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Enhancing Teacher Competence through Effective Training: A Case Study of Vocational Education Transformation in Majalengka Regency

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ABSTRACT

This study investigates the effectiveness of training programs to improve teachers' competencies in Majalengka Regency, where vocational education has been transformed. A quantitative approach was employed, utilizing Partial Least Square Structural Equation Modeling (PLS-SEM) to analyze data collected from the entire population of public vocational secondary school (SMK Negeri) teachers in Majalengka Regency. The results prove that all indicators for training effectiveness and teacher competence are valid. The data processing reveals that the effectiveness of training contributes to 43.9% of total variance in teacher competence indicator and possesses a relatively high influence. As far as results from hypothesis testing, it can be concluded that the training effectiveness contributes significantly to the improvement of teacher competence. These findings highlight the need for proper and continuous training to fortify vocational teachers' capacity to cope with changes in educational reform. These study implications offer a strategic recommendation for the relevant of education policy makers to improve the quality of human resources to build vocational education as a leading sector.

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1. INTRODUCTION

A demographic dividend is projected to benefit Indonesia, positioning it as one of the developed nations (Puspa et al., 2023). The potential offers a crucial opportunity to enhance human resource development, as a quality workforce is widely acknowledged as a key element for success in national development. According to the 2023 IMD World Talent Ranking, Indonesia's labour competitiveness improved from 51st to 47th among 64 countries, showing steady improvement in the quality of its human capital (Institute for Management Development, 2023). Schools are the key factor in this process of human resource development, while teachers are the main factor for student achievement (Turetsky et al., 2021; Goddard et al., 2021). It is the duty of the teacher not only to impart knowledge but also to mould the character of the students according to the general aims of education.

Regardless matter how well the curriculum is created and how suitable the learning facilities are, educational goals are barely achievable in the absence of high-quality teachers (Angin & Edwina, 2022). Based on official data from the Indonesian Ministry of Education and Culture, as shown in Figure 1, the total number of teachers in Indonesia was 3,432,460 in the odd semester of the 2024/2025 academic year. With 482,301 teachers, West Java had the most instructors of any province (Muhamad, 2024).

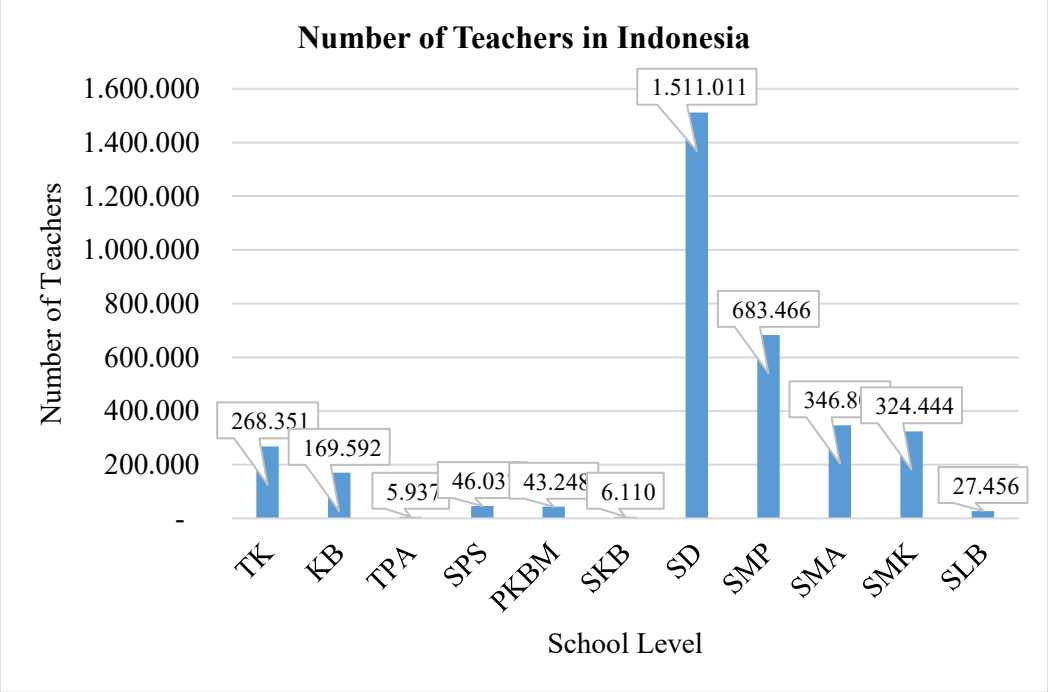


Figure 1. Number of Teachers in Indonesia
Source: Muhamad (2024)

