

The impact of professional autonomy on the teaching effectiveness of geography teachers: a case study in Vietnam

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ABSTRACT

Professional autonomy is a crucial factor influencing teacher motivation, satisfaction, and performance. However, much of the existing research focuses on developed countries, while evidence from developing countries, particularly Vietnam, remains limited. This study aims to identify teachers' professional autonomy as a crucial mediating mechanism linking contextual and organizational conditions with teaching effectiveness in schools. A cross-sectional survey was conducted with 368 geography teachers in high schools in Hanoi. The proposed research model was tested using partial least squares structural equation modeling (PLS-SEM). The results show that leadership and organizational culture have the strongest impact on teachers' professional autonomy, while the indirect influence of educational policy is relatively modest. These findings suggest that contextual, leadership, and organizational conditions contribute to teaching effectiveness by expanding teachers' professional autonomy in classroom practice. This study expands on existing models of teaching effectiveness and leadership by positioning teacher autonomy as a crucial mediating mechanism linking policy and the organizational environment to subject-level teaching outcomes. Empirically, it provides concrete evidence for the subject of geography education, an area where large-scale quantitative studies on teacher autonomy and teaching effectiveness remain limited, particularly in developing and transitioning education systems.

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1. INTRODUCTION

In recent decades, educational curriculum reforms have focused on developing learners' competencies. Teachers must not only impart knowledge but also design flexible learning environments that integrate and adapt to different contexts. In the context of educational innovation, teachers need to be empowered to make professional decisions to interpret and restructure the curriculum [1]. This shows that, in essence, curriculum reform and educational innovation must reform professional autonomy. When teachers' autonomy is limited, innovation easily becomes superficial [2].

Research on teachers' professional autonomy has demonstrated a positive correlation between autonomy and intrinsic motivation: when teachers are satisfied with their profession, they are more likely to actively innovate [3]. Professional autonomy is one of the three basic psychological needs that determine the

quality of motivation and professional performance [4]. For geography, the requirement for professional autonomy for teachers is even more evident and necessary. Geography is an interdisciplinary field with unique spatial elements, especially for secondary school geography teachers. Teaching geography requires integrating local data, analyzing maps, and connecting global issues with specific contexts [5]. Therefore, to ensure effectiveness, geography teachers need to adjust the content to the socio-environmental context and incorporate current events. This is difficult to achieve in a tightly controlled environment. However, autonomy does not exist independently; it is influenced by policies and leadership styles at the school level [6]. This raises an important theoretical question: through what mechanisms does professional autonomy affect teaching effectiveness, especially for geography teachers?

Research on leadership and educational management has shown that leadership positively influences learning outcomes by indirectly shaping teachers' teaching environments [7]. However, most research on leadership and educational outcomes often models direct influence, lacking a clear mediating model between the school level (leader) and the classroom level [8]. Professional autonomy is often viewed as an independent predictor, rather than a mediating variable linking other factors to teaching effectiveness. Geography, a subject heavily focused on social sciences, has received little attention in research on autonomy. Therefore, this gap is of significant theoretical importance. If professional autonomy is considered an intermediary mechanism in transforming policy structures, leadership, and infrastructure that influence classroom practices, then failing to examine this intermediary role may lead to misunderstandings of the true impacts of governance reform.

Furthermore, empirical studies on the impact of policy and leadership decentralization on Western education systems [9] have been extensively discussed. Meanwhile, in Southeast Asian systems, where centralized governance remains dominant, there is less research on intermediary mechanisms. Studies mainly focus on the direct impact of policy, leadership, and infrastructure factors on the quality of education, or on teachers and students. At the same time, very few studies focus on the specific knowledge characteristics of each subject. Geography, with its spatial and interdisciplinary characteristics, may require a specific level of autonomy for teachers to deliver quality instruction. Therefore, this study poses two research questions:

- What factors influence the autonomy of geography teachers?
- How does autonomy affect teaching effectiveness?

In the context of Vietnamese education, the relationship between organizational structure, policy framework, and teacher autonomy is increasingly seen as a crucial mechanism for improving teaching quality and student learning outcomes. Since the promulgation of Vietnam's 2018 Education Program, the scope of teacher decision-making has been officially expanded, positioning autonomy as a driving force for innovation in pedagogical methods and student-centered learning [10]. However, empirical evidence suggests that the effectiveness of this autonomy depends on organizational conditions, including school leadership, peer collaboration, and school support systems [11]. According to TALIS 2018 results in Vietnam, teacher autonomy significantly influences teaching activities, directly promoting better student learning outcomes, especially when supported by a professional and collaborative work environment [12]. Conversely, rigid administrative control and unclear policies can limit teachers' autonomy, reducing their ability to respond to learners' needs through teaching [13]. Overall, studies emphasize that teacher autonomy in Vietnam is not simply an individual ability but a structure clearly influenced by institutions. Consistent policy design and organizational culture within schools will support teaching quality and student achievement.

