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The Impact of "Job Mismatch" on Earnings and Job Satisfaction: The Dual Consideration of Educational Acquisition and Skill

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Researching the impact of job mismatch is a trend in the economy, society, and other related fields and is as essential as the field of education. This study explored the impact of the mismatch between education/skills and employment on labor market outcomes such as earnings and job satisfaction. We used the Taiwan Social Change Survey to analyze workers with formal employment. The findings indicate that two forms of job mismatch had different effects on earnings and job satisfaction. Among them, overeducation reduced earnings, but those undereducated and underskilled experienced differing results of favorable and reduced earnings respectively. Additionally, overeducation and underskilling were not conducive to job satisfaction. Furthermore, highly educated workers had significant overeducation and overskilling, adversely affecting earnings and job satisfaction. Based on the analysis results, this study suggests that the job mismatch issue should be effectively alleviated by improving the overall quality and level of work in the labor market.

Keywords: earnings; educational acquisition; job mismatch; job satisfaction; technical skill

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Introduction

A wave of highly industrialized development has spread worldwide, leading to scientific and technological progress and the increasing development of global trade. At the same time, a demand for a more educated workforce has induced the expansion of higher education. This has resulted in an imbalance between the supply and demand of higher education talents and professional and technical talents in the labor market (Delaney et al., 2020; McGuinness, Bergin, et al., 2018; McGuinness, Pouliakas, et al., 2018). Recently, the job mismatch issue regarding what one learns in school and what one needs for employment is growing increasingly severe, which has attracted attention from academia and the job market (Delaney et al., 2020).

The job mismatch phenomenon stems from high expectations of human resources in national development (Marioni, 2021). Several countries typically regard improving national human capital as the central core of economic development to pursue economic benefits. Furthermore, improving its residents' quality is a central concept regarding human capital. As such, the state's or individuals' investments in education have become the main symbol of human capital (Sellami et al., 2020). Generally, the more investment in education, the higher the productivity of a workforce; the higher the opportunities for individual employment, the higher the earnings and remuneration should be (Huang & Lin, 2010). Such a consensus and perspective has influenced countries worldwide, in Europe and the United States. It has also led to Taiwan's policy of promoting the expansion of higher education since the 1990s. Many higher education institutions have risen rapidly, reaching 84.82% of university enrollment by 2023 in Taiwan as a result (Statistics Department of the Ministry of Education, 2024).

Establishing higher education institutions has improved the quality of people's lives and work. However, it has also led to a rapid increase in workers above the university level. Based on the expansion of higher education, many workers with higher than the university degree requirements or above have entered the labor market. If these higher education workers are unwilling to take jobs below their education level and professional ability, this may lead to a "high education, high unemployment" dilemma (McGuinness, Bergin, et al., 2018). Moreover, the job mismatch caused by the expansion of higher education may also be unsuitable for industrial transformation, occupational structure, and the improvement of education for all, reflecting poor working market conditions. This may impact workers' earnings and job satisfaction. Or there could be an oversupply of the higher education workforce, which may lead to a depreciation of higher education diplomas, reducing or suppressing average earnings and affecting the unemployment rate (McGuinness, Bergin, et al., 2018; Sellami et al., 2020).

Owing to the expansion of higher education, workers are often forced to work below their own level of education or in occupations incompatible with their professional competence to obtain jobs and professions, which may negatively impact the stability of the workforce (Delaney et al., 2020) and quality of the life (Frank & Hou, 2018).

More importantly, a job mismatch can be detrimental to economic development and the promotion of education policies. This reflects a lack of reasonable and appropriate use of human resources in the labor market by national economic policies and the improper allocation of human resources. It also highlights the low efficiency of educational investment and the misallocation of educational resources (Huang & Lin, 2010). However, past research has typically focused on the impact of educational mismatch. More recently, there has been a focus on the mismatch of skills. The emphasis on skill mismatch reflects a shift in the labor market's orientation toward recruitment. As such, exploring the impact of skills mismatch should not be overlooked. Research also suggests that overskilling is a better measure of employer-employee mismatch (Cim et al., 2020). Studies indicate that overskilling overcomes many of the perceived measurement problems associated with overeducation as respondents directly compare all skills and abilities, whether they relate to formal/informal schooling or innate ability, with the actual skill requirements of their job (Sánchez-Sánchez & McGuinness, 2015). Taiwan, like many Western societies, has experienced rapid changes in education development and the labor market, and studies have found that excessive education has adverse effects on individual salary acquisition, job satisfaction, job identity, job performance, and other issues (Chao & Luh, 2019; Hsiao et al., 2023; Hsu, 2021; Huang & Lin, 2010; Liu & Huang, 2011). Nevertheless, compared with the research results of European and American countries, the research on the impact of overskills in Taiwan is insufficient, and it is an important topic that needs to be strengthened to enhance the research results.

Therefore, the present study explored the impact of job mismatch regarding education and skills. The study constructed an integrated research model of the effects of job mismatch on earnings and job satisfaction to address the shortcomings of previous research on this topic. The findings can serve as a reference for future education and society policy adjustment and future research directions.

Literature Review

While the job mismatch phenomenon has received considerable attention in empirical labor economics, there is no consensus on how to measure it. Generally, there are three

common approaches to measurement. The first is based on workers' self-assessment of the skill requirements of their jobs. This method has been considered to be a suitable measure of educational matches because the evaluation of employment comes directly from individuals performing these jobs (Morsy & Mukasa, 2020). The second method is based on experts' job analyses. In this method, job analysts define educational requirements for each occupation. Individuals with more years of schooling than required are described as overeducated (Huang & Lin, 2010). The third method uses realized job matches (RM) to measure educational mismatch. The RM approach compares individual educational attainment to the mean education within an occupation (Cim et al., 2020; Delaney et al., 2020). Some studies have used the average years of education in each occupation while adding one or half standard deviation to determine an overeducated threshold (e.g., Bauer, 2002; Huang & Lin, 2010).