However, the competency of instructors in Indonesia is still very poor despite this big workforce. This is demonstrated by the UNESCO Global Education Monitoring (GEM) report (Edwards et al., 2018), which placed Indonesia's educational system 10th out of 14 developing nations, while the country's teacher quality came in last, at 14th.

The quality of teachers in Indonesia is not good enough to support even basic educational transformations such as the introduction of competency-based curricula, according to the Human Development Index (as cited in Said, 2020). This stagnation is also reflected in the 2022 Regional Education Balance Sheet (Neraca Pendidikan Daerah) officially released by the Ministry of Education and Culture, which reports an average score of 54.05 on the Teacher

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Competency Test (UKG), below the minimum standard set at 55 (Hilmiatussadiah et al., 2024). To make things worse, Databoks (2019) revealed that less than half of Indonesian teachers have professional certification, with the percentage of teachers' certification by education level of 45.77% for elementary school (SD), 48.44% for junior secondary school (SMP), 45.07% for special-needs education (PLB), 41.09% for senior secondary school (SMA), and even only 28.49% for vocational secondary school (SMK) (Jayani, 2019).

Law No. 14 of 2005 regulating Teachers and Lecturers (as mentioned in Ifriani et al., 2024) clearly defines teacher competence in Indonesia in four dimensions: educational competence, professional competence, personal competence, and social competence. Pedagogical competence comprises the capacity to comprehend the characteristics of students, craft engaging teaching, and seamlessly incorporate technology into teaching. Professional competence is a reflection of the sense of responsibility and professionalism of the teacher in the achievement of education goals. Teachers must exhibit personal competency by setting a good example. The capacity of a teacher to engage constructively with students, coworkers, and the larger community is known as social competency (Veirissa, 2021). These four dimensions are critical precondition for vocational school (SMK) teachers who are training pupils to satisfy workforce criteria following graduation.

Scholars must pay attention to this condition because teacher competency has a big impact on the teaching-learning process, which in turn affects students' motivation and learning results (Suwandi, 2020; Titu et al., 2023). The decline in student proficiency will worsen the general standard of education in the country if it is not stopped. Individual competency is the consequence of a mix of knowledge, skills, experience, training and personal interest (Sutermeister, 1976). Based on this assumption, the present study evaluates the contribution of training effectiveness to the improvement of teacher competence using a quantitative research approach.

The present study is limited to the scope of studying the contribution of the effectiveness of education and training on the improvement of teachers' occupational competence at the level of vocational schools. It consists of evaluation of the effectiveness of training from the point of view of teachers and the development of competencies in the pedagogical, professional, personal and social dimensions, in compliance with Law No. 14 of 2005 (Ifriani et al., 2024). Data collection is restricted to Majalengka Regency, West Java. The study does not take into account other factors that may affect teachers' occupational competence apart from the effectiveness of training, such as educational background, school conditions, or education policy at the national level.

2. LITERATURE REVIEW

2.1 Training Effectiveness

Effectiveness of education and training programs The extent to which a training program meets stated goals, in terms of the acquisition of knowledge, skills or work-related attitudes by trainees. In a synthesis of 27 reviews spanning three decades of research (1993–2023), König et al. (2023) argue that teacher education effectiveness research (TEER) has matured into a distinct research paradigm covering the entire span of teacher professionalization, from initial preparation and induction through to continuous professional development. Their synthesis emphasizes that the success of a training program cannot be assessed only through implementation but must be assessed by measurable results that are reflected in teacher competence.

