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Job–Education Mismatch and Wage Penalties: Evidence from Graduates in Educational Science and Teacher Education in Vietnam

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ABSTRACT

This paper examines education–job mismatch and wage differences among graduates in educational science and teacher education in Vietnam. We analyse wage effects of field-of-study mismatch and full mismatch, defined as the joint occurrence of overeducation and field mismatch. Contrary to much existing evidence, field-of-study mismatch is associated with a wage premium, particularly among women, older workers, and private-sector workers. For some graduates, working outside education yields higher earnings than remaining in teaching-related jobs. In contrast, full mismatch is consistently linked to wage penalties, with larger disadvantages for younger graduates, women, private-sector employees, and rural workers. The findings point to a clear paradox: teaching retains social prestige, yet low pay may weaken retention and encourage graduates to leave the sector.

Keywords: Educational Science and Teacher Education; Endogeneity; Field-of-study mismatch; Overeducation; Wage premium; Wage penalty; Vietnam.

INTRODUCTION

Education–job mismatch is a common challenge in both transitional (Kupets, 2015) and developed economies (Abdulla, 2025). Rapid economic changes, weak connections between universities and employers, and the lack of lifelong learning systems reduce the efficient use of human resources (Kupets, 2015). In Vietnam, this issue is also evident among educational science and teacher education graduates (Nguyen et al., 2026), who represent nearly one-third of university graduates (Tran et al., 2025a). Although teaching is highly respected in society (Dung & Pereira, 2022), wages in this profession remain relatively low (Ministry of Education and Training [MOET], 2025). Moreover, many of these graduates cannot secure suitable employment and often accept jobs below their education level or outside their trained field (Nguyễn Liên, 2022; Thanh et al., 2024; Thu Thuy, 2024). This paradox of high social prestige but low economic returns highlights the weak link between higher education and labor market needs, and raises questions about the effectiveness of investment in educational science and teacher education. Accordingly, this study focuses on educational science and teacher education graduates operating in a labor market characterized by regulated wages and constrained career progression. Given the central role of education in human capital development, analyzing education-job alignment for this group has clear academic and policy relevance.

In Vietnam, education-job mismatch among educational science and teacher education graduates is shaped not only by labor market conditions but also by the institutional features of the higher education system. Over the past decades, higher education enrollment has expanded rapidly, partly driven by policies promoting mass access (Truong et al., 2021), creating strong competition among graduates for a limited number of quality jobs (Vnexpress, 2023). In addition, pressures related to accreditation and quality assurance have led training programs to be designed with a strong focus on compliance and, as a result, with limited creativity and flexibility in responding to labor-market needs (Pham, 2019).

Moreover, limited workforce planning in Vietnamese higher education weakens the alignment between graduate supply and labor-market demand. The absence of a unified labor-market information and forecasting system means that enrolment and program decisions are often made without clear signals from employers (Parajuli et al., 2020; Tran, 2016). The impact of these institutional

features is further reinforced by the structural characteristics of Vietnam's labor market. Gender disparities in employment opportunities remain, with women still concentrated in certain occupations and facing barriers to advancement (World Bank [WB], 2020). At the same time, the coexistence of a large public sector with state-regulated pay scales, which are generally lower, and a private sector offering more competitive and dynamic wages, creates a dual structure that influences employment outcomes (WB, 2025). These features provide the context for analyzing job–education mismatch in Vietnam and place the findings in the context of a broader international discussion.

Despite a growing literature on education-job mismatch in Vietnam, important gaps remain. Most studies focus on the overall graduate population and tend to examine vertical or horizontal mismatch separately, offering limited insight into educational science and teacher education graduates or into combined forms of mismatch. Moreover, evidence on wage effects is mixed and largely descriptive, leaving it unclear whether observed outcomes reflect productivity differences, institutional pay and hiring constraints, or adaptive occupational choices. This study addresses these gaps by examining multiple dimensions of mismatch among educational science and teacher education graduates in Vietnam and assessing associated wage differentials, using nationally representative data and econometric approaches that account for endogeneity. By doing so, the study contributes to theoretical debates on skill utilization under institutional constraints, and provides policy-relevant evidence for higher education planning and teacher labor market reforms.

This paper pursues two main objectives. First, it classifies job–education alignment into four categories: vertical mismatch, horizontal mismatch, combined mismatch, and full match. Second, it examines wage differences associated with these forms of mismatch using nationally representative survey data from 2018–2021. The contribution of the study is threefold. First, it addresses an important research gap by providing new evidence on education-job mismatch and wage outcomes among graduates in educational science and teacher education in Vietnam. Second, the findings reveal notable heterogeneity in wage patterns: horizontal mismatch is associated with wage premiums for certain groups, whereas full mismatch is linked to lower wages, particularly among young workers, those in rural areas, and those employed in the private sector. These results challenge the common assumption that horizontal mismatch is uniformly associated with wage penalties and suggest that, in some contexts, it may reflect adaptive labor market positioning. Third, the Vietnamese case offers broader relevance. As many countries experience rapid higher education expansion alongside constrained demand for skilled jobs, the study contributes to the international debate by highlighting the context-dependent nature of mismatch-related wage differentials and offering insights applicable to other transitional and developing economies.

LITERATURE REVIEW

We first discuss field-of-study mismatch theories, including human capital, job competition, assignment, and heterogeneous skills theories. We then turn to empirical evidence from both advanced and transitional economies before highlighting gaps in the Vietnamese context.

Conceptual Framework

Measurements of Education-Job Mismatch

Before discussing theoretical explanations, it is necessary to clarify the conceptual distinctions adopted in this study. Field-of-study (horizontal) mismatch refers to employment that is unrelated to a worker's trained discipline (Montt, 2017). Qualification (vertical) mismatch occurs when a worker's educational attainment is either above or below the level required by the job, encompassing overeducation and undereducation (Somers et al., 2019). Full mismatch combines these two dimensions, referring to situations in which workers are simultaneously mismatched in both field of study and educational level, whereas a full match indicates alignment along both dimensions (Tran et al., 2025a). These distinctions are important because each form of mismatch reflects different mechanisms of skill utilization and may lead to different wage outcomes.