Education and job mismatch is not a recent issue. It refers to the phenomenon whereby individuals are employed in jobs for which they hold an educational qualification at a level that either exceeds or is under the educational requirements for that job (Cim et al., 2020; Delaney et al., 2020). A worker is classified as an overeducated if they perform a job that requires less education than they have. If the education necessary for a job is higher than the degree of education obtained, a worker is considered undereducated. The education level required by the academic qualifications is similar to that of the job, and it is considered appropriate education (Frank & Hou, 2018).

Among these categories, overeducation is particularly valued by academia and the labor market. Most job mismatch literature has considered overeducation as an indicator of human capital waste (Cim et al., 2020). The literature on labor mismatch has rapidly increased as scholars have broadly investigated the impact of overeducation on labor market outcomes such as earnings (Huang & Lin, 2010; Marioni, 2021; McGuinness, Pouliakas, et al., 2018; Sánchez-Sánchez & McGuinness, 2015; Sellami et al., 2020), job/career mobility (Mavromaras et al., 2013), well-being (Frank & Hou, 2018), and job satisfaction (Huang & Lin, 2010; Sánchez-Sánchez & McGuinness, 2015; Sellami et al., 2020).

Researchers have generally found that workers employed in occupations for which they are overeducated earn lower salaries than those employed in professions appropriately matched with their education level (McGuinness, Pouliakas, et al., 2018; Sellami et al., 2020). McGuinness, Pouliakas, et al. (2018) examined 98 studies on overeducation, which covered approximately 40 of the mainly high-income countries. They reported an average overeducation rate of one quarter across all studies. They also found that highly educated workers may earn less than a similar level of education in a worker's matching occupation.

Overeducated workers were also more dissatisfied with their jobs. These studies indicate that job mismatches reduce workers' earnings, lower job satisfaction, and increase the likelihood of job mobility (Cim et al., 2020). Mismatches can result in suboptimal allocation of skills and education qualifications across jobs, which adversely impacts labor productivity and can subsequently undermine firm dynamism, growth, and even survival (Frank & Hou, 2018; McGuinness, Pouliakas, et al., 2018; Sellami et al., 2020). Sánchez-Sánchez and McGuinness (2015) also found that overeducation and overskilling was associated with substantially lower earnings and lower job satisfaction.

In recent years, Taiwan has experienced significant development in the quantity and quality of higher education as a result of the government's emphasis on education and society's increasing demand for knowledge. For example, Huang and Lin (2010) found that when "education" was controlled, overeducated workers had lower earnings than adequately educated ones; when both "education" and "earnings" were controlled, overeducated workers had lower job satisfaction and class identification, held a more pessimistic career perspective, and were more likely to identify with the proletariat than adequately educated ones. Chao and Luh (2019) administered a self-reported online survey, and 1,522 subjects in Taiwan were recruited. The results also showed that, compared with those with bachelor's degrees, graduates with master's degrees tended to have stronger feelings of educational mismatch. College graduates who were overeducated or suffered from skill mismatch tended to have significantly lower earnings. By contrast, for graduates with master's degrees, only those with skill mismatch suffered from significantly lower earnings. Finally, others study of Taiwan's labor market such as Liu and Huang (2011), Hsiao et al. (2023), and Hsu (2021) have similarly pointed out that mismatches in learning and use can significantly lead to lower employees' salaries.

It is evident that the research orientation of "the impact of education and job mismatch on work earnings" has been valued by the academic community. This is because, since the rise of human capital theory in the early 1960s, the cost-benefit analysis of education proposed by educational economists began to take precedence. The relationship between the cost of education and its personal relative benefits, remuneration, and work consciousness has become a considerable issue in various academic fields as a result. The most representative indicator of personal remuneration is work income. The basic thesis of human capital theory is that the higher the level of education a person has in the labor market, the more they have "acquired professional knowledge and skills related to economic productive activities." In other words, the higher the human capital, the higher the efficiency and productivity of

the work, the greater the contribution, leading to increased income (Huang & Lin, 2010). However, such views and assertions have been questioned by many scholars. For example, Collins's (1979) diploma theory argues that higher education in school is primarily related to learning the upper-class culture, rather than the professional competence claimed by the human capital theory. The diploma theory further asserts that the professional competence required for a job is mainly derived from post-employment work experience and on-the-job training. Higher-educated people can obtain high-level positions and higher work earnings because they have a higher degree of mastery of upper-class culture. They are more likely to be accepted by employers who belong to the upper class and value the cultural capital represented by educational diplomas rather than because they are better educated and more productive. From this perspective, personal earnings and performance are not necessarily dominated by school education, and the level of job skills represented by experience and on-the-job training may be an important indicator of job suitability (Ghosh & Grassi, 2020). As a result, the assessment of educational attainment and skill mastery, as well as the degree commensurate with a job, must also be considered.

Previous research has mainly focused on the impact of education-job match on earnings and job satisfaction, but relatively few studies have examined the skill-job match. At the same time, the effect of under-qualifications on earnings and job satisfaction is relatively rare compared to the high level of attention that over-qualifications receive. The causes of the job mismatch of underqualified and overqualified workers can vary significantly depending on their impact on earnings and job satisfaction. Therefore, the impact of over-qualification and under-qualification is an essential issue in the labor market that needs further exploration.