In recent years, the Vietnamese education system has undergone extensive reforms, most notably the implementation of the 2018 General Education Program. These reforms have shifted from a content-based approach to a competency-based approach, emphasizing the development of learners' qualities and competencies, and enhancing practicality and experiential learning in teaching. Furthermore, the digital transformation of education, driven by technological infrastructure and online learning platforms, has facilitated innovation in teaching methods and educational management. However, this reform process also presents significant challenges. Teacher shortages and limitations in facilities and teaching equipment persist in many localities, especially in disadvantaged areas [14]. In addition, the implementation of integrated subjects (such as history and geography) has encountered considerable difficulties because teachers are primarily trained to teach each subject separately. At the same time, teachers' limited technological capabilities also pose a barrier to the digital transformation process.

For geography teachers, the specifics of their profession further highlight these challenges. The local education content in the 2018 General Education Curriculum requires teachers to integrate interdisciplinary knowledge and deeply explore sources of local culture, economy, and environment, while learning resources are scattered and lack a systematic approach. In particular, since Vietnam merged provinces and reorganized administrative units, local education materials have not been updated in time for teaching. Therefore, Vietnamese education is undergoing significant transformation, with many opportunities but also numerous challenges. For geography teachers, the need for innovation lies not only in teaching methods but also in integrating practical applications and adapting to the rapidly changing educational landscape.

The novelty of this study lies in examining the relationship between professional autonomy and teaching effectiveness in the context of Vietnam's ongoing educational reforms. This research examines the professional autonomy of geography teachers, a subject that demands high levels of interdisciplinary integration, the exploration of local contexts, and the use of diverse learning resources. Furthermore, the study reflects the context of policy changes stemming from the merger of administrative units in Vietnam, thus requiring the updating of local education content to meet the requirements of the 2018 General Education Program. Finally, the study contributes by connecting professional autonomy with the ability to utilize local contexts and teaching effectiveness. This creates a new perspective, valuable both theoretically and practically, in current educational research.

2. THE COMPREHENSIVE THEORETICAL BASIS

2.1. Professional autonomy and factors affecting professional autonomy

2.1.1. Teacher autonomy

The theory of self-determination asserts that only when basic human needs—autonomy, competence, and commitment—are met are they ensured [4]. When autonomy needs are met, individuals tend to exhibit higher levels of commitment and performance. Therefore, working in an environment that supports autonomy will increase creativity and professional commitment [15].

In the field of education, teacher autonomy (AGT) is the sense of the right to make decisions in professional teaching activities rather than being controlled by administrative mechanisms [16]. AGT is one of the most important elements of teacher professionalism [17], enabling them to control their teaching and environment [18] and to take greater responsibility in performing their duties [19]. In general, AGT plays a crucial role in the effective management of the teaching process [20] and provides benefits for both teachers and students in various ways. Autonomous teachers are more motivated and satisfied with their work because they can control their work area, increasing their dedication and confidence, which ultimately contributes to positive behavior within the organization and impacts the success of any educational transformation [21].

2.1.2. Educational policy and its impact on teacher professional autonomy

Numerous studies have demonstrated that teacher autonomy is highly dependent on educational policy (EPY). The degree of control or empowerment in teaching affects teachers' professional decision-making abilities [2]. Teachers' professional initiative depends heavily on policy factors [1]. Different educational governance models create differences in the level of teacher autonomy. Specifically, centralized policies tend to restrict teachers' decision-making power in curriculum and teaching matters [22]. This shows that EPY will either facilitate or restrict teacher autonomy.

In addition to affecting teacher autonomy, EPY also has an indirect or direct impact on teaching effectiveness. Previous studies [8], [23] affirm that school-level policies and leadership influence learning outcomes through mediating variables such as teachers (their motivation and working conditions). Meanwhile, Skaalvik [3] argue that professional autonomy positively impacts teachers' intrinsic motivation, thereby reducing occupational burnout and increasing teaching effectiveness. Therefore, policies affecting teachers' autonomy will indirectly affect the quality of teaching. Following a hierarchical approach, Rohmadi *et al.* [24] suggest that educational policies do not directly impact learning outcomes but depend on factors at lower levels, such as the school level (where the policy is implemented). Therefore, the degree of policy flexibility will determine the scope of professional autonomy that teachers can exercise.

In teaching history and geography, Vietnam's education policy allows teachers to independently decide on local educational content in accordance with the official curriculum, reflecting a form of autonomy promoted by reform policies [10]. Geography teachers often respond differently to competency-based curriculum reforms, suggesting that autonomy is influenced not only by policy but also by the practical context of their profession [25]. Empirical evidence and descriptive practices across many countries, including the Vietnamese context, show that how policies are designed and implemented directly affects teachers' autonomy in the classroom. When policies on teachers' pedagogical decision-making are clear, they facilitate teachers' professional autonomy, thereby increasing teaching effectiveness [10]. The first hypothesis is formulated as: education policy has a positive influence on the autonomy of geography teachers (H1).