Horizontal Mismatch and Wage Outcomes

The three dominant theories, namely human capital theory, job competition theory, and assignment theory, have been commonly used to explain the relationship between field-of-study mismatch and wage outcomes. These theories mainly differ in how they conceptualize productivity, leading to different expectations regarding the wage consequences of mismatch. According to human capital theory (Becker, 1964), field-of-study mismatch reflects an inefficient use of specialized skills acquired through formal education. Although employers are expected to adjust labor demand over time, mismatch may persist when workers cannot apply field-specific knowledge, leading to lower productivity and wages (Montt, 2017). By contrast, job competition theory (Thurow, 1975) emphasizes job characteristics as the primary source of productivity. From this perspective, mismatch arises when graduate supply does not match occupational demand or when employers place limited weight on field relevance, and thus does not necessarily imply wage penalties. Assignment theory (Sattinger, 1993) provides an intermediate view, suggesting that wages depend on the quality of alignment between workers' training and job requirements. Field-of-study mismatch is therefore associated with lower wages due to skill under-utilization or additional training needs, although such penalties may decline as workers gain experience and develop job-relevant competencies (Nordin et al., 2010).

Vertical Mismatch and Wage Outcomes

Vertical mismatch, particularly overeducation, is mainly explained by assignment theory and the heterogeneous skills perspective. Although both address wage differences among workers with the same level of education, they rely on different mechanisms. Assignment theory argues that wages depend on the alignment between education and job requirements, implying lower earnings for overeducated workers due to skill under-utilization (Morrar & Syed Zwick, 2021; Tran et al., 2026). In contrast, the heterogeneous skills view attributes wage differences to variation in individual abilities, suggesting that overeducated workers earn less because of lower actual skills rather than mismatch itself, while undereducated workers may earn comparable or higher wages if their skills compensate for lower formal education (Nieto & Ramos, 2017).

Institutional Drivers of Education-Job Mismatch in the Education Sector

Education-job mismatch may stem from features of higher education governance rather than individual occupational choices alone (Somers et al., 2019). In particular, program design, enrolment regulation, curriculum relevance, and coordination between higher education institutions and labor market demand shape the alignment between the level and field of study and job requirements. Weak governance and limited system-level coordination can therefore contribute to mismatches in both field of study and qualification level (Parajuli et al., 2020; Scandurra et al., 2024).

Education-job mismatch may also originate from education system reforms, particularly in contexts where higher education has expanded rapidly while the availability of high-quality employment opportunities has grown more slowly. This imbalance between the supply of graduates and the absorptive capacity of the labor market can exacerbate misalignment between educational qualifications and job requirements (Henseke, 2025; Tran et al., 2026). In the teaching profession, mismatch and its wage premium may also affect teacher retention, as teachers may exit the profession when earnings in teaching are lower than those available in alternative occupations (Imazeki, 2005; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2024).

In Vietnam, wages in the education sector, especially in public institutions, are largely set by state pay scales and remain low relative to many non-education jobs (MOET, 2025). As a result, graduates who work outside their field of study may earn higher wages than those in matched positions. Under these conditions, horizontal mismatch can be associated with wage premiums. Unlike fields such as business and management, where wage penalties from horizontal mismatch mainly reflect under-utilized skills (Tran et al., 2023), low wages in matched education jobs largely arise from institutional wage regulation rather than inefficient skill use. This institutional context helps explain why mismatch dynamics for

educational science and teacher education graduates differ from those observed in less regulated sectors.

Empirical Evidence

Empirical Evidence on Horizontal Mismatch and Wage Outcomes

Research on horizontal mismatch generally supports assignment theory, showing that workers employed outside their field of study face wage penalties because their skills are underutilized or require costly adaptation (Montt, 2017; Nordin et al., 2010; Robst, 2007; Rudakov et al., 2022; Somers et al., 2019; Tran et al., 2023). However, results are not uniform. Studies in Austria, Greece, Norway, Turkey, China, and Vietnam find little or no wage penalty, and in some cases even wage benefits (Orbay et al., 2021; Passaretta et al., 2023; Tran et al., 2025a; Zhu, 2014), lending support to job competition theory, which emphasises job characteristics over educational alignment.

Empirical Evidence on Vertical Mismatch and Wage Outcomes

Vertical mismatch shows a clearer pattern. A meta-review of 74 estimates across 23 studies reports that overeducated workers earn, on average 13.6% less than their well-matched peers (McGuinness et al., 2018), with wage penalties observed in both advanced and developing economies (Caroleo & Pastore, 2018; Chuang & Liang, 2022; Dolton & Silles, 2008; Mavromaras et al., 2015; Paweenawat & Vechbanyongratana, 2015; Sellami et al., 2017; Sharma & Sharma, 2017; Tran et al., 2025a; Wu & Wang, 2018). Evidence for undereducation is mixed. While many studies find no significant advantage (Di Pietro & Urwin, 2006; Sánchez-Sánchez & McGuinness, 2015), some show that actual skills can compensate for lower qualifications, with undereducated workers even earning more in specific contexts, such as Thailand (Vivatsurakit & Vechbanyongratana, 2021).

Empirical Evidence and Research Gaps in Vietnam

In Vietnam, several studies have documented wage penalties associated with job–education mismatch, particularly among business and management graduates (Tran et al., 2023) and among the general population of university graduates (Tran et al., 2025a; Tran et al., 2025b). To the best of our knowledge, however, no research has yet focused on graduates in educational science and teacher education. This paper seeks to fill that gap. Given the central role of the education sector in human capital development, a deeper understanding of education-job alignment in this field is crucial—not only for academic inquiry but also for informing education managers and policymakers.

