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Building Multicultural Education Based on Technology and Local Wisdom: A Study of Teachers' Perceptions in West Kalimantan

Yudi Darma¹⁾✉, Ahmad Yani T.²⁾, Sulistyarini³⁾

¹⁾ Universitas Tanjungpura, Pontianak, Indonesia

E-mail: f3441251007@student.untan.ac.id ; yudidarmamtk@gmail.com

²⁾ Universitas Tanjungpura, Pontianak, Indonesia

E-mail: ahmad.yani.t@fkip.untan.ac.id

³⁾ Universitas Tanjungpura, Pontianak, Indonesia

E-mail: sulistyarini@fkip.untan.ac.id

✉ Correspondence Author

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Abstract

Multicultural education in culturally diverse regions requires not only teachers' recognition of its importance but also adequate conditions for its implementation. However, empirical evidence establishing a systematic baseline of teachers' perceptions and the practical conditions for implementing local culture-based multicultural education in West Kalimantan remains limited. This study aims to provide a baseline assessment of teachers' perceptions of multicultural education, local cultural integration, perceived implementation barriers, institutional support, professional development needs, and readiness to use technology in multicultural learning. A quantitative descriptive survey was conducted with 250 teachers from several regencies and cities in West Kalimantan using a 25-item questionnaire with a five-point Likert scale. Descriptive statistics, particularly frequencies and percentages, were used to summarize response distributions across five dimensions: understanding and importance of multicultural education, integration of local culture in learning, implementation challenges, support and development needs, and technology use. The questionnaire demonstrated satisfactory to excellent internal consistency across the five dimensions, with Cronbach's alpha coefficients ranging from 0.794 to 0.931. The findings indicate very high agreement regarding the importance of multicultural education (90.40%–98.80%) and the value of integrating local culture into learning (87.45%–97.60%). In contrast, practical implementation conditions were less favorable, particularly regarding the availability of local culture-based learning materials (53.01%), limited learning time (57.20%), and perceived curriculum accommodation (48.80%). Teachers also demonstrated high interest in technology-supported multicultural learning, with 90.32% agreeing that augmented reality could make cultural learning more interesting and 93.60% expressing willingness to learn new technologies. These findings indicate a substantial contrast between strong conceptual support and less favorable perceived implementation conditions. The study recommends targeted development of local culture-based digital resources, competency-based teacher training, greater practical flexibility for local cultural integration, and systematic strengthening of teachers' contextual cultural knowledge.

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INTRODUCTION

West Kalimantan presents a particularly important context for examining multicultural education because teachers work within classrooms shaped by substantial ethnic and cultural diversity. The province includes Malay, Dayak, Javanese, Bugis, Madurese, and other communities, creating learning environments in which cultural differences are part of everyday educational experience (Tilaar, 2000). In such a context, the challenge is not merely whether teachers recognize cultural diversity, but whether schools provide sufficient resources, curriculum flexibility, instructional time, and teacher competence to translate that recognition into meaningful classroom practices.

In this context, multicultural education serves as an important educational approach for strengthening social cohesion, tolerance, and mutual understanding among different cultural groups. UNESCO recognizes multicultural and culturally responsive education as important for promoting inclusive learning and respect for diversity. At the national level, Indonesia has incorporated principles related to diversity, inclusion, and cultural responsiveness into its education policies and curriculum development, including the Merdeka Curriculum.

West Kalimantan, as a province with substantial ethnic and cultural diversity, provides a particularly relevant setting for examining this issue. The province includes Malay, Dayak, Javanese, Bugis, Madurese, and other ethnic communities, making cultural diversity an integral part of the social and educational environment. Previous research has shown that although multicultural education is widely recognized among educators, its implementation continues to face practical obstacles, including limited resources, teachers' varying understanding of local cultural contexts, and limited curriculum flexibility (Banks, J. A., & Banks, 2010; Tilaar, 2000).

A recent study in Indonesia revealed that multicultural education has not been implemented optimally due to several factors: an exclusive curriculum, inadequate teacher training, and weak education policies in responding to diversity (Dahri et al., 2025). In addition, with the rapid development of digital technology, there is great potential to utilize technologies such as interactive media and augmented reality (AR) in supporting learning based on local culture in a more engaging and effective way.

Multicultural education is defined as an educational approach that recognizes, values, and responds to cultural, ethnic, religious, and other social identity diversity in the learning context (Banks, 2003; Tilaar, 2000). More than just adding content about various cultures, multicultural education is a fundamental educational philosophy that changes the way educators teach and how students learn.

According to Banks (2003), One of the most influential figures in the field of multicultural education stated that there are four main approaches to integrating multicultural content into the curriculum. The first approach is the Contributions Approach, which involves adding specific cultural figures, stories, or celebrations into the curriculum without changing its basic structure. The second approach, the Additive Approach, is implemented by adding additional units or materials on multicultural issues while still maintaining the existing core curriculum. The third approach is the Transformation Approach, which emphasizes changing perspectives, assumptions, and curriculum structures so that students can learn concepts and issues from various cultural viewpoints. The last approach, the Social Action Approach, encourages students to get involved directly in real activities aimed at addressing social problems and injustices related to cultural diversity. These four approaches

provide a comprehensive conceptual foundation for educators in developing a curriculum that is responsive to diversity.

