

A SYSTEMATIC LITERATURE REVIEW (SLR): ADAPTATION OF EDUCATORS' PROFESSIONALISM IN MARGINALISED AREAS TO DIGITAL CURRICULUM, TECHNOLOGY AND SOCIOCULTURAL DYNAMICS

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Abstract

The digital era has presented significant challenges and opportunities for teaching professionals, particularly in underserved areas. This study aims to examine the adaptation of educator professionalism to curriculum transformation, the integration of learning technology, and socio-cultural dynamics through a Systematic Literature Review (SLR) approach. The analysis process involved identifying, selecting, and synthesising 136 studies from the database, using specific inclusion criteria, over the past 10 years. The results indicate that teachers in marginalised areas face infrastructure constraints, digital literacy issues, a lack of ongoing training, and socio-cultural challenges that affect curriculum implementation, technology utilisation, and character building. The findings also reveal the role of teachers as mediators between the formal curriculum and local values, as well as the importance of adaptive policy support and learning communities to enhance learning effectiveness. This study provides critical insights into contextual professional development strategies that are responsive to regional heterogeneity, with implications for improving the quality of education in the digital era.

Keywords: *Digital integration, Marginalised areas, Socio-cultural, Teacher professionalism*

INTRODUCTION

The digital era has brought significant transformations to the global education system, presenting both challenges and opportunities for educators, particularly in marginalized regions. According to (Admiraal et al. (2021), teacher professional development is more sustainable if embedded in a school culture of learning and collaboration. Educational change will also be effective if supported by relevant learning designs, teacher professionalism, adequate infrastructure, and culturally based content (Anggraini, 2025). However, in the context of technology-based education, marginalized regions face specific obstacles due to limited digital infrastructure and limited access to professional training for teachers (Wijaksono, 2023; Faizi, 2024). Curriculum transformation necessitates a flexible learning approach that is aligned with 21st-century professionalism. Saiman & Kasman (2025), findings in the 3T region suggest that curriculum implementation is suboptimal due to the lack of teacher preparedness, as they have not received adequate training. The teacher agency model positions teachers as actors in a multi-level context, facilitating an effective continuous cycle to analyse the complexity of teacher professionalism (Imants & Wal, 2019). Therefore, improving facilities and ongoing training are essential. Studies show that intensive mentoring through training and technical guidance can improve the ability of teachers in remote areas to implement a professional-based curriculum more effectively (Ni et al., 2025). The integration of learning technology poses a significant challenge due to the persistent digital divide between urban areas and marginalized regions. Teachers continue to struggle with using software and exhibit low digital literacy (Astuti, 2022). This condition is further exacerbated by the low digital literacy rate in rural schools on Timor Island, which stands at 79%, and the lack of teacher training, which hinders learning effectiveness (Tanggur, 2022). According to Atmaja (2024) and Piter et al. (2025), local socio-cultural dynamics also influence teachers' adaptation in shaping diversity, tolerance, and student identity, despite limited access and cultural representation.

This SLR study examines professional adaptation in marginalised areas in the digital era to support a curriculum based on local wisdom. Teacher training in Indonesia remains top-down and lacks research, making it ineffective in 3T (frontier and remote) areas. Therefore, a contextual approach involving teacher participation is needed (Pingkan et al., 2025). Furthermore, research Ruhimat et al. (2024) shows that the effectiveness of teacher professional adaptation in marginalised areas is highly dependent on educational policy support and ongoing training, particularly in areas with diverse geographic and sociocultural challenges.

Table 1. Research questions (RQ) are contained in the research

RQ	Questions
RQ1	How many trending articles are published a year?
RQ2	Which articles are most cited?
RQ3	Which countries frequently conduct research?
RQ4	What types of research are frequently used?
RQ5	Who are the subjects of research?
RQ6	Which teaching professions are frequently developed?
RQ7	Challenges and obstacles to teacher professionalism

METHOD

This study employed the Systematic Literature Review (SLR) method to analyse the adaptation of educator professionalism in marginalised areas to curriculum transformation and learning technology. The SLR approach was chosen because it enables the systematic and comprehensive synthesis of empirical evidence (Kitchenham & Brereton, 2015). A literature search was conducted in leading databases, including ERIC and Scopus, using keywords related to teacher professionalism, marginalised areas, and educational transformation. The criteria included studies within the last 10 years to ensure relevance to the digital era. The data was analysed thematically to identify patterns of teacher professional adaptation, which were divided into three main themes: (1) technological infrastructure challenges, (2) local context-based curriculum adaptation strategies, and (3) socio-cultural dynamics that influence the implementation of learning technology (Braun & Clarke, 2006). This SLR also identified research gaps, particularly the lack of studies on the long-term impact of digital transformation on teacher professional development in marginalised areas.

