

# Determinants of integrated teaching capacity among teachers in ethnic minority primary schools in northern Vietnam

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## ABSTRACT

This study explores factors affecting the integrated teaching capacity of primary school teachers in ethnic minority schools in the northern mountainous regions of Vietnam. Given the challenges of linguistic and cultural diversity in this context, the research aims to address gaps in current practices and propose measures for improvement. A quantitative approach was adopted, surveying 280 teachers and administrators using exploratory factor analysis (EFA) and multivariate regression. The results identify four primary factors influencing teaching capacity: i) language, culture, and parent coordination; ii) teacher capacity and community participation; iii) teaching materials, equipment, and teacher attitudes; and iv) policies and support from management agencies. Among these, language, culture, and parent coordination are the most impactful. The study underscores the need for targeted teacher training programs and improved collaboration with local communities to enhance teaching outcomes. These findings provide actionable insights for policymakers and educators to improve integrated teaching in ethnically diverse and economically challenged regions.

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## 1. INTRODUCTION

In recent years, there has been a growing trend in the global adoption of integrated teaching in many countries. Integrated teaching proves to be beneficial for students' skills in elementary education. According to Brown [1], integrated teaching can be characterized as: i) the unification of all knowledge; ii) the conceptual unification of the sciences; iii) the unification of the scientific inquiry process; and iv) the interdisciplinary nature of the instruction.

The core focus of integrated teaching is to encourage students to think critically, actively engage in the learning process, and apply acquired knowledge to practical contexts. Through structured learning activities-including experience, understanding, practice, reflection, and application- this approach bridges theoretical learning with real-world relevance [2]. Integrated teaching is widely recognized as a highly effective educational method, which has been extensively researched and implemented in various settings. Elementary school students, as the foundational level for individual development, particularly benefit from this method [3]–[5]. Integrated teaching practices have demonstrated outstanding advantages in avoiding knowledge duplication between subjects, creating interdisciplinary knowledge and skills to solve practical problems and developing an active initiative for students in the learning process [2], [3].

The implementation of integrated teaching in primary schools in the northern mountainous regions of Vietnam, where there are a large number of students from ethnic minorities, presents considerable

challenges due to linguistic and cultural diversity as well as socio-economic disparities. Integrated teaching, with the goal of connecting academic knowledge to real life, must be carefully tailored to meet the diverse needs of students. However, research on implementing this method in the specific context of ethnic minority schools in the northern mountainous regions of Vietnam remains limited.

One of the main challenges in this context is teachers' limited exposure to integrated teaching methods in multilingual and multiethnic environments. This study addresses this issue by providing a data-driven framework to identify the most influential factors affecting integrated teaching capacity. Our key contribution lies in integrating policy, cultural, and pedagogical dimensions into a single explanatory model. To fill that gap, this study focuses on answering the following research questions:

- What factors affect the capacity of primary school teachers to implement integrated teaching in ethnic minority schools in the northern mountainous regions of Vietnam?
- What is the level of influence of each factor on primary school teachers' readiness for integrated teaching?
- What measures can be applied to improve integrated teaching capacity for primary teachers at these schools?

The novelty of this study lies in its contextualized and empirical approach to integrated teaching in a culturally and linguistically diverse setting. Unlike previous studies that either focused broadly on integrated teaching or emphasized general teacher competencies, this research uniquely examines the combined impact of language, culture, parental involvement, teacher capacity, institutional policies, and materials on integrated teaching capacity within ethnic minority primary schools in Vietnam's northern mountainous regions. It is one of the first studies in Vietnam to develop and validate a multi-dimensional explanatory model using exploratory factor analysis (EFA) and regression to quantify these influences. Furthermore, by including variables related to local language barriers, cultural adaptation, and grassroots-level policy implementation, the study bridges theoretical frameworks with practical challenges faced by teachers in under-researched, multi-ethnic educational contexts. This integrated and data-driven perspective contributes new empirical evidence and policy implications for improving educational equity in marginalized communities.

