

EXAMINING THE STATE OF DIGITAL COMPETENCE IN MICROTEACHING AMONG PRE-SERVICE TEACHERS OF ECONOMICS

Lina Rifda Naufalin¹, Cicilia Dyah Sulistyaningrum Indrawati¹, Mintasih Indriayu^{1*}, Leny Noviani¹

¹Faculty of Teacher Training and Education, Universitas Sebelas Maret, Indonesia

*Email corresponding author: mintasih_indri@staff.uns.ac.id

Abstract

This study aims to analyse the level of digital competence of economics pre-service teachers in the context of microteaching learning. The digital competencies examined include information and data literacy, communication and collaboration, digital content creation, security, and problem solving. The method used is quantitative descriptive with instruments in the form of questionnaires and interviews, involving 70 economic education pre-service teachers from various batches. The results indicate that most economic education pre-service teachers fall into the 'good' category in terms of information and data literacy, communication and collaboration, security, and problem-solving. However, the indicator for digital content creation received the lowest score, indicating the need for improved understanding of copyright, digital ethics, and technical skills in creating content. The data also reveals a weak understanding of digital security and technical skills in addressing technological issues. These findings highlight the importance of explicitly integrating digital competencies into the microteaching curriculum to support students' readiness to face the challenges of 21st-century learning.

Keywords: Digital Competence, Microteaching, Economics Education, Pre-Service Teachers, Digital Ethics

INTRODUCTION

Digital transformation in education has changed the way teachers teach and students learn, especially with the increasing use of digital technology in the learning process. In the context of higher education, especially in teacher education programs, digital competence is a crucial element that must be possessed by pre-service teachers in order to be able to adapt to the dynamics of the 21st-century classroom (Ferrari et al., 2012; Reisoğlu & Çebi, 2020). Microteaching, as an important part of pedagogical training, provides space for pre-service teachers students to develop limited teaching skills in a simulated context (Sudrajat et al., 2024). However, the effectiveness of microteaching in improving the digital competence of pre-service teachers is still an issue that requires further study, especially in the field of economic education, which requires a contextual approach based on data and technology (Kafyulilo et al., 2015).

Although several studies have revealed the importance of technology integration in teaching practices (Mishra & Koehler, 2006; Tondeur et al., 2017), most studies still focus on general pedagogical mastery and few have specifically evaluated digital competence in microteaching practices, especially in the scope of economic education. On the other hand, the challenges faced by student teachers in implementing technology during microteaching, such as limited mastery of presentation software, use of learning management systems (LMS), and lack of digital media literacy, are often overlooked by teacher education institutions (Instefjord & Munthe, 2017). This indicates a gap between policies to strengthen digital competence and their implementation in practical learning.

This gap becomes even more significant considering that economics education requires mastery of complex digital content, such as economic data analysis, interactive visual presentations, and the use of digital platforms in delivering material that is relevant to the global context. Therefore, it is important to evaluate the extent to which digital competence has been built in the microteaching experience of economics education students, in order to provide input for the design of a relevant curriculum (Luís & Rodrigues, 2025; Mena & Flores, 2016). In addition, mapping students' digital competence is also important to ensure their readiness to face the challenges of digital-based education, both in schools and in continuing professional development.

This article aims to examine the condition of digital competence in microteaching practices among student economics teachers. By focusing the study on the technical, pedagogical, and digital ethical aspects of microteaching, this study attempts to provide a comprehensive picture of students' strengths and weaknesses in using technology during teaching practice. The findings of this study are expected to be the basis for curriculum improvement, technology-based training enhancement, and the development of microteaching learning models that are more responsive to the challenges of the digital era.

LITERATURE REVIEW

Digital Competence

Digital competence is a set of knowledge, skills, attitudes, abilities, strategies, and awareness needed by individuals to use digital technology effectively in various life contexts, including education (Ferrari et al., 2012; Martinussen et al., 2015). Fessler et al. (2022) explains that teacher digital competence includes pedagogical abilities to select, modify, and apply technology in learning meaningfully. In the context of teacher education, strengthening digital competence is not only about mastering technological tools, but also includes information literacy, digital communication, and ethical awareness in media use (Buchholz et al., 2020). Therefore, the education of pre-service teachers is required to ensure that students are able to integrate technology reflectively and critically in order to be ready to face the challenges of 21st-century learning.