Based on the theoretical and empirical discussion, different forms of job–education mismatch are likely to be associated with distinct wage outcomes among

educational science and teacher education graduates. Horizontal mismatch may be linked to neutral or positive wage outcomes in contexts where institutional wage-setting constrains returns in the education sector. By contrast, full mismatch is likely to be associated with wage penalties, reflecting deeper skill misalignment. These relationships appear to be moderated by institutional structures and vary across career stages, gender, regions, and sectors, as illustrated in Figure 1.

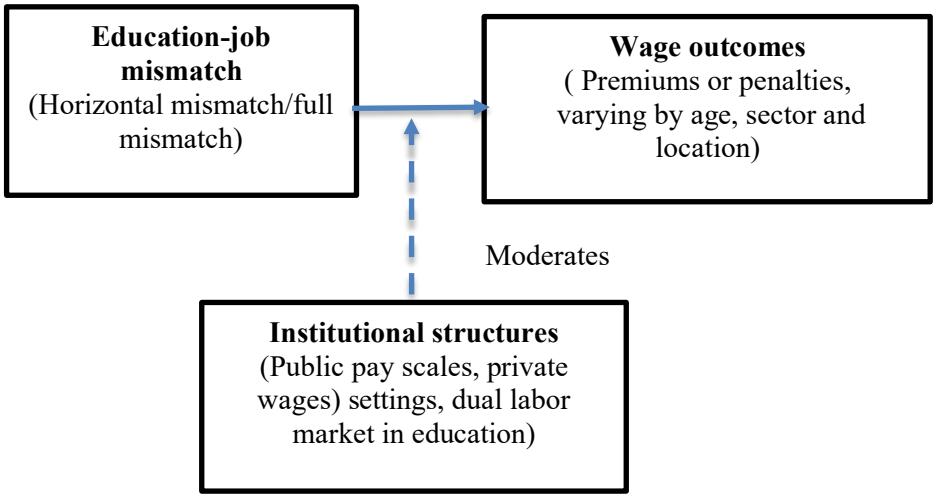

Figure 1: *Institutional Variation in Wage Associations Related to Education–Job Mismatch*

RESEARCH METHOD

Data

This study draws on secondary data from the 2018–2021 Labor Force Survey (LFS), conducted by the General Statistics Office of Vietnam (GSO). The LFS is nationally representative, covering provincial, regional, and national levels. It provides comprehensive information on individual characteristics, such as age, gender, educational attainment, field of study, occupation, job sector, working conditions, and labor market outcomes, including wages and other benefits. Importantly, the 2018 survey cycle was the first to include data on respondents' areas of study, making it possible to examine education-job mismatch. The paper focuses on a sample of approximately 35,786 university graduates in educational science and teacher education, aged under 61, who were in paid employment at the time of the survey.

Following the job analysis approach proposed by the International Labor Organization (ILO) (2018), we identify horizontal mismatch when a graduate's

field of study does not correspond to their current occupation or occupational group, based on the classification in Appendix I of Vietnam's occupational list (Government of Vietnam, 2020a) and the ISCO four-digit coding system (International Standard Classification of Occupations). Likewise, vertical mismatch (overeducation) is determined using Appendix II of the same list (Government of Vietnam, 2020b), where graduates are considered overeducated if they are employed in positions that require qualifications below university level. This study does not examine undereducation, as only a very small number of university graduates hold jobs that demand educational levels higher than a university degree. Missing values are negligible. All wage and individual-level variables are fully observed. Missing data occur only for household size and the dependency ratio (22 observations each, accounting for 0.06% of the sample). Given this very small proportion, observations with missing values are excluded, with no material impact on the sample size or the estimation results.

Analytical Method

The extended Mincerian wage equation, estimated by ordinary least squares (OLS), has been widely applied in prior studies to analyze wage differences associated with job mismatch (Hartog, 2000; Montt, 2017; Tran et al., 2025a). To examine the effect of job mismatch on wages, this study begins with an ordinary least squares (OLS) model. In the education sector, mismatch is particularly prone to endogeneity because wages, especially in public institutions, are administratively determined and directly influence occupational decisions. Graduates with stronger ability or higher earnings expectations may therefore leave teaching for better-paid jobs outside the sector, while others may remain due to employment stability or limited outside options. This non-random selection across occupations implies that mismatch is correlated with unobserved individual characteristics, potentially biasing OLS estimates (Rudakov et al., 2022; Tran et al., 2023). Endogeneity can also arise from measurement error, omitted variables, or reverse causality (Gaeta et al., 2021). To address this issue, we adopt an instrumental variable (IV) approach, which yields consistent estimates by exploiting exogenous variation in mismatch (Wooldridge, 2013).

Following recent studies (Njifen & Smith, 2023; Tran et al., 2025a), the instrument is defined as the average mismatch rate in the respondent's district, excluding the individual's own value. This community-level measure is appropriate in the Vietnamese context because local labor markets strongly shape graduates' job opportunities. A high level of district-level mismatch reflects structural frictions, such as limited demand for certain skills or weak job-matching institutions, which increase an individual's likelihood of mismatch and are assumed not to directly determine wages once individual and household characteristics are controlled for. These variables are therefore used as instruments, as they are strongly associated with individual mismatch and plausibly exogenous

to unobserved wage determinants (Handa, 1996; Njifen & Smith, 2023; Tran et al., 2025a).

