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# Enhancing Archival Competence of Vocational Teachers through Structured Training within the Merdeka Curriculum Framework

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## ABSTRACT

This study examines the effectiveness of structured archival training for vocational high school (SMK) teachers in the Office Management and Business Services (MPLB) program under Indonesia's Merdeka Curriculum framework. The urgency of digital archival literacy is increasingly evident as industries demand future-ready graduates with strong data management and technological competencies. Employing a pre-experimental one-group pretest-posttest design, this study involved 101 teachers participating in a 24-hour training program that covered technical, procedural, and digital archiving components. The collected data were examined through paired sample t-tests, Wilcoxon signed-rank tests, N-Gain analysis, and effect size computation. Findings reveal a significant improvement in archival competence, with an average gain score of 0.37 (moderate category) and a large effect size (Cohen's  $d = 0.95$ ). Despite overall effectiveness, variations in individual outcomes highlight the need for differentiated follow-up support. The study underscores that archival training not only enhances teachers' pedagogical capacity but also aligns with UNESCO-UNEVOC's global agenda on digital transformation in TVET. By strengthening teachers' digital archival competence, vocational education can better prepare graduates to meet the demands of a data-driven and technology-oriented workforce.

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## 1. INTRODUCTION

The ongoing transformation of vocational education in Indonesia through the *Kurikulum Merdeka* (Independent Curriculum) requires the strengthening of teachers' competencies in their respective fields, including the Office Management and Business Services Program (*Manajemen Perkantoran dan Layanan Bisnis – MPLB*). The *Kurikulum Merdeka* emphasizes institutional autonomy, differentiated instruction, and student-centered assessment, thereby requiring teachers' instructional practices to be oriented toward achieving learning outcomes (*Capaian Pembelajaran – CP*) while strengthening workplace relevance (Mulyasa, 2023; Lestari et al., 2023; Nasution et al., 2023). Furthermore, curriculum and assessment policy documents highlight the importance of teachers' preparedness to design, implement, and evaluate authentic, performance-based assessments (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2023). Within the MPLB program, one of the key competencies that underpins the achievement of learning outcomes is digital records and document management as a representation of modern office business processes. Without adequate archival competence, the development of contextual learning experiences for students becomes suboptimal.

At the global level, educational transformation has also accelerated through the adoption of digital technology. Huang et al. (2024) proposed the *Digital Pedagogy for Sustainable Educational Transformation (DP4SET)* framework, which emphasizes the importance of digital competence, evidence-based practice, and synergy between teachers and artificial intelligence. This framework demonstrates that mastery of digital pedagogy extends beyond technical skills, encompassing the ability of teachers to design student-centered learning experiences through the use of advanced technologies. Similarly, McCarthy et al. (2023) argue that the success of digital transformation in education is determined by leadership, integrated digital strategies, and teachers' readiness to adapt, ensuring that innovation is not limited to fragmented initiatives.

The increasingly digitalized labor market requires graduates of Vocational High Schools (*Sekolah Menengah Kejuruan – SMK*), particularly those enrolled in the MPLB program, to acquire skills in digital records management. Archival digitalization not only enhances the efficiency of administrative services but also serves as an indicator of preparedness to engage with modern work ecosystems driven by data and information technology. By mastering these competencies, students are expected to perform administrative functions with greater accuracy, speed, and accountability while simultaneously strengthening their competitiveness in the labor market. The integration of digital archival literacy into vocational learning thus represents a strategic step in preparing a generation that is adaptive to technological change and organizational needs (Suryadhingrat et al., 2023; Lestari et al., 2022; Jannah et al., 2024). Supporting this argument, Kayanja et al. (2025) demonstrated how universities in Uganda transitioned toward paperless systems and full automation to enhance efficiency, accessibility, and transparency—an approach that simultaneously requires educators and administrative staff to strengthen their digital literacy.

In alignment with these findings, UNESCO-UNEVOC emphasizes that digital transformation in Technical and Vocational Education and Training (TVET) is not merely about the adoption of technology, but part of broader processes of *digital innovation, adaptation, and acceleration* that shape how teachers, students, and institutions respond to the demands of the global labor market (Nozawa, 2020). A recent UNEVOC report also underscores the need to strengthen teachers' digital competencies through a systemic, whole-institution approach that involves leadership, educators, and students within a comprehensive competence framework (Zhong & Juwaheer, 2024). Accordingly, the effort to strengthen digital archival literacy in Indonesia is aligned with UNESCO's 2022–2029 strategy, which positions TVET as a key actor in the transition toward an inclusive digital economy.