These questions are gradually explored, analyzed, and discussed in the following part of the study based on the EFA method. The results of this study will greatly enhance the understanding of integrated education in practical settings, specifically for the education of students facing significant challenges, such as those belonging to ethnic minority groups in the northern mountainous regions of Vietnam. At the same time, from clearly showing the interest, readiness, difficulties, and challenges of teachers when implementing integrated teaching through the practical context and the measures proposed in the study will provide practical guidance for teachers, educational administrators, and policymakers. This will help integrate teaching through effective practical contexts for students in ethnic minority primary schools in the northern mountainous regions of Vietnam. This study provides new empirical evidence by focusing specifically on teachers from ethnic minority primary schools in the northern mountainous areas, which has not been extensively addressed in our previous publications. While our earlier work analyzed general barriers in integrated teaching, this paper uniquely integrates cultural-linguistic and policy-related variables to model teacher capacity.

## 2. LITERATURE REVIEW

Many authors have researched and pointed out the advantages of integrated teaching in helping students connect scientific knowledge with real life [2], [6], [7]. This approach transforms learning into a meaningful experience that closely relates to students' daily lives [8]. In Australia, Todd [9] affirmed the difference between regular teaching content and integrated teaching as well as the positive effects in integrated teaching classes. Based on this research, the key criteria and requirements for integrated teaching include the following: i) integrated teaching is associated with learning and researching many different subjects, learning activities are clearly designed; ii) the school has a flexible schedule; iii) teachers teach in groups, develop curriculum, have cooperation and planning among teachers, school library staff; and iv) students take a central role in the learning process, benefiting from positive interactions among peers and between teachers and students, as well as collaboration within teacher groups.

Since the early 2000s, research on integrated teaching has expanded significantly. Many researchers have confirmed that this approach encourages active student participation and enhances the interactive nature of the learning environment. Studies have shown that students in integrated teaching classrooms perform more effectively than those in traditional teaching settings [10], [11]. In addition, Blegur *et al.* [12], emphasized integrated learning models as essential for pre-service teacher development, while the research by Severini *et al.* [13] highlighted inquiry-based approaches in teacher training. Shannaq [14] also explored the importance of e-learning integration in enhancing students' engagement and management information systems (MIS) skill development. These findings reinforce the need for context-aware and technology-enhanced approaches to integrated teaching in multicultural settings.

Teacher professional development can benefit teachers in classrooms [15]. In primary schools, the quality of teaching in general and integrated teaching in particular is strongly influenced and determined by teachers [16], [17]. They also have an important role in creating good learning environments [18] and have a strong impact on student learning outcomes [19]. Developing an integrated curriculum not only enhances teaching efficiency but also bridges the gap between academic knowledge and its real-life applications, especially for primary school students [20]. In a related study focusing on intercultural education, researchers investigated the cultural and language barriers faced by Lao students at Vietnamese universities [21]. Using a mixed-methods approach with 624 students, the study revealed significant challenges in Vietnamese language proficiency and academic cultural adaptation. However, it also highlighted the vital role of teacher and peer support in facilitating students' academic and social integration. These findings underscore the need for culturally responsive pedagogical strategies and language support mechanisms in multicultural education contexts. Such insights are highly relevant to efforts aimed at improving integrated teaching for ethnic minority students in Vietnam's primary schools [21].

As a result, evaluating teachers' perceptions, opinions, and practices regarding integrated teaching becomes crucial for devising effective measures to support its implementation. Research has analyzed the necessary conditions for teachers to organize integrated teaching effectively, emphasizing the need to allocate sufficient time for building teacher-student relationships and conducting comprehensive student assessments. Additionally, teachers must focus on connecting knowledge across disciplines, expanding scientific content tied to real-life contexts, rather than merely repeating lessons in a single subject. Teachers' readiness for integrated teaching is reflected in their willingness to share responsibilities, collaborate with colleagues, and effectively transfer knowledge across different domains. In 1979, Vietnam advocated implementing the third educational reform, which aimed at the educational principle of "learning combined with practice, education combined with productive labor, schools associated with society." Up to now, integrated teaching has been still one of the important approaches emphasized in the primary school education program and is implemented for many students in different regions across the country [22].