2.1.3. Leadership and organizational culture in schools, and the influence on teacher professional autonomy

Leadership in the educational environment emphasizes the principal's role in curriculum orientation, practice supervision, and professional development [6]. Leadership indirectly influences student achievement through improved teaching quality [26]. Meanwhile, Rudolph [18] showed that leadership directly influences learning outcomes. The theory of decentralized leadership suggests that, in an organization, leadership should

not be concentrated in a single individual but should be distributed across multiple individuals. This decentralized leadership approach empowers teachers to make decisions in their professional activities.

A high degree of decentralized leadership is positively correlated with collective competence and teaching effectiveness [8]. Therefore, when school leaders encourage teachers to participate in decision-making, recognize their expertise, and create conditions for them to be autonomous in teaching, teachers' professional confidence and motivation for innovation are significantly increased [27], thereby improving teaching effectiveness. Thus, where there is a clear hierarchical decentralization of power, teachers will have more power to participate in decisions about curriculum content and teaching methods. Conversely, if power is concentrated, teachers' decision-making power will be limited [9]. Organizational culture is composed of core values, beliefs, and fundamental assumptions that accumulate over the organization's operations, profoundly influencing management decisions and individual behavior [28]. In secondary schools, organizational culture is clearly manifested through the level of democracy in professional matters, respect for pedagogical knowledge, a spirit of cooperation, and an open attitude towards teaching innovation [29]. A positive cultural environment that values creativity, encourages reflection, and supports professional learning will enable teachers to make professional decisions confidently, proactively adjust their methods, and take responsibility for the quality of their teaching [30]. In organizational culture, the quality of the professional development support system directly affects the level and effectiveness of teachers' professional autonomy [31]. If support activities are organized flexibly and selectively, respect individual needs, and are linked to the school's development goals, teachers have the opportunity to proactively determine their learning path, choose training content, and apply learning outcomes to their teaching practice. Therefore, the following hypothesis is constructed: school leadership and organizational culture (LOC) have a positive influence on teachers' professional autonomy (H2).

2.1.4. Physical facilities and its influence on teachers' professional autonomy

In international educational research, school facilities are considered a crucial structural factor influencing teaching quality. Hsieh *et al.* [12] noted that facilities enable teachers to design and experiment with new methods. This finding implies that facilities are also a factor that helps teachers become autonomous in teaching. Arifin *et al.* [32] previously argued that the quality of facilities affects the school atmosphere and teachers' professional behavior, and that it also influences students' academic achievement. Similarly, Aryani and Rindaningsih [33] emphasized that the quality of facilities not only affects student outcomes but also influences teachers' motivation and professional satisfaction, thereby indirectly shaping teaching quality. However, very few studies have shown how physical facilities (FTL) affect teachers' autonomy. When physical conditions are limited, such as cramped classrooms, a lack of equipment, and fixed spaces, teachers' autonomy in teaching is restricted. Conversely, when FTL are provided, they create conditions for teachers to exercise their pedagogical autonomy. Therefore, FTL are not only a technical factor but also affect the working environment, the level of cooperation, and the ability to implement innovative teaching methods - a structural variable affecting teachers' professional autonomy. Thus, the following hypothesis is formulated as: FTL positively affect teachers' autonomy (H3).

2.2. The effectiveness of geography teaching and the influence of professional autonomy

Teaching and learning activities in Vietnamese secondary schools today are crucial to student learning outcomes. Assessment methods are overly reliant on rote memorization, lacking contextual reasoning or sufficient critical thinking support [34]. This reflects the fact that effective learning activities are not being evaluated holistically. The effectiveness of geography teaching (ETC) is often assessed by the quality of knowledge and spatial thinking, as well as the level of student participation [35]. The ETC is the ability of teachers to help students develop the capacity to explain and reason geographically [5], thereby helping learners significantly develop the ability to integrate theory with practical observation, as well as increase their understanding of reality [36], improve problem-solving skills and geographical analytical thinking [37]. At the same time, integrating geospatial technology (GIS) also contributes to the development of spatial thinking and data-driven reasoning skills for learners [38]. This implies that autonomy in designing learning activities is an important condition for promoting effective learning and developing students' competencies. Therefore, when teachers are given autonomy over teaching methods and fieldwork, the quality of teaching will improve.

From this, it can be summarized that when teachers have professional autonomy, teaching effectiveness increases and students' competencies are developed: i) development of higher-level geographical knowledge such as analytical, comparative, and explanatory thinking; ii) spatial thinking and data analysis skills; iii) development of practical problem-solving abilities through fieldwork (real-world learning experiences); and iv) the level of student participation and learning autonomy.