Recent studies highlight that the implementation of the *Kurikulum Merdeka* in practice continues to face various challenges, ranging from instructional planning to evaluation, which are directly linked to teacher readiness and capacity (Aulia et al., 2023; Jannah et al., 2024; Khoirurrijal et al., 2022). Within the MPLB program, these challenges are particularly evident in the need to integrate digital archival literacy, document management, and the application of information and communication technology (ICT) into vocational learning (Suryadhiningrat et al., 2023). Research and best practices across institutions reveal multiple initiatives to develop digital archival media, tools, and systems—such as Microsoft Access-based e-archives, archival learning applications, and electronic record systems—that have enhanced students' learning outcomes and improved document management efficiency (Lestari et al., 2023; Jannah et al., 2024; Mufarridah & Susantiningrum, 2024; Wadana et al., 2023). However, most research has focused more heavily on technological innovations and their impacts on students, while studies specifically examining the effectiveness of archival training for teachers—particularly SMK teachers in the MPLB program—remain limited.

This gap is crucial to address. Within the *Kurikulum Merdeka* framework, teaching competence entails not only mastery of subject matter but also the ability to design contextual learning experiences, facilitate project-based learning, utilize performance-based portfolios, and conduct valid and reliable formative and summative assessments (Ardiansyah et al., 2023). In the MPLB program, teachers need to integrate archival practices—including classification, organization, preservation, and information retrieval—into classroom activities, projects, and authentic assessments. In this regard, archival training interventions are essential: they do not merely enrich teachers' procedural knowledge but also enhance pedagogical confidence in designing learning scenarios that replicate office work processes, thereby directly supporting the MPLB learning outcomes.

National policy also provides substantive references on archival training standards. The Decree of the Head of the National Archives of the Republic of Indonesia (*Arsip Nasional Republik Indonesia – ANRI*) on the technical training curriculum outlines the competency structure, core content, and training outcomes relevant for society, including the education ecosystem (Arsip Nasional Republik Indonesia, 2024). Similarly, various school-based mentoring and archival training initiatives have shown positive impacts on archival practices, administrative efficiency, and school readiness for digital

transformation (Citraningsih & Fauzi, 2023; Kristiningsih et al., 2022; Mutmainnah et al., 2024; Sutisna et al., 2020; Pramana et al., 2024). Within the MPLB ecosystem, such efforts align with the requirements of CP and *Alur Tujuan Pembelajaran* (Learning Trajectories – ATP), which emphasize managerial-administrative competencies grounded in technology and documentation (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2023; Nurohmah, 2024).

Considering this context, a systematic review conducted by Azman et al. (2024) shows that strengthening digital pedagogical skills has become a fundamental need, even at the primary school level. Teachers are increasingly required to master digital-based teaching approaches, methods, and techniques in order to optimize students' learning experiences. Similarly, a literature review by Bui and Nguyen (2023) underscores that digital transformation within the educational sector involves three principal dimensions: the campus setting, pedagogical strategies, and learner experiences, each exerting a direct impact on learning outcomes. The integration of these global perspectives reinforces the argument that enhancing archival literacy among MPLB teachers in Indonesian SMKs is an integral part of international trends in strengthening teacher readiness to meet the demands of digital learning ecosystems.

Strengthening teachers' competencies in digital archival management ultimately has direct implications for the preparedness of SMK graduates in facing global labor market challenges. Teachers' mastery of digital archival literacy facilitates the development of higher-quality vocational learning, as instructional materials extend beyond theoretical orientation to reflect modern, data-driven administrative practices. Embedding these competencies into learning ensures that students are accustomed to digital work standards applied in industry, particularly in data and document management, which constitute the foundation of contemporary organizational governance. Thus, enhancing teachers' competencies not only improves the quality of instructional processes but also contributes to the formation of graduates who are adaptive, competitive, and ready to enter international labor markets that demand efficiency, accuracy, and mastery of information technology across all aspects of administrative work.

Despite the growing attention to digital transformation in vocational education, limited empirical studies have specifically examined how structured archival training enhances teachers' digital archival competence within the Merdeka Curriculum framework—thereby positioning this study to fill a critical gap in linking professional training with pedagogical readiness for digital-era TVET.