However, Vietnam is a multi-ethnic country with a large number of ethnic minority groups (53/54 ethnic groups). Ethnic minority groups live mainly in remote areas and their economic life face many difficulties [23]. The level of awareness between ethnic minority students and Kinh students also has many differences right from the age when children start going to school. Therefore, the impact and intervention of teachers on ethnic minority students right from the primary level plays an important role [24]. In order to balance that gap, the Party and State of Vietnam always advocate equality, solidarity and mutual support for ethnic minority students. In particular, teachers must adapt their teaching approach, flexibly apply integrated methods to connect teaching content with real life for ethnic minority students. However, this implementation process still reveals many difficulties because of its own characteristics in terms of personal components and context, especially when Vietnam began to implement the new general education program. This shows that there needs to be more research and attention to the organization of integrated teaching through practical contexts for ethnic minority students in the northern mountainous regions of Vietnam.

To date, there have also been a number of studies on fostering and developing teaching capacity for teachers in areas with ethnic minority primary school students in Vietnam and policies to promote education in areas with ethnic primary school students. Hieu and Nam [25] conducted a study on integrated teaching for primary school students in the context of curriculum innovation and new textbooks. They also created and defined the fundamental competency components of teachers required for implementing integrated teaching. This investigation was conducted to assess the professional standards of primary school teachers in Vietnam. The competencies encompassed in these groups are as: i) the capacity to establish comprehensive teaching objectives; ii) the capacity to strategize integrated teaching; iii) the capacity to formulate integrated lesson plans; iv) the capacity to employ language in integrated teaching; v) the capacity to cooperate in integrated teaching; vi) the capacity to devise and construct an integrated teaching environment; vii) the capacity to link lesson content and application; viii) the capacity to arrange integrated teaching; and ix) the capacity to assess learning outcomes in integrated teaching [25]. Despite these advancements, there is still a lack of comprehensive studies that explore the challenges faced by primary school teachers in implementing integrated teaching for ethnic minority students in Vietnam's northern mountainous regions. This gap is particularly significant in the context of the country's ongoing curriculum and textbook reforms.

### 3. METHOD

#### 3.1. Research design

This study employs quantitative research methods to identify and analyze the factors affecting the capacity to implement integrated teaching in primary schools in the northern mountainous regions of Vietnam. Specifically, EFA and multivariate linear regression analysis were used. These methods were

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selected due to their proven effectiveness in uncovering underlying relationships among variables and measuring the influence of various factors. EFA was selected due to its strength in identifying latent constructs underlying teacher perceptions, especially in settings with complex, multidimensional influences such as language, culture, and policy. This method is particularly suitable for exploring relationships among variables in under-researched educational contexts, such as ethnic minority schools. By applying these techniques, the study establishes a strong analytical foundation to explore the challenges and opportunities associated with integrated teaching in this specific context.

### 3.2. Research subjects

Research subjects include 280 teachers who are teaching at primary schools for ethnic minority students in the northern mountainous regions of Vietnam, including Lao Cai, Yen Bai, Thai Nguyen, Ha Giang, Tuyen Quang, and Phu Tho. These subjects were randomly selected and the survey was conducted according to the link sent on Google Form. We addressed and studied a variety of factors, including gender, age, qualification, and years of working experience. The distribution is specifically shown in Table 1.

Table 1 shows that female teachers made up the main proportion (76.4%), and the proportion of male teachers was 23.6%. This ratio is also similar to the gender ratio of primary school teachers in Vietnam in which the majority of primary school teachers are women. Most of the teachers in the study were experienced and have worked in primary education for 6 years or more. The number of teachers aged 30-45 years old accounts for 40.0%, teachers aged over 45 years old account for 48.9%, and only 11.1% of young teachers are under 30 years old. Regarding qualification, among the number of teachers participating in the survey, the number of people with university degrees is the largest (96.8%) while post-graduate training level is 3.2%. According to Vietnam's 2019 Education Law, all survey participants met primary school teacher training standards.

