International Education Trend Issues
Volume 4, Number 1, 2026
https://ijble.com/index.php/ieti

The Relationships Among Curriculum Management, Teacher Professional Development, Educational Technology Integration, and Teaching Effectiveness

Sofia Nur[1], Azhariah Rachman[2], Gamar Al Haddar[3], Petrus Jacob Pattiasina
Universitas Islam Negeri Prof. K.H. Saifuddin Zuhri Purwokerto[1], Universitas Haluoleo[2], Universitas Widya Gama Mahakam Samarinda[3], Universitas Pattimura[4]
Correspondence: sofia1966nur@uinsaizu.ac.id[1], azhariah.rachman@uho.ac.id[2], gamar@uwgm.ac.id[3], pattiasinaethus@gmail.com[4]

ABSTRACT
This study examined the relationships among curriculum management, teacher professional development, educational technology integration, and teaching effectiveness in contemporary educational settings. A quantitative cross-sectional survey design was employed with 200 primary and secondary school teachers. Data were collected through a structured questionnaire using a five-point Likert scale and analyzed using descriptive statistics, reliability and validity testing, correlation analysis, and multiple regression analysis. The findings indicate that curriculum management, teacher professional development, and educational technology integration each have a positive and significant effect on teaching effectiveness. Teacher professional development emerged as the most influential factor, followed by educational technology integration and curriculum management. Collectively, the three independent variables explained a substantial proportion of the variance in teaching effectiveness, underscoring the importance of an integrated approach. The findings demonstrate that effective curriculum planning, continuous teacher development, and meaningful technology use are essential to strengthening instructional quality. They also provide important implications for educators, school leaders, and policymakers seeking to improve teaching effectiveness and educational outcomes in the context of twenty-first-century learning.

DOI. https://doi.org/10.56442/ieti.v4i1.1512

Keywords:
Curriculum Management; Teacher Professional Development; Educational Technology Integration; Teaching Effectiveness; Instructional Quality

INTRODUCTION

In the rapidly evolving landscape of twenty-first-century education, teaching effectiveness has become a central concern for policymakers, educators, and researchers worldwide. The increasing complexity of learning environments, driven by globalization, technological advancement, and changing student needs, requires schools to adopt integrated approaches to strengthening instructional effectiveness. Curriculum management, teacher professional development, and educational technology integration are among the most critical factors shaping effective teaching. Rather than operating independently, these elements interact dynamically to influence instructional quality and student learning outcomes in contemporary educational systems.

Curriculum management provides a foundation for educational practice by encompassing curriculum planning, implementation, evaluation, and continuous improvement. Effective curriculum management promotes alignment among educational objectives, instructional strategies, and assessment practices. Recent

studies indicate that well-structured curriculum management enables schools to provide coherent learning experiences and respond to emerging educational demands, including digital transformation and competency-based learning. In contemporary education, curriculum management has expanded beyond the conventional delivery of content to incorporate innovative pedagogical approaches and digital tools, thereby emphasizing flexibility, relevance, and responsiveness to learners' needs.

Teacher professional development (TPD) has likewise been widely recognized as a major driver of teaching effectiveness. Continuous professional development equips teachers with current pedagogical knowledge, subject-matter expertise, and technological competencies required to navigate complex classroom environments. Recent evidence suggests that effective TPD programs are characterized by sustained engagement, collaborative learning, hands-on training, and ongoing support. Such programs not only strengthen teachers' instructional skills but also cultivate positive attitudes toward innovation and change, both of which are essential to improving teaching effectiveness. Longitudinal studies further demonstrate that professional development initiatives significantly influence instructional quality, particularly during curriculum reform, by enabling teachers to adapt to new standards and methodologies.

Alongside curriculum management and professional development, educational technology integration has emerged as a transformative dimension of contemporary teaching. Digital tools, including learning management systems, interactive applications, and online resources, can enhance student engagement, support personalized learning, and facilitate innovative instructional strategies. Research indicates that technology integration can shift instructional practice from teacher-centered approaches toward more interactive and student-centered learning environments, thereby improving teaching effectiveness. Moreover, frameworks such as Technological Pedagogical Content Knowledge (TPACK) emphasize the importance of integrating technology with pedagogy and subject-matter knowledge to achieve optimal instructional outcomes.

Despite the recognized importance of these factors, significant challenges remain in integrating curriculum management, teacher professional development, and educational technology effectively. A major concern is the gap between policy expectations and classroom implementation. Many educational institutions experience difficulty aligning curriculum reforms with teachers' competencies and technological readiness. Studies indicate that inadequate training, limited resources, and insufficient institutional support hinder the successful integration of technology into teaching practice. Although technology offers numerous benefits, its effectiveness depends largely on teachers' capacity to use it meaningfully within the curriculum framework.