Teaching effectiveness and professional satisfaction among teachers are positively correlated with the level of teacher autonomy [39]. Therefore, this provides the theoretical basis for identifying autonomy as

a mediating variable between the administrative environment and teachers' teaching outcomes [40]. Autonomy in teaching practice has the potential to enhance participation, understanding, and learning achievement, thereby improving the quality of teaching. The findings show that teacher autonomy in teaching contributes positively to the teaching process. A high level of autonomy is an important factor in teachers' ability to apply alternative educational methods [41]. Teachers with a clear understanding of autonomy have been very successful in selecting activities based on student-centered methods and techniques, consistent with a constructivist approach, and have achieved very high teaching effectiveness [42]. Teachers with a high degree of autonomy are successful in finding creative solutions to problems arising during teaching and in collaborating with other teachers when necessary [43]. Therefore, the final hypothesis is: professional autonomy has a positive impact on the effectiveness of teaching geography (H4).

3. METHOD

3.1. Research design and survey sample

This study reconstructs the relationship among policy, work environment, leadership, facilities, and teaching quality through teacher autonomy as an intermediary mechanism, thereby expanding the argument of Leithwood *et al.* [8] regarding the necessity of mechanism models in educational research. The study employed a quantitative design and a cross-sectional survey to test the relationships among variables in the proposed model.

3.2. Data collection process

The survey subjects were high school geography teachers in 32 high schools in Hanoi. All participating teachers were fully informed of the research objectives, procedures, and their rights before data collection and provided informed consent. Strict anonymity and confidentiality were ensured; no personally identifiable information was collected or disclosed. These measures were taken to maintain ethical transparency and enhance the credibility of the research results.

To ensure the survey's effectiveness, questionnaires were sent to Principals and Department Heads to monitor the response process. A total of 415 questionnaires were sent via Google Forms, and 402 were returned. After cleaning, 368 valid responses were obtained. With 20 items, the sample size is perfectly appropriate, as the total number of responses is many times the minimum required, which is 5 times larger [44]. A convenient sampling method was used due to limited access to the research subjects.

3.3. Measurement tools

The latent variables in the study, including EPY, FTL, LOC, AGT, ETC, were measured using multi-observed-variable scales, inherited and adjusted from previous studies to ensure relevance to the educational context. All observed variables were measured on a 5-point Likert scale (from strongly disagree to agree strongly). Before the official survey, the questionnaire was reviewed by three experts (one university associate professor, one principal, and one head of department at a high school) to ensure its scientific validity, clarity, ease of understanding, and suitability for the target group of teachers.

3.4. Data analysis methods

The study used SPSS for exploratory factor analysis and partial least squares structural equation modeling (PLS-SEM) to test the research model and proposed hypotheses. PLS-SEM was chosen over covariance-based SEM (CB-SEM) because: i) the predictive orientation of the research model; ii) the existence of complex mediating relationships; and iii) it is suitable for complex models and small samples. Therefore, PLS-SEM is not only a suitable technical choice but also contributes to improving the reliability and inference validity of the results in this study.

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics of the research sample

The results from Table 1 show that, based on descriptive statistics, the study's sample structure not only relatively accurately reflects the characteristics of high school teachers in Vietnam but also carries important practical implications for interpreting the research results. First, the dominant proportion of women (68.5%) with a medium effect size indicates that conclusions related to professional awareness and practice tend to clearly reflect the characteristics of female teachers as the dominant force in the general education system. This suggests that professional development and career support policies should pay closer attention to the specific needs, pressures, and motivations of this group.

Table 1. Descriptive statistics of the research sample

Content	Quantity	Rate (%)
Male	116	31.5
Female	252	68.5
Bachelor	231	62.8
Master	137	37.2
< 5 years	82	22.7
5-10 years	142	38.5
> 10 years	144	39.1

In addition, the proportion of teachers with postgraduate qualifications (37.2%) shows a positive effect size on the capacity to embrace innovation, especially in the context of implementing the new general education curriculum and digital transformation. From a practical perspective, this implies that interventions to improve teaching quality, such as fostering active teaching methods or integrating technology, will be more effective when implemented on a foundation of highly qualified professionals.

Notably, the distribution of seniority, with the majority of teachers having more than 5 years of experience (77.6%), shows a strong effect size related to stability and accumulation of professional experience. This reinforces the reliability of assessments of teaching and classroom management practices and suggests that innovative policies need to balance leveraging existing experience with promoting changes in professional mindset. Therefore, it can be affirmed that the research findings are not only academically valuable but also highly feasible when translated into policy implications and educational practices in the context of high schools in Hanoi.

Using SPSS for descriptive statistics, Table 2 shows the observed variables on the EPY, FTL, LOC, AGT, ETC scales have relatively high mean values ($M=3.579-4.435$), indicating high consensus among respondents. Standard deviations range from 0.688 to 0.992, reflecting an acceptable level of dispersion for the Likert scale data. All variables have negative skewness (-1.419 to -0.364), indicating left-skewed distributions that tend to concentrate at higher score levels. The excess kurtosis (-0.234 to 3.648) and skewness values are both within acceptable limits, confirming that the data are reasonably distributed, the variability is appropriate, and there is no excessive skewness or peaking. Therefore, the data meet the necessary conditions to proceed with exploratory factor analysis (EFA) and survey evaluation (SEM).