Table 1. Information on research subjects (n=280)

Research sample	Gender		Age			Qualification		Working experience		
	Female	Male	Under 30 years old	30-45 years old	Over 45 years old	Graduate	Post-graduate	Under 10 years	From 10 to 20 years	Over 20 years
Quantity	214	66	31	112	137	271	9	55	75	150
Rate (%)	76.4	23.6	11.1	40.0	48.9	96.8	3.2	19.6	26.8	53.6

### 3.3. Research tools

The primary data collection tool used in this study is a questionnaire consisting of 14 questions designed on a Likert scale ranging from 1 to 5. This questionnaire was developed to systematically gather information on various aspects related to integrated teaching. Specifically, it addresses key areas such as teachers' capacity, attitudes, language and cultural considerations, as well as the level of support from parents and the community. These components were carefully selected to ensure a comprehensive evaluation of the factors influencing the implementation of integrated teaching.

### 3.4. Validity of the research tool

To ensure the validity of the research tool, the questionnaire was developed based on existing theories and models related to integrated teaching and the factors influencing its implementation in ethnic minority primary schools in the northern mountainous regions of Vietnam. The questionnaire was reviewed by experts in the field of education and integrated teaching, who provided feedback on the content and structure. Based on their feedback, the questionnaire was revised to ensure that it accurately captured the necessary concepts and was easily understood by the target group of primary school teachers. Additionally, the validity of the tool was assessed through EFA. The results of the EFA indicated that the factors in the questionnaire were appropriately grouped, and there were high correlations between items within the same factor.

### 3.5. Data analysis

EFA was utilized in order to assess the data that was collected for this investigation. The EFA is a quantitative analysis technique that reduces a large collection of interdependent measures to a smaller number of variables, which are referred to as components while preserving the overwhelming majority of the variables' initial information content. The objective is to gain an understanding of the fundamental structure of a collection of variables. Indicators in the collection are assumed to be linear functions of one or more general components and one EFA component. This assumption is made for each indicator in the collection. Unobservable factors that have an effect on a large number of indicators in a collection are referred to be common components. Unique components are latent variables that are not designed to index the correlations

that are being considered and are supposed to influence only one of the indicators that are included in the set (the set of indicators). Before the EFA was finished, descriptive data were used to determine whether or not they were relevant to the 14 survey questions. Both the average of all responses and the standard deviation (SD) for each question were computed by the research team and included in the descriptive statistics table. Since the mean of a statement may potentially have an impact on the quality of the correlations between the remaining parts, the team decided to remove it from the table if it was somewhat near to either 1 or 5. After conducting tests to determine the skewness and curvature of the distribution, it was determined that the distribution was normal. The exploratory component analysis was carried out using the SPSS 26 program after the normality of the distribution had been established.

To determine the relative significance of each component, multivariate regression analysis is used. The standardized regression equation is used to establish the order in which the independent variables affect the dependent variable. This is made possible by the consistency of the units and SD of the variables included in the regression model over time [26]. The standardized regression equation has the form as in (1):

$$Y = \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i + \varepsilon \quad (1)$$

We will be able to determine which variable  $X_i$  has a strong or weak influence on variable  $Y$  by utilizing the standardized regression equation. This determination will be based on the absolute value of the standardized regression coefficient. When the absolute value of the coefficient is made larger, it indicates that the component is of greater significance. Within the context of  $Y$ , the variable is more significant, in which:

$Y$ =dependent variable

$X_1, X_2, X_i$ =independent variables

$\beta_1, \beta_2, \beta_i$ =standardized regression coefficient

$\varepsilon$ =observational error

This study assumes that teachers' self-reported perceptions and practices accurately reflect their actual capacity and behavior. While self-reported data can be subject to social desirability bias, previous research has confirmed its reliability in similar educational settings. The effect of this assumption is mitigated by triangulating results through robust statistical tools such as EFA and regression, which help validate relationships among factors.