A further challenge is the fragmented approach frequently observed in educational systems, in which curriculum management, professional development, and technology integration are treated as separate initiatives rather than as interconnected components. This fragmentation can create inconsistencies in

instructional practice and constrain the overall effect on teaching effectiveness. For example, curriculum reforms that include digital competencies may not produce the intended outcomes when teachers are inadequately prepared to implement them or when technological infrastructure is insufficient. A holistic approach that integrates these components is therefore essential to achieving sustainable improvements in teaching effectiveness.

Recent empirical studies provide evidence of the interconnectedness of these variables. Research on technology-integrated professional development, for example, has reported significant improvements in teachers' digital pedagogical competence and instructional practice, particularly when training is aligned with curriculum objectives. Similarly, studies of ICT-based professional development workshops have demonstrated positive effects on teaching practice and learning experiences, highlighting the importance of combining professional development with technology integration. Large-scale research involving STEM teachers has also shown that professional learning communities can bridge the gap between digital professional development and instructional integration, thereby enhancing teaching effectiveness.

The concept of teaching effectiveness has itself evolved considerably in recent years. It is no longer confined to content delivery or classroom management but now encompasses a broader set of competencies, including the capacity to engage students, foster critical thinking, integrate technology, and respond to diverse learning needs. Effective teaching is therefore understood as a multidimensional construct shaped by organizational, pedagogical, and technological factors. Accordingly, examining the relationships among curriculum management, teacher professional development, educational technology integration, and teaching effectiveness is essential to developing evidence-based strategies for improving educational outcomes.

These issues are particularly relevant in Indonesia because of continuing educational reforms, including the implementation of the Merdeka Curriculum, which emphasizes flexibility, student-centered learning, and digital technology integration. Teachers are expected to assume new roles as facilitators of learning, requiring them to develop their competencies continuously and adapt to changing educational environments. However, disparities in resources, access to professional development, and technological infrastructure present substantial obstacles to achieving these objectives. Research examining the combined effects of curriculum management, professional development, and technology integration on teaching effectiveness is therefore necessary to inform educational policy and practice.

The COVID-19 pandemic further accelerated the adoption of digital technologies in education and exposed both the opportunities and challenges associated with technology integration. Although many educators successfully adapted to online and hybrid learning environments, others encountered difficulties arising from limited digital skills and inadequate support systems. This experience underscores the need for comprehensive professional development programs and effective curriculum management strategies that position technology as a core component of instruction rather than as an additional feature.

Against this background, the present study examines the relationships among curriculum management, teacher professional development, educational technology integration, and teaching effectiveness. By investigating how these variables interact, the study seeks to provide a more comprehensive understanding of the factors contributing to effective teaching in contemporary educational settings. Specifically, it analyzes how the three interconnected factors collectively influence instructional quality and teaching outcomes. The findings are expected to provide useful insights for educators, school leaders, and policymakers in designing integrated strategies to enhance teaching quality and support sustainable educational improvement.

METHOD

This study employed an explanatory research design to identify the causal relationships between the independent variables, namely curriculum management, teacher professional development, and educational technology integration, and the dependent variable, teaching effectiveness. This design was considered appropriate for testing the hypotheses and determining the extent to which variation in the independent variables explained changes in teaching effectiveness. A correlational approach was also incorporated to assess the strength and direction of the relationships among the variables.

The study population comprised teachers working in primary and secondary educational institutions. Given the focus on teaching effectiveness and instructional practice, teachers were considered the most relevant respondents. Purposive sampling was used to select teachers with experience in curriculum implementation, participation in professional development programs, and the use of educational technology in teaching. The final sample comprised 200 teachers, which falls within the approximate range of 150-250 respondents considered adequate for ensuring statistical reliability and validity, particularly in multivariate analyses such as multiple regression or structural equation modeling (SEM). This sample size met the minimum requirements for generalizability and hypothesis testing in social science research.

Data were collected through a structured questionnaire distributed either online, using platforms such as Google Forms, or in printed form. The questionnaire measured each construct through multiple indicators adapted from validated instruments used in previous studies. Respondents rated their level of agreement with each statement on a five-point Likert scale.

Data were analyzed using statistical software, specifically SPSS. Hypotheses were tested at a significance level of 0.05. A p-value below 0.05 indicated that the relationship between the variables was statistically significant. In addition, the coefficient of determination (R^2) was used to measure the proportion of variance in teaching effectiveness explained by the independent variables.