Table 2. Mean, Standard deviation, and kurtosis of items

Indicators	Mean	STD	Excess kurtosis	Skewness
EPY1	4.435	0.688	3.648	-1.419
EPY2	4.073	0.792	0.451	-0.592
EPY3	4.258	0.845	1.576	-1.199
FTL1	4.247	0.802	1.342	-1.049
FTL2	4.076	0.875	0.389	-0.759
FTL3	4.016	0.867	0.308	-0.661
LOC1	3.579	0.975	-0.234	-0.364
LOC2	3.807	0.890	0.021	-0.495
LOC3	3.897	0.906	0.289	-0.675
LOC4	3.755	0.992	0.052	-0.618
LOC5	4.283	0.749	2.357	-1.177
AGT1	3.823	0.935	-0.074	-0.543
AGT2	3.872	0.907	0.061	-0.599
AGT3	3.837	0.882	0.229	-0.535
AGT4	4.027	0.820	0.835	-0.732
ETC1	3.981	0.826	0.048	-0.517
ETC2	3.984	0.831	0.138	-0.512
ETC3	4.016	0.844	0.472	-0.658
ETC4	4.025	0.827	0.301	-0.598
ETC5	4.137	0.861	0.378	-0.809

4.2. EFA analysis

The test results showed that the data were suitable for factor analysis with $KMO=0.918$ (very good) and the Bartlett test was statistically significant ($\chi^2=3160.764$; $df=105$; $p<.001$). In Table 3, EFA analysis with Varimax rotation extracted four factors, consistent with the original theoretical structure (EPY, FTL, LOC, and AGT). The total variance extracted was 66.62%. All observed variables had factor loadings greater than 0.50, ranging from 0.558 to 0.845. Specifically, variables EPY1–EPY3 strongly load the first factor (0.693–0.788), variables FTL1–FTL3 load the second factor (0.654–0.735), variables LOC1–LOC5 load the third factor (0.558–0.845), and variables AGT1–AGT4 load the fourth factor (0.688–0.812). The factor

structure achieves good preliminary convergent and discriminant validity, providing a suitable basis for further testing the measurement model using CFA in the next step.

Table 3. Rotated component matrix

Items	1	2	3	4
EPY1	.788			
EPY2	.731			
EPY3	.693			
FTL3		.654		
FTL2		.735		
FTL1		.712		
LOC4			.845	
LOC1			.828	
LOC2			.728	
LOC3			.644	
LOC5			.558	
AGT2				.812
AGT3				.807
AGT4				.802
AGT1				.688

4.3. Evaluation of the measurement model using PLS-SEM

The outer loading coefficients for the indicators are all greater than 0.7, indicating that they are all high-quality variables [44]. Furthermore, all variables have VIF values < 3, indicating no multicollinearity. The results are shown in Table 4. The results show that the latent constructs all achieved high internal reliability. Specifically, the Cronbach's alpha coefficient ranged from 0.805 to 0.927, rho_A from 0.810 to 0.928, and composite reliability from 0.884 to 0.945, all exceeding the recommended threshold of 0.70, thus confirming the internal consistency of the scales. At the same time, the convergent validity of the constructs was ensured, with average variance extracted (AVE) ranging from 0.665 to 0.775, all of which exceeded the threshold of 0.50, indicating that the observed variables explain a large portion of the variance of the respective latent constructs.

Table 5 shows regarding discriminant validity, the Fornell–Larker test results show that the square root of each construct's AVE (the values on the diagonal) is greater than the correlations between that construct and the others, thus confirming a satisfactory level of discriminant validity between the constructs in the measurement model. In summary, the measurement model fully meets the requirements for reliability, convergent validity, and discriminant validity, thereby providing a solid methodological basis for subsequent testing of the structural model.

Table 4. Construct reliability and validity

Items	Cronbach's alpha	rho_A	CR	AVE
AGT	0.873	0.881	0.913	0.725
EPY	0.805	0.810	0.884	0.718
ETC	0.927	0.928	0.945	0.775
FTL	0.826	0.841	0.896	0.742
LOC	0.874	0.875	0.908	0.665

Table 5. Fornell–Larker criterion results

Items	AGT	EPY	ETC	FTL	LOC
AGT	0.852				
EPY	0.498	0.847			
ETC	0.765	0.508	0.880		
FTL	0.541	0.656	0.540	0.862	
LOC	0.629	0.556	0.589	0.586	0.815

4.4. Evaluation of the structural model

The 5000 bootstrap results in Table 6 confirm that AGT is a statistically significant mediating variable in all three relationships: EPY–ETC, FTL–ETC, and LOC–ETC. The indirect impact levels are arranged in descending order as: LOC → AGT → ETC > FTL → AGT → ETC > EPY → AGT → ETC. These results provide strong empirical evidence for the mediating role of AGT in the research model and emphasize that influencing LOC and FTL will yield a larger indirect effect on ETC through the AGT mechanism.

