessment instrument in a pre-post design. A control group was also surveyed to contextualize the representativeness of the trained sample. The findings will be presented at the conference.

Keywords: academic self-concept; digital competencies; MEGA software; out-of-school student laboratories; TPACK model