Data and Methodology

Data

The data analysis for this study was based on the "2015 Taiwan Social Change Survey (Round 7, Year 1): Work Orientation." The data was collected from a survey of people over 18 years old in Taiwan. This was a face-to-face survey project jointly conducted by the Institute of Sociology of Academia Sinica and the Center for Survey Research, aiming to understand Taiwanese people's views on society. A total of 2,031 questionnaires were successfully completed (Fu, 2016). The survey included questions on many topics such as employment status, work and life, work experiences, work consciousness, division of

household chores, work proportionality, work innovation, physical and mental health, happiness, and a considerable investigation of the respondents' background.

For the purposes of this study, it was necessary to deduct respondents who did not have a formal job, those who were retired, homemakers, students, and other unpaid work/non-employment statuses. We finally obtained a valid sample of 1,144 respondents. Furthermore, since many variables were included in this study, if only those who completed all variables were taken as the research subject, the valid sample would inevitably be reduced. Among the variables analyzed in this study, the number of missing variables was at least 18 (for years of service) and at most 70 (for total years of service). We used the expectation-maximization method (Allison, 2009) to impute the missing values. The number of imputed data was 1,144. The maximum number of imputed records was only 6.12% (70/1,144).

Measures

Table 1 shows the design and scoring methods for each variable of the study. Variables used in this study were grounded into two types: (a) worker's individual characteristics, such

Table 1: Variable Measurement

Variable	Description
Gender	1 = female, 0 = male (reference category)
Age	Conversion to age according to the year of birth
Years of service	Years of experience in the company (or organization) currently working for
Seniority	Number of years in gainful employment since the first formal employment
Working hours per week	Average number of hours worked per week (hours), including overtime
Work experience	The total number of companies (or institutions) that people have worked
Required education	The measures include three categories: high school or below (reference category), college, and graduate school
Occupation	The measures include five categories: professional, semi-professional, clerical work (as reference category), service and technicians, unskilled manual labor jobs
Job and education/skill match	The measurement of the match between education and job, and the match between skills and job, is divided into three situations: appropriate, over, and under
Earnings	Based on the average monthly working earnings, the earnings are taken as the logarithm in the regression analysis
Job satisfaction	A seven-point scale was given on a scale of 1–7 from very dissatisfied to very satisfied; the higher the score, the higher the job satisfaction

as gender, age, years of service, seniority, work experience, working hours per week, education level, and job acquisition, and (b) job match, earnings, and job satisfaction.

Additionally, the measure of job mismatch used in this study was based on the subjective responses of workers in each profession regarding their own education and skills compared to the job they are currently performing. The results of this study's subsequent analysis of the match condition between education and job are consistent with previous studies on earnings and job satisfaction (e.g., Huang & Lin, 2010; Marioni, 2021). As such, the measure has good construct validity. Notably, in addition to the match between education and job, the match between skills and job is a more innovative exploration of this study. This has received less attention in previous studies. However, the skills and job measurements are similar to the measure of match between education and job. As such, it can be inferred that the measure of skills and job match has acceptable construct validity.

Analysis Strategy

This study took educational attainment and occupational categories as the core variables. Education-job match and skill-job match were the mediating variables. The study explored the impact of these variables on earnings and job satisfaction to clarify the most critical issue of commensurate learning and employment in the labor market. Based on the findings of previous studies, this study hypothesized that overeducation would be detrimental to workers' earnings and thus reduce job satisfaction compared to appropriate education levels. Overskilled employees are also less likely to be appropriately paid than appropriately skilled workers, thus reducing job satisfaction. It remains to be seen what impact the undereducated and unskilled will have on their earnings and job satisfaction. Second, this study predicted that the difference in earnings and job satisfaction among workers with different educational backgrounds and occupations can be attributed to the indirect effects of differences in education- and skill-job matches. However, the research results on such impact paths in the past are not clear, and further exploration is required.

Based on the above, we performed frequency analysis and descriptive statistics, mean difference, cross-table analysis, multiple regression analysis, and multi-category logistic regression analysis respectively. The analysis examined the overall status of individual demographic variables (e.g., gender, age, seniority, working hours, work experience, education level, occupation), job match, earnings, job satisfaction by using frequency analysis, mean, and standard deviation. Then, we analyzed the differences in the average earnings and job satisfaction of Taiwanese workers with different education and occupation categories.

A cross-table was used to analyze the percentage distribution of education- and skill-job matches among Taiwanese workers.

Additionally, this study used hierarchical multiple regression analysis to explore the differences between workers' education and job achievement, the difference between education-job/skill-job match, and the impact on earnings acquisition and job satisfaction while controlling for relevant demographic variables. Furthermore, it explored the differences in the job match of various education levels and occupations. Based on the three categories of education-job match (i.e., appropriate, over, and under), while the same is true for skill-job match, the study adopted the multi-category logistic regression analysis according to the variables. During the regression analysis, the study also performed statistical controls for demographic variables. In addition, the PROCESS plug-in program developed by Hayes (2018) and the Bootstrap method were sampled 5,000 times to conduct a 95% confidence interval estimate to test whether the mediation mechanism was valid.