In the Indonesian context, multicultural education is not only relevant but also strategic in building unity in diversity (*Bhinneka Tunggal Ika*). Research shows that the effective implementation of multicultural education can increase tolerance among students from different backgrounds, reduce negative stereotypes, and improve academic achievement, especially for students from minority groups (Handayani et al., 2018; Nyoman & Putu, 2024).

In line with this, local wisdom plays an important role in strengthening multicultural education practices. Local wisdom encompasses the knowledge, values, and practices unique to a community that have been shaped through long experiences of interacting with the social and natural environment (Diyanti et al., 2024). The integration of local wisdom into learning has been proven to increase learning motivation, deepen the understanding of academic concepts, train critical thinking skills, and strengthen students' cultural identity. Empirical research shows that learning based on local wisdom results in much higher learning outcomes compared to conventional approaches, while also serving as a means of cultural preservation (Nyoman & Putu, 2024). These findings align with UNESCO's recommendation that the curriculum needs to be responsive to the local context so that the learning process becomes more relevant and meaningful (Fitzsimons et al., 2020).

The development of digital technology also presents new opportunities to enrich multicultural learning. Interactive media, augmented reality (AR), virtual reality (VR), and digital platforms have shown effectiveness in increasing student engagement and bringing local cultural artifacts to life in visually appealing forms. Recent studies indicate that the use of AR in learning can lead to significant improvements in learning outcomes with a high gain category (Mukhlisin et al., 2025). Meanwhile, digital learning media based on local culture has also been proven to significantly enhance students' understanding of culture (Wijayati, 2024). However, the success of technology utilization depends not only on the availability of devices but also on teachers' readiness to integrate technology, pedagogy, and content. The TPACK framework emphasizes the importance of teacher competence, and several studies indicate that structured training significantly enhances their self-efficacy as well as their ability to use technology effectively (Joshi, 2025; Liu, 2013).

Although the urgency of multicultural education is widely understood, its implementation in Indonesia still faces various obstacles. The national curriculum tends to be rigid and oriented towards the majority culture, so there is limited space for the integration of local cultures (Dahri et al., 2025). Special training for teachers is also inadequate, particularly regarding the integration of multicultural education and the use of supporting technology (Proceeding BBG, 2024). In addition, limited resources, the scarcity of learning materials based on local culture, and uneven technological infrastructure also hinder the practice of diversity-based learning (Palmer, 2023; Snively & Corsiglia, 2000). The heavy curriculum load and teachers' varying understanding of students' cultural contexts are also challenges that need attention. These conditions indicate the need for comprehensive strategies, innovative approaches, and technological support to strengthen multicultural education in heterogeneous regions such as West Kalimantan.

Despite the growing body of literature on multicultural education in Indonesia, an important empirical gap remains. Existing studies have largely discussed the conceptual importance of multicultural education and its general implementation challenges, while relatively limited attention

has been given to establishing a systematic baseline of teachers' perceptions in highly heterogeneous regions such as West Kalimantan. In particular, limited empirical evidence simultaneously describes teachers' perceptions of multicultural education, their readiness to integrate local culture into classroom learning, the practical barriers they perceive, the support available from schools and families, their professional development needs, and their readiness to utilize digital technologies. This gap is important because strong conceptual support for multicultural education does not necessarily indicate that teachers have adequate resources, instructional time, curriculum flexibility, contextual cultural knowledge, or technological readiness to translate that support into classroom practice. Therefore, a teacher-perception-based baseline assessment is needed to identify current strengths, perceived constraints, and development priorities for multicultural education in West Kalimantan.

METHODS

This study employed a quantitative approach using a descriptive survey design to establish a baseline assessment of teachers' perceptions of multicultural education and the perceived conditions for its implementation. The study was perception-based rather than an observational assessment of actual classroom implementation. Accordingly, the questionnaire measured teachers' self-reported perceptions regarding the importance of multicultural education, integration of local culture, perceived implementation barriers, institutional and community support, professional development needs, and readiness to use technology.

The research sample comprised 250 teachers, selected using a convenience sampling technique from several areas in West Kalimantan. The sampling focused on teachers working in culturally diverse educational contexts. The respondents represented various educational levels and subject areas. Because a small number of respondents did not provide responses to every questionnaire item, the number of valid responses varied slightly across individual items; 237 respondents provided complete responses across all 25 questionnaire items.

The first part collected demographic information, including the regency/city of teaching, subject area, educational level, ethnicity, and gender. The second part contained 25 closed-ended statements measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The statements were organized into five dimensions: (1) Understanding and Importance of Multicultural Education (4 items), (2) Integration of Local Culture in Learning (6 items), (3) Challenges and Obstacles (5 items), (4) Support and Development Needs (5 items), and (5) Use of Technology (5 items). The items were developed to capture teachers' perceptions of multicultural education and the perceived conditions supporting or constraining its implementation.