To address potential endogeneity in education-job mismatch, we employ a two-stage least squares (2SLS) estimation strategy. The first-stage equation predicts the likelihood of individual mismatch (JM_{it}) using the district-level mismatch rate (Z_{it}) and other covariates (X'_{it}) (Equation 1).

$$JM_{it} = \delta Z_{it} + X'_{it}\theta + e_{it} \quad (1)$$

In the second-stage equation, wage outcomes (W_{it}) are estimated as a function of the predicted mismatch and other covariates (Equation 2). The endogenous regressors are two dummy indicators: field-of-study mismatch and full mismatch (field mismatch combined with overeducation). The reference category is fully matched graduates. The vertical mismatch variable is excluded from the analysis due to the negligible number of graduates classified as either overeducated or undereducated (see Table 2 for details). This group represents only 0.11% of the sample, corresponding to 39 observations out of 35,786, which is too small to support reliable estimation or meaningful statistical inference. This pattern is consistent with the institutional features of the education sector in Vietnam, where recruitment and pay, particularly in public institutions, are closely tied to formal qualifications, leaving limited scope for vertical mismatch. Control variables are drawn from prior studies in Vietnam and internationally (Ki & Hyungjo, 2020; Montt, 2017; Somers et al., 2019; Tran et al., 2025a).

$$W_{it} = \gamma \widehat{JM}_{it} + X'_{it}\beta + u_{it} \quad (2).$$

RESULTS

Background on graduates in educational science and teacher education

Table 1 summarizes the key characteristics of educational science and teacher education graduates during the period 2018–2021. On average, the monthly wage was approximately 7.5 million Vietnamese dong (VND), showing a modest increase from around 6.9 million VND in 2018 to nearly 8 million VND in 2021. About one-quarter of the sample is male, reflecting the predominance of women in this field and suggesting that teaching may be more attractive to women than to men. Approximately 88% of the graduates are married, and this figure remains stable across the years. The average level of work experience is about 17 years, suggesting a workforce composed largely of experienced professionals. The average household size is four members, while the dependency ratio stands at approximately 37%. Lastly, the majority of graduates reside in urban areas, indicating a concentration of education professionals in cities and towns.

Table 1 : Individual Characteristics of Educational Science and Teacher Education Graduates, 2018–2021

Year	2018		2019		2020		2021		Total	
Individual characteristics	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Monthly wages	6856.23	2384.16	7468.00	2571.80	7864.73	2617.63	7977.03	2605.84	7508.59	2578.64
Gender (1=male; 0=female)	0.25	0.43	0.26	0.44	0.25	0.44	0.25	0.43	0.25	0.44
Married (1=yes;0=no)	0.87	0.33	0.89	0.32	0.88	0.33	0.88	0.32	0.88	0.33
Experience	16.46	8.02	16.63	7.89	17.38	7.80	17.89	7.79	17.05	7.90
Public sector (1=yes;0=private)	0.93	0.26	0.87	0.34	0.89	0.31	0.91	0.28	0.90	0.30
Household size	4.10	1.36	3.97	1.34	4.02	1.38	4.04	1.42	4.03	1.38
Dependency ratio	37.09	21.53	37.19	21.40	36.49	21.93	36.66	22.05	36.89	21.71
Urban (1=yes; 0=rural)	0.63	0.48	0.61	0.49	0.61	0.49	0.61	0.49	0.62	0.49
Observation	9714		9920		7348		8801		35783	

Source: Authors' calculations from the LFS, 2018-2021.

Table 2 presents descriptive statistics on the education-job mismatches among graduates in educational science and teacher education from 2018 to 2021, disaggregated by gender. The results indicate that the majority of graduates occupy positions that are well-matched with their academic training. On average, 84.57% of the sample reported a full match, while the remaining 15.43% experienced some form of mismatch—whether in terms of education level, field of study, or both. These mismatch rates are substantially lower than those observed among the general population of university graduates in Vietnam. Specifically, the average full match rate among all graduates stands at approximately 63.8%, while the combined rate of overeducation, field-of-study mismatch, or full mismatch comes to 36.2% (Tran et al., 2025a).

Field-of-study mismatch is more prevalent than overeducation. While only 0.11% of graduates were identified as overeducated across the 4-year period, 7.40% worked in occupations unrelated to their field of study, and 7.92% experienced both overeducation and field of study mismatch. This pattern implies that the education sector tends to recruit graduates with the appropriate level of education but not always in the relevant discipline. The results indicate that the rate of full mismatch is lower among females than among males. Correspondingly, the numbers of field-of-study mismatch, overeducation, and full mismatch are higher among males than females.

Table 2: Education–Job Mismatch among Educational Science and Teacher Education Graduates by Gender

Group		2018	2019	2020	2021	2018-2021
Whole sample	Full match	89.11%	83.59%	83.60%	81.49%	84.57%
	Overeducation	0.21%	0.07%	0.10%	0.06%	0.11%
	Field of study mismatch	4.87%	7.62%	6.91%	10.34%	7.40%
	Full mismatch	5.82%	8.72%	9.39%	8.11%	7.92%
Men	Full match	85.52%	77.50%	77.10%	76.40%	79.30%
	Overeducation	0.21%	0.23%	0.16%	0.00%	0.15%
	Field of study mismatch	7.86%	10.86%	10.06%	14.88%	10.86%
	Full mismatch	6.42%	11.40%	12.68%	8.72%	9.69%
Women	Full match	90.31%	85.76%	85.82%	83.18%	86.37%
	Overeducation	0.21%	0.01%	0.07%	0.08%	0.09%
	Field of study mismatch	3.87%	6.47%	5.84%	8.84%	6.22%
	Full mismatch	5.62%	7.76%	8.27%	7.91%	7.32%

Source: Authors' calculations from the LFS, 2018–2021

Over the 2018-2021 period, there has been a declining trend in the proportion of graduates holding jobs that fully match both their field and level of education, dropping from 89.11% to 81.49%. Meanwhile, the rates of field-of-study mismatch and full mismatch have increased, rising from approximately 4.9% to 10.3%, and from 5.8% to 8.1%, respectively, over the same period. A similar trend was also observed among the broader population of university graduates in Vietnam (Tran et al., 2025a), suggesting that the rise in mismatch rates may reflect

broader imbalances in the national labor market rather than dynamics specific to the education sector.