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This view is supported by the meta-analytic findings of Zhang et al. (2024) who synthesized 37 independent studies and reported that teacher training programs generally produce moderate-to-large effects on competence development. Specifically, program characteristics including institutional support, experienced facilitators, and integration of technology were found to moderate the magnitude of these effects. This observation lends empirical support to the argument that training outcome is a function of the quality of training delivery, rather than a function of the number of times a person participates in a training event.

With regard to professional development in developing countries, Nkundabakura et al. (2023) investigated the contribution of a continuous professional development program to the pedagogical, technological and content knowledge of secondary school mathematics and science teachers in Rwanda, reporting that structured and sustained programs contributed significantly to all three competence domains. Similarly, Qaisar and Haider (2023) observed that in-service training programs positively influenced the professional development of school teachers of Pakistan in terms of instructional methods and use of teaching resources.

2.2 Teacher Competence

Conceptually, teacher competence is understood as a complex set of knowledge, skills and attitudes necessary for the professional performance of teaching duties. In their study of productive teachers in vocational high schools, Susatya et al. (2022) confirms that the competence of teachers in vocational education has four interrelated dimensions (professional, pedagogical, social, and personal) and says that the competence of vocational school teachers in Indonesia still needs to be strengthened, especially in terms of the alignment between the expertise of teachers and their subject areas. This observation bears direct relevance to the present study's focus on SMK teachers in Majalengka Regency.

The professional competence dimension has likewise received considerable scholarly attention. Mutohhari et al. (2021) investigated the technological competence of vocational teachers in Indonesia and found that the mastery and acceptance of digital technology is an integral component of professional competence in the context of educational transformation. Further supporting this is a systematic literature review by Zhang et al. (2026) that synthesized research on digital competence of pre-service teachers from 2014-2024 and concluded that purposeful strengthening of digital competence through targeted training is a prerequisite for teaching readiness in an increasingly digitalized educational landscape.

2.3 The Relationship between Training Effectiveness and Teacher Competence

There are many empirical studies that give the direct evidence of a causal relationship between training effectiveness and teacher competence enhancement. Muzakky et al. (2026) studied the management of teacher training programs in Indonesia and concluded that good program management, including planning, implementation, and follow-up after training, had a real contribution to improving the professional competence of teachers. This result supports the argument that the effectiveness of training is not simply a matter of participation but is fundamentally shaped by the quality of program governance itself.

Fernández-García et al. (2019) examined instructional outcomes, concluding that the perceptions of students regarding the effectiveness of teaching were closely linked to the particular traits and competences of the teachers, which are influenced by their experience and training. The above results taken together suggest that training effectiveness is an important mechanism in which the four dimensions of teacher competence, namely

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pedagogical, professional, personal, and social, are shaped and enhanced, which is consistent with the main focus of this study.

2.4 Conceptual Framework

Drawing on the literature reviewed above, a conceptual framework is proposed where training effectiveness, evidenced through the appropriateness of training content, quality of facilitator, instructional methods and follow-up of training activities, is hypothesized to make a substantial contribution to the development of teacher competence encompassing the pedagogical, professional, personal and social dimensions. This framework serves as the foundation of the research hypothesis tested by the PLS-SEM approach, which is elaborated in the following methodology section.

H1: The contribution of training effectiveness is very large to improve the competence of teachers in public vocational high schools.

3. METHODOLOGY

The study employs an explanatory survey method and is quantitative in nature. This is why this method was used to investigate the causal association between training efficacy and increased teacher competency. By using formal statistical hypothesis testing, explanatory design aids the researcher in explaining how an independent variable affects a dependent variable (Creswell & Creswell, 2017).

The population in this study are all teachers of public vocational secondary school (SMK Negeri) in Majalengka Regency, West Java. Based on statistical estimates, a total of 225 respondents were collected by random sampling. According to Hair et al. (2020), the sample size satisfies the minimal requirements for multiple regression analysis, which call for a ratio of at least 5–10 responders for each indicator variable under study. Software called Partial Least Square Structural Equation Modeling (PLS-SEM) was used to evaluate the gathered data. The conceptual framework for the study is presented in Figure 2.