The questionnaire was developed according to the five dimensions described above and reviewed during the instrument preparation process to ensure content relevance to the research objectives and the West Kalimantan cultural context. To examine internal consistency, Cronbach's alpha coefficients were calculated using the collected response data. The results showed satisfactory to excellent internal consistency across the five dimensions. Cronbach's alpha was 0.794 for Understanding and Importance of Multicultural Education (Items 1–4), 0.900 for Integration of Local Culture in Learning (Items 5–10), 0.820 for Challenges and Obstacles (Items 11–15), 0.883 for Support and Development Needs (Items 16–20), and 0.931 for Use of Technology (Items 21–25). When all 25 items were analyzed together, the overall Cronbach's alpha coefficient was 0.925, based

on 237 complete cases. These results indicate satisfactory to excellent internal consistency for the descriptive baseline assessment.

Because the questionnaire was designed as a multidimensional instrument, reliability was primarily interpreted at the dimension level rather than solely from the overall coefficient. A small number of missing responses resulted in slightly different numbers of complete cases across the five dimensions.

Table 1. Internal Consistency Reliability of the Questionnaire

<i>Dimension</i>	<i>Items</i>	<i>Complete Cases (N)</i>	<i>Cronbach's Alpha</i>
<i>Understanding and Importance of Multicultural Education</i>	1–4	249	0.794
<i>Integration of Local Culture in Learning</i>	5–10	246	0.900
<i>Challenges and Obstacles</i>	11–15	248	0.820
<i>Support and Development Needs</i>	16–20	244	0.883
<i>Use of Technology</i>	21–25	248	0.931
<i>Overall 25-item instrument</i>	1–25	237	0.925

The data were analyzed using descriptive statistics, specifically frequencies and percentages, to describe respondent characteristics and the distribution of responses to each questionnaire item. Responses were summarized into three categories: Agree/Strongly Agree (A+SA), Disagree/Strongly Disagree (D+SD), and Neutral (N). The percentages reported in the Results represent the proportion of valid responses for each item. The analysis was conducted across the five dimensions of the questionnaire to identify patterns in teachers' perceptions and perceived implementation conditions. No inferential statistical analysis was conducted because the primary purpose of the study was to establish a descriptive baseline rather than to test differences, associations, or causal relationships.

It should be noted that the study did not directly observe classroom practices, evaluate curriculum documents, or measure implementation fidelity. Therefore, the findings represent teachers' perceptions of implementation conditions rather than direct evidence of the frequency, quality, or effectiveness of actual classroom implementation.

RESULT AND DISCUSSION

This study involved 250 teachers from various regencies/cities in West Kalimantan with diverse demographic characteristics. Geographically, the majority of respondents came from Mempawah Regency (79.35%), followed by Sintang Regency (8.91%), Kapuas Hulu Regency (4.05%), and other areas. The concentration of respondents in Mempawah indicates that this study has strong representation from a region with high cultural diversity, although there are limitations in generalizing to the entire West Kalimantan area. In terms of gender, respondents were predominantly female (78.14%), reflecting the common trend in the teaching profession in Indonesia. Regarding educational qualifications, almost all respondents (96.33%) had a bachelor's degree (S1), while 3.27% held a master's degree (S2) and 0.41% had a diploma (D2/D3), indicating that respondents overall have sufficient academic qualifications to implement multicultural education.

The ethnic composition of respondents reflects the demographic reality of West Kalimantan, with a dominance of the Malay ethnic group (46.75%), followed by Dayak (19.92%), Javanese (16.67%), Bugis (8.54%), Madurese (5.28%), and others (2.84%), reflecting the cultural diversity of the participating teachers. Based on the field of study, the Classroom Teacher category dominated the

sample (54.36%), followed by Religious Education (14.52%), Mathematics & Social Sciences (11.20%), Physical Education & Health (5.39%), Language & Arts (4.15%), and others (10.37%). The dominance of Classroom Teachers indicates that this study primarily involved elementary school teachers or teachers who teach across subjects, which is a strategic position in the implementation of multicultural education at the primary level.

1. Analysis of Teachers' Perceptions of Multicultural Education

The analysis of the four statements in this category shows a very high level of agreement, as shown in Table 2 below.

Table 2. Understanding and the Importance of Multicultural Education

Statement	Agree/Strongly Agree (%)	Disagree (%)	Neutral (%)
Understanding the concept of multiculturalism (Q1)	90,40	1,20	8,40
The Importance of Multicultural Education (Q2)	97,20	0,40	2,40
Cultural diversity as an asset (Q3)	98,80	0,40	0,80
Tolerance among students (Q5)	98,79	0,40	0,81

The analysis results show a very strong consensus among respondents on the importance of multicultural education in West Kalimantan, with an approval rate of over 90 percent. Teachers have a good understanding that cultural diversity is a valuable asset in learning, reflected in the approval rate reaching 98.80 percent. Teachers' belief in the role of multicultural education in enhancing tolerance and mutual respect among students is also very high, at 98.79 percent. Nevertheless, there is a gap in terms of understanding the concept of multicultural education, which records a level of the lowest agreement (90.40%), with 8.40 percent of respondents remaining neutral. This condition indicates a need for strengthening conceptual understanding through more in-depth training. This finding is in line with studies in Indonesia showing that teachers generally understand the importance of multicultural education, but their understanding of practical implementation still needs to be improved (Jaswan et al., 2025).

