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TPACK – UDL Scale for Science Teachers: Construction, Validation, and Reliability

| Jamil Suprihatiningrum |

ABSTRACT

The Technological Pedagogical Content Knowledge (TPACK) has been widely studied, but only a few have been found that integrate it with the Universal Design for Learning (UDL) framework. This study aims to develop the TPACK-UDL Scale to examine teacher's knowledge of pedagogic, content, and technology related to inclusive science learning. The development of the scale refers to the eight development steps by DeVellis. After reviewing the constructs of TPACK and UDL, and examining for intersections between them, the next step was preparing the initial draft, which produced 60 items, which were divided into eight aspects (Pedagogical Knowledge/PK, Technological Knowledge/TK, Content Knowledge/CK, Technological Content Knowledge/TCK, Pedagogical Content Knowledge/PCK, Technological Pedagogical Knowledge/TPK, TPACK, and Inclusive Education Knowledge/IEK). Six-panel experts examined the initial draft of the TPACK-UDL Scale, focusing on the content and items construction. The panel experts' feedback was used to revise the initial draft and produced the second draft. This draft was then tested on 42 science teachers who were randomly selected and asked for their willingness to fill out the scale voluntarily. Validity and reliability of the scale were tested using the Partial Least Square (PLS) method. Several iterative stages of testing were conducted and produced a final 48 valid items with a Cronbach's Alpha value > 0.8, ρA value > 0.8, and composite reliability > 0.9. Therefore, the TPACK-UDL Scale is valid and reliable for measuring teachers' knowledge and abilities in designing inclusive science learning. Suggestions are made for the use of the TPACK-UDL scale from a practical and theoretical perspective for future research.

KEYWORDS

TPACK, UDL, TPACK-UDL Scale, inclusive science learning

INTRODUCTION

Nowadays, the education system in Indonesia (including teacher education programs) is influenced by the new era of digital technology, the industrial revolution 4.0, and Society 5.0 (Rahayu, 2021; Subandowo, 2022; Teknowijoyo & Marpelina, 2021). Preparing prospective teachers to use Information and Communication Technology (ICT) in the classroom and proposing innovative strategies that increase student-teacher competency in integrating technology are the biggest challenges of teacher training programs (Angeli & Valanides, 2005, 2009). ICT is currently a primary prerequisite in teaching that can expand the learning environment. Research by Tondeur et al. (2017), however, demonstrated that many teacher candidates must prepare to operate learning-tech based effectively. Great teachers provide the right ways for students to plan and succeed in learning and motivate them to utilize their abilities (including ICT) to build their country (Gloria & Benjamin, 2018).

Previous studies state that ICT knowledge is essential for teachers to integrate it into their classroom within their conceptual framework of teaching knowledge (Qasem & Viswanathappa, 2016). Teachers need representational skills to integrate ICT in their way to

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