Figure 1 and Table 6 summarize the findings, which show that four hypotheses are supported. From the PLS Algorithm results, the adjusted R-squared results are provided. The adjusted R-squared of ETC is 0.585, so the independent variables affecting it (EPY, LOC, FTL) explain 58.5% of the variation (variance) of the ETC variable. The adjusted R-squared of AGT is 0.448, so the independent variable ETC explains 44.8% of the variation (variance) of the AGT variable.

Table 6. Path coefficients

Path	Original sample	Sample mean	Standard deviation	T Statistics	P Values
EPY → AGT → ETC	0.090	0.090	0.038	2.377	0.018
FTL → AGT → ETC	0.156	0.157	0.043	3.659	0.000
LOC → AGT → ETC	0.340	0.342	0.045	7.615	0.000

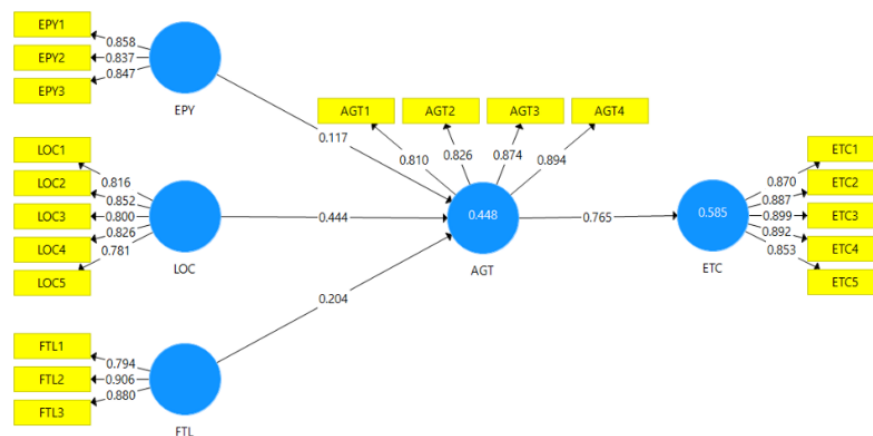


Figure 1. Path analysis results

Furthermore, the model's explanatory power and effect size (f^2) were assessed to determine the relative impact of each outlier on the endogenous variables. The results showed that LOC had a moderate effect on AGT, indicating that this factor plays a significant role in explaining AGT variability. Conversely, FTL may have a smaller effect, suggesting a more limited but still significant contribution. EPY showed a relatively weak effect size, suggesting that, although statistically significant, its impact on AGT was modest. Regarding the relationship between AGT, ETC, the applied effect size was medium to large, reinforcing the importance of AGT as a major predictor of ETC. This is currently being demonstrated as a mediating role of AGT in the model structure.

To assess the model's predictive power, the Q^2 value was calculated using information hiding. The results show that the Q^2 values for both AGT, ETC are greater than 0, confirming that the model has the expected fit. This indicates that the model is incapable of adequately resolving the relationship between the constructs while still possessing sufficient predictive power outside the sample. Note that the Q^2 value for ETC is higher than that for AGT, suggesting that the model may exhibit stronger predictive accuracy for the outcome of the variation. This development is consistent with the R^2 results and further strengthens the certainty of the published relationship structure. Overall, the R^2 , f^2 , and Q^2 results are consistent, indicating that the model achieves sufficient explanatory and predictive performance and thus provides strong empirical evidence for the proposed theoretical framework.

All hypotheses H1-H4 are accepted because their P-values are less than 0.005, as seen in Table 7. The results show that AGT plays a statistically significant mediating role in the relationship between exogenous variables and ETC. Specifically, EPY has a positive indirect influence on teaching effectiveness through teacher professional autonomy ($\beta=0.090$; $t=2.377$; $p=0.018$). This result indicates that improving and implementing educational policies enhances teaching effectiveness in geography by increasing teacher professional autonomy, though the impact is modest.

Regarding the FTL, the indirect effect on teaching effectiveness through professional autonomy was also statistically significant ($\beta=0.156$; $t=3.659$; $p<0.001$), indicating that AGT is an important mediating mechanism that transforms FTL's impact into teaching outcomes. Notably, LOC showed the strongest indirect influence on teaching effectiveness through teachers' professional autonomy ($\beta=0.340$; $t=7.615$; $p<0.001$). This result implies that a favorable leadership environment and school culture play a particularly important role in promoting teachers' professional autonomy, thereby improving the ETC.