The distribution of responses indicates that teachers' strongest consensus concerns the value and social purpose of multicultural education rather than their conceptual understanding alone. The difference between agreement on the importance of multicultural education (97.20%) and agreement reflecting understanding of the concept (90.40%) is 6.80 percentage points. Although both levels are high, the difference suggests that a proportion of teachers recognize the importance of multicultural education without expressing equally strong confidence in their conceptual understanding. This pattern indicates that professional development should move beyond general awareness and place greater emphasis on translating multicultural principles into practical pedagogical strategies.

2. Integration of Local Culture in Learning

This category measures teachers' perceptions of the value and feasibility of integrating various forms of local culture into academic learning. The distribution of responses to the six statements in this category is presented in Table 3 below.

Table 3. Integration of Local Culture in Learning

Statement	Agree/Strongly Agree (%)	Disagree (%)	Neutral (%)
Students' local cultural knowledge (Q4)	89,15	1,60	9,24
Material related to cultural context (Q6)	96,79	0,80	2,41
Learning is more interesting with culture (Q7)	94,40	2,40	3,20
Integration of traditional stories/arts (Q8)	97,60	0,80	1,60
Local wisdom helps academic understanding (Q9)	96,40	1,20	2,40
Positive use of local languages (Q10)	87,45	4,45	8,10

In general, there is a very high level of agreement on the concept and importance of multicultural education. Overall, teachers' perception patterns of multicultural education and local cultural integration can be observed through the visualization of responses to 25 survey statements. The following Figure 1 displays the full spectrum of teachers' responses, ranging from strongly disagree to strongly agree, for each statement grouped into five thematic categories.