#### 4. RESULTS

Before confirming the factors that influence the capacity to implement integrated teaching for primary school teachers in the mountainous regions of the northern part of Vietnam, it is required to check Kaiser-Meyer-Olkin (KMO) and Bartlett's tests. This can be accomplished by processing data using SPSS software. If the KMO measurement is larger than .6 and the sig value is less than .05, then the parameters that were derived by the EFA method are considered to be acceptable standards. Based on the information shown in Table 2, it can be concluded that the KMO measurement has a value of .932, which substantiates the appropriateness of the analysis.

Bartlett's test of sphericity produces a value of  $\chi^2 (91)=883.953$   $p$ , which is less than .000. This indicates that there is a significant correlation between the variables that have been observed, which is sufficient for exploratory component analysis. Table 3 presents the extracted main components and their corresponding variance percentages resulting from the EFA.

Table 2. The test of sphericity conducted by KMO and Bartlett

KMO		.717
The sphericity test developed by Bartlett	Chi-square	883.953
	df	91
	Sig.	.000

Table 3. Main components

Component	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative (%)	Total	% of Variance	Cumulative (%)	Total	% of Variance	Cumulative (%)
1	3.449	24.635	24.635	3.449	24.635	24.635	2.417	17.263	17.263
2	2.046	14.616	39.251	2.046	14.616	39.251	2.259	16.136	33.399
3	1.275	9.109	48.360	1.275	9.109	48.360	1.684	12.026	45.425
4	1.141	8.147	56.507	1.141	8.147	56.507	1.552	11.083	56.507
5	.987	7.048	63.555						

The results from the EFA provide insights into the key components that influence the capacity of primary school teachers to implement integrated teaching. The analysis identified four distinct components, which together account for 56.507% of the total variance in teachers' ability to conduct integrated teaching. These components include factors related to language and culture, teacher capacity, teaching materials, and community participation.

Component 1, which is related to language and culture, has the greatest influence, explaining 24.635% of the variance. This suggests that teachers' awareness and understanding of local languages and cultural contexts play a significant role in their ability to effectively implement integrated teaching. Component 2, which focuses on teacher capacity and community participation, contributes 14.616%, indicating that the involvement of teachers and the local community is crucial for the success of integrated teaching. The other two components, related to teaching materials and support from policies and management, account for smaller but still significant portions of the variance. This distribution of influences underscores the multifaceted nature of integrated teaching and highlights the importance of addressing various factors, including cultural understanding, teacher readiness, and external support, to improve its implementation in primary schools. Table 4 presents the rotated component matrix, which provides further detail on how the individual items load onto these components.

Using the information included in the rotational component matrix table, we are able to determine the names of the components that have an impact on the teachers' capacity to conduct integrated teaching in primary schools located in the mountainous regions of the northern part of Vietnam. The naming of components is based on Hair *et al.* [27]. In accordance with the findings presented in Table 5, each of the components possesses Cronbach's alpha coefficients that are higher than .60. Therefore, the size of components that affect the capacity to implement integrated teaching for primary school teachers in the northern mountainous regions of Vietnam is sufficiently trustworthy. The analysis of variance (ANOVA) and coefficients provide additional foundations for determining the factors that influence the capacity of educators to conduct integrated teaching.

**Table 4. Rotated component matrix**

Variables	Component			
	1	2	3	4
LC1	.704			
LC2	.695			
LC3	.691			
LC4	.671			
LC5	.617			
TC1		.735		
TC2		.684		
TC3		.644		
TC4		.584		
TM1			.844	
TM2			.710	
TM3			.537	
PS1				.812
PS2				.704