Regression analysis

Table 3 reports the IV estimates of the relationship between wages and education-job mismatch. The coefficient for field-of-study mismatch is positive and statistically significant at the 1% level ($\beta = 0.064$, $p < 0.01$), indicating that, controlling for other covariates, graduates employed outside their field of study earn approximately 6.4% higher wages than their well-matched counterparts. The finding is consistent with evidence among agricultural graduates in Vietnam, where field-of-study mismatch is associated with a wage premium rather than a wage penalty (Tran, 2024). This result contrasts with the conventional expectation that field-of-study mismatch is penalized in the labor market. For instance, it results in a wage penalty of about 17% among business and management graduates in Vietnam (Tran et al., 2023).

Similar findings are also observed in several other countries (Somers et al., 2019). A plausible explanation is that many graduates, particularly those from fields with relatively low wage levels, such as education, may intentionally seek employment outside their trained field to secure better-paying opportunities. In Vietnam, this result reflects a paradox: teaching carries high social prestige, yet salaries remain modest under public pay scales. In such a context, horizontal mismatch may be understood not only as inefficiency but also as an adaptive choice, as graduates move into sectors where their general skills are more highly rewarded. The result is consistent with the assignment theory, which posits that field-of-study mismatch may not necessarily result in a wage penalty, as job characteristics—rather than field of study—are considered the main determinants of productivity and earnings.

Conversely, the coefficient on full mismatch is negative and significant at the 5% level ($\beta = -0.029$, $p < 0.05$), suggesting a 2.9% wage penalty for individuals whose jobs are misaligned with both their field of study and level of education. This result reflects the compounded disadvantage associated with the simultaneous presence of horizontal and vertical mismatch. It suggests that these graduates are not only under-utilizing their formal qualifications but also failing to apply any specific knowledge, thereby facing a wage penalty. The same result holds, on average, for the entire graduate population in Vietnam, where the wage penalty associated with full mismatch is approximately 12.4% (Tran et al., 2025a).

Table 3: The Relationship between Education–Job Mismatch and Wages

Explanatory variables	Coefficient	Robust Standard Error	P-value
Field of study mismatch	0.064	0.016	0.000
Full mismatch	-0.029	0.014	0.041
Gender	0.066	0.006	0.000
Marital status	0.021	0.011	0.058
Experience	0.045	0.002	0.000
Experience squared	-0.001	0.000	0.000
Public sector	-0.102	0.013	0.000
Household size	-0.009	0.004	0.015
Dependency ratio	-0.001	0.000	0.000
Year 2019	0.079	0.007	0.000
Year 2020	0.117	0.008	0.000
Year 2021	0.112	0.009	0.000
Urban	0.010	0.006	0.137
District dummies (yes)			
Observations	35783		
Centered R2	0.4194		
F test of excluded instruments	163.04		
Prob>F	0.000		

Notes: ** p<0.01, * p<0.05, + p<0.1. Estimates account for sampling weights and are clustered at the commune level.

In addition to mismatch variables, other covariates exhibit expected patterns. Male workers earn significantly higher wages than female workers ($\beta = 0.066$, $p < 0.01$), reflecting persistent gender wage disparities. Marital status has a marginally positive effect on earnings ($\beta = 0.021$, $p = 0.058$), while experience displays a concave relationship with wages—positive in linear form and negative in squared terms. Graduates employed in the public sector earn significantly lower wages ($\beta = -0.102$, $p < 0.01$) than those in the private sector, which may reflect standardized pay scales and non-monetary compensation (e.g., job security) typical of public employment. Household size and dependency ratio are both negatively associated with earnings, albeit with relatively small magnitudes. Time dummy variables for the years 2019 through 2021 show statistically significant and positive coefficients, indicating an upward trend in earnings over time.

Table 4: The Relationship between Education–Job Mismatch and Wages by Gender

	Female graduates			Male graduates		
Explanatory variables	Coefficient	Robust Standard Error	P-value	Coefficient	Robust Standard Error	P-value
Field of study mismatch	0.063	0.022	0.005	0.028	0.022	0.188
Full mismatch	-0.044	0.017	0.008	0.001	0.025	0.979
Marital status	0.005	0.013	0.714	0.072	0.022	0.001
Experience	0.046	0.002	0.000	0.045	0.003	0.000
Experience squared	-0.001	0.000	0.000	-0.001	0.000	0.000
Public sector	-0.103	0.015	0.000	-0.089	0.025	0.000
Household size	-0.009	0.004	0.046	-0.006	0.005	0.230
Dependency ratio	-0.001	0.000	0.000	-0.002	0.000	0.000
Year 2019	0.078	0.008	0.000	0.084	0.014	0.000
Year 2020	0.108	0.008	0.000	0.140	0.013	0.000
Year 2021	0.102	0.010	0.000	0.142	0.015	0.000
Urban	0.015	0.007	0.047	-0.004	0.011	0.691
District dummies (yes)						
Observations	26687			9096		
Centered R2	0.4169			0.4782		
F test of excluded instruments	146.98			64.84		
Prob>F	0.000			0.000		

Notes: ** p<0.01, * p<0.05, + p<0.1. Estimates account for sampling weights and are clustered at the commune level

We further explore how the wage associations of education-job mismatch differ by gender. Table 4 shows that, for female graduates, working outside one's field of study is associated with higher earnings ($\beta = 0.063$, $p < 0.01$), while full mismatch is linked to lower pay ($\beta = -0.044$, $p < 0.01$) for female graduates. Such results are statistically insignificant for male graduates. This suggests that the labor market responds differently to education-job mismatch across gender. While female graduates appear to be rewarded for switching fields—possibly by moving into better-paying occupations—they are more vulnerable to wage penalties when both the field and level of education are mismatched. In contrast, no statistically significant wage associations are observed for male graduates across either form of mismatch, which may reflect greater occupational flexibility or weaker wage penalties in the presence of mismatch. This result contrasts with the pattern observed among all graduates in Vietnam, where full mismatch is associated with significant wage penalties for both male and female graduates (Tran et al., 2025a).