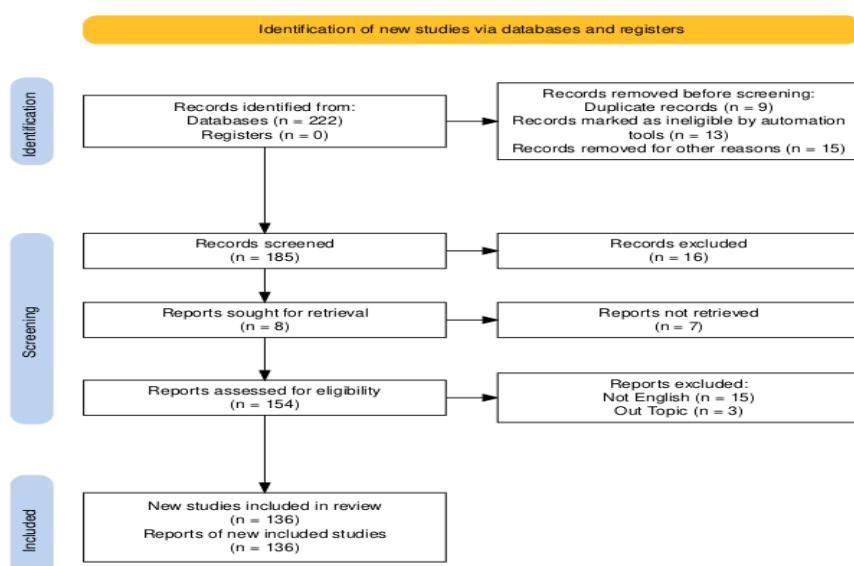


Figure 1. Flow Diagram of PRISMA Systematic Literature

During the identification phase, 222 records were identified from the database. Thirty-seven records were removed due to duplication, leaving 185 records for screening. Of these, 16 were irrelevant, and only one of the eight reports had full text retrieved. Furthermore, of the 154 reports assessed, 18 were excluded because they were not in English or were off-topic. Ultimately, 136 studies met the criteria and were included in the systematic review for analysis.

Clustering and visualization of keyword networks

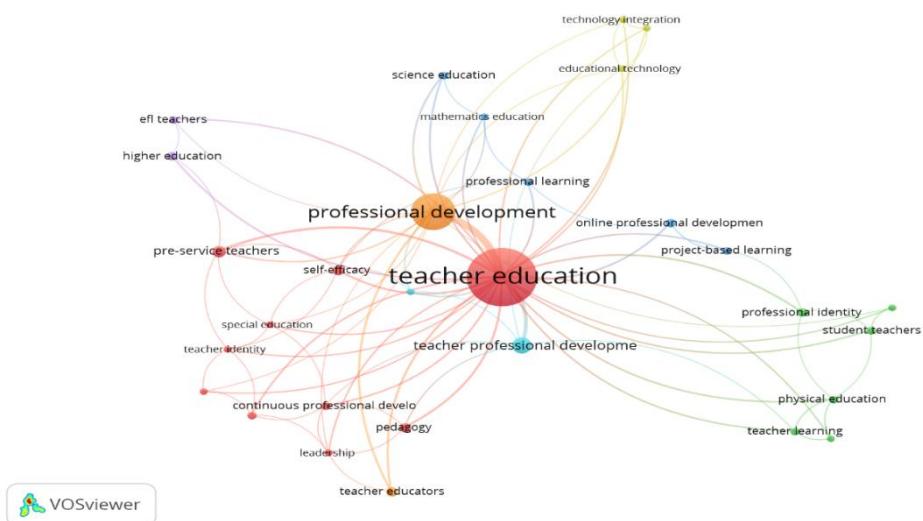


Figure 2. Visualization of keyword relationships using VOSviewer

The VOSviewer analysis results indicate that the most common keyword in the literature is teacher education, which is central to various themes, including professional development, professional learning, technology integration, and professional identity. The central cluster illustrates that global research focuses heavily on teacher professionalism, the integration of learning technologies, and teacher identity and learning. However, there is still a lack of keywords directly related to the context of marginalised areas or the digital divide, indicating a research gap that can be filled in this study.