In line with this, the study was conducted to examine how effective archival training is in improving the archival skills of 101 MPLB teachers in West Java Province, particularly in relation to achieving the learning outcomes outlined in the *Kurikulum Merdeka*. More specifically, this study seeks to: (1) measure differences in archival competence scores before and after the training; (2) identify the extent of overall improvement; and (3) provide practical implications for refining the design of training and post-training mentoring. The findings are expected to strengthen the argument that improving teachers' archival literacy is both a prerequisite and a key driver for authentic,

outcome-oriented vocational learning in the MPLB program (Mulyasa, 2023; Lestari et al., 2023).

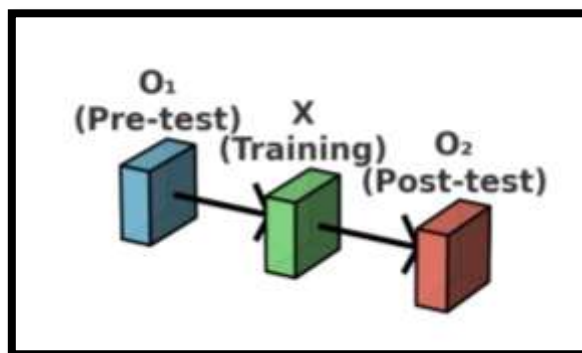
## 2. METHODS

### 2.1. Research Design

This study adopted a quantitative method through a pre-experimental design that included a single group subjected to both pretest and posttest assessments. This approach was deemed suitable for assessing the impact of the archival training by analyzing changes occurring before and after the program in the same participants. According to Arikunto (2019), this design enables researchers to detect changes in behavior or competence following the intervention, even without the presence of a control group. Its strength lies in its simplicity and its ability to provide an initial overview of program effectiveness, although it is limited by potential threats to internal validity such as maturation effects or external influences.

Conceptually, this design consists of three main stages: initial measurement ( $O_1$ ), implementation of the intervention ( $X$ ), and final measurement ( $O_2$ ). The effectiveness of the training is determined by comparing the results of  $O_1$  and  $O_2$ .

Figure 1 : Research Design Scheme



### 2.2. Population and Sample

This study's population encompassed all educators belonging to the Office Management and Business Services Program (*Manajemen Perkantoran dan Layanan Bisnis* – MPLB) at public SMK in West Java Province. The research sample consisted of 101 teachers, all of whom were official participants in the third and fourth cohorts of archival training conducted in 2025. The sampling technique applied was total sampling (census sampling), as all members of the population were considered relevant to serve as respondents. However, only 91 responses were eligible for analysis because 10 participants did not complete the pre-test. The rationale for using a saturated sample was to obtain a comprehensive overview of the training's impact without introducing selection bias. By including all participants, this study aims to produce findings that more accurately reflect the real conditions of MPLB teachers across the province.

### 2.3. Research Instruments and Measure

The instrument utilized in this research comprised objective assessments, specifically pre-test and post-test items. The development of the test items was based on an exploration of the *Capaian Pembelajaran* (Learning Outcomes – CP) of the *Kurikulum Merdeka* (Independent Curriculum) for SMK and Islamic Vocational Madrasahs (*Madrasah Aliyah Kejuruan – MAK*), particularly within the Office Management and Business Services Program (*Manajemen Perkantoran dan Layanan Bisnis – MPLB*). These learning outcomes emphasize the importance of digital archival literacy, document management, and administrative skills as core competencies that support authentic vocational learning (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2023). Accordingly, the research instrument was designed not only to measure cognitive aspects but also to accommodate practical skills relevant to labor market demands.

The exploration of CP was then translated into the Technical Archival Training Curriculum for the Community established by ANRI. This curriculum, specifically intended for MPLB teachers, outlines six core learning materials in accordance with ANRI Head Decree No. 444 of 2025 concerning the Technical Training Curriculum for the Community.

These materials formed the basis for constructing the pre-test and post-test items in this study's research instrument. The instrument was developed and validated by an expert team—*Tim Perumus Soal Pre-Test dan Post-Test*—comprising functional officials such as trainers (*widyaiswara*), archivists, learning technology developers, and computer specialists at the Human Resources Development Center (*Pusat Pelatihan Sumber Daya Manusia – PPSDM*) of ANRI. In addition, the instrument was tested for reliability using Cronbach's Alpha. The calculation yielded a Cronbach's Alpha value of 0.698, indicating that the test instrument had acceptable reliability. A value of 0.698 is above the commonly accepted minimum threshold ( $\geq 0.60$ ), thereby confirming that the instrument is reliable and appropriate for measuring the consistency of test results among participants.