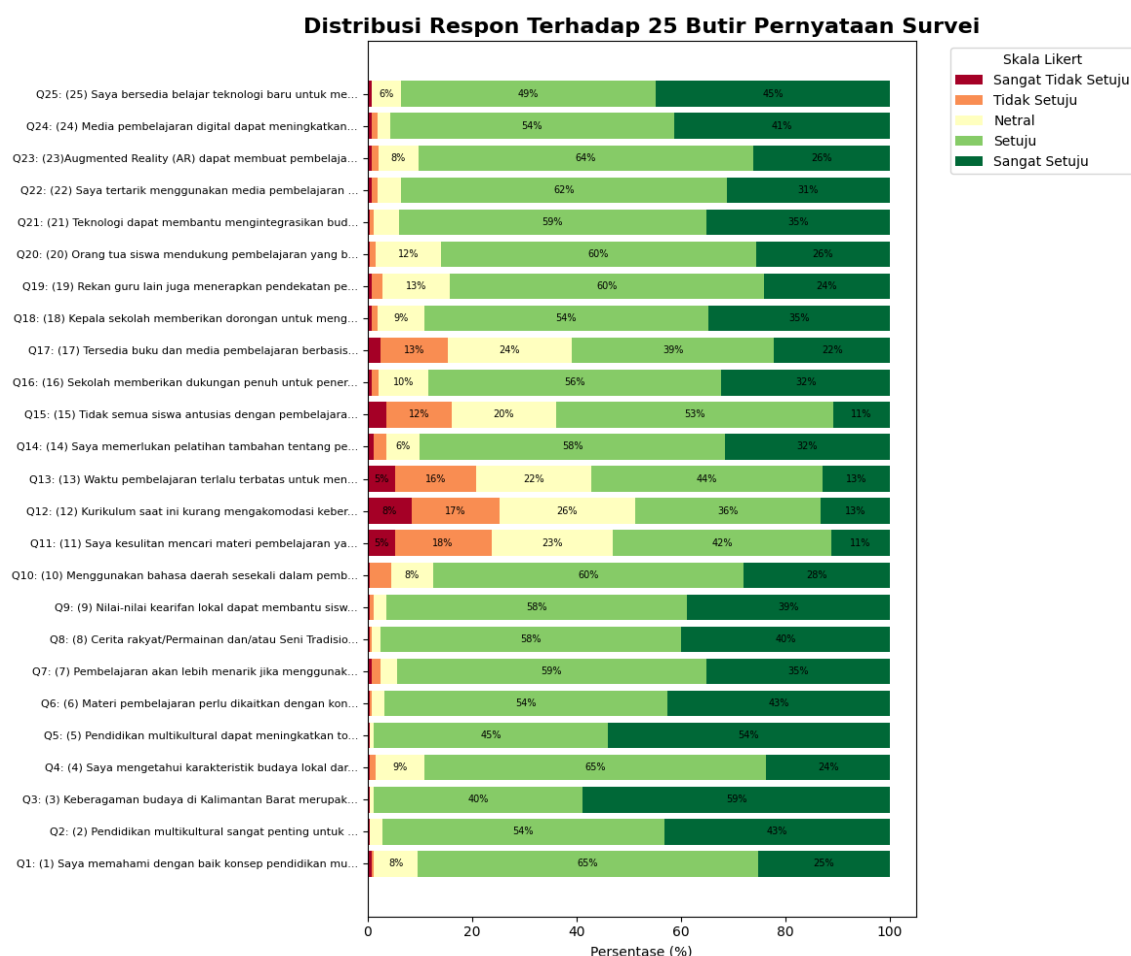


Figure 1. Response Distribution to 25 Survey Statements

The findings show very high agreement regarding the integration of local culture into learning, particularly the integration of traditional stories and arts (97.60%), culturally relevant materials (96.79%), and the contribution of local wisdom to academic understanding (96.40%). However, the relatively lower agreement regarding teachers' knowledge of students' local cultural backgrounds (89.15%) and the positive use of local languages (87.45%) indicates that recognition of cultural integration does not necessarily mean that teachers possess sufficient contextual knowledge to implement it confidently. This finding reinforces the distinction between conceptual readiness and practical readiness. Teachers appear to value local culture as a learning resource, but some may require more systematic opportunities to develop contextual cultural knowledge and pedagogical strategies for using it in diverse classrooms.

3. Challenges and Obstacles to Implementation

This category identifies the practical obstacles faced by teachers in implementing multicultural education. It is important to note that in this category, a high level of agreement indicates the presence of barriers perceived by teachers, as shown in Table 4 below

Table 4. Perceived Implementation Barriers and Supporting Conditions

Statement	Recognizing Barriers (%)	Do Not Recognize (%)	Neutral (%)
Difficulty finding local cultural materials (Q11)	53,01	23,69	23,29
Accommodative curriculum lacks culture (Q12)	48,80	25,20	26,00
Limited learning time (Q13)	57,20	20,80	22,00
Not all students are enthusiastic (Q15)	63,85	16,06	20,08
Availability of books/media is adequate (Q17)*	60,89	15,32	23,79

* Note: Q17 is reversed in its interpretation (agree = adequate availability)

Analysis of the category of barriers reveals various practical challenges faced by teachers in implementing multicultural education, with varying levels of agreement indicating the complexity of the issues. Only 53.01% of teachers felt it was difficult to find learning materials based on local culture, but this figure is significant as it indicates limited access to resources (Q11). A high proportion who disagreed (23.69%) might suggest that teachers who have better access or who have developed their own materials do not experience this difficulty. Q12 shows the lowest level of agreement (48.80%) among all statements, with 25.20% disagreeing and 26.00% neutral. This indicates that there are significant differences of opinion on whether the current curriculum is flexible enough to accommodate regional cultural diversity. This gap is important because it suggests that some teachers see the curriculum as a major barrier, while others may disagree or see possibilities for adaptation within the existing curriculum.

57.20% of teachers agree that learning time is limited for integrating local culture (Q13), indicating that time management is a significant practical barrier to implementation. 63.85% of teachers agree that not all students are enthusiastic about local culture-based learning (Q15), suggesting that implementation does not always proceed smoothly even if teachers are willing. Only 60.89% of teachers agree that adequate books and learning media based on local culture are available (Q17), indicating that the availability of resources remains a significant challenge. These findings are consistent with previous research which identified that the main challenges in implementing

multicultural education in Indonesia are the lack of resources and curriculum flexibility, not a lack of teacher interest or understanding (Dahri et al., 2025; Jaswan et al., 2025).

4. Support from Various Parties

In addition to perceptions and obstacles, the success of implementing multicultural education heavily depends on the support ecosystem available to teachers. This category explores teachers' perceptions of the support they receive from the school, principals, fellow teachers, and parents, as well as their need for additional training. The results of the analysis of five statements related to support and development needs are presented in Table 5 below.

Table 5. Support from Various Parties

Statement	Agree/Strongly Agree (%)	Disagree (%)	Neutral (%)
Additional training needed (Q14)	90,00	3,60	6,40
The school provides full support (Q16)	88,31	2,02	9,68
The principal encourages cultural integration (Q18)	89,20	2,00	8,80
Colleague teachers apply a multicultural approach (Q19)	84,27	2,83	12,90
Parents support culture-based learning (Q20)	86,00	1,60	12,40

There are 90.00% of teachers who state that they need additional training on multicultural education, indicating a high awareness of the need for professional development and readiness to learn. Support from the school (88.31%) and the principal (89.20%) is considered good, showing a conducive environment for implementing multicultural education. 84.27% of teachers agree that other teacher colleagues also implement multicultural learning approaches (Q19), although slightly lower than institutional support, indicating that multicultural practices are not yet fully widespread among all teachers. 86.00% of teachers agree that students' parents support learning based on local culture, showing synergy between the school and families in supporting multicultural education.