Table 7. Hypotheses test results

Hypothesis	Path	Coefficient	P-values	Results
H1	EPY → AGT	0.117	0.018	Accepted
H2	LOC → AGT	0.444	0.000	Accepted
H3	FTL → AGT	0.204	0.000	Accepted
H4	AGT → ETC	0.765	0.000	Accepted

4.5. Discussion

First, the research results show that professional autonomy plays a statistically significant mediating role in the relationship between educational policy factors, facilities, leadership, and organizational culture with the effectiveness of geography teaching by teachers. This finding is consistent with the ecological approach to teacher agency [1], which holds that teacher professional autonomy is not a single individual attribute but is shaped by the interaction among context, policy, and school conditions. Compared with studies focusing on motivation or self-efficacy as the main mediating mechanisms [3], the current study shows that professional autonomy emerges as a central mediating mechanism, especially in the context of teaching geography and curriculum reform. This reflects the specific context of teaching geography and the context of high school education reform in Vietnam, where teachers are often strongly influenced by the curriculum framework, assessment, and administrative regulations.

Second, the indirect impact of education policy on professional autonomy. Compared to studies in countries with high levels of empowerment, where AGT is emphasized as an important component of policy [7], the intensity of the indirect influence of education policy in this study is relatively low. This shows that AGT in the Vietnamese context is still significantly influenced by curriculum control and assessment mechanisms [10]. Studies on curriculum reform and policy implementation in schools in Asia and Southeast Asia emphasize that the success of policies depends heavily on the professional space teachers can use in the classroom [24]. Although policies often emphasize methodological innovation, competency development, and learner individualization, the extent to which they translate into classroom practice depends greatly on the autonomy teachers are granted and the practices they adopt.

Third, leadership and organizational culture represent the strongest mediating mechanism through professional autonomy. Existing studies indicate that school leadership rarely directly affects learning outcomes, primarily through teachers' organizational conditions and teaching practices [8], [23]. Leaders can promote teaching quality by building a shared vision, fostering a professional learning culture, cultivating a trusting environment, and supporting teachers' professional development. The results of the current study add empirical evidence that, in the context of teaching geography, the core element that enables leadership and organizational culture to exert their impact is the expansion of teachers' professional autonomy. This is also consistent with studies showing that when school leaders enable teachers to proactively choose methods, design teaching activities, build a professional learning environment, and foster organizational trust and a culture of cooperation [7], [9].

Fourth, the role of facilities and mechanisms promoting professional autonomy. This finding is consistent with studies on the important supporting role of facilities in professional autonomy and teaching effectiveness. Adequate facilities create conditions for teachers to design and experiment with new methods, helping them become more autonomous in their teaching [32]. This research supports the study [34], which shows that facilities bring professional satisfaction to teachers, thereby improving teaching effectiveness.

Fifth, professional autonomy and teaching effectiveness in geography. This result is closely related to the theory of self-determination, which considers autonomy a basic psychological need that drives intrinsic motivation and the effectiveness of professional behavior [4], [10]. When geography teachers feel empowered to choose content, methods, assessment forms, and organize learning activities, it can increase professional engagement, creativity in lesson design, and responsiveness to the diverse needs of students. Empirical studies also show that teacher autonomy is positively correlated with professional engagement, job satisfaction, and reduced burnout [3], leading to more effective teaching practices [43]. Compared to studies on teacher autonomy in Western contexts [12], the results of the current study show that a form of classroom autonomy is dominant, namely flexibility in designing learning activities and organizing lessons, rather than participation in school administration decisions.

Sixth, in recent years, Vietnam has been vigorously implementing educational reform policies, especially the 2018 General Education Program, which focuses on developing learners' competencies and strengthening teachers' proactive role. In this context, professional autonomy is not merely a theoretical concept but also a practical requirement for improving the quality of teaching and learning. However, AGT in Vietnam remains constrained by factors such as centralized management mechanisms, administrative pressure, and curriculum standardization. This raises an important question: does increased autonomy truly improve teaching effectiveness, and under what conditions does this impact become apparent? In the context

of the current educational transformation, the lack of reliable quantitative evidence on the role of professional autonomy may lead to policy decisions lacking a scientific basis. Therefore, this research not only adds to existing knowledge but also has urgent significance in guiding educational reform in Vietnam.

4.6. Management implications

Compared to international studies, the difference in the current study lies in the context of national curriculum reform, in which geography teachers must simultaneously meet the requirements of standardized outputs and innovative methods. This creates a form of “conditional autonomy”, in which teachers have flexibility in organizing their teaching but remain strongly constrained by educational policies. The results of this study emphasize that methods such as inquiry-based learning, phenomenon-based learning, out-of-classroom teaching, and GIS integration require teachers to have a high degree of flexibility and decision-making power [36]. Furthermore, teaching geography with a concept-oriented approach requires teachers to proactively change the content structure, design learning situations, and connect geographical knowledge with real-world contexts. Therefore, professional autonomy is not just a management issue but a core pedagogical condition for ensuring the quality of teaching this subject.