Table 2. Inclusion and Exclusion Criteria

Category	Inclusion	Exclusions
Document Type	Scopus Article 2019-2025	Non-Scopus / < 2019
Language	English	Languages other than English
Main Topic	Topic: teachers, marginalisation, curriculum, technology, and culture	Topics not related to Education
Access	Data/findings and full text included	No findings / Abstract only
Relevance	Answers research questions	Not relevant to the study focus

RESULTS AND DISCUSSION

Result

A Systematic Literature Review analysis of 136 studies reveals that, while the topic of Teacher Education and Professional Development in marginalised areas has steadily increased over the past decade, it remains rarely discussed. Research continues to focus on adapting education to meet the needs of curriculum, technology, and sociocultural dynamics. In limited areas, teachers generally use creative strategies and simple technology. This

underscores the need for ongoing support, from early education to professional development, to prepare teachers to meet the demands of the digital era curriculum.

1. How many trending articles are published a year



Figure 3. Annual Publication Trend Graph

Based on the data analysis in Figure 3, the development of the number of publications over the past decade can be observed. The number of publications increased annually from 2015 to 2024. Between 2015 and 2016, the number of publications remained relatively low, with approximately 9 to 12 articles. However, since 2017, there has been a significant increase, reaching 21 publications in 2020. This trend indicates that interest in this research topic is growing over time. Furthermore, from 2021 to 2024, the number of publications showed a steady increase, with an average annual growth rate of 15%, which is lower than the 40% increase observed in the 2017-2020 period. The peak publication figure in 2024 reflects the steady development of this research field. This indicates that research in this area remains a relevant and interesting trend for researchers, demonstrating a consistent increase in academic attention to the topic.

2. Which articles are most cited

Table 3. Articles with the 10 most citations

No	Author	Title	Journal	Year	Country	Highly cited
1	Korthagen, F.	Inconvenient truths about teacher learning: towards professional development 3.0	Teachers and,Teaching Theory and Practice	(2017)	Netherlands	488
2	Admiraal, W., et al.	Schools as professional learning communities: what can schools do to support professional development of their teachers?	Professional Development In Education	(2021)	The Netherlands	165
3	Imants, J., & Van der Wal, M.M.	A model of teacher agency in professional development and school reform	Journal of Curriculum Studies	(2020)	Netherlands	159
4	Ding, A, et al	Enhancing teacher AI literacy and integration through different types of cases in teacher professional development	Computers and Education Open	(2024)	United States	99
5	Prestridge, S. Tondeur, J.	Exploring elements that support teachers engagement in online professional	Education Sciences	(2015)	Australia	53

		development				
6	Li, S., et al.	The influence of teachers' professional development activities on the factors promoting ICT integration in Primary Schools	Education Sciences	Japan	46	
7	Fernandes, S., et al.	Teacher Professional Development in Higher Education: The Impact of Pedagogical Training Perceived by Teachers	Education Sciences	Portugal	40	
8	Booth, J., et al	Mid-career teachers: A mixed methods scoping study of professional development, career progression and retention	Education Sciences	United Kingdom	36	
9	Theodorio, A.O.	Examining the support required by educators for successful technology integration in teacher professional development program	Cogent Education	South Africa	22	
10	Ben Assaraf, O., et al	Climate change education implementation: the voices of policymakers, professional development providers, and teachers in five countries	International Journal of Science Education	Australia	12	

Table analysis shows that research on teacher professional development has been largely pioneered by the Netherlands, with three articles in the top ten citations. Korthagen (2017) article emerged as the most influential, with 488 citations, emphasising the need to transform teacher professional development toward Professional Development 3.0, with a focus on reflective, collaborative learning that adapts to educators' practical needs. Furthermore, recent research trends are shifting toward the integration of technology and artificial intelligence in teacher professional development (Ding et al., 2024), and community-based professional learning (Admiraal et al., 2021). These research findings demonstrate a shift from traditional approaches to more contextual, technology-based approaches focused on developing teachers' digital competencies. These articles can serve as valuable references for understanding teacher professional development strategies in the digital age.