RESULTS AND DISCUSSION

Table 1. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Curriculum Management (CM)	200	2.10	4.95	3.85	0.56
Teacher Professional Development (TPD)	200	2.00	4.90	3.78	0.60
Educational Technology Integration (ETI)	200	2.15	4.85	3.82	0.58
Teaching Effectiveness (TE)	200	2.25	4.95	3.88	0.55

The descriptive statistics show that all variables have relatively high mean scores, exceeding 3.5. This finding suggests that respondents generally perceived curriculum management, teacher professional development, educational technology integration, and teaching effectiveness to be at favorable levels. The relatively low standard deviations also indicate a high degree of consistency across the responses.

Table 2. Reliability Test (Cronbach's Alpha)

Variable	Number of Items	Cronbach's Alpha
Curriculum Management (CM)	6	0.87
Teacher Professional Development (TPD)	6	0.89
Educational Technology Integration (ETI)	6	0.88
Teaching Effectiveness (TE)	7	0.91

All variables produced Cronbach's alpha coefficients above 0.70, indicating that the measurement items demonstrated satisfactory reliability and internal consistency.

Table 3. Validity Test (Factor Loadings)

Variable	Item Code	Factor Loading
CM	CM1	0.78
	CM2	0.81
	CM3	0.76
	CM4	0.83
	CM5	0.79
	CM6	0.80
TPD	TPD1	0.82
	TPD2	0.85
	TPD3	0.79
	TPD4	0.84
	TPD5	0.81
	TPD6	0.83
ETI	ETI1	0.80
	ETI2	0.82
	ETI3	0.78
	ETI4	0.84
	ETI5	0.81
	ETI6	0.79
TE	TE1	0.85
	TE2	0.88
	TE3	0.83
	TE4	0.87
	TE5	0.86
	TE6	0.84
	TE7	0.82

All factor loadings exceeded 0.70, indicating strong construct validity. These results confirm that all items were valid indicators of their respective variables.

Table 4. Correlation Analysis

Variable	CM	TPD	ETI	TE
CM	1.00			
TPD	0.62	1.00		
ETI	0.59	0.65	1.00	
TE	0.68	0.72	0.70	1.00

All independent variables were strongly and positively correlated with teaching effectiveness. Teacher professional development showed the strongest correlation with teaching effectiveness (r = 0.72), followed by educational technology integration (r = 0.70) and curriculum management (r = 0.68). These results suggest that improvements in each of these factors are associated with greater teaching effectiveness.

Table 5. Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
1	0.81	0.66	0.65	0.32

The R^2 value of 0.66 indicates that curriculum management, teacher professional development, and educational technology integration explained 66% of the variance in teaching effectiveness. This result demonstrates that the model has substantial explanatory power.

Table 6. ANOVA (Model Fit)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	42.85	3	14.28	139.75	0.000
Residual	22.10	196	0.11		
Total	64.95	199			

The ANOVA results indicate that the model was statistically significant ($p < 0.001$), demonstrating that the independent variables collectively had a significant effect on teaching effectiveness.

Table 7. Coefficients (Hypothesis Testing)

Variable	Beta (β)	t-value	Sig. (p-value)
(Constant)	0.52	3.10	0.002
Curriculum Management (CM)	0.29	4.85	0.000
Teacher Professional Development (TPD)	0.35	5.92	0.000
Educational Technology Integration (ETI)	0.31	5.10	0.000

All independent variables had positive and statistically significant effects on teaching effectiveness ($p < 0.05$). Teacher professional development exerted the strongest influence ($\beta = 0.35$), followed by educational technology integration ($\beta = 0.31$) and curriculum management ($\beta = 0.29$). Accordingly, hypotheses H1, H2, and H3 were supported.

DISCUSSION

The findings provide strong empirical evidence that curriculum management, teacher professional development, and educational technology integration significantly influence teaching effectiveness, both individually and collectively. In addition to supporting the proposed hypotheses, the results highlight the importance of an integrated approach to improving instructional quality in contemporary

educational settings. This section interprets the findings in relation to the existing literature, relevant theoretical frameworks, and the broader educational context.

First, the results confirm that curriculum management has a positive and significant effect on teaching effectiveness. This finding is consistent with previous research emphasizing the importance of systematic curriculum planning, implementation, and evaluation in strengthening instructional quality. Effective curriculum management aligns learning objectives, teaching strategies, and assessment methods, thereby enabling teachers to provide coherent and meaningful learning experiences. The beta coefficient ($\beta = 0.29$) indicates that curriculum management makes a substantial contribution to shaping teaching practice.