5. The Use of Technology in Multicultural Learning

This category measures teachers' perceptions and interest in utilizing technology to support multicultural education. The distribution of responses to five statements regarding the integration of technology in learning based on local culture is presented in Table 5 below.

Table 6. The Use of Technology in Multicultural Learning

Statement	Agree/Strongly Agree (%)	Disagree (%)	Neutral (%)
Technology aids local culture integration (Q21)	94,00	1,20	4,80
Interested in culture-based interactive media (Q22)	93,60	2,00	4,40
AR makes cultural learning more interesting (Q23)	90,32	2,02	7,66
Digital media enhances cultural understanding (Q24)	95,59	2,00	2,41
Willing to learn new technology (Q25)	93,60	0,80	5,60

94.00% of teachers believe that technology can help integrate local culture into learning (Q21), indicating a positive awareness of technology's potential. 93.60% of teachers are interested in using interactive learning media based on local culture (Q22), showing a practical interest in adopting technological solutions. 90.32% of teachers agree that augmented reality (AR) can make cultural

learning more engaging (Q23), suggesting that emerging technology is seen as a useful tool, even though the adoption rate is not yet clear. 95.59% of teachers are confident that digital learning media can enhance students' understanding of culture (Q24), the highest among all statements related to technology. 93.60% of teachers are willing to learn new technologies to support multicultural education (Q25), indicating a positive disposition toward digital transformation in learning. These findings demonstrate a very high enthusiasm for utilizing technology in multicultural education. This aligns with research on TPACK, which shows that when teachers receive proper training and support, they can become enthusiastic adopters of new technologies in their teaching (Joshi, 2025; Wiguna et al., 2024).

DISCUSSION

The Implementation Gap Between Conceptual Support and Perceived Practical Conditions

One of the most important findings of this study is the contrast between teachers' strong conceptual support for multicultural education and the less favorable practical conditions they perceive for its implementation. While 97.20% of teachers agreed that multicultural education is important and 98.80% viewed cultural diversity as an educational asset, substantially fewer teachers reported favorable practical conditions for integrating local culture into learning. Only 53.01% agreed that local culture-based learning materials were easily available, 57.20% identified limited learning time as a challenge, and only 48.80% reported favorable perceptions regarding curriculum accommodation.

This contrast represents an important implementation gap in perceived conditions. The difference between agreement regarding the importance of multicultural education (97.20%) and favorable perceptions of curriculum accommodation (48.80%) is 48.40 percentage points. Similarly, the difference between viewing cultural diversity as an educational asset (98.80%) and reporting favorable access to local culture-based learning materials (53.01%) is 45.79 percentage points.

These differences should not be interpreted as direct evidence of implementation failure because the study measured teachers' perceptions rather than observing classroom practices or measuring implementation fidelity. Rather, they indicate that teachers' strong conceptual support is not fully matched by the practical conditions they perceive as available. The findings therefore suggest that the challenge lies not only in teachers' recognition of the importance of multicultural education, but also in the availability of resources, instructional time, curriculum accommodation, and contextual cultural knowledge needed to translate this recognition into classroom practice.

The findings regarding teachers' cultural knowledge provide further evidence of this contrast. Although 89.15% of respondents agreed regarding the relevance of students' local cultural knowledge, 9.24% selected the neutral response. Agreement regarding the positive use of local languages was also comparatively lower at 87.45%. These findings suggest that professional development should move beyond general awareness of multicultural education and provide teachers with more systematic opportunities to develop contextual knowledge of local communities, cultural practices, languages, and culturally responsive pedagogical strategies.

The resource findings provide a practical explanation for part of the implementation gap. Although teachers strongly support the integration of local culture into learning, only 53.01% reported that local culture-based learning materials were easily available, while 60.89% agreed that adequate books and media were available. This pattern suggests that teachers' willingness to integrate local

culture may be constrained by the availability of suitable instructional resources. Therefore, the development of accessible local culture-based materials is an important practical priority. Such resources may include digital modules, videos, interactive learning materials, and other culturally relevant content that can be adapted to different subjects and educational levels.

The technology findings provide a complementary insight into the implementation gap. Teachers demonstrated high perceived readiness and interest in technology-supported multicultural learning, with agreement ranging from 90.32% to 95.59% across the technology-related items. Specifically, 94.00% agreed that technology can support local cultural integration, 93.60% expressed interest in culture-based interactive media, 90.32% considered augmented reality potentially useful for making cultural learning more interesting, and 95.59% believed that digital learning media could enhance cultural understanding. In addition, 93.60% expressed willingness to learn new technologies to support multicultural education.

These findings indicate strong perceived potential for technology-supported multicultural learning. However, they should be interpreted as teachers' perceived readiness and interest rather than evidence of actual technology adoption. The present study did not measure the frequency of technology use, teachers' technological competence, or the actual implementation of augmented reality in classrooms. Therefore, technology should be viewed as a potential enabling mechanism for addressing resource and accessibility constraints, particularly the limited availability of local culture-based learning materials, rather than as a solution by itself. Effective use of technology would still require relevant cultural content, teacher training, and appropriate pedagogical integration.