#### **2.4. Research Procedure**

The research process was implemented through four main phases, described as follows:

a. Preparation Stage

Coordination and communication were conducted with the Provincial Office of Education in Central Java regarding the request for training participants.

- The training schedule was prepared, and technical coordination was established with the training implementation team.
- The test items used in the pre-test and post-test were constructed by the Training Planning and Evaluation Team based on the Decree of the Head of ANRI No. 444 of 2025 on the Technical Training Curriculum for the Community, specifically designed for SMK teachers majoring in MPLB.

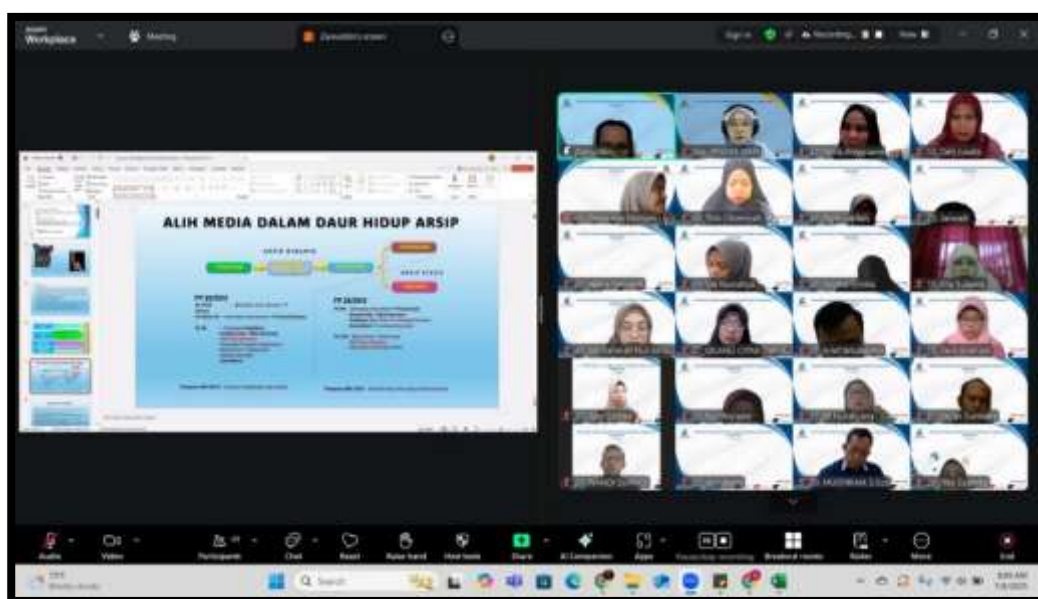
b. Pre-Test Stage

- All training participants completed an archival knowledge test before the intervention.
- The pre-test data served as a baseline to measure teachers' initial competence.

### c. Archival Training Stage

- The training was conducted over 24 Learning Hours (*Jam Pembelajaran – JP*), each consisting of 45 minutes, covering the following modules:
  1. Introduction to Records and Archives (3 JP)
  2. Records Creation (3 JP)
  3. Records Use and Maintenance (6 JP)
  4. Records Conversion and Migration (4 JP)
  5. Records Disposal (5 JP)
  6. Digital Transformation on Archives (3 JP)
- The training methods included interactive lectures, demonstrations, hands-on practice, group discussions, and case studies based on real school-related problems.
- The training facilitators consisted of trainers (*widyaiswara*), archivists, and computer specialists from ANRI.

Figure 2. Implementation of Community-Based Archival Training for MPLB Teachers, West Java Provincial Government



### d. Post-Test Stage

- Upon completion of all training modules, participants were administered a post-test with items equivalent to the pre-test.
- Results from the post-test were analyzed to assess how much participants' competencies had improved after completing the training.