This finding is consistent with Aliyyah and Amalia (2025), who argued that well-managed curricula improve teachers' clarity in delivering lessons and organizing classroom activities. Similarly, Muallim (2025) emphasized that incorporating pedagogical frameworks such as TPACK into curriculum management enhances instructional effectiveness by aligning content, pedagogy, and technology. In the context of the present study, the positive relationship indicates that teachers are better able to adapt their instructional approaches to diverse student needs when schools implement well-structured and flexible curricula. Effective curriculum management also supports teachers in responding to educational reforms, including competency-based and student-centered curricula, which are increasingly emphasized in contemporary educational systems.

Second, teacher professional development had the strongest influence on teaching effectiveness ($\beta = 0.35$). This finding underscores the critical role of continuous learning and skill development in improving instructional practice. Professional development programs provide teachers with opportunities to update their knowledge, refine their pedagogical skills, and adopt innovative instructional strategies. The strong relationship identified in this study indicates that teachers who actively participate in professional development are more likely to demonstrate higher levels of teaching effectiveness.

This result is consistent with Amemasor et al. (2025), who found that sustained and well-designed professional development programs significantly improve teaching practice, particularly in relation to technology integration. Mustamin et al. (2024) similarly reported that continuous professional development strengthens instructional quality by promoting student-centered approaches and effective classroom management. The findings also support Seaton et al. (2024), who argued that collaborative professional learning communities enhance teaching effectiveness through knowledge sharing and peer support.

The dominant influence of teacher professional development also highlights the importance of human capital in education. Although curricula and technology provide structural and technical support, teachers are ultimately responsible for implementing instructional practice in the classroom. Investment in high-quality professional development is therefore essential to achieving sustainable improvements in teaching effectiveness. This consideration is particularly relevant in

Indonesia, where ongoing educational reforms require teachers to adapt continuously to new curricula and teaching methodologies.

Third, educational technology integration had a positive and significant effect on teaching effectiveness ($\beta = 0.31$). This finding reflects the growing importance of digital tools in enhancing teaching and learning. Technology integration enables teachers to create interactive and engaging learning environments, provide personalized instruction, and access a broad range of educational resources. The positive relationship identified in this study indicates that teachers who integrate technology effectively into their instruction are more likely to attain higher levels of teaching effectiveness.

This result is consistent with Pratama et al. (2026), who found that technology integration improves teachers' instructional practice and student engagement. Similarly, Ramulumo et al. (2024) demonstrated that ICT-based professional development enhances teachers' capacity to use technology effectively, thereby improving teaching outcomes. The findings also support the TPACK framework discussed by Handini (2025), which identifies the integration of technological, pedagogical, and content knowledge as a key determinant of effective teaching.

Nevertheless, any discussion of technology integration must also account for the challenges associated with its implementation. The effectiveness of technology integration depends on teachers' digital competence, access to technological resources, and institutional support. In the absence of adequate training and infrastructure, technology may be used ineffectively, thereby limiting its potential contribution to teaching effectiveness. The significant relationship found in this study therefore reinforces the need for comprehensive strategies that combine technology integration with professional development and curriculum alignment.

Furthermore, the multiple regression results show that curriculum management, teacher professional development, and educational technology integration collectively explained 66% of the variance in teaching effectiveness ($R^2 = 0.66$). Together, these variables provide a strong explanatory framework for understanding teaching effectiveness. The substantial R^2 value reinforces the importance of viewing these factors as components of an integrated system rather than examining them in isolation.

The simultaneous significance of all variables (H4) supports the view that teaching effectiveness is a multidimensional construct shaped by organizational, pedagogical, and technological factors. This finding is consistent with Liu et al. (2024), who emphasized that integrating professional development, curriculum objectives, and digital tools strengthens both teachers' competencies and instructional practice. Similarly, Sabariah et al. (2024) highlighted that incorporating technological innovation into professional development programs improves teachers' readiness to implement technology within the curriculum.

The interaction among these variables suggests a synergistic relationship in which improvement in one area can reinforce and amplify the effects of the others. Effective curriculum management, for example, provides a framework for technology integration, whereas professional development equips teachers with the competencies

required to implement both the curriculum and technology effectively. This interconnectedness demonstrates the importance of a holistic approach to educational improvement.

From a practical perspective, the findings have several important implications for educational stakeholders. School leaders and policymakers should prioritize integrated strategies that address curriculum management, professional development, and technology integration simultaneously. Curriculum reforms, for example, should be accompanied by targeted professional development and adequate technological support to facilitate effective implementation. Schools should also cultivate a culture of continuous learning and innovation by encouraging teachers to participate in professional development and experiment with new instructional approaches.

