

turnitin unesa1

256 Similarity



Document Details

Submission ID

trn:oid:::3618:145532591

Submission Date

Jul 14, 2026, 8:48 AM GMT+7

Download Date

Jul 14, 2026, 8:54 AM GMT+7

File Name

256 Similarity.pdf

File Size

574.5 KB

1 Page**536 Words****3,296 Characters**

9% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography

Exclusions

- 11 Excluded Matches

Match Groups

-  **5 Not Cited or Quoted 9%**
Matches with neither in-text citation nor quotation marks
-  **0 Missing Quotations 0%**
Matches that are still very similar to source material
-  **0 Missing Citation 0%**
Matches that have quotation marks, but no in-text citation
-  **0 Cited and Quoted 0%**
Matches with in-text citation present, but no quotation marks

Top Sources

- 5%  Internet sources
- 6%  Publications
- 0%  Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

Match Groups

- 5 Not Cited or Quoted 9%**
Matches with neither in-text citation nor quotation marks
- 0 Missing Quotations 0%**
Matches that are still very similar to source material
- 0 Missing Citation 0%**
Matches that have quotation marks, but no in-text citation
- 0 Cited and Quoted 0%**
Matches with in-text citation present, but no quotation marks

Top Sources

- 5% Internet sources
- 6% Publications
- 0% Submitted works (Student Papers)

Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

- 1** **Publication**
Mary C. Herring, Matthew J. Koehler, Punya Mishra. "Handbook of Technological ... 3%
- 2** **Internet**
garuda.kemdiktisaintek.go.id 3%
- 3** **Publication**
Michael Phillips, Evrim Baran, Punya Mishra, Matthew J. Koehler. "Handbook of T... 2%
- 4** **Internet**
eprints.iain-surakarta.ac.id 1%



Advancing SDG 4 through TPACK-Driven Development of Technological Knowledge and Competence in Pre-Service Science Teachers

Dyah Astriani^{1*}, An Nuril Maulida Fauziah¹, Ahmad Fauzi Hendratmoko¹, Laily Rosdiana¹, Martini¹, Nur Hayati²

¹Universitas Negeri Surabaya, Surabaya, Indonesia

²Universitas Hasyim Asyari, Jombang, Indonesia



DOI : <https://doi.org/10.63230/jocsis.2.3.256>

Sections Info

Article history:

Submitted: March 19, 2026

Final Revised: June 25, 2026

Accepted: July 4, 2026

First Available Online: Agustus 14, 2026

Publication Date: September 27, 2026

Keywords:

Pre-service Science Teachers;

Science Learning;

TPACK Training.

ABSTRACT

Objective: The increasing complexity of 21st-century education requires pre-service science teachers to develop integrated knowledge of technology, pedagogy, and content. This study aims to examine the relationships among Content Knowledge (CK), Technological Knowledge (TK), Technological Content Knowledge (TCK), and Technological Pedagogical Content Knowledge (TPACK) in shaping pre-service science teachers' competence to integrate technology into science instruction. **Method:** A quantitative approach with a cross-sectional survey design was employed. Data were collected using a valid and reliable TPACK questionnaire and analyzed through Structural Equation Modeling using SmartPLS. **Result:** The findings revealed that CK significantly contributed to both TK and TCK, indicating that strong content mastery supports the development of technology-related knowledge. TK also made a substantial contribution to TCK and a moderate direct contribution to TPACK. Among all examined relationships, TCK provided the strongest contribution to TPACK. These results suggest that the development of TPACK is not determined by CK alone, but is strengthened through the integration of technological and content knowledge. **Novelty:** The novelty of this study lies in highlighting TCK as a key mediating domain that bridges CK and TK in developing pre-service science teachers' TPACK, thereby offering empirical evidence for designing teacher education programs that support technology-integrated science learning and contribute to quality education aligned with SDG 4.

INTRODUCTION

Education plays a crucial role in creating superior human resources (HR) to face the challenges and advancements of increasingly sophisticated technology. The Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 22 of 2016 emphasizes several principles of learning, including: 1) students must be able to discover information, 2) learning should be based on various learning resources, 3) the use of a scientific approach is essential, 4) competency-based learning is required, 5) integrated learning should be implemented, 6) learning should accommodate multi-dimensional answers, 7) practical skills are important, 8) There should be an enhancement and balance between hard skills and soft skills, 9) Learning must prioritize the cultural development and empowerment of students as lifelong learners, 10) Learning should apply values by providing exemplary models, building motivation, and fostering student creativity, 11) Learning occurs at home, in school, and in the community, 12) The principle that anyone can be a teacher, anyone can be a student, and anywhere can be a classroom should be applied, 13) Utilization of information and communication technology (ICT) to improve the efficiency and effectiveness of learning; and 14) recognition of individual differences and students' cultural