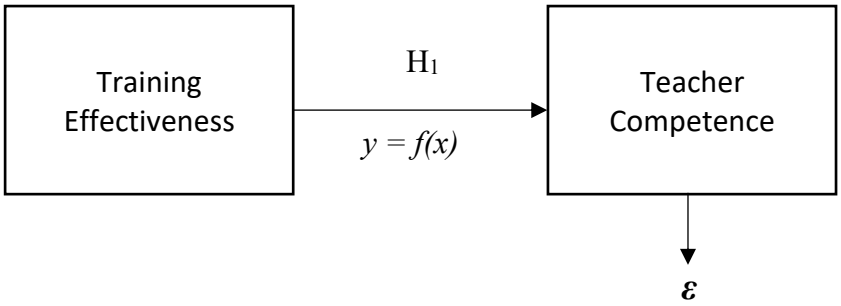


Figure 2. Conceptual Framework of the Study

4. RESULTS AND DISCUSSION

4.1. Research Findings

This study intends to assess the contribution of training effectiveness to the enhancement of teacher competency. PLS-SEM was used to process the data. PLS-SEM provides for the concurrent assessment of causal links between latent constructs, spanning both the measurement model (outer model) and the structural model (inner model).

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Measurement Model (Outer Model) Evaluation

The outer model evaluation was targeted at analyzing the validity and reliability of the constructs employed in this study. The results of convergent validity show that the outer loading of all indicators of the Training variable is between 0.573 and 0.833 and the outer loading of all indicators of Teacher Competence (Y) variables are between 0.586 and 0.838. According to Ghazali's (2014) definition, an indicator is considered legitimate when its outer loading value is at least 0.5. This indicates that every indicator for both variables satisfies the convergent validity requirements.

The discriminant validity was evaluated using the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT). The Training construct's square root of the AVE was 0.760, and the Teacher Competence construct's was 0.743, both of which were more than the inter-construct correlation of 0.663, as Table 1 illustrates. This outcome satisfies Fornell and Larcker's (1981) criterion that discriminant validity is demonstrated when a construct's square root of its AVE is greater than its correlation with other constructs.

In contrast, Table 2's HTMT test yielded a ratio of 0.683, which was still below Gold et al. (2001)'s recommended cutoff of 0.90. Overall, the findings demonstrate that both categories have strong discriminant validity, indicating that Training and Teacher Competence are distinct ideas from an empirical and conceptual standpoint.

Tabel 1. Fornell-Larcker Criterion

	Training (X)	Teacher Competence (Y)
Training (X)	0.760	
Teacher Competence (Y)	0.663	0.743

Tabel 2. Heterotrait-Monotrait (HTMT)

	Training (X)	Teacher Competence (Y)
Training (X)		
Teacher Competence (Y)	0.683	

The construct reliability was tested using Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE). Table 3 displays the Training construct, which has a Composite Reliability of 0.960 and a Cronbach's Alpha score of 0.955. The Teacher Competence construct has a Cronbach's Alpha value of 0.951 and a Composite Reliability rating of 0.956. Excellent dependability is indicated by all values being considerably above the minimum threshold of 0.7 (Hair et al., 2021). Similarly, the AVE values of both constructs were over 0.5 (0.577 for Training and 0.551 for Teacher Competence), indicating that more than half of the variance of each set of indicators is explained by its underlying concept. Based on this, it was determined that both constructs were convergent valid and dependable.

Table 3. Construct Reliability Test

	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
Training (X)	0.955	0.962	0.960	0.577

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Teacher Competence (Y)	0.951	0.955	0.956	0.551

Structural Model (Inner Model) Evaluation

The model evaluation revealed a Standardized Root Mean Square Residual (SRMR) of 0.071, which is less than the optimal threshold of 0.10, as Table 4 illustrates. This implies that the theoretical model and the empirical data (Hair et al., 2021) fit each other well. Moreover, the Normed Fit Index (NFI) of 0.691 suggests that the model is fairly representative, although not to a perfect degree of fit. Thus the model can be considered as an acceptable model for further research.

Table 4. Model Fit

	Saturated model	**Estimated model**
SRMR	0.071	0.071
d_ULS	3.394	3.394
d_G	2.117	2.117
Chi-square	2.348,148	2.348,148
NFI	0.691	0.691

Training effectiveness accounts for 43.9% of the variance in teacher competence (Table 5), according to the endogenous variable Teacher Competence's R-square of 0.439. The remaining 56.1% is related to characteristics outside of the model such as teaching experience, work motivation, organizational support, and school climate. Additionally, an adjusted R-square value of 0.436 shows that the model is stable and not prone to overfitting.