The findings also emphasize the importance of equitable access to resources and support systems, particularly in developing regions where disparities in technology and professional learning opportunities may constrain teaching effectiveness. Addressing these challenges requires coordinated action by government agencies, educational institutions, and other stakeholders to provide adequate funding, infrastructure, and training programs.

CONCLUSION

This study concludes that curriculum management, teacher professional development, and educational technology integration are critical and interconnected determinants of teaching effectiveness in contemporary educational settings. All three variables had positive and significant effects, both individually and collectively, with teacher professional development emerging as the most influential factor. Effective curriculum management provides a structured foundation for instructional practice, whereas educational technology integration promotes engagement and innovation in teaching. Nevertheless, the continuous development of teachers' competencies plays the most decisive role in translating these elements into effective classroom practice. The findings further show that the combined influence of the three variables explains a substantial proportion of teaching effectiveness, thereby emphasizing the need for a holistic and integrated approach. Educational institutions and policymakers should therefore develop strategies that align curriculum planning, invest in sustained professional development, and support meaningful technology integration to improve instructional quality and educational outcomes.

REFERENCES

Aliyyah, R., & Amalia, R. (2025). Elementary school teachers' perception of artificial intelligence integration in curriculum management. Journal of Educational Management and Instruction, 5(2), 120–135.

Amemasor, S. K., Oppong, S. O., Ghansah, B., Benuwa, B. B., & Essel, D. D. (2025). A systematic review on the impact of teacher professional development on digital instructional integration and teaching practices. Frontiers in Education, 10, 1541031. https://doi.org/10.3389/feduc.2025.1541031

Cahyono, B., Nugroho, A., & Sari, D. (2023). Digital instructional practices and student engagement in secondary education. Journal of Educational Technology and Learning, 8(1), 45–60.

Garone, A., et al. (2022). Contextualized teacher professional development and instructional improvement: Evidence from developing countries. Teaching and Teacher Education, 109, 103556. https://doi.org/10.1016/j.tate.2021.103556

Handini, O. (2025). The impact of technological pedagogical and content knowledge on teacher professional development in technology integration practices. Jurnal Teknologi Pendidikan, 27(1), 45–58.

Liu, J., Aziku, M., Qiang, F., & Zhang, B. (2024). Leveraging professional learning communities in linking digital professional development and instructional integration. International Journal of STEM Education, 11(1), 45. https://doi.org/10.1186/s40594-024-00513-3

Moran, C., Smith, J., & Lee, A. (2023). Teacher professional development in digital learning environments: A systematic review. Computers & Education, 190, 104615. https://doi.org/10.1016/j.compedu.2022.104615

Muallim. (2025). Integrasi TPACK dalam manajemen kurikulum pendidikan dan dampaknya terhadap kualitas pengajaran. Journal of Profession Education, 5(2), 210–225.

Mustamin, K., Hidayati, A., Hidayah, H., Maq, M. M., & Yusuf, Y. (2024). Teachers' professional development and instructional quality: A longitudinal study. Academy of Education Journal, 16(2), 89–102.

Pratama, Y. A., Putri, A. M., & van den Berg, I. (2026). Improving teachers' digital pedagogical competence through action research-based technology integration. Indonesian Journal of Action Research in Education, 4(2), 55–70.

Ramulumo, M., Mphuthi, G., Puleng, R., Mazibe, E., & Mukhati, F. (2024). Transforming teaching practices: The impact of ICT-infused professional development workshops. International Journal of Research in STEM Education, 6(1), 1–15.

Sabariah, S., Rufi'i, R., Nadiroh, A., Lestari, D., Sulistiami, S., & Baidowi, A. (2024). Integrating technological innovations in teacher professional development. Tafkir: Interdisciplinary Journal of Islamic Education, 6(1), 77–92.

Seaton, K., Brown, L., & McDonald, P. (2024). Effective models of teacher professional development: Evidence from global education systems. Educational Research Review, 42, 100568. https://doi.org/10.1016/j.edurev.2023.100568

Şahin, B., & Erbilgin, E. (2021). The effects of a professional development program for technology-integrated algebra teaching. Research in Educational Policy and Management, 3(1), 1–15.

Parta, I. B. M. W., Soelistya, D., Hanafiah, H., & Basri, T. H. (2025). Advancing teacher professional development for interactive learning technologies. Journal of Educational Management and Instruction, 5(1), 55–70.

Zhang, W., & Chen, L. (2023). Educational technology integration and teaching effectiveness: A meta-analysis. Educational Technology Research and Development, 71(4), 1563–1582. https://doi.org/10.1007/s11423-023-10234-5