Zhi Rong Chen, 2025

Volume 9 Issue 1, pp. 14-40

Received: 28 April 2025

Revised: 5 May 2025, 20 May 2025

Accepted: 03 June 2025

Date of Publication: 18 July 2025

DOI- https://doi.org/10.20319/pijtel.2025.91.1440

This paper can be cited as: Rong Chen, Z.(2025). The Relationship between Learning Motivation, Professional Courses and Pass Rates of Skills Certification: A Case Study of Vocational Senior High School Students in Taiwan. PUPIL: International Journal of Teaching, Education and Learning, 9(1), 14-40

THE RELATIONSHIP BETWEEN LEARNING MOTIVATION, PROFESSIONAL COURSES AND PASS RATES OF SKILLS CERTIFICATION: A CASE STUDY OF VOCATIONAL SENIOR HIGH SCHOOL STUDENTS IN TAIWAN

Zhi Rong Chen

Department of Education, National Kaohsiung Normal University, Taiwan

j19940830@gmail.com

Abstract

This study investigates the relationship between learning motivation, professional courses performance, and the pass rates of skills certification among students in vocational senior high schools in Taiwan. In response to the growing demand for professional competencies in the labor market, skills certification has become a crucial indicator of students' occupational readiness and a determinant of their future career trajectories.The research employed a questionnaire method to collect data regarding students' learning motivation, professional courses performance, and skills certification outcomes .A quantification method was adopted, utilizing descriptive statistics, correlation analysis, and logistic regression analysis to examine the relationships among the core variables.The results indicate a statistically significant positive relationship between professional courses performance and the pass rates of skills certification, confirming course performance as a key predictive factor. While learning motivation was positively correlated with course performance, it did not exhibit a statistically significant direct effect on certification outcomes.Additionally, different preparation strategies were found to impact course performance significantly. Among these, participation in after-school programs and group study demonstrated the most favorable outcomes. These findings provide empirical insights into how instructional design and preparatory practices can enhance students' performance in professional courses and increase their likelihood of success in skills certification.The study recommends integrating simulated certification exercises and diversified instructional resources into professional courses to optimize learning outcomes and improve certification pass rates across the vocational education system in Taiwan.

Keywords:

Learning Motivation, Skills Certification, Professional Courses, Vocational High Schools

1. Introduction

The development of vocational education plays a pivotal role in shaping Taiwan's economic and industrial structure. In the face of rapid technological innovation and accelerating industrial transformation, the demand for highly skilled technical personnel has steadily increased. Within this context, students enrolled in vocational senior high schools are expected to complete specialized professional courses and successfully pass skills certification exams to gain a competitive edge in the labor market (Kuo & Lyau, 2021).

Among the various factors influencing students' success in skills certification, professional courses performance and learning motivation have been identified as critical determinants. professional courses performance reflects students' mastery of both theoretical and practical knowledge, which directly aligns with the competencies evaluated in certification assessments. High achievement in these courses is often associated with greater proficiency and preparedness for real-world application.

On the other hand, learning motivation—as an internal psychological driver—shapes students' academic engagement, persistence, and willingness to overcome obstacles in the learning process (Chen, 2012). According to self-determination theory (Ryan & Deci, 2000), motivation can be classified into two types: intrinsic motivation, which is driven by personal interest and curiosity; and extrinsic motivation, which is fueled by external goals such as obtaining a certificate, achieving academic recognition, or securing future employment. In the setting of vocational education, the attainment of skills certification represents a strong form of extrinsic motivation, guiding students' academic behaviors and influencing their learning strategies.

Prior research has demonstrated that students with higher levels of learning motivation tend to be more persistent, self-regulated, and goal-oriented—traits that are essential when preparing for high-stakes assessments. Nevertheless, the extent to which learning motivation independently contributes to skills certification outcomes, beyond its influence on professional courses performance, remains underexplored.

In light of these considerations, this study seeks to examine the interplay between learning motivation, professional courses performance, and the pass rates of skills certification among students in vocational senior high schools in Taiwan.

Specifically, the study is guided by the following research objectives:

- To examine the extent to which students' learning motivation influences their success in passing skills certification