**Table 5. Names of components**

Code	Observable variable	Load factor
Factor 1 (X1): language, culture and parent coordination in integrated teaching (Cronbach's alpha=.732)		
LC1	Level of adaptation of teaching content to the language and culture of local ethnic minority students.	.704
LC2	Language barrier of ethnic minority students and its impact on learning.	.695
LC3	Community participation and influence in the educational process.	.691
LC4	Support and respect for the cultural diversity of ethnic minority students in education.	.671
LC5	Level of commitment and support from parents.	.617
Factor 2 (X2): teacher capacity and community participation in integrated teaching (Cronbach alpha=.665)		
TC1	Professional qualifications and integrated teaching capacity of teachers.	.735
TC2	Teachers' experience and practical knowledge of local culture.	.684
TC3	Opportunities and quality of training courses to improve integrated teaching capacity for teachers.	.644
TC4	Involvement and support from the local community.	.584
Factor 3 (X3): teaching materials, equipment and teacher attitudes in integrated teaching (Cronbach alpha=.609)		
TM1	Facilities and equipment to organize integrated teaching.	.844
TM2	Availability and quality of integrated instructional materials.	.710
TM3	Teachers' readiness and attitudes towards educational innovation.	.537
Factor 4 (X4): policies and support from management agencies in integrated teaching (Cronbach alpha=.611)		
PS1	Support and direction from education management agencies.	.812
PS2	Educational development policies and resources provided to schools.	.704

The results in Table 6 show that the significance level is  $.000 < .05$ , indicating that the regression model is suitable for reality. This means that the independent variables have a linear correlation with the dependent variable and the confidence level is 95%. Table 7 provides a detailed summary of the regression model's coefficients. The coefficients for each variable indicate the strength of their influence on the dependent variable.

Table 6. ANOVA

Model	Source	Sum of squares	df	Mean square	F	Sig.
1	Regression	2346.591	4	586.648	21.915	.000
	Residual	7361.681	275	26.770		
	Total	9708.271	279			

Table 7. Summary of the multivariate regression model (Coefficients)

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	49.579	.309		160.343	.000
	Language, culture and parent coordination	1.733	.310	.294	5.593	.000
	Teacher capacity and community participation	1.723	.310	.292	5.564	.000
	Teaching materials, equipment and teacher attitudes	.926	.310	.157	2.990	.000
	Policies and support from management agencies	1.257	.310	.213	4.060	.000

Following the completion of the EFA analysis, the authors made use of a regression model in order to assess the influence of various components on the integrated learning capability of primary school teachers in the northern mountainous regions of Vietnam. All of the variables have a significance level that is lower than .05, which indicates that they are all significant in the regression model. To put it another way, this variable exhibits an influence on the dependent variable which is referred to as the “capacity to implement integrated teaching”. Based on the research results, the standardized regression equation to determine the capacity to implement integrated teaching of primary school teachers in the northern mountainous regions of Vietnam is determined based on the (2):

$$Y = .294 * X1 + .292 * X2 + .213 * X4 + .157 * X3 + \epsilon \quad (2)$$

in which:

Y=the integrated teaching capacity of primary school teachers in the northern mountainous regions of Vietnam

X1=language, culture, and parent coordination

X2=teacher capacity and community participation

X4=policies and support from management agencies

X3=teaching materials, equipment, and teacher attitudes

$\epsilon$ =Observational error

According to the regression equation, we can see that all of the independent variables have an effect on the capacity of primary school teachers in the mountainous regions of Vietnam's northern region to execute integrated teaching, with the following levels of influence decreasing in order: language, culture and parent coordination; teacher capacity and community participation; policies and support from management agencies; teaching materials, equipment and teacher attitudes. Of these four basic components, language, culture and the coordination of ethnic minority students' parents have the strongest impact on teachers' capacity to deploy and organize integrated teaching in primary schools in the northern mountainous region ( $\beta=.294$ ). This reflects that when the language, culture and coordination of ethnic minority students' parents with teachers and schools are improved by 1 unit, the capacity to successfully implement integrated teaching will increase by .294 units, assuming other components remain unchanged.

## 5. DISCUSSION

The results of this study reaffirm previous research asserting that the teaching process is strongly influenced by social and cultural contexts [28]. To understand their own students, teachers first need to understand their cultural identities [28]–[30]. In specific areas such as integrated science and technology education, prior studies have emphasized that contextual and cultural components play a crucial role in shaping teaching decisions and classroom practices [31]–[33]. In the context of ethnic minority education, understanding local culture and language allows teachers to build positive relationships with students and

their families, facilitating the integration of real-life contexts into teaching [34]–[36]. Teachers who are familiar with the language and customs of ethnic minority students in Vietnam's northern mountainous regions are better positioned to collaborate with parents and design culturally relevant and engaging lessons.