Based on the interpretive criteria proposed by Hair et al. (2021), the value of R2 is 0.436 in the moderate category, meaning that the effectiveness of training has a fairly strong effect on improving teacher competence.

Table 6 shows the f-square value, 0.782, which is a large effect size, showing that the training effectiveness variable significantly affects the improvement of teacher competence. In other words, effective training contributes very significantly to the development of teachers' practical professional competence.

Tabel 5. R-Square

	R-square (R^2)	R-square adjusted
Teacher Competence (Y)	0.439	0.436

Tabel 6. F-Square

	Training (X)	Teacher Competence (Y)
Training (X)		0.782
Teacher Competence (Y)		

Table 7 shows the result of hypothesis testing. Training to Teacher Competence has a path coefficient of 0.663, a t-statistic of 15.173, and a p-value of 0.000, all of which are below the

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significance level of 0.05. The study hypothesis is accepted since the t-statistic is greater than 1.97 and the p-value is less than 0.05. The aforementioned rationale leads to the conclusion that training effectiveness is a key factor in raising teacher competency.

Table 7. Hypothesis Testing Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Training (X) -> Teacher Competence (Y)	0.663	0.668	0.044	15.173	0.000

4.2. Discussion

The study's conclusions support the significance of training's efficacy in raising teacher competency. This result is in line with previous research that has verified that training, designed in a systematic way to respond to the professional needs of teachers, can produce pedagogical improvements, technological, and social competence within the workplace (Zhao, 2024; Ramos et al., 2022).

The high level of effectiveness of the training is demonstrated by indicators such as the well-designed programme planning, the content being adapted to the needs of the participants, the quality of the facilitator, the follow-up after the training. In this sense, the relatively high values of outer loading (0.77–0.83) indicate that these indicators are faithful and appropriate reflections of the construct of training effectiveness.

Additionally, the R-square value of 0.439 shows that nearly half of the variance in teacher competency can be explained by the effective implementation of training. This suggests that training programs aim to develop teachers' perspectives, inventiveness, and ability to adjust to the demands of 21st-century education in addition to enhancing their technical proficiency. The f-square value of 0.782 supports the empirical data showing that effective training implementation is linked to increased teacher competence and that training plays a major role in teacher competence. This outcome is in line with the findings of Wood et al. (2017), who discovered that content understanding, teaching effectiveness, and student learning outcomes are all directly improved by good teacher training.

Each concept has a unique identity, as confirmed by the Fornell-Larcker and HTMT test results, which show the discriminant validity of the constructs. This implies that the efficacy of training as a form of professional learning serves as an external factor that enhances teacher competence rather than conceptually overlapping with it. Additionally, the model fit findings (SRMR = 0.071) demonstrate how well the model fits the empirical data. The model is nonetheless sufficient and robust for explaining the association between training efficacy and teacher competence in the field, even though the NFI value (0.691) does not represent a perfect degree of fit.

Practically speaking, the study's findings have significant ramifications for educational establishments and teacher training providers. However, it is not just the frequency of training that matters but more fundamentally the quality of training, for example, whether the content is relevant to teachers' needs, whether active learning methods are employed

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and whether it supports the use of training outcomes in the workplace. It has been demonstrated that training programs that include reflective and collaborative techniques are more successful in raising teachers' professional and pedagogical competency (Chung, 2023; Ramos et al., 2022).

This study provides theoretical support for the notion that formal education and ongoing professional development combine to produce teacher competence. A transformative process, effective training encourages teachers to adopt cutting-edge teaching tools, improve their critical thinking abilities, and update their knowledge.

The training had a great contribution to the teacher competence, however, 56.1% of the variance of the teacher competence is explained by factors other than training. These include instructional experience, managerial support, school organization culture and intrinsic drive. This asks for a more holistic vision of teachers' professional development, which transcends training alone, and takes into account the wider working context and the support structures in the school setting.