Finally, regarding the demographic variables included in the analysis for statistical control, since many previous studies have pointed out that there may be a non-linear relationship between age, years of service, or seniority on earnings acquisition and job satisfaction, it is generally common practice to include additional square terms for analysis to more realistically approximate the current situation of the labor market (Baran, 2024; Caglayan-Akay & Komuryakan, 2024; Hsu, 2021). However, the operation of square terms may lead to the generation of multicollinearity, resulting in unstable or unreliable regression coefficient estimates, high variant or covariate estimates, and overall R^2 has a significant effect, but individual predictive variables have no significant effect. The severity of multicollinearity is often determined by the variance inflation factor (VIF) or tolerance, where VIF is the reciprocal of the tolerance value. When the tolerance value is high and the VIF is small, it means that the multicollinearity problem does not affect the analysis results too severely. When the VIF is greater than 10, it indicates severe collinearity (Cohen et al., 2003; Kim, 2019). In the subsequent regression model analysis of this study, the VIF value of the predicted variable was not higher than 5.50 when the square term of the years of service or the square term of the seniority was not included, and the VIF value of the first and square terms of the years of service and the seniority would be higher than 10.00 after the square term was included. Before and after adding the square term, each predictor has the same effect direction on salary attainment and job satisfaction, but the magnitude of the coefficient is slightly different, so it should be feasible to determine the analysis method for adding the square term.

Results

Descriptive Statistics

Table 2 shows that among the 1,144 workers analyzed in this study, 54.7% were males and 45.3% were females. The average age of respondents was 43.50 years, with 10.92 years of service and 19.73 years of seniority. The average number of hours worked per week was 46.66, and each respondent worked for about three companies or units on average (the average was 2.89). About 49.9% had high school or lower as their education level, 40.8% were in

Table 2: Descriptive Statistics for Variables

Variable	*N*	%	*M*	*SD*
Gender	1,144			
Male	626	54.7		
Female	518	45.3		
Age	1,144		43.50	12.99
Year in service	1,144		10.92	11.14
Seniority	1,144		19.73	12.96
Work hours per week	1,144		46.66	14.86
Work experience	1,144		2.89	2.19
Education level	1,144			
High school or lower	571	49.9		
College	467	40.8		
Graduate school	106	9.3		
Occupation	1,144			
Unskilled manual labor	134	11.7		
Service and technicians	449	39.2		
Clerical work	162	14.2		
Semi-professional	239	20.9		
Professional	160	14.0		
Education-job match	1,144			
Appropriately educated	866	75.7		
Overeducated	149	13.0		
Undereducated	129	11.3		
Skill-job match	1,144			
Appropriately skilled	913	79.8		
Overskilled	154	13.5		
Underskilled	77	6.7		
Earnings	1,144		TW$44,900	4.40
Job satisfaction	1,144		5.29	0.97

college, and 9.3% were in graduate school. Regarding occupation, the lowest proportion was unskilled manual workers (11.7%), while those service and technician workers (39.2%) accounted for the largest proportion. Additionally, 75.7% of the respondents were appropriately educated, 13.0% were overeducated, and 11.3% were undereducated. Furthermore, 79.8% were appropriately skilled, 13.5% were overskilled, and 6.7% were underskilled. Overall, the proportion of those in appropriate jobs was the highest, and the proportion of those over and under was about 10% each. Finally, the average monthly earnings of workers was about TW$44,900 (about US$1,400). Job satisfaction was measured on a seven-point scale, with an average of 5.29.

The distribution of the percentage of different educators in terms of education and occupation is presented in Table 3. First, 6.8% of high school workers were overeducated, 78.8% had appropriate education levels, and 14.4% were undereducated. The proportion of appropriate education for college degree labor was also the highest, reaching 72.8%, while the proportion of overeducation and undereducation was 17.3% and 9.9% respectively.

Table 3: Percentage Distribution of Education Match and Job Match

	Education and job match			Row % (total)
	Overeducation	Appropriate education	Undereducation	*N* = 1,144
High school or lower				
Row %	6.8	78.8	14.4	100 (*n* = 571)
Column %	26.2	52.0	63.6	
College				
Row %	17.3	72.8	9.9	100 (*n* = 467)
Column %	54.4	39.2	35.7	
Graduate				
Row %	27.4	71.7	0.9	100 (*n* = 106)
Column %	19.5	8.8	0.8	
Column % (Total)	100 (*n* = 866)	100 (*n* = 149)	100 (*n* = 129)	

Regarding those with graduate school qualifications, the proportion of respondents with an appropriate education level was the highest (71.7%), while the proportion of overeducation was 27.4%, and the proportion of undereducation was less than 1% (0.9%). Additionally, the proportion of workers with a college degree was the highest (54.4%), followed by those with a high school level or lower (26.2%) and graduate degree (19.5%). On the other hand, 52.0% of the respondents with a high school degree or less were employed, 39.2% had a college degree, and 8.8% had a graduate degree.

Finally, regarding the percentage distribution of undereducated workers, respondents with a high school or lower education (63.6%) were still the highest. Nearly 40% (35.7%) of those had a college degree and less than 1% (0.8%) had a graduate degree. The findings indicate that the appropriate amount of education for workers with different academic qualifications was the more common phenomenon. However, the overeducation of college and graduate school education was quite evident and severe.

The percentage distribution of job-skill matches at different educational levels is presented in Table 4. Among the workers with high school or lower qualifications, 12.1% were overskilled, with 82.7% having the highest proportion of appropriate skills and 5.3% being underskilled. The proportion of workers with a college degree with appropriate skills was also the highest, reaching 77.1%. The proportions of overskilled and underskilled workers were 13.9% and 9.0% respectively. Regarding those with a graduate degree or above, the proportion of respondents with appropriate skills was the highest (76.4%). The proportion of those who were overskilled was 18.9%, and the proportion of those who were underskilled was 4.7%.