Another important finding is that knowledge of language and culture, along with parent–teacher collaboration, appears to precede teaching competence and community engagement in influencing integrated teaching capacity. This contrasts with the common assumption that teaching competence is the most critical factor. The results show that when teachers possess strong cultural understanding and maintain close relationships with families, they are more capable of designing and implementing effective integrated teaching that aligns with the community context [37]–[41].

These findings are consistent with prior studies emphasizing the importance of teachers' sociocultural knowledge and their ability to collaborate with peers in organizing integrated lessons [37]. They also align with the view that culturally responsive teaching requires deep knowledge of students' lives and the ability to integrate that knowledge into instruction [29]. Furthermore, these findings complement research showing that community-connected instruction significantly improves learning outcomes and student engagement [40], [41]. Compared to previous research which often addressed integrated teaching in general contexts, this study offers a novel contribution by situating integrated teaching within a multi-ethnic, resource-constrained environment, and empirically validating the influence of language, culture, and local policy implementation. This specificity adds new theoretical and practical insights to the field of multicultural education.

To foster integrated teaching capacity among teachers in ethnic minority primary schools, it is essential to strengthen professional development programs focused on sociocultural understanding. Training should cover local languages, customs, traditions, and communication norms, enabling teachers to connect with students and families more effectively. These programs should be tailored to reflect the unique characteristics of different ethnic communities.

In addition, support from educational managers is vital. Teachers must be equipped not only with pedagogical skills but also with the ability to adapt curricula to local realities, cultivate empathy, and build inclusive, equitable learning environments. These requirements align with six key characteristics of culturally responsive teachers: i) being sociocultural conscious; ii) holding affirming views of diverse students; iii) being committed to equity and change; iv) understanding how learners construct knowledge; v) knowing students' lives; and vi) designing instruction that bridges students' existing knowledge with new learning experiences [29].

Policies and support from management agencies also affect teachers' integrated teaching capacity. These policies can be developed and implemented by management agencies related to providing regulations, instructions, support and encouragement for teachers to implement integrated teaching. In addition, training courses, teaching resources, teaching equipment, and physical and mental encouragement must be provided to create trust and motivation, helping teachers organize effective integrated teaching. This result also has many similarities with components mentioned in previous studies related to the development of teaching in general, including integrated teaching, which needs to be considered in making appropriate educational policies [39], [42]. It is necessary to carefully consider the role of teachers in education reform policies [43], [44]. The Government of Vietnam has issued many policies related to education and training in ethnic minority areas, such as Decision No. 47/2001/QĐ-TTg of the Prime Minister which clearly stated that “priority is given to training ethnic minority teachers at all school levels in districts with large ethnic minority populations”; Decision No. 159/2002/QĐ-TTg dated November 15, 2002 on “implementing the Program to solidify schools, preschool and high school classrooms, build dormitories for pupils and public houses for teachers working in mountainous ethnic areas with many difficulties”; Decision No. 05/2022/QĐ-TTg dated March 23, 2022 of the Prime Minister on “credit support for students and pedagogical students in difficult circumstances”. With the policies, it can be seen that the current Government of Vietnam is also very interested in and prioritizes training and fostering teachers for educational establishments with many ethnic minority groups in the northern mountainous regions of Vietnam. The government also has many preferential policies, such as allowances to increase teachers' income, creating favorable living and working conditions for teachers from localities throughout the country taking teaching tasks in ethnic minority areas. Professional development programs are regularly organized to enhance teacher qualifications. Therefore, these policies also partly bring positive impacts on the integrated teaching capacity of primary school teachers in the northern mountainous regions of Vietnam.