3. Which countries frequently conduct research

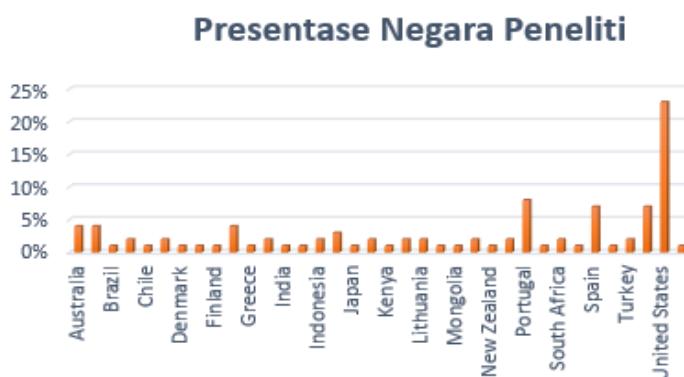


Figure 4. Annual Publication Trend Graph

Based on a graphical analysis of publication trends by country, the United States still dominates research on adapting educator professionalism in marginalised areas to curriculum transformation, learning technology, and sociocultural dynamics in the digital era, accounting for approximately 23% of total publications. Other countries, such as Australia, the Netherlands, the United Kingdom, and Japan, each contribute 3–7%, while developing countries, including Indonesia, contribute less than 5%. This situation suggests that research on the adaptation of educator professionalism in Indonesia, particularly in marginalised areas facing challenges related to infrastructure, access to technology, and local socio-cultural dynamics, remains very limited. Therefore, there is a need to increase educational research relevant to Indonesian conditions to support the development of teacher professionalism capable of adapting to curriculum transformations and learning technologies in the digital era.

4. What types of research are frequently used

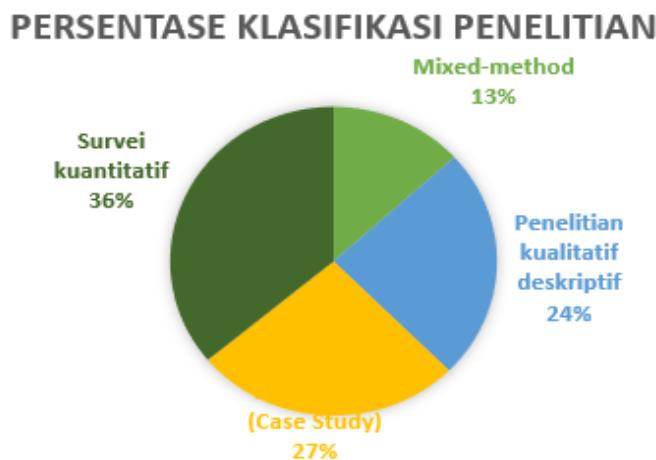


Figure 5. Research Type Diagram

Based on the research classification percentage diagram, four types of research were most frequently used in the analysed studies. The most dominant type was quantitative surveys, accounting for 36%, indicating that numerical approaches and structured measurements were widely used to describe phenomena objectively. Furthermore, case studies also accounted for a significant portion, accounting for 27%, reflecting researchers' tendency to conduct in-depth explorations of a particular phenomenon, context, or group. Another widely used type of research is descriptive qualitative research, accounting for 24% of the data, indicating the need to understand phenomena in detail through narrative and contextual analysis. Meanwhile, mixed-methods research accounted for 13%, indicating that some researchers choose to combine qualitative and quantitative approaches to obtain more comprehensive results. Overall, the data indicate that quantitative research remains dominant; however, qualitative and mixed methods also play a significant role in providing a more comprehensive understanding of the topic.