The gender differences observed may be linked to structural features of Vietnam's labor market. Occupational segregation means that many women are concentrated in low-paid sectors such as education. Thus, working outside one's field of expertise is associated with access to better-paying jobs and a corresponding wage premium. By contrast, full mismatch among female graduates is characterized by weaker skill utilization and is negatively associated with wages. In addition, women may have weaker bargaining power in new sectors, making them more vulnerable to penalties when both their field and education level are misaligned.

Table 5: The Relationship between Education–Job Mismatch and Wages by Job Sector

	Public sector			Private sector		
Explanatory variables	Coefficient	Robust Standard Error	P-value	Coefficient	Robust Standard Error	P-value
Field of study mismatch	0.020	0.017	0.235	0.074	0.044	0.093
Full mismatch	0.000	0.014	0.994	-0.092	0.047	0.049
Gender	0.054	0.006	0.000	0.150	0.024	0.000
Marital status	0.023	0.010	0.015	0.052	0.031	0.099
Experience	0.049	0.002	0.000	0.038	0.005	0.000
Experience squared	-0.001	0.000	0.000	-0.001	0.000	0.000
Household size	-0.005	0.003	0.087	-0.025	0.012	0.036
Dependency ratio	-0.001	0.000	0.000	0.000	0.001	0.927
Year 2019	0.078	0.007	0.000	0.099	0.027	0.000
Year 2020	0.118	0.007	0.000	0.113	0.028	0.000
Year 2021	0.116	0.008	0.000	0.090	0.040	0.023
Urban	0.005	0.006	0.407	-0.017	0.029	0.568
District dummies (yes)						
Observations	33232			3551		
Centered R2	0.4857			0.4842		
F test of excluded instruments	117.54			175.37		
Prob>F	0.000			0.000		

Notes: ** p<0.01, * p<0.05, + p<0.1. Estimates account for sampling weights and are clustered at the commune level

Table 5 presents the wage implications of education–job misalignment by job sector. The findings demonstrate that neither field-of-study mismatch nor full mismatch is significantly associated with wages in the public sector, implying that public employers prioritize formal qualifications and utilize standardized pay

scales, irrespective of the correspondence between educational background and job responsibilities. Conversely, in the private sector, a mismatch in field of study correlates with a 7.4% wage premium, suggesting that private enterprises may prioritize flexibility and transferable abilities, rewarding workers who move into more lucrative positions beyond their field of study. This premium may also reflect the presence of higher-paying industries, such as corporate training or professional education, which offer better remuneration than K–12 teaching., In the private sector, furthermore, full mismatch corresponds to an estimated wage disadvantage of about 9.2%, possibly indicating the under-utilization of both domain-specific expertise and educational qualifications in roles that do not correspond with graduates' competencies. A similar finding is also observed among all graduates in Vietnam (Tran et al., 2025a).

Table 6: The Relationship between Education–Job Mismatch and Wages by Age

	Young			Adult		
Explanatory variables	Coefficient	Robust Standard Error	P-value	Coefficient	Robust Standard Error	P-value
Field of study mismatch	0.021	0.033	0.528	0.060	0.017	0.000
Full mismatch	-0.085	0.028	0.002	-0.002	0.016	0.904
Gender	0.076	0.020	0.000	0.060	0.006	0.000
Marital status	0.037	0.018	0.036	0.033	0.013	0.013
Experience	0.018	0.013	0.167	0.050	0.003	0.000
Experience squared	0.002	0.001	0.110	-0.001	0.000	0.000
Public sector	-0.216	0.022	0.000	-0.030	0.016	0.068
Household size	-0.013	0.005	0.003	-0.005	0.004	0.280
Dependency ratio	-0.001	0.000	0.037	-0.001	0.000	0.000
Year 2019	0.131	0.017	0.000	0.065	0.008	0.000
Year 2020	0.125	0.017	0.000	0.105	0.008	0.000
Year 2021	0.165	0.020	0.000	0.095	0.009	0.000
Urban	-0.016	0.015	0.279	0.011	0.007	0.082
District dummies (yes)						
Observations	6616			29622		
Centered R2	0.4657			0.3466		
F test of excluded instruments	201.96			119.37		
Prob>F	0.000			0.000		

Notes: ** p<0.01, * p<0.05, + p<0.1. Estimates account for sampling weights and are clustered at the commune level

Table 6 presents the IV estimates of the wage associations of education–job mismatch by age group. The results suggest no statistically significant relationship between field-of-study mismatch and wages for young graduates, possibly because they are at early stages in their careers where employers focus more on adaptability and learning potential than on field-specific skills. In contrast, adult graduates benefit from working outside their field of study, with a 6% wage premium, suggesting that experienced graduates may leverage transferable skills more effectively or transition into higher-paying sectors over time.

This finding is partially consistent with evidence from business and management graduates in Vietnam, where a wage penalty linked to field-of-study mismatch is observed among younger graduates but not among older ones (Tran et al., 2023). Full mismatch is associated with a substantial wage penalty (−8.5%) among young graduates. More generally, mismatches at the early stages of graduates' careers have been interpreted as evidence of a weak connection between having higher education and labor market demand (Legazpe et al., 2025).