The final component affecting the integrated teaching capacity of primary school teachers in the northern mountainous regions of Vietnam is the teaching materials, equipment and teachers' attitudes about integrated teaching. This result agrees with previous studies related to the influence of teachers' beliefs and attitudes to teaching [6], [16], [37], [43] and teaching equipment is also one of the components of organizing effective teaching. In addition, when comparing the influence of components on the integrated teaching



capacity of primary school teachers in the northern mountainous regions, it shows that teachers also have positive attitudes and beliefs in the usefulness of integrated teaching for ethnic minority students. At the same time, teaching materials and equipment are not components that play a large role in creating effective integrated teaching and helping to improve teachers' integrated teaching capacity. This result shows that in order to improve the capacity of integrated teaching for primary school teachers in the northern mountainous regions of Vietnam, it is necessary to continue to strengthen teachers' positive attitudes and beliefs about how to implement and the positive effects that integrated teaching brings to ethnic minority students. It is necessary to organize activities, events, and teacher forums to create opportunities for collaboration and sharing of experiences on integrated teaching. At the same time, teachers should be provided with diverse and culturally appropriate teaching materials and facilities for students of ethnic groups in the northern mountainous regions. Besides, they need to be encouraged to be creative and take advantage of practical classroom resources, schools in the process of integrated teaching.

Enhancing integrated teaching capacity in ethnic minority primary schools in Vietnam's northern mountainous regions requires a multifaceted approach. Key components include improving teachers' sociocultural understanding, strengthening collaboration with families and communities, offering context-specific professional development, and maintaining consistent policy support. While teacher beliefs and attitudes are generally positive, further investment in culturally appropriate materials, classroom resources, and experience-sharing platforms is needed to fully realize the potential of integrated teaching in multicultural settings.

## 6. CONCLUSION

This study highlights the components influencing the capacity of teachers to implement integrated teaching in ethnic minority primary schools in the northern mountainous region of Vietnam. Based on data collected from 280 teachers and administrators, the findings reveal that local language and culture, along with parental cooperation, are the most significant factors affecting the successful application of integrated teaching methods. Additionally, other elements, such as teacher capacity and community involvement, availability of teaching materials and equipment, teacher attitudes, and supportive policies from management agencies, also contribute significantly to the effectiveness of integrated teaching implementation. These findings emphasize the multifaceted nature of challenges and opportunities in this context, underlining the interplay between teacher competencies, cultural and social factors, and institutional support systems.

Given these results, we strongly recommend that policymakers and educational administrators prioritize strategies to strengthen teacher capacity and provide enhanced support and resources, particularly in areas that promote students' cultural and language-related competencies. These measures are crucial for improving the quality of integrated teaching, enabling teachers to establish effective and student-centered learning environments. By fostering these conditions, students can connect their knowledge to real-life contexts, achieve holistic development, and benefit from educational practices that reduce inequalities between the northern mountainous regions and other parts of Vietnam.

The study's key contribution lies in establishing a localized, evidence-based framework for understanding integrated teaching in ethnic minority contexts-an area previously underexplored in Vietnamese educational research. Furthermore, future research could extend this study by incorporating additional variables, such as teachers' workload, level of training and pedagogical experience, and ethnicity of teachers, to provide a more comprehensive understanding of the challenges faced. Another direction could involve exploring the cultural characteristics of ethnic minority students and their impact on the quality and effectiveness of education in the region. Investigating the integrated approaches applied by primary school teachers- including environmental and technological educational content tailored for ethnic minority students- could also yield valuable insights. Future research should also consider combining quantitative and qualitative methods, including observations of administrators, teachers, and students during integrated teaching activities, to capture diverse and practical information about the integrated teaching process. This dual-method approach could provide richer insights into improving educational practices for ethnic minority primary school students in the northern mountainous regions of Vietnam.

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## AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest. There are no known financial, personal, or professional relationships that could have influenced the work reported in this paper.

## INFORMED CONSENT

We obtained informed consent from all participating teachers and administrators prior to data collection, ensuring that their participation was voluntary and confidential.

## ETHICAL APPROVAL

The study was conducted in compliance with all relevant national regulations and institutional policies. It was reviewed and approved by the Institutional Review Board of Thai Nguyen University of Education (Decision No. 547/QD-DHSP).

## DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author [CTHN] upon reasonable request. Due to privacy and confidentiality agreements with participants, the dataset is not publicly available.

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