Microteaching

Microteaching is a small-scale teaching practice strategy that allows pre-service teachers to practice specific teaching skills in a short time with direct feedback (Kafyulilo et al., 2015). This approach has been proven effective in improving the mastery of basic teaching skills, such as opening lessons, delivering materials, using media, and interacting with students (Takhassuna, 2023). According to (Azrai et al., 2024), microteaching provides space for self-reflection and ongoing professional development while facilitating the use of learning technology in a more targeted manner. In the digital era, the integration of technology into microteaching sessions is becoming increasingly relevant, as pre-service teachers are required to be not only pedagogically proficient but also competent in utilising digital devices to support the learning process.

Economic Education Pre-Service Teachers

Economic education pre-service teachers requires a solid mastery of economic content knowledge, pedagogical skills, and the ability to apply contextual learning approaches that are relevant to socio-economic developments (Ihrig et al., 2023). According to Naufalin et al. (2024), economics pre-service teachers are faced with the challenge of bridging abstract economic concepts with practical applications in students' daily lives. In addition, they also need to develop adequate digital competencies in order to access the latest economic data, utilize interactive media, and use digital platforms to enrich the teaching and learning process. This shows that comprehensive provision, covering aspects of content, pedagogy, and technology, is very important in preparing economics pre-service teachers who are professional and adaptive to changing times.

RESEARCH METHODS

This study uses a quantitative descriptive approach. Data collection was carried out using a questionnaire as the main instrument. This procedure consists of two main stages, namely the first theoretical exploration, which was carried out to analyse digital competency indicators for economics pre-service teacher students. Furthermore, the research instrument was developed and validated. Participants in this study were economics pre-services teachers from a group of students who had taken the microteaching course from the 2018 to 2022 intakes, totalling 70 students. The sample was selected using the quota sampling method because the number was below 100. Responses were captured on a Likert scale of 1-4.

The description of each indicator is done by interpreting the average value of each indicator. Determination of categories is done using the formula:

$$i = \frac{r}{k} = \frac{4-1}{5} = 0,6$$

Description:

i = class interval

r = range

k = Number of classes

Then the intervals presented in table 1. are obtained as follows:

Table.1 Assessment criteria

No	Scale	Category
1	3,6 - 4	Very good
2	2.9 - 3.5	Good
3	2.2 - 2.8	Enough
4	1.7 - 2.3	Less
5	1 - 1.6	Very Less

RESULTS AND DISCUSSION

This research examined sociodemographic characteristics such as participants' gender and generational cohort determined by their year of enrollment. An overview of these sociodemographic variables is shown in Table 2.

Tabel 2. Respondent Sociodemographic Dimension

Characteristic	Total
Gender	
Male	57
female	13
Enrollment year	
2018	3
2019	6
2020	17
2021	13
2022	31

Source: Primary Data processed (2025)

Instrument Test Results

Using the Pearson correlation formula, the validity test produced significance values < 0.05, indicating that every item was considered valid. In addition to the validity assessment, the research

instruments underwent reliability testing. The reliability analysis, conducted with the Cronbach's Alpha coefficient, yielded a value of 0.907, which exceeds 0.70 and demonstrates that the instrument is reliable. The reliability test outcomes are shown in Table 3.

Table 3. Reliability Test Results

Cronbach's Alpha	Description
0,907	Reliable

Source: Primary Data processed (2025)

Data Test Result

The data were analyzed using SPSS version 25 to determine the mean score, standard deviation, and the highest and lowest scores for each statement item. These statistical values support the researchers in understanding students' conditions across the various dimensions studied. The analysis results are shown in Table 4.

Table 4. Data Test Result

Dimension	Min	Max	Mean	St. Dev.
Information and Data Literacy	1	4	3,36	0,660
Communication and Collaboration	1	4	3,39	0,686
Digital Content Creation	1	4	3,25	0,729
Security	1	4	3,32	0,701
Problem Solving	1	4	3,31	0,682

Source: Primary Data processed (2025)

Table 4 presents descriptive statistics for each dimension assessed in this study. The Information and Data Literacy dimension showed a mean score of 3.36 with a standard deviation of 0.660, indicating that students generally showed good competence in finding, evaluating, and managing digital information. This result suggests that students are relatively skilled in identifying credible sources and organizing information effectively. According to Tomczyk et al., (2023), information literacy is one of the basic elements of digital literacy because it allows individuals to critically navigate the large amount of content available online. The relatively high mean score implies that participants likely had sufficient exposure to information search tasks during their studies, which supports their ability to work independently in academic and professional contexts.