Several actionable implications for policymakers and school administrators can be suggested by directly linking evidence to practical implementation. First, school leadership capacity should be developed toward a “learning leadership” approach, in which principals and subject heads receive targeted training in innovative governance, professional support, and guidance on teaching practices. Leadership development programs should focus on using data for decision-making, fostering a culture of professional learning, and enabling teachers to exercise autonomy in a directed manner.

Second, infrastructure investment should be strategic rather than scattered, especially in technology infrastructure supporting geography teaching, such as digital mapping systems, GIS software, and digitized learning materials. Ensuring access to and effective use of these tools will help teachers translate autonomy into creative teaching practices relevant to the local context. At the same time, it is necessary to design accompanying training programs to enhance the capacity to integrate technology into teaching, avoiding the situation of “investment without effective exploitation.”

Thirdly, regarding policy, it is necessary to build and institutionalize clear professional autonomy frameworks that specifically define the scope, responsibilities, and support mechanisms for teachers. Autonomy should not be limited to empowering teachers to choose teaching methods but should also extend to designing local educational content, evaluating students, and participating in school-level decision-making. However, empowerment must be accompanied by transparent accountability mechanisms and a continuous professional support system to ensure quality.

Finally, administrators need to promote professional learning communities within schools as platforms for disseminating best practices and supporting teachers in supporting one another. Through these collaborative structures, professional autonomy is no longer an individual activity but becomes a process of interaction, reflection, and continuous improvement. Overall, transforming research findings into action requires a systems approach that combines policy, leadership, and implementation conditions within the institution.

Given the interdisciplinary nature of geography (connecting natural and social sciences), spatial aspects (spatial reasoning and map analysis), and local-global contextualization, policies and leadership must be flexible, avoiding excessive content control that could reduce the quality of geography teaching. Research also suggests that autonomy is meaningful only when accompanied by professional competence. Therefore, geography teacher training programs need to develop the capacity to design lessons based on spatial data, enhance skills in using mapping and GIS technology, and cultivate the capacity to analyze environmental issues and sustainable development. If autonomy is granted without accompanying professional support, teaching effectiveness may not improve or may even decrease.

5. CONCLUSION

The results of the PLS-SEM analysis show that policy factors, leadership, organizational culture, and physical conditions can be effective only when they are translated into specific pedagogical autonomy for teachers, thereby increasing teaching effectiveness. Theoretically, this study extends models of leadership and school effectiveness by establishing teacher professional autonomy as a central mediating mechanism in the relationships among organizational context, institutions, physical conditions, and teaching outcomes at the subject level. Unlike many previous studies that mainly consider teacher autonomy in general contexts, this study clarifies the specific role of autonomy in teaching geography. This field requires a high degree of flexibility in organizing learning activities, integrating technology, and leveraging practical contexts. In practical terms, the results suggest that strategies to improve the effectiveness of geography teaching should prioritize developing a leadership environment and organizational culture within schools that

empowers teachers to proactively make pedagogical decisions, experiment with new teaching methods, and adapt content to learner characteristics. At the policy level, promoting teacher autonomy should be accompanied by substantive adjustments to curriculum management and assessment mechanisms to create greater flexibility for teachers in implementing instruction. More importantly, this research lays the groundwork for a new approach to educational reform in Vietnam: shifting from a “management by control” model to a “governance based on trust and professional competence”. This could be the key to sustainably improving the quality of education in the future.

Despite its significant contributions, this study has several limitations. Firstly, due to its cross-sectional design, the data reflect relationships at a specific point in time, thus not allowing the establishment of chronological sequences or the inference of causal relationships. This can increase the risk of common-method bias, as variables are measured through teachers’ self-reports, as well as cognitive biases such as societal expectations or overestimation of one’s own abilities. Secondly, the sample size is limited to high schools in Hanoi, a region with relatively high socio-economic conditions and teacher quality compared to other provinces in Vietnam. This limits the generalizability of the results when applied to other localities or subjects. The unique characteristics of this context may have shaped how teachers perceive and practice professional autonomy, thereby influencing the research findings. Third, the current research model only considers professional autonomy as a single mediating mechanism, while other psychological and professional mechanisms, such as motivation and peer cooperation, can coexist and interact in complex ways. Therefore, future studies should prioritize designs that account for the evolution of professional autonomy over time while better controlling for potential biases. Expanding the research context and integrating additional mediating and moderating variables at both the individual and school levels will improve the reliability and generalizability of the conclusions, thereby providing a more comprehensive view of the mechanisms influencing the effectiveness of geography teaching.

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C : **C**onceptualization

M : **M**ethodology

So : **S**oftware

Va : **V**alidation

Fo : **F**ormal analysis

I : **I**nvestigation

R : **R**esources

D : **D**ata Curation

O : Writing - **O**riginal Draft

E : Writing - Review & **E**ding

Vi : **V**isualization

Su : **S**upervision

P : **P**roject administration

Fu : **F**unding 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.

DATA AVAILABILITY

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

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