The stronger wage penalties for young graduates are consistent with career stage theory (Super, 1980). At the early stage, workers are still forming their occupational identity and accumulating experience, with limited networks and bargaining power. These disadvantages heighten their vulnerability to mismatch and help explain the harsher wage outcomes. Nonetheless, among adults, no statistically significant wage association with full mismatch is observed, most likely due to their increased ability to minimize mismatch through work experience or by moving into more suitable roles over time. This result diverges from the findings for the overall graduate population in Vietnam, where field-of-study mismatch is associated with a wage penalty among young graduates, and full mismatch is linked to lower earnings among both young and adult workers (Tran et al., 2025a).

Table 7 reports the regression estimates of the wage differences associated with education–job mismatch across urban and rural regions. In urban areas, field-of-study mismatch is linked to a small wage premium. For instance, field-of-study mismatched graduates earn approximately 4.3% more than their well-matched counterparts. A similar pattern is observed in rural areas, where the wage premium reaches 6.5%. These findings suggest that field-of-study mismatch may reflect strategic job switching or career mobility in contexts where labor markets allow for greater occupational flexibility and skill transferability. It is also found that full mismatch corresponds to a small wage penalty for rural graduates, with a coefficient of −0.038. This suggests that fully mismatched graduates in rural areas may face structural disadvantages that limit their ability to utilize their qualifications in higher-paying jobs.

Table 7: The Relationship between Education–Job Mismatch and Wages by Region

	Urban			Rural		
Explanatory variables	Coefficient	Robust Standard Error	P-value	Coefficient	Robust Standard Error	P-value
Field of study mismatch	0.043	0.023	0.063	0.065	0.021	0.065
Full mismatch	-0.023	0.023	0.322	-0.038	0.018	-0.038
Gender	0.067	0.010	0.000	0.063	0.009	0.063
Marital status	0.026	0.017	0.123	0.012	0.015	0.012
Experience	0.044	0.003	0.000	0.046	0.002	0.046
Experience squared	-0.001	0.000	0.000	-0.001	0.000	-0.001
Public sector	-0.102	0.019	0.000	-0.109	0.017	-0.109
Household size	-0.012	0.006	0.065	-0.004	0.004	-0.004
Dependency ratio	-0.001	0.000	0.000	-0.001	0.000	-0.001
Year 2019	0.084	0.011	0.000	0.075	0.010	0.075
Year 2020	0.117	0.012	0.000	0.115	0.011	0.115
Year 2021	0.104	0.013	0.000	0.119	0.013	0.119
District dummies (yes)						
Observations	22059			13724		
Centered R2	0.3299			0.5349		
F test of excluded instruments	79.52			121.03		
Prob>F	0.000			0.000		

Notes: ** p<0.01, * p<0.05, + p<0.1. Estimates account for sampling weights and are clustered at the commune level.

In summary, Figure 2 indicates that horizontal mismatch is often accompanied by higher wages across most subgroups, particularly among private-sector and rural workers. By contrast, full mismatch is consistently associated with lower earnings, with the gap most evident among younger graduates and those employed in the private sector. Taken together, these results indicate that wage differentials related to mismatch vary across institutional contexts and graduate characteristics.

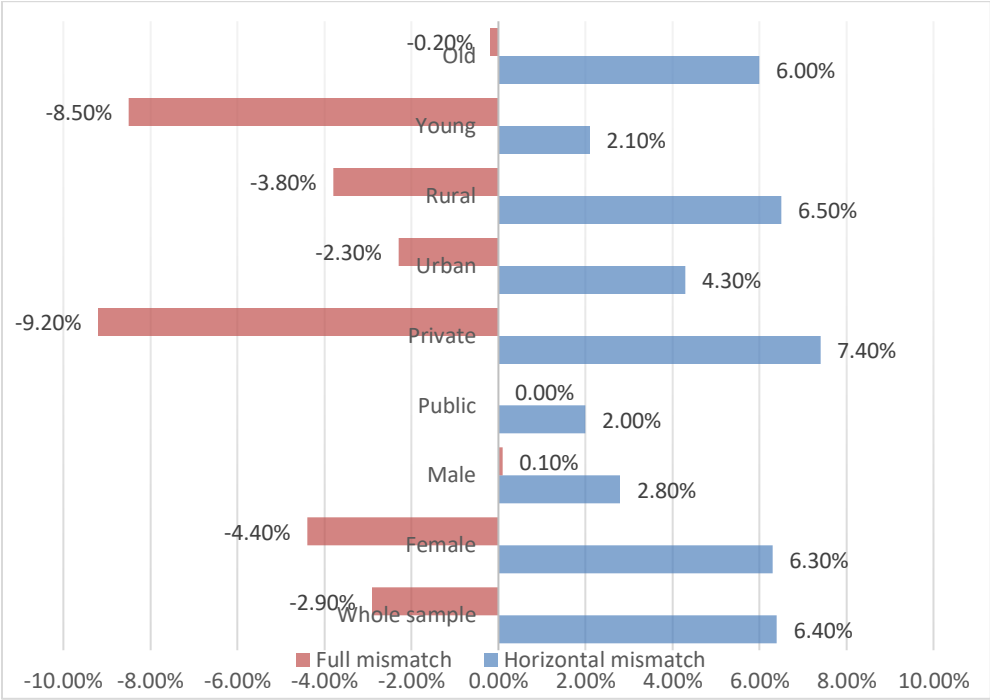

Figure 2: *Estimated Wage Differences by Type and Subgroup of Education–Job Mismatch*

DISCUSSION AND CONCLUSIONS

This paper provides the first evidence on wage differentials related to job–education mismatch among graduates in educational science and teacher education in Vietnam. Using nationally representative data and instrumental variable estimation, the analysis reveals a paradoxical pattern. Field-of-study mismatch is not uniformly related to wage penalties. In many cases, it coincides with a wage premium, particularly among female graduates, adult workers, and those employed in the private sector. By contrast, full mismatch is consistently accompanied by wage penalties, with more pronounced differentials evident among young graduates, women, and individuals working in rural areas or in the private sector. Overall, graduates who remain in their field of expertise tend to earn lower wages than those who transition into other occupations. This pattern mirrors the long-standing issue of relatively low teacher salaries in both developing (Evans et al., 2022) and developed countries (Organization for Economic Co-operation and Development [OECD], 2023).