## 2.5. Data Analysis

This study employed two principal analytical approaches. The first involved applying a paired sample *t*-test to assess whether the mean scores of the pre- and post-tests differed significantly at  $\alpha = 0.05$ . If the significance value (p-value) was less than 0.05, the alternative hypothesis ( $H_a$ ) was accepted, indicating an improvement in archival knowledge and skills after the training. In addition, the effect size was calculated using Cohen's *d* to determine the magnitude of the training's practical impact. Second, the N-Gain score was computed to assess the effectiveness of the training based on the extent

of score improvement. The effectiveness categories referred to Hake (1999), namely high ( $\geq 0.70$ ), moderate ( $0.30 \leq g < 0.70$ ), and low ( $g < 0.30$ ). This N-Gain analysis provided a more detailed picture of the degree of improvement in teachers' competencies, beyond merely identifying statistically significant differences.

To strengthen the reliability of the analysis, data normality was first examined using the Kolmogorov–Smirnov or Shapiro–Wilk tests before performing the t-test. If normality assumptions were violated, the Wilcoxon Signed Rank Test served as a substitute. This study did not apply content validity testing using the Content Validity Index (CVI) due to time and resource constraints. Nevertheless, the instrument had undergone expert validation and internal reliability testing, thereby remaining appropriate for measuring the archival competence of training participants.

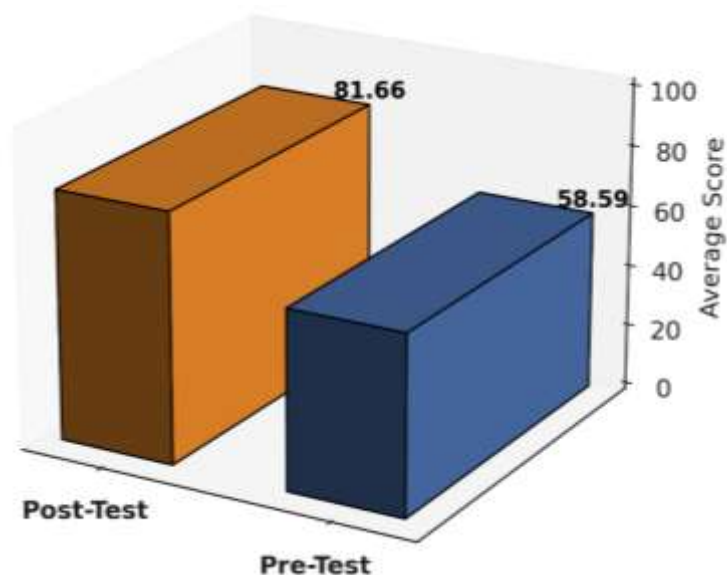
### 3. RESULTS AND DISCUSSION

The analysis of training participants' learning improvement began with a normality assumption test to determine whether the data distribution met the prerequisites for parametric testing. The Shapiro–Wilk test yielded a statistic of 0.812 with a  $p$ -value of 0.000000021, while the Kolmogorov–Smirnov test produced a statistic of 0.151 with a  $p$ -value of 0.028. Both results indicated  $p$ -values lower than the significance level of 0.05, suggesting that the distribution of N-Gain scores was not normal. This finding justified the use of non-parametric statistical analysis for subsequent tests.

The non-normal distribution strengthened the decision to apply the Wilcoxon Signed Rank Test as a non-parametric alternative to examine differences between pre-test and post-test scores. The Wilcoxon test produced a statistic of 88.0 with a  $p$ -value of  $3.25 \times 10^{-11}$ , well below the 0.05 threshold. This result provides robust evidence of a significant difference between pre-test and post-test scores, thereby demonstrating that the training program significantly improved participants' competencies even when normality assumptions were not met.

For comparison, a paired sample t-test was also conducted to provide a parametric perspective. The results showed a  $t$ -value of  $-9.10$  with a  $p$ -value of  $2.14 \times 10^{-14}$ , again far below the 0.05 threshold. From a statistical perspective, this indicates a meaningful difference between the pre-test and post-test results. The consistency of conclusions across both non-parametric and parametric tests strengthens the confidence that the improvement in participants' learning outcomes was not coincidental, but rather a genuine effect of the training intervention.

Figure 3: Comparison of Pre-Test and Post Test Score



Along with analyzing the statistical difference between pre-test and post-test results, the study employed Cohen's  $d$  to measure how substantial the training effect was. The results showed a mean difference of 16.13 with a standard deviation of 16.91, yielding a Cohen's  $d$  of 0.95. According to Cohen (1988), this value falls within the large effect category, indicating that the archival training exerted a strong impact on improving teachers' archival competence. Thus, beyond statistically significant differences, the magnitude of the effect was also substantial, reinforcing the argument that the training intervention was genuinely effective in enhancing the competencies of teachers in the MPLB at SMK.