Communication and Collaboration obtained the highest mean compared to other indicators (3.39; SD = 0.686), indicating that participants are skilled in using digital tools to interact, share ideas, and collaborate with others. However, students also felt that they were still not fully utilizing media such as the cloud to share information and content. This is consistent with research by(Núñez-Román et al., 2021) which highlighted that social media and digital platforms have changed the way students communicate and collectively construct knowledge. but it takes effort from the environment and students themselves to get used to communicating and collaborating through digital channels. The increasing integration of online collaboration tools in higher education, which has been shown to increase student engagement and encourage peer learning (Adamec & Šimáně, 2021). These findings suggest that educational institutions have successfully embedded digital collaboration practices into coursework and extracurricular activities, preparing students for a technology-rich workplace.

The Digital Content Creation dimension had the lowest mean score (3.25; SD = 0.729), highlighting that students felt less confident in producing and editing digital content compared to other skills. This gap suggests that while students may be able to consume information effectively, they may lack advanced competency in content development, such as designing multimedia materials or using specialist editing software. Miguel-Revilla et al., (2020) also noted that creative content production is essential for full digital citizenship and employability. These results highlight the need for targeted instruction and hands-on practice in digital content creation to help learners build confidence and skills in this area.

The Security and Problem Solving dimensions each obtained an average score of 3.32 (SD = 0.701) and 3.31 (SD = 0.682), respectively, based on further analysis indicating that students have not paid attention to the content produced such as watermarking the learning videos they create. In the problem-solving indicator, it was identified that not all students have the skills to overcome technical problems that occur during learning. Ferrari et al., (2012) argues that security awareness is an important aspect of digital competence because it empowers individuals to protect themselves and their communities online. Similarly, the ability to solve digital problems contributes to self-directed learning and adaptive skills, which are key skills in a rapidly evolving digital environment (Voogt & McKenney, 2017).

CONCLUSION

The findings of this study indicate that students in the Economics Education program demonstrate varying levels of digital competency across the indicators assessed. Information and Data Literacy and Communication and Collaboration are the strongest dimensions, reflecting students' ability to effectively search for credible information and engage in digital interactions and teamwork. However, Digital Content Creation emerged as the weakest area, indicating that many students lack confidence in developing and editing digital materials. Similarly, in the Security and Problem-Solving dimension, students demonstrated moderate competency, but there were significant gaps, such as a lack of attention to protecting their digital products and limited readiness to overcome technical difficulties.

This variation highlights that while students are proficient in some aspects of digital literacy, other competencies are underdeveloped and require focused intervention. Therefore, it is important for educational institutions to adopt concrete measures—such as targeted workshops, digital skills clinics, and integration of practical project curricula—to systematically strengthen students' capabilities in digital content creation, security practices, and problem-solving. Ensuring balanced development across all dimensions will better prepare students to meet the demands of modern education and the professional digital environment.

BIBLIOGRAPHY

- Adamec, P., & Šimáně, M. (2021). Perception Of Online Learning By Students Of University Pedagogical Study Programs During Covid-19 Pandemic. *AD ALTA: Journal of Interdisciplinary Research*, 11(2), 8–14. <https://doi.org/10.33543/1102814>
- Azrai, E. P., Rini, D. S., & Suryanda, A. (2024). Development and Validation of TPACK-Based Microteaching Assessment Instruments. In R. R.H., I. null, R. S., A. T.A., & M. D. (Eds.), *AIP Conference Proceedings* (Vol. 2982, Issue 1). American Institute of Physics Inc. <https://doi.org/10.1063/5.0182853>
- Buchholz, B. A., DeHart, J., & Moorman, G. (2020). Digital Citizenship During a Global Pandemic: Moving Beyond Digital Literacy. In *Journal of Adolescent and Adult Literacy* (Vol. 64, Issue 1, pp. 11–17). <https://doi.org/10.1002/jaal.1076>
- Ferrari, A., Punie, Y., & Redecker, C. (2012). Understanding digital competence in the 21st century: An analysis of current frameworks. *21st Century Learning for 21st Century Skills*, 79–92.
- Fessler, A., Maitz, K., Paleczek, L., Köhler, T., Irnleitner, S., & Divitini, M. (2022). Designing a Curriculum for Digital Competencies Towards Teaching and Learning. In F. P. & B. A. (Eds.), *Proceedings of the European Conference on e-Learning, ECEL* (Vols. 2022-Octob, pp. 469–471). Academic Conferences and Publishing International Limited. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85172297000&partnerID=40&md5=4dc9f713a6bed3169af1869e67de599b>
- Ihrig, J., Weinbach, G., & Wolla, S. (2023). How are Banks and the Fed Linked? Teaching Key Concepts Today. *Review of Political Economy*, 35(2), 555–571. <https://doi.org/10.1080/09538259.2022.2040906>