Technology readiness also needs to be considered alongside teacher competence and institutional support. The TPACK framework emphasizes the integration of technological, pedagogical, and content knowledge in meaningful technology-supported teaching. In this study, the high demand for additional training (90.00%) indicates that teachers' interest in technology should be accompanied by structured professional development. At the same time, 88.31% of teachers reported school support, 89.20% reported that principals encourage the integration of local culture, and 86.00% perceived parental support for culture-based learning. These findings indicate that the perceived institutional and community environment is relatively supportive, while professional development remains an important area for strengthening implementation capacity.

Taken together, the findings indicate that the main priority is not simply to increase teachers' awareness of multicultural education, but to strengthen the conditions that enable teachers to translate positive perceptions into classroom practice. The most relevant areas identified by the survey are the availability of local culture-based learning resources, curriculum accommodation, instructional time, contextual cultural knowledge, professional development, and technology-supported learning. This study has several important implications:

1. For Teachers and Schools: The findings indicate that teachers have strong conceptual support for multicultural education and high interest in its implementation. However, perceived constraints related to resources, instructional time, and curriculum accommodation may limit the translation of this support into practice. Therefore, schools should focus on providing practical resources and implementation support rather than awareness alone.
2. For Curriculum Developers: The relatively low agreement regarding curriculum accommodation (48.80%) indicates that curriculum conditions are perceived as an important constraint. Therefore,

curriculum guidance should provide practical space for teachers to integrate local cultural content while maintaining the required learning standards.

3. For Teacher Training: The high demand for additional training (90.00%) indicates a clear professional development need. Training should address not only the concepts of multicultural education but also practical strategies for integrating local wisdom, using educational technology, managing instructional time, and developing culturally responsive learning materials.
4. For Technology Development: The high level of interest in technology-supported multicultural learning (90.32%–95.59%) indicates that teachers perceive technology as a potentially useful support mechanism. Development efforts should therefore focus on practical, culturally relevant digital resources that can be integrated into existing classroom learning rather than technology adoption alone.

In this study, the term "implementation gap" refers specifically to the contrast between teachers' strong conceptual support for multicultural education and their less favorable perceptions of selected practical conditions for implementation. It does not represent a direct measurement of classroom implementation fidelity. Based on research findings, here are four strategic recommendations to enhance the effectiveness of technology-based multicultural education in West Kalimantan and similar regions:

1. Development of Technology-Based Multicultural Learning Resources

This aims to provide learning materials based on local culture that are easily accessible to all teachers through a digital platform. Implementation Steps:

- a. Form a cross-disciplinary team (teachers, academics, cultural experts, and technology specialists) to identify and curate local culture-based learning content that aligns with the national curriculum.
- b. Develop a digital database accessible through an online platform, containing:
 - 1) Learning modules (at least 5 per educational level) on folklore, traditions, arts, and local wisdom.
 - 2) Documentary videos on local cultural practices.
 - 3) Interactive student worksheets.
 - 4) Content that can be integrated with AR/VR applications.
- c. Ensure the digital platform is accessible with limited internet connectivity through mobile-first design and offline capabilities.
- d. Provide training for teachers on how to access and use these digital resources.

Success Indicators: At least 80% of teachers in the surveyed areas use at least one material from the digital database in their teaching within the first 12 months.

2. Competency-Based Training Program for Teachers

This training program aims to enhance teachers' competencies in implementing multicultural education by utilizing modern technology. Implementation Steps:

- a. Training of Trainers (ToT): Train a minimum of 20 core teachers from various fields of study and education levels to become instructors or facilitators of multicultural education training.
- b. Mass Training Program: Conduct training for all teachers in the surveyed areas, focusing on:
 - 1) Concepts and practices of multicultural education
 - 2) Integration of local wisdom in the teaching of various subjects

- 3) Use of technology (interactive media, AR, VR) for cultural learning
 - 4) Time and resource management in integrating local culture
 - 5) Learning assessment that is responsive to cultural diversity
- c. Sustainable Approach: Ensuring that training is not a one-time event, but a continuous process through:
- 1) Professional learning communities
 - 2) Mentoring and coaching from lead
 - 3) Periodic workshops to share best practices

target: At least 80% of teachers in the survey area complete the training within 12 months, with certification recognized by the Education Office.

3. Curriculum Advocacy for Flexibility in Local Content Integration

At this stage, the goal is to ensure that the curriculum provides enough space for teachers to integrate local content and perspectives without compromising the achievement of national standards. Implementation Steps:

- a. Curriculum Gap Analysis: Conduct an in-depth analysis of the articles in the current curriculum that restrict the integration of local content.
- b. Policy Recommendation Drafting: Develop specific recommendations for curriculum adjustments, both at the national curriculum level and at the regional curriculum level (KTSP or Merdeka Curriculum at the school level).
- c. Stakeholder Advocacy: Socialize these recommendations to the Provincial and District Education Offices, the National Education Standards Agency, and other stakeholders.
- d. Teaching Material Implementation: Develop practical guides for teachers on how to integrate local culture into learning without deviating from the national curriculum.