Table 1. Results of the Paired Sample t-Test

Mean Pre-test	Mean Post-test	Mean Difference	t-value	p-value
65.03	81.16	16.13	9.099	2.14E-14

The interrelation of the three tests provides a consistent and mutually reinforcing picture. The normality test confirmed that the N-Gain data did not follow a normal distribution, thereby validating the Wilcoxon Signed Rank Test as the primary non-parametric analysis. However, the results of the paired sample t-test, consistent with the Wilcoxon analysis, revealed that the significant differences between pre-test and post-test scores remained regardless of the statistical method used. In other words, both parametric and non-parametric approaches yielded convergent results.

The calculation of N-Gain added a further layer of in-depth analysis. The overall mean N-Gain of 0.37 placed the training program in the moderate effectiveness category. Participants in the high category achieved a mean score of 0.84, reflecting optimal improvement, while those in the moderate category recorded a mean of 0.52, indicating adequate progress. Interestingly, participants in the low category registered a negative mean score of  $-0.12$ , suggesting that a portion of the participants experienced stagnation or even a decline in performance. These findings are consistent with the Wilcoxon and

paired t-test results, which indicated a significant overall improvement, although individual variations warrant further attention.

Table 2. Calculation of N-Gain Score

Category	Mean N-Gain
Overall	0.37
Low	-0.12
Moderate	0.52
High	0.84

Overall, the combination of the normality test, Wilcoxon Signed Rank Test, paired sample t-test, and N-Gain calculation provided a comprehensive understanding of the training's effectiveness. The non-normal distribution of data highlighted the importance of selecting appropriate analytical methods, while the consistency of findings between non-parametric and parametric tests reinforced the evidence that the training had a significant impact. The N-Gain calculation further confirmed the magnitude of improvement while also revealing variations among participants, which serve as a basis for program refinement to ensure more equitable learning outcomes. Taken together, these analyses demonstrate that the training was not only statistically effective but also offered practical insights for the development of future instructional strategies.

#### 4. CONCLUSION

This study demonstrates that structured archival training significantly enhanced the archival competence of teachers in the MPLB at SMK within the framework of the *Kurikulum Merdeka* (Independent Curriculum). The substantial post-training score improvements, reinforced by both parametric and non-parametric analyses as well as the large effect size, confirmed the effectiveness of the program. Although the mean N-Gain score indicated moderate effectiveness, the variations in individual achievements suggest the need for continuous support and program differentiation to ensure equitable benefits for all participants.

Apart from the statistical gains, the results highlight how digital archival literacy plays a vital role in enhancing vocational teachers' pedagogical competence. By integrating archival competence into instructional practice, teachers are able to design authentic learning experiences that align with industry needs, thereby preparing students for participation in increasingly digitalized work ecosystems. This effort not only reinforces the implementation of the *Kurikulum Merdeka* but also aligns with international TVET agendas that emphasize digital innovation, adaptability, and global workforce readiness.

From a practical perspective, this study recommends that archival training programs be further developed as part of continuous professional development, grounded in real-world practice, integrated with institutional strategies, and complemented by personalized mentoring and the use of digital technologies. Such measures would enable

vocational education in Indonesia to contribute more effectively to the preparation of graduates who are adaptive, competitive, and globally competent in the digital era.

Furthermore, this research contributes meaningfully to the expanding conversation about the reform of TVET systems at regional and international scales. By demonstrating the effectiveness of structured archival training in enhancing teachers' digital and pedagogical competencies, this research provides empirical evidence that supports ASEAN member states' shared agenda of advancing digital readiness and professional development among TVET educators. The model of competence-based archival training implemented in Indonesia can serve as a transferable framework for other countries seeking to strengthen teacher capacity in managing digital records and integrating technology into vocational learning. In this regard, the study aligns with regional efforts under the UNESCO–UNEVOC and SEAMEO–VOCTECH initiatives to promote innovation, collaboration, and sustainability in preparing a future-ready workforce across Southeast Asia.

## 5. AUTHORS' NOTE

The authors report no conflicts of interest in connection with this manuscript and confirm that the work is original.

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