5. CONCLUSION

The results of the study concluded that the effectiveness of training has a significant contribution in improving teacher competence for public vocational secondary school (SMK Negeri) teachers in Majalengka Regency. The results of data analysis show the contribution of training effectiveness of 43.9% towards the variance of teacher competence. It shows that there is a strong relationship between the two variables. The results confirm the importance of well-planned, relevant and sustained training implementation to develop the professional and digital competence of vocational teachers. The study also has strategic implications for education policy makers, especially in the design of training programs that are responsive to the need for educational transformation to improve the quality of human resources in the vocational education sector.

6. AUTHORS' NOTE

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7. REFERENCES

Angin, L. M., & Edwina, Y. (2022, December 30). *Implementasi dan manajemen pengelolaan kelas dalam meningkatkan mutu pembelajaran di kelas*. Uwais Inspirasi Indonesia.

Chung, E. (2023). Eleven factors contributing to the effectiveness of dialogic reflection: Understanding professional development from the teacher's perspective. *Pedagogies: An International Journal*, *18*(2), 268-288.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Edwards, D. B., Jr., Okitsu, T., Da Costa, R., & Kitamura, Y. (2018). Organizational legitimacy in the global education policy field: Learning from UNESCO and the Global Monitoring Report. *Comparative Education Review, 62*(1), 31–63.

Fernández-García, C.-M., Maulana, R., Inda-Caro, M., Helms-Lorenz, M., & García-Pérez, O. (2019). Student perceptions of secondary education teaching effectiveness: General profile, the role of personal factors, and educational level. *Frontiers in Psychology, 10*, 533. https://doi.org/10.3389/fpsyg.2019.00533

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50.

Goddard, R. D., Bailes, L. P., & Kim, M. (2021). Principal efficacy beliefs for instructional leadership and their relation to teachers' sense of collective efficacy and student achievement. *Leadership and Policy in Schools, 20*(3), 472–493.

Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of management information systems*, *18*(1), 185-214.

Hair, J. F., Astrachan, C. B., Moisescu, O. I., Radomir, L., Sarstedt, M., Vaithilingam, S., & Ringle, C. M. (2021). Executing and interpreting applications of PLS-SEM: Updates for family business researchers. *Journal of Family Business Strategy*, *12*(3), 100392.

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of business research*, *109*, 101-110.

Hilmiatussadiah, K. G., Ahman, E., & Disman, D. (2024). Teacher competency: Descriptive study of guru penggerak. *Inovasi Kurikulum, 21*(1), 149–162.

Ifriani, I., Hamnar, N. R., & Rama, B. (2024, July 24). Visi misi UU RI No. 14 Tahun 2005 tentang guru dan dosen dalam hubungannya dengan evaluasi pendidikan. *Ulil Albab: Jurnal Ilmiah Multidisiplin, 3*(8), 574–583.*

Institute for Management Development. (2023). *IMD World Talent Ranking 2023* [PDF]. Switzerland. https://www.imd.org

Jayani, D. H. (2019, December 12). Jumlah guru yang tersertifikasi belum sampai 50%. *Databoks*. https://databoks.katadata.co.id/datapublish/2019/12/12/guru-sertifikasi-belum-sampai-50

König, J., Heine, S., Kramer, C., Weyers, J., Becker-Mrotzek, M., Großschedl, J., ... & Strauß, S. (2024). Teacher education effectiveness as an emerging research paradigm: A synthesis of reviews of empirical studies published over three decades (1993–2023). *Journal of Curriculum Studies*, *56*(4), 371-391.

Muhamad, N. (2024, October 2). Jumlah guru di 38 provinsi Indonesia semester ganjil TA 2024/2025. *Databoks.*

DOI: https://doi.org/10.17509/jpm.v11i2.91336
p- ISSN 2686-5491 e- ISSN 2656-4734

Mutohhari, F., Sofyan, H., & Nurtanto, M. (2021). Technological competencies: A study on the acceptance of digital technology on vocational teachers in Indonesia. *Proceedings of the 1st International Conference on Law, Social Science, Economics, and Education (ICLSSEE 2021)*. https://doi.org/10.4108/eai.6-3-2021.2305971

Muzakky, M. Y., Masrurah, S. F., & Taher, T. (2026). Pengelolaan Profesionalisme Guru: Studi Kasus tentang Diklat, Supervisi, dan Standar Kualifikasi. *Artikulasi: Jurnal Pendidikan Bahasa dan Sastra Indonesia*, *6*(1), 92-107.