Table 4: Percentage Distribution of Different Education Attainment and Skill Match

	Education-skill match			Row % (total)
	Overskilled	Appropriately skilled	Underskilled	*N* = 1,144
High school or lower				
Row %	12.1	82.7	5.3	100 (*n* = 571)
Column %	44.8	51.7	39.0	
College				
Row %	13.9	77.1	9.0	100 (*n* = 467)
Column %	42.2	39.4	54.5	
Graduate				
Row %	18.9	76.4	4.7	100 (*n* = 106)
Column %	13.0	8.9	6.5	
Column % (Total)	100 (*n* = 913)	100 (*n* = 154)	100 (*n* = 77)	

Additionally, the proportion of respondents who were overskilled with high school or lower and college education were more than 40%, reaching 44.8% and 42.2% respectively, and about 13.0% of those had graduate education. In contrast, the proportion of appropriately skilled workers with a high school degree or lower was the highest (51.7%). The proportion of appropriately skilled workers with a college degree was 39.4%, and the proportion of appropriately skilled workers with a graduate degree was 8.9%. Finally, among those underskilled, respondents with a college degree were the highest (54.5%). Those with a high

school or lower education were 39.0%, and those with a graduate degree were 6.5%. The findings suggest that the workers with appropriate skill levels with different educational qualifications was the more common phenomenon; overskilled workers with different educational qualifications were about 10–20%.

Table 5 shows that the proportion of unskilled manual workers with appropriate education was about 80%, and the proportion of overeducated and undereducated manual workers was around 10%. The distribution of those mentioned above for unskilled manual workers in the proportionality of different education levels was similar to that of clerical workers, semi-professional workers, and professional workers. The difference is that the proportion of trade service and technician workers was 73.3%, and the proportion of those undereducated was 9.6%. Still, the proportion of those overeducated was 17.1%, higher than that of the other occupations. Additionally, the proportion of transactional service and technician workers with overeducation was the highest (51.7%), followed by semi-professional workers (18.8%). Regarding the distribution of appropriate education, the proportion of service and technician workers was the highest (38.0%), and the proportion of semi-professional workers was second (20.8%). Finally, among those who were undereducated, the proportion of service and technician workers was still the highest (33.3%), followed by semi-professional workers (24.0%).

Table 5: Percentage Distribution of Education-Job Match for Different Occupations

	Education-job match			Row % (total)
	Overeducation	Appropriate education	Undereducation	*N* = 1,144
Unskilled manual Labor				
Row %	9.0	79.1	11.9	100 (*n* = 134)
Column %	8.1	12.2	12.4	
Service and technicians				
Row %	17.1	73.3	9.6	100 (*n* = 449)
Column %	51.7	38.0	33.3	
Clerical work				
Row %	9.9	77.8	12.3	100 (*n* = 162)
Column %	10.7	14.5	15.5	
Semi-professional				
Row %	11.7	75.3	13.0	100 (*n* = 239)
Column %	18.8	20.8	24.0	
Professional				
Row %	10.0	78.1	11.9	100 (*n* = 160)
Column %	10.7	14.4	14.7	
Column % (total)	100 (*n* = 866)	100 (*n* = 149)	100 (*n* = 129)	

Finally, Table 6 shows that the proportion of unskilled manual workers with appropriate skill levels (row %) exceeded 80% (83.6%), while those who were overskilled was about 10% (11.2%), which was higher than that of those who were underskilled (5.2%). The proportion of semi-professional workers with appropriate skill levels was 74.1%, followed by overskilled levels at 14.6%, with about 10% underskilled (11.3%). The professional workers had the highest proportion of all workers with appropriate skill levels (85.6%). The proportion of overskilled professional workers was 11.9%, and the proportion of underskilled professional workers was the lowest of all occupational groups (2.5%).

Regarding overskilled workers, the proportion of respondents in the service and technicians was the highest (43.5%), followed by semi-professional workers (22.7%). Regarding the distribution of appropriate skills, the proportion of service and technician workers was the highest (39.4%), and the proportion of semi-professional workers was second (19.4%). Finally, among underskilled workers, semi-professional workers had the highest proportion (35.1%), followed by service and technician workers (28.6%) and clerical workers (22.1%).

Table 6: Percentage Distribution of Education-Skill Match for Different Occupations

	Skill-job match			Row % (total)
	Overskilled	Appropriately skilled	Underskilled	*N* = 1,144
Unskilled manual Labor				
Row %	11.2	83.6	5.2	100 (*n* = 134)
Column %	9.7	12.3	9.1	
Service and technicians				
Row %	14.9	80.2	4.9	100 (*n* = 449)
Column %	43.5	39.4	28.6	
Clerical work				
Row %	11.1	78.4	10.5	100 (*n* = 162)
Column %	11.7	13.9	22.1	
Semi-professional				
Row %	14.6	74.1	11.3	100 (*n* = 239)
Column %	22.7	19.4	35.1	
Professional				
Row %	11.9	85.6	2.5	100 (*n* = 160)
Column %	12.3	15.0	5.2	
Column % (total)	100 (*n* = 913)	100 (*n* = 154)	100 (*n* = 77)	