Success Indicator: New policies or guidelines that enable the integration of local content to be adopted by at least 70% of schools in the surveyed area.

4. Teacher Cultural Knowledge Enhancement Program

This program aims to enhance teachers' knowledge about the local cultural characteristics of various ethnic groups and communities, as a prerequisite for the implementation of authentic and meaningful multicultural education. Implementation Steps:

- a. School Culture Mapping: Each school creates a comprehensive "cultural map," documenting:
 - 1) The main ethnic groups of the students
 - 2) Languages spoken at home
 - 3) Important traditions, rituals, and celebrations
 - 4) Cultural values upheld
 - 5) Community figures or "knowledge keepers" who can share knowledge
- b. Teacher Knowledge Exchange Program: Organize at least two sessions per year where teachers from different ethnicities or regions share about their respective cultural characteristics.
- c. Partnership with Local Communities: Invite traditional leaders, community elders, or local community representatives to provide teachers with firsthand knowledge about local values, traditions, and wisdom.

- d. Integration into New Teacher Onboarding Programs: Ensure that new teachers receive orientation about the cultural diversity of students and the school community as part of the school's introduction process.

Success Indicators: At least 90% of schools have created a cultural map, and at least 80% of teachers have participated in one knowledge exchange session or program with the local community.

5. Gradual Implementation

The implementation of the four recommendations above should be carried out gradually and in a coordinated manner:

- a. Phase 1 (Months 1-3): Planning and Preparation
 - 1) Formation of the development team
 - 2) Further needs analysis
 - 3) Design of the training program
 - 4) Identification of partners (training institutions, technology developers)
- b. Phase 2 (Months 3-6): Initial Launch
 - 1) Begin development of the digital data bank
 - 2) Conduct ToT for core teachers
 - 3) Start socializing the curriculum recommendations
 - 4) Conduct school culture mapping in pilot schools
- c. Phase 3 (Months 6-12): Scalability
 - 1) Complete and launch the digital data bank
 - 2) Begin mass training for all teachers
 - 3) Continue curriculum advocacy
 - 4) Expand the knowledge exchange program to all schools
- d. Phase 4 (Year 2 and beyond): Sustainability
 - 1) Ensure program continuity through integration into the formal system
 - 2) Monitoring and evaluation of impact
 - 3) Adjustments based on feedback
 - 4) Dissemination of best practices to other regions

RESEARCH LIMITATIONS

1. Geographical Representation: The high concentration of respondents from Mempawah Regency (79.35%) limits the generalization of the findings to the entirety of West Kalimantan. Further research should involve a more balanced representation from all regencies/cities.
2. Gender Sample: The predominance of female respondents (78.14%) may not reflect the composition of male teachers across all fields of study. Further research should investigate whether there are significant differences in perceptions based on gender.
3. Survey Methodology: This survey uses a cross-sectional design, so it cannot determine causality or track changes in perceptions over time. Longitudinal research would provide richer insights.
4. Response Bias: Teachers who are more interested in multicultural education may be more likely to participate in this survey, resulting in selection bias that could inflate approval scores.
5. Instrument Validity: Although the survey instrument was carefully designed, further studies are needed to test the construct validity and reliability of the instrument in different contexts.

CONCLUSIONS

This research provides strong empirical evidence regarding teachers' perceptions of multicultural education in West Kalimantan. The main findings indicate that:

1. Teachers have a strong conceptual understanding and very high agreement (>90%) on the importance of multicultural education and the benefits of integrating local culture into learning.
2. A significant gap arises between aspirations and practical implementation, particularly in terms of resource availability, curriculum flexibility, and in-depth knowledge of students' local cultural diversity.
3. Teachers show very high interest (93.60%-95.59%) in adopting technology to support multicultural learning, creating opportunities to leverage emerging technological solutions such as AR and interactive learning media.
4. Institutional support (from schools and principals) and community support (from parents) are strong, creating a conducive environment for implementing multicultural education.
5. The need for ongoing professional training (90.00%) should be translated into comprehensive and measurable development programs.

This research produces four interrelated strategic recommendations: (1) development of technology-based learning resources, (2) competency-based training programs, (3) advocacy for curriculum flexibility, and (4) enhancement of teachers' cultural knowledge. If implemented well and coordinated, these recommendations can significantly improve the effectiveness of multicultural education in West Kalimantan and can be applied in other regions with similar contexts in Indonesia.

Moving forward, further research is needed to: (1) evaluate the long-term impact of implementing these recommendations on student learning and social cohesion, (2) explore students' and parents' perspectives on multicultural education, (3) analyze best practices from schools that have successfully implemented multicultural education, and (4) compare findings in West Kalimantan with other regions in Indonesia to identify more general patterns.

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