Nkundabakura, P., Nsengimana, T., Uwamariya, E., et al. (2023). Contribution of Continuous Professional Development (CPD) training programme on Rwandan secondary school mathematics and science teachers' pedagogical, technological, and content knowledge. *Education and Information Technologies, 29*(4), 4969–4999. https://doi.org/10.1007/s10639-023-11992-2

Puspa, C. I., Rahayu, D. N., & Parhan, M. (2023, December 1). Transformasi pendidikan abad 21 dalam merealisasikan sumber daya manusia unggul menuju Indonesia emas 2045. *Jurnal Basicedu, 7*(5), 3309–3321.

Qaisar, R., & Haider, S. Z. (2023). The influence of in-service teachers training programs on the professional development of school teachers. *Pakistan Journal of Humanities and Social Sciences, 11*(1), 507–516. https://doi.org/10.52131/pjhss.2023.1101.0368

Ramos, J. L., Cattaneo, A. A., de Jong, F. P., & Espadeiro, R. G. (2022). Pedagogical models for the facilitation of teacher professional development via video-supported collaborative learning. A review of the state of the art. *Journal of Research on Technology in Education*, *54*(5), 695-718.

Said, A. (2020). *Profil guru masa depan berbasis teknologi pendidikan*. Universitas Terbuka.

Susatya, E., Mahmudah, F. N., & Budhiasih, R. (2022). Mapping professional competency for teachers' productive arts and culture of vocational school. *Jurnal Pendidikan Vokasi, 12*(1), 21–33.

Sutermeister, R. A. (1976). *People and productivity*. McGraw-Hill.

Suwandi, F. Y. (2020, December 30). Pengaruh kompetensi pedagogik, kompetensi kepribadian, kompetensi profesional, kompetensi sosial guru terhadap motivasi belajar siswa di SMPN 1 Karangampel Indramayu. *Jurnal Ekonomi Manajemen, 15*(2), 54–68.

DOI: https://doi.org/10.17509/jpm.v11i2.91336
p- ISSN 2686-5491 e- ISSN 2656-4734

Titu, M. A., Masi, R., & Keban, S. K. (2023, January 12). Pengaruh kompetensi guru terhadap hasil belajar siswa kelas XI di SMA Negeri I Adonara Barat tahun ajaran 2022/2023. *Jurnal Pendidikan dan Kewirausahaan, 11*(1), 213–222.

Turetsky, K. M., Sinclair, S., Starck, J. G., & Shelton, J. N. (2021, August 1). Beyond students: How teacher psychology shapes educational inequality. *Trends in Cognitive Sciences, 25*(8), 697–709.

Veirissa, A. H. (2021). Kualitas guru di Indonesia. In *Prosiding Seminar Nasional Pascasarjana 2021* (Vol. 4, No. 1, pp. 267–272).

Wood, K., Jaidin, H., Jawawi, R., Perera, J. S. H. Q., Salleh, S., Shahrill, M., & Sithamparam, S. (2017). How and what teachers learn from collaborative professional development. *International Journal for Lesson and Learning Studies*, *6*(2), 151-168.

Zhang, L., Yang, C., & Zheng, Y. (2026). Digital competence for sustainable education of pre-service teachers: A systematic literature review (2014–2024). *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2025.1710983

Zhang, Y., Zhou, S., Wu, X., & Cheung, A. C. K. (2024). The effect of teacher training programs on pre-service and in-service teachers' global competence: A meta-analysis. *Educational Research Review, 45*,100627.

Zhao, X. (2024). The impact of collaborative learning on teacher professional development and individual growth within team collaboration. *Research and Advances in Education*, *3*(2), 11-15.

DOI: https://doi.org/10.17509/jpm.v11i2.91336
p- ISSN 2686-5491 e- ISSN 2656-4734