5. Who are the subjects of research

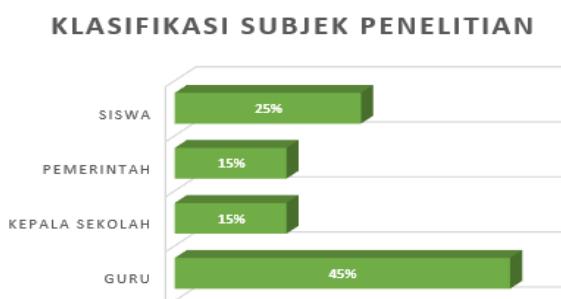


Figure 6. Research Subject Classification Diagram

The research subject classification diagram above shows that teachers are the most frequently studied subject, accounting for 45%. This is highly relevant to the current state of education in Indonesia, where teachers play a crucial role in implementing the Merdeka Belajar curriculum, digital transformation of education, and improving professional pedagogical competency. Research focused on teachers typically examines how they adapt to policy changes, the use of technology in learning, and effective teaching strategies to improve student learning. In addition to teachers, students also constituted a significant portion of the research, accounting for 25% of the research, reflecting a strong focus on character development, 21st-century competencies, and their readiness to face the challenges of the digital era. Meanwhile, school principals and the government, each accounting for 15%, demonstrate that the research also highlights the role of school leadership and government policies in supporting improvements in education quality. Focusing on these two subjects is crucial, given that Indonesia is strengthening its education governance, quality control, and digitalisation programs in schools. Overall, the distribution of research subjects reflects the current situation, where improving the quality of Indonesian education relies heavily on collaboration between teachers, students, school leaders, and the government.

6. Which teaching professions are frequently developed

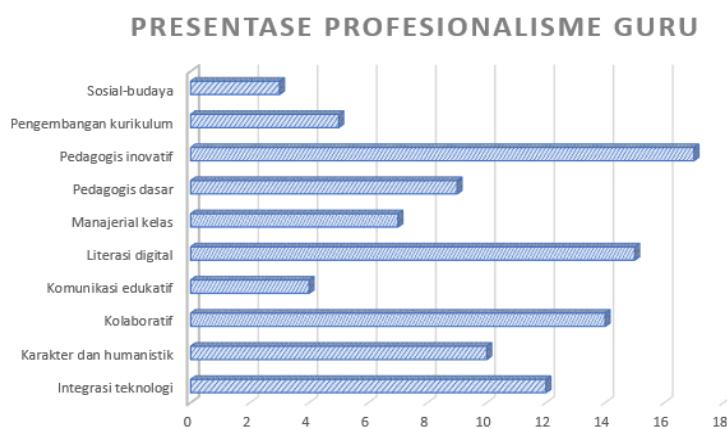


Figure 7. Teacher Professional Diagram

The teacher professionalism diagram shows that the most frequently developed competencies in Indonesia include innovative pedagogy, digital literacy, collaboration, and technology integration. This aligns with the demands of the Independent Curriculum and the digital transformation of education, which requires teachers to create innovative learning experiences and utilise technology collaboratively to enhance the quality of the learning process. Meanwhile, development of character and humanistic aspects, classroom management, and curriculum development are also important focuses. These competencies are essential for supporting the development of the Pancasila Student profile, fostering a conducive learning environment, and ensuring that the curriculum is tailored to the school's needs and local context. Overall, strengthening teacher professionalism in Indonesia emphasises a balance between pedagogical skills, technology, and character values.

7. Challenges and obstacles to teacher professionalism

Table 4. Challenges and Barriers to Teacher Professionalism

No	Challenges and Obstacles to Teacher Professionalism	Description
1	Limited Infrastructure and Technology Access	Unstable internet connection, lack of digital devices, and inadequate online learning facilities
2	Lack of Continuous Professional Training	Limited training related to the new curriculum, technology integration, and contextual pedagogical development
3	Low Digital Literacy and Pedagogical Readiness	Teachers struggle to use digital software or platforms effectively
4	Socio-Cultural Barriers	Limited cultural representation in the curriculum, language barriers, and challenges in adapting learning to local wisdom
5	Lack of Learning Resources	Lack of relevant teaching materials, media, and learning resources for contextual learning
6	Limited Collaborative Support	Lack of collaboration or supervision in professional development and curriculum implementation
7	Diverse Teacher Motivation and Readiness	Differences in teacher motivation and preparedness to address changes in curriculum, technology, and pedagogical approaches

Table 4 above indicates that teacher professionalism in Indonesia remains hindered by several factors, including limited infrastructure and access to technology, a lack of ongoing training, and low digital literacy and pedagogical preparedness. Furthermore, teachers face socio-cultural barriers, limited learning resources, a lack of collaborative support, and differences in motivation and preparedness for curriculum and technological changes. These challenges underscore the need for more substantial support in terms of facilities, training, and mentoring for teachers. Addressing these various obstacles requires a concerted effort involving the government, schools, and the education community. Improving digital infrastructure, providing ongoing professional development training, and fostering a culture of collaboration among teachers are crucial steps to support professional growth. Furthermore, providing relevant learning resources and developing mentoring programs can help teachers better prepare for curriculum changes and educational developments in today's digital era.