These findings are broadly consistent with the international literature on teacher labor markets, which repeatedly documents challenges related to wage competitiveness and workforce retention in the teaching profession. Evidence from

both developed and developing contexts indicates that relatively low and rigid wage structures in teaching (Evans et al., 2020; OECD, 2023) may constrain the sector's capacity to attract and retain highly qualified graduates, particularly when alternative employment opportunities offer higher economic returns. At the same time, evidence from developing contexts suggests that teacher retention is shaped not only by wage incentives but also by familial, societal, and situational factors influencing career choices (Fenu et al., 2021). In our study, the wage premium observed for horizontal mismatch can be understood as reflecting adaptive labor-market choices in response to weak economic incentives within the education sector. Meanwhile, wage penalties characterizing full mismatch are in line with international evidence suggesting that more severe forms of skill under-utilization tend to be correlated with lower earnings and less favorable career trajectories.

IMPLICATIONS

Theoretical Implications

Our findings can be interpreted through a conceptual perspective in which the wage implications of education–job mismatch depend on the interaction between institutional wage-setting, the type of mismatch, and age. They challenge the common view that field-of-study mismatch is always negative. In the Vietnamese case, teaching is socially respected, yet salaries remain low under state-regulated pay scales. In this setting, working outside one's field of expertise can be understood as a rational adjustment rather than pure inefficiency.

By contrast, the consistent penalties linked to full mismatch suggest that more severe forms of misalignment reduce the effective use of skills and lower returns to education. Differences across gender and age further indicate that mismatch outcomes are not uniform but vary with labor market position and age. The stronger penalties observed among younger graduates are consistent with career stage theory (Super, 1980), which emphasizes limited experience, weaker networks, and lower bargaining power early in working life.

Taken together, these results suggest that the consequences of mismatch depend not only on whether mismatch occurs, but also on its depth and the institutional context within which employment decisions are made. This perspective helps reconcile mixed findings in the literature by showing that mismatch may reflect adaptive responses to institutional constraints in some cases, and substantive skill under-utilization in others.

Policy Implications

The findings of this study point to several implications for higher education and labor-market policy. The evidence that graduates experiencing full mismatch suffer significant wage penalties, particularly outside the public sector, suggests a persistent misalignment between higher education training and labor-

market demand. Without improvements in pay and working conditions, it will remain difficult to retain high-quality graduates in education-related occupations, a challenge that has been observed in many countries. This has direct implications for teacher retention. Persistent wage penalties and limited career incentives may further exacerbate difficulties in attracting and retaining teachers in rural and disadvantaged areas, where working conditions are often less favorable and professional support is limited. At the policy level, reforms to public-sector salary structures, particularly greater wage flexibility and targeted incentives for rural placement, could help reduce attrition and improve the distribution of qualified teachers across regions. In addition, targeted public funding could help improve entry-level salaries and working conditions for teachers, particularly in disadvantaged locations.

Given that mismatch-related wage penalties are linked to limited skill transferability, universities should adjust curricula in educational science and teacher education to move beyond narrow occupational preparation and place greater emphasis on transferable and adaptable skills. Evidence from other contexts shows that despite fostering future-oriented skills, teacher education programs still face gaps in adaptability and transferability (Eid & Al-Senaidi, 2024). The results also highlight the need to rethink teacher preparation programs, particularly in contexts where graduates increasingly work outside the public education system. Higher education institutions should therefore equip students not only for traditional public-sector teaching roles but also for employment in private and non-school settings, in which adaptability and performance-based skills are more strongly rewarded. For early-career teachers, additional salary support, improved working conditions, and professional development support could help them adapt more effectively to teaching jobs and reduce early-career attrition.

Closer coordination among universities, employers, and government agencies is essential to align enrolment planning and curriculum design with evolving labor-market demand. Targeted support should be directed towards groups most exposed to these penalties. Career counselling can play a critical role in smoothing the school-to-work transition, while female graduates may require additional support to mitigate compounded disadvantages. Greater public–private sector collaboration, such as joint training programs, internships, or co-funded professional development initiatives, can further enhance curriculum relevance and expand career pathways for education graduates.

Limitations and Future Research

This study has some limitations. First, the IV model is exactly identified, so overidentification tests could not be performed, and the validity of the instrument rests mainly on theoretical grounds. Future research should consider additional instruments to allow for stronger testing of identification. Second, the

study is based on cross-sectional data. Without longitudinal information, it is not possible to trace how mismatches and wage effects evolve as graduates move through their careers. Moreover, the cross-sectional structure limits the scope for strong causal inference. Future work using panel or longitudinal data would be important to assess whether observed penalties persist or diminish over time.

Third, the analysis is restricted to wage and salaried workers in order to ensure reliable income data. Consequently, graduates in informal employment or self-employment are not included, and the findings should be understood within this scope. This limitation also suggests avenues for future research to extend the analysis to graduates in informal- and self-employment.

Fourth, educational science and teacher education graduates are analyzed as a single group for conceptual and empirical reasons, as they share similar institutional training structures and career orientations toward the education sector. Moreover, the Labor Force Survey does not provide sufficiently detailed information to reliably distinguish between these two fields. However, this aggregation may obscure heterogeneity across specializations. Future research using more detailed program-level data could disaggregate these graduates to examine potential differences across specializations.

Finally, this study adopts a job-analysis (normative) approach to identify job–education mismatch. While this measure offers consistency and is less prone to bias than many alternatives (Flisi et al., 2017), relying on a single definition may limit robustness. Future research could strengthen the analysis by combining job-analysis measures with alternative approaches, such as self-assessed or statistical indicators, to assess the sensitivity of the results.

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