Multiple Regression Analysis

Table 7 analyzes the impact of education, occupation, and job match on earnings acquisition. Model 1 indicates that female's earnings were significantly lower (B = –.25, $p < .01$), and older age had a negative impact on earnings (B = –.01, $p < .01$). The years of service had a positive impact on earnings (B =.01, $p < .05$), and both the primary and squared seniority significantly impacted earnings. Such analysis results indicate that with the increase of the workers' experience, its effect on earnings first rises and then declines. The longer the seniority, the higher the increase in earnings. Additionally, the longer the average number of hours worked per week, the higher the earnings (B = .01, $p < .01$). Moreover, the earnings of those with tertiary education were significantly higher, especially those with graduate education (B = .39, $p < .01$). This indicates that those with higher education still contributed

Table 7: Regression Analysis of the Impact of Education, Occupation, and Job Match on Earnings Acquisition

	Model 1		Model 2	
	B	β	B	β
Female	–.25**	–.20	–.25**	–.20
Age	–.01**	–.17	–.01**	–.16
Years in service	.01*	.18	.01*	.17
Years in service (squared)	< –.01	–.05	< –.01	–.05
Seniority	.04**	.76	.04**	.74
Seniority (squared)	< –.01**	–.62	< –.01**	–.60
Work hours per week	.01**	.15	.01**	.15
Work experience	.01	.02	.01	.02
College	.09**	.07	.12*	.09
Graduate	.39**	.19	.46**	.22
Unskilled manual labor	–.43**	–.23	–.42**	–.22
Service and technicians	–.15**	–.12	–.14**	–.11
Semi-professional	.25**	.17	.25**	.17
Professional	.40**	.23	.37**	.21
Overeducation			–.10*	–.06
Undereducation			.20**	.10
Overskilled			–.01	–.01
Underskilled			–.20**	–.08
Constant	.90**		.89**	
R^2	.43		.45	
N	1,144		1,144	

*$p < .05$, **$p < .01$

to higher earnings. With clerical work as the reference group, the earnings of unskilled manual workers and service and technician workers were significantly lower. In contrast, the earnings of semi-professional and professional workers were significantly higher. The highest was still professionals (B = .40, $p < .01$), which generally shows that the higher the professional status, the higher the earnings. The amount of explanatory variation (R^2) in the entire Model 1 was .43.

Subsequently, Model 2 shows that overeducation negatively impacted earnings (B = –.10, $p < .05$), while undereducation positively impacted earnings (B = .20, $p < .01$). On the other hand, being underskilled had a negative effect on earnings (B = –.20, $p < .01$). In contrast, the effect of being overskilled on earnings was not significant. In other words, job match significantly impacted earnings acquisition. Moreover, the significant influence of each occupational group in Model 1 decreased slightly in Model 2, such as the impact of professional workers decreased from .40 to .37. The B-value of unskilled manual workers and service and technician workers also decreased slightly by .01. This indicates that the earnings gap due to mismatched work in different occupational groups was not evident, explaining how the variation (R^2) increased slightly to .45.

Table 8 shows the impact of education, occupation, job match, and earnings acquisition on job satisfaction. Model 1 shows a significant effect of more satisfying work with a higher seniority (B = .02, $p < .05$). Additionally, the coefficient of work experience had a negative effect (B = –.04, $p < .01$). In other words, more frequent workplace changes will have a negative effect on job satisfaction. Second, job satisfaction was significantly lower among those with graduate education (B = –.33, $p < .01$), indicating that acquiring higher education would harm job satisfaction. At the same time, we found that professionals had significantly higher satisfaction (B = .37, $p < .01$). The amount of explanatory variation (R^2) in Model 1 was .06.

Model 2 shows that overeducation also had a negative effect on job satisfaction (B = –.30, $p < .01$), while undereducation had no significant effect on job satisfaction. Being underskilled negatively affected job satisfaction (B = –.31, $p < .01$), but the effect of being overskilled on job satisfaction was not significant. However, after including job match, the significant negative effect of education in Model 1 decreased significantly (B coefficient decreased from –.33 to –.22). Thus, job match should have a possible mediating role between education and job satisfaction. Moreover, the significant impact of professional work in Model 1 decreased from .37 to .32 in Model 2. This indicates that the factor of professional workers' satisfaction with work may be due to the job match phenomenon, and the R^2 in Model 2 increased slightly from .06 to .07.

Table 8: Regression Analysis of the Effects of Education, Occupation, Job Match, and Earnings Acquisition on Job Satisfaction

	Model 1		Model 2		Model 3	
	B	B	B	β	B	β
Female	.07	.03	.06	.03	.16*	.08
Age	< .01	.01	< .01	.02	< .01	.06
Years in service	–.01	–.11	< –.01	–.11	–.01	–.15
Years in service (squared)	< .01	.08	< .01	.06	< .01	.08
Seniority	.02*	.30	.02	.25	.01	.07
Seniority (squared)	< .01	–.12	< .01	–.09	< .01	.07
Work hours per week	< –.01	–.05	< –.01	–.04	–.01*	–.08
Work experience	–.04**	–.09	–.04*	–.09	–.04**	–.09
College	–.12	–.06	–.06	–.03	–.11	–.06
Graduate	–.33**	–.10	–.22	–.07	–.41**	–.12
Unskilled manual labor	.01	< .01	.03	.01	.20	.07
Service and technicians	–.02	–.01	< .01	< .01	.06	.03
Semi–professional	.18	.08	.17	.07	.08	.03
Professional	.37**	.13	.32**	.11	.17	.06
Overeducation			–.30**	–.10	–.26**	–.09
Undereducation			.12	.04	.04	.01
Overskilled			.06	.02	.06	.02
Underskilled			–.31**	–.08	–.24*	–.06
Earnings logarithm					.40**	.25
Constant	5.19**		5.20**		4.85**	
R^2	.06		.07		.11	
N	1,144		1,144		1,144	

*p < .05, **p <.01

Finally, Model 3 is an integrated model that includes the logarithm of earnings. It shows that higher earnings were associated with more satisfying jobs (B = .40, p < .01). Compared to Model 2, the impact of overeducation and being underskilled, which had a significant effect on job match, decreased in Model 3. This suggests that both affected job satisfaction through the mediating mechanism of earnings acquisition. For example, the effect of professional work was reduced to non-significance in Model 3 (B coefficient from .32 to .17). This can be roughly attributed to the mediating effect of education match and job satisfaction through earnings, and the mediation mechanism will be analyzed further.