Discussion

Professional adaptation of teachers in remote areas in today's digital era is not merely an obligation, but also essential to anticipate rapidly changing social and cultural dynamics. Curriculum updates based on digital skills and 21st-century competencies are easier to implement in urban areas because they are supported by optimal infrastructure, including access to technology and adequate teacher training (Hoskin, 2025). Research by Theodorio (2024), suggests that integrating technology into learning necessitates a sustainable and proactive support mechanism, enabling educators to develop technical competencies and implement innovative pedagogical strategies. This suggests that teaching transformation can be achieved through gradual changes that rely on teacher expertise amidst sociocultural changes (Murray et al., 2025). As stated by (Aminah et al., 2024) Digital technology has great potential in creating personalised and interactive learning, but the gap in digital infrastructure and access remains a challenge. Paradoxically, uniformly designed educational modernisation initiatives risk deepening social, cultural, and educational access disparities between core and peripheral areas. The use of technology in learning in marginalised areas must consider local social and cultural conditions, not just the use of modern devices or applications. Educators in areas with good infrastructure find it easier to implement digital curricula, whereas those

in peripheral areas must innovate sensitively to the socio-cultural context to ensure effective learning despite limitations (Li et al., 2019; Charania & Paltiwale, 2023). Failure to adapt is not only due to limited teacher competency but also to weak support for professional development that strengthens collaboration and autonomy in innovation in technology integration practices (Prestridge & Tondeur, 2015). However, this is mainly due to the education system's limited responsiveness to the region's socio-cultural dynamics. As noted in a recent report, educational disparities in 3T and marginal areas persist due to limited attention from the central government (Renyaan, 2025). Teachers must be flexible and contextual, so they can integrate innovations and learning methods with local cultural nuances without forgetting national curriculum standards. Sociocultural dynamics in marginalised areas place teachers in a crucial position as mediators between the formal curriculum and inherent local values. The transformation of social interaction patterns, including cultural changes and digital modernisation, shifts the character and aspirations of students, thereby burdening teachers' pedagogical responsibilities (Nganga & Kambutu, 2024).

Educator professionalism requires development that extends beyond technical competencies, including the ability to critically evaluate materials and adapt teaching strategies to meet the needs of students (Montero-mesa et al., 2023). Research by Korthagen (2017), shows that teacher professional development that considers cognitive, emotional, and motivational dimensions, as well as personal connections, is crucial for maintaining cultural sensitivity and preventing student alienation. Failure to integrate these three values has the potential to result in suboptimal learning processes and even trigger value tensions between educational institutions and local communities. Adapting educator professionalism in marginalised areas requires systematic interventions integrating technology, pedagogy, and cultural values. Key strategies include equitable access to technology, context-specific professional training, and strengthening teacher learning communities (CoPs) to develop TPACK and support sustainable growth, even during crises (Mahlo & Waghid, 2025). Educational technologies can enhance learning in low-income contexts if aligned with local capacities and socio-cultural realities (Castillo & Adam, 2024). Policy support that is responsive to regional heterogeneity is also crucial for implementing curriculum and technology innovations effectively, enabling education to keep pace with technological evolution while addressing socio-cultural nuances.

CONCLUSION

Adapting teacher professionalism in Indonesia's marginalised regions in the digital era is crucial in facing the massive curriculum transformation, technology integration, and socio-cultural dynamics. Teachers in areas with limited access to technology and training must be able to develop innovative, contextual, and culturally sensitive learning strategies that still meet national curriculum standards. Context-based development, ongoing mentoring, collaboration among teachers, and technology integration have been proven to enhance digital literacy and teacher readiness to adapt teaching methods to social changes and students' evolving aspirations. Furthermore, teachers play a crucial role as mediators between the demands of the formal curriculum and local values inherent in society, ensuring that learning remains accessible to all students and relevant to local wisdom. Furthermore, adaptive and responsive policy support, addressing regional heterogeneity, and strengthening teacher communities, are key factors in ensuring the effective transformation of education in marginalised regions, empowering students with skills and understanding that meet the needs of the times.

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