- Instefjord, E. J., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education*, 67, 37–45. <https://doi.org/10.1016/j.tate.2017.05.016>
- Kafyulilo, A., Fisser, P., Pieters, J., & Voogt, J. (2015). ICT use in science and mathematics teacher education in Tanzania: Developing technological pedagogical content knowledge. *Australasian Journal of Educational Technology*, 31(4), 381–399. <https://doi.org/10.14742/ajet.1240>
- Luís, A. R., & Rodrigues, C. (2025). Toward the Effective Integration of DigCompEdu: A Pilot Study in ELT Teacher Education. *Ubiquitous Learning*, 18(1), 49–66. <https://doi.org/10.18848/1835-9795/CGP/v18i01/49-66>
- Martinussen, R., Ferrari, J., Aitken, M., & Willows, D. (2015). Pre-service teachers' knowledge of phonemic awareness: relationship to perceived knowledge, self-efficacy beliefs, and exposure to a multimedia-enhanced lecture. *Annals of Dyslexia*, 65(3), 142–158. <https://doi.org/10.1007/s11881-015-0104-0>
- Mena, J., & Flores, M. A. (2016). Teacher education research and the use of information and communication technologies. In G.-P. F.J. & R. I. for E. S. (IUCE) University of Salamanca Department of Computer Science and Automatics, Plaza de los Caidos s/n, Salamanca (Eds.), *ACM International Conference Proceeding Series* (Vols. 02-04-Nove, pp. 653–656). Association for Computing Machinery. <https://doi.org/10.1145/3012430.3012588>
- Miguel-Revilla, D., Martínez-Ferreira, J. M., & Sánchez-Agustí, M. (2020). Assessing the digital competence of educators in social studies: An analysis in initial teacher training using the TPACK-21 model. *Australasian Journal of Educational Technology*, 36(2), 1–12. <https://doi.org/10.14742/ajet.5281>
- Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Naufalin, L. R., Indrawati, C. D. S., Indriayu, M., & Noviani, L. (2024). The Ethical Side of Economic Learning Integration: Empirical Study of Prospective Economic Teacher. *Jurnal Pendidikan Progresif*, 14(2), 1234–1244.
- Núñez-Román, F., Gómez-Camacho, A., Errázuriz-Cruz, M. C., & Núñez-Cortés, J. A. (2021). Pre-service Teachers' perceptions on instant messaging and orthographic competence. *Texto Livre*, 14(3). <https://doi.org/10.35699/1983-3652.2021.34141>
- Reisoğlu, İ., & Çebi, A. (2020). How can the digital competences of pre-service teachers be developed? Examining a case study through the lens of DigComp and DigCompEdu. *Computers and Education*, 156(May). <https://doi.org/10.1016/j.compedu.2020.103940>
- Sudrajat, A. K., Ibrohim, I., & Susilo, H. (2024). Preservice teachers' reflections on lesson study integration into a microteaching course. *Social Sciences & Humanities Open*, 10, 101140. <https://doi.org/https://doi.org/10.1016/j.ssaho.2024.101140>
- Takhassuna, M. (2023). *UPAYA PENINGKATAN KEMAMPUAN MENYUSUN PERANGKAT PEMBELAJARAN MAHASISWA PAI MELALUI KEGIATAN MAGANG II (Studi Kasus Mahasiswa ...* etheses.iainponorogo.ac.id. <http://etheses.iainponorogo.ac.id/id/eprint/27191>
- Tomczyk, Ł., Fedeli, L., Włoch, A., Limone, P., Frania, M., Guarini, P., Szyszka, M., Mascia, M. L., & Falkowska, J. (2023). Digital Competences of Pre-service Teachers in Italy and Poland. *Technology, Knowledge and Learning*, 28(2), 651–681. <https://doi.org/10.1007/s10758-022-09626-6>
- Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. *Educational Technology Research and Development*, 65(3), 555–575. <https://doi.org/10.1007/s11423-016-9481-2>
- Voogt, J., & McKenney, S. (2017). TPACK in teacher education: are we preparing teachers to use technology for early literacy? *Technology, Pedagogy and Education*, 26(1), 69–83. <https://doi.org/10.1080/1475939X.2016.1174730>