Multi-category Logistic Regression Analysis

Table 9 shows that the overeducation situation was more significant for those with college or graduate school education levels (B = 1.54 and 2.79, $p < .01$ respectively). The overeducation problem was more evident in unskilled manual workers with lower occupational status and service and technician workers (B = .89 and 1.04, $p < .05$ and .01 respectively). However, there was no significant overeducation level regarding professional workers (B = –1.01, $p < .05$). Additionally, the higher the average weekly working hours, the more pronounced the overeducation was (B = .02, $p < .01$).

Second, examining undereducation shows that the higher the average working hours per week, the more significant the undereducation phenomenon (B = .01, $p < .05$). In contrast, the college and graduate education degrees had significantly negative effects on undereducation. The higher the educational qualifications, the less undereducated the respondents were (B = –.60 and –3.13, $p < .05$ respectively). The undereducation of service and technician workers (B = –.70, $p < .05$) was more significant than that of clerical workers.

Table 9: Multi-categorical Logistic Regression Analysis of the Match Between Education and Occupation

	Reference: Appropriate education			
	Overeducation		Undereducation	
	B	*SE*	B	*SE*
Female	–.34	.20	–.46*	.22
Age	.02	.02	–.01	.02
Years in service	.03	.04	.05	.03
Years in service (squared)	< –.01	< .01	< .01	< .01
Seniority	–.05	.04	–.04	.04
Seniority (squared)	< .01	< .01	< .01	< .01
Work hours per week	.02**	.01	.01*	.01
Work experience	.03	.05	.08	.05
College	1.54**	.26	–.60*	.25
Graduate	2.79**	.41	–3.13*	1.04
Unskilled manual labor	.89*	.46	–.53	.41
Service and technicians	1.04**	.33	–.70*	.32
Semi-professional	–.33	.37	.01	.33
Professional	–1.01*	.45	.12	.38
Constant	–4.26**	.70	–1.65*	.66

*$p < .05$, **$p < .01$

Finally, Table 10 shows that college and graduate school respondents with higher education qualifications had a significant positive impact (with high school education or lower as the reference group), indicating that the higher the educational qualifications, the more severe the issue of being overskilled (B = .45 and .99, $p < .05$ respectively). However, there was no significant overskilled issue for workers in different occupations. Next, in examining the underskilled respondents, we found that the shortage of skills of college and graduate school workers was not noticeable (compared to workers with a high school degree or lower). Nevertheless, compared to clerical workers, service and technician workers, as well as professional workers, were less significantly underskilled (B = –.87 and –1.39, $p < .05$ respectively).

Table 10: Multi-categorical Logistic Regression Analysis of Skill and Occupation Match

	Reference: Appropriate skill			
	Overskilled		Underskilled	
	B	*SE*	B	*SE*
Female	–.23	.19	–.41	.26
Age	.01	.02	–.01	.02
Years in service	–.02	.03	.01	.05
Years in service (squared)	< .01	< .01	< –.01	< .01
Seniority	.01	.03	–.09*	.05
Seniority (squared)	< .01	< .01	< .01*	< .01
Work hours per week	.01	.01	.01	.01
Work experience	.01	.05	.12*	.06
College	.45*	.23	.02	.31
Graduate	.99*	.37	–.50	.59
Unskilled manual labor	.03	.41	–.53	.53
Service and technicians	.28	.31	–.87*	.38
Semi-professional	.11	.33	.22	.36
Professional	–.43	.39	–1.39*	.61
Constant	–2.99**	.65	–1.35	.85

*$p < .05$, **$p < .01$

Finally, this study integrates the results of the analysis from Table 7 to Table 10 and uses the PROCESS plug-in program to perform a 95% confidence interval estimate to check whether the mediating mechanism is valid. In this indirect effect test, the overeducation and overskilling in this study are divided into a continuous scale of 1–3 points according to the three situations of insufficiency, adequacy, and excess. Mainly in the above test, the mediating variable item cannot be a dichotomous scale.

Based on the above findings, this study first found that overeducation is not conducive to earnings and reduces job satisfaction. This indirect effect is –0.06, and its confidence interval estimate [BootLLCI/BootULCI = –0.09/–0.03] does not contain 0, and the mediation mechanism can be established. Secondly, compared with those with a high school degree or less, workers with a college education will have more obvious overeducation, which is not conducive to earnings acquisition, with an indirect impact of –0.04, and the estimated value of their confidence interval [BootLLCI/BootULCI = –0.06/–0.02] does not include 0, indicating that the mediation mechanism is established. In addition, compared with those with a high school degree or less, workers with a master's degree or above have a more obvious phenomenon of overeducation, which is not conducive to work income, and then reduces job satisfaction, with an indirect effect of –0.05, and the estimated value of the confidence interval [BootLLCI/BootULCI = –0.05/–0.01] does not contain 0, indicating that the mediation mechanism can be established. Lastly, professional workers were less likely to be overeducated, which was more conducive to earnings acquisition and job satisfaction. The indirect effect is 0.01, and the estimated value of the confidence interval [BootLLCI/BootULCI = 0.01/0.02] does not contain 0. However, professional workers are also less likely to have skills deficits, but since the confidence interval [BootLLCI/BootULCI = –0.01/0.04] contains 0, the mediating effect of this situation on earnings acquisition and job satisfaction is not valid.

Summary and Discussion

The impact of job mismatch research efforts has been a trend in the economic, social, and other related fields in recent years. Since the work is not commensurate nor less associated with educational expansion, this topic is equally essential for the field of education (Delaney et al., 2020; McGuinness, Bergin, et al., 2018; McGuinness, Pouliakas, et al., 2018). The results of this study show that in Taiwan's labor market today, workers with different educational qualifications or occupations have the highest proportion of appropriate education and skills. The "excess" of education and skills is generally more evident than the "insufficiency." The different aspects of workers due to various education and jobs are also evident. This indicates diverse interactions between educational expansion and the labor market.

Moreover, this study separately explored the impact of education/skills and job mismatch on labor market outcomes such as earnings and job satisfaction. Using data from the Taiwan

Social Change Survey on the formally employed population, we found that the two categories of job mismatch had different effects on earnings and job satisfaction. Among them, we confirmed that overeducation was not conducive to earnings and job satisfaction, but those undereducated and underskilled experienced differing results of favorable and reduced earnings respectively. Additionally, overeducation and underskilling were not conducive to job satisfaction. Furthermore, highly educated workers had significant overeducation and overskilling, adversely affecting earnings and job satisfaction. The results also show the adverse impact of overeducation on one's work achievement, which can support many researches on Western societies (Cim et al., 2020; McGuinness, Pouliakas, et al., 2018; Sellami et al., 2020) and the existing research on Taiwanese society (Chao & Luh, 2019; Hsiao et al., 2023; Hsu, 2021; Huang & Lin, 2010), but also reflect that Taiwan's labor market is still clearly detached from the development of education. Additionally, being overskilled had no adverse effect on earnings and job satisfaction but being underskilled led to a decline in job satisfaction due to a disadvantage in earnings. In other words, in Taiwan's labor market, having too high a skill does not have any adverse effects on the individual development. Further, unskilled manual labor, and service and technician workers who had a low socio-economic status, were more likely to be overeducated. Professional workers, on the other hand, were less likely to be overeducated and underskilled, which is more conducive to earnings and job satisfaction.

The results of the analysis indicate that there is still an urgent need to effectively alleviate the job mismatch issue by improving the close connection between the labor market and school education in Taiwan society. Therefore, in the future, in formulating and implementing policies related to education expansion and human resource supply and demand, the appropriateness of education investment should be more carefully examined. Furthermore, more reasonable matching with industrial economic development plans should be implemented. The workforce cultivated by higher education can be more closely matched with the actual needs of the workplace to reduce the higher education and low employment phenomenon (Ghosh & Grassi, 2020). In Taiwan, the rapid expansion of college graduates will be alleviated year by year. However, in terms of social needs, the government should still focus on promoting economic growth and expanding employment opportunities in the workplace, as well as reducing the underuse of manpower. At the same time, the curriculum teaching of higher education should take into account both theory and practice, and strengthen the cooperation between industry and academia. It is important to be able to effectively assess students' learning outcomes during their time at school to ensure that the students they nurture

are employable by the time they graduate with the employability expected by employers (Hsiao et al., 2023; Liu & Huang, 2011), and can effectively promote the commensurate use of education and vocational learning in the labor market (Hsu, 2021).

Finally, in addition to actively reviewing the issue of too many job seekers with higher education elicited by the expansion policy of higher education, it is also necessary to improve the dilemma of severe underutilization of the workforce in the labor market (Cim et al., 2020). Nevertheless, the future of education and labor market supply and demand remains highly uncertain. The uneven distribution of high levels of job growth, coupled with the increase in education supply, may lead to the continued high incidence of education and skills mismatch. This phenomenon affects several countries and regions worldwide, and it is necessary to continue to focus on this critical issue. In today's increasingly globalized world, the diversity of immigrants in different countries will contribute to the phenomenon of education and skills mismatch (Frank & Hou, 2018; Wen & Maani, 2018). The impact on work output is also a topic that should be further explored. In addition to the career disproportionality that the expansion of higher education can elicit, current fast-paced technological changes have significantly changed career requirements. Therefore, future researchers should be more cautious when examining disproportionate measurements while considering alternative measurement orientations in addition to education and skills.

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「工作不相稱」對收入和工作滿意度的影響：教育取得與技能的雙重考量

林俊瑩

摘 要

研究工作不相稱的影響是經濟、社會和其他相關領域的趨勢，且在教育領域同樣重要。本研究主要探討教育／技能兩種形式的不相稱對收入和工作滿意度等勞動力市場結果的影響，並使用台灣社會變遷調查正式就業者資料來進行分析。研究結果表明，兩種形式的工作不相稱對收入和工作滿意度的影響並不相同。其中，過度教育會減少收入，但所受教育程度偏低和技能不足的工作者卻表現出有利收入和收入減少的不同結果。教育程度過高和技能不足亦不利於工作滿意度。此外，受過高等教育的工作者受教育程度過高，對收入和工作滿意度都產生不利影響。基於分析結果，本研究建議應通過提高勞動市場的整體工作品質和水準來有效緩解工作不相稱的問題。

關鍵詞：收入；教育取得；工作不相稱；工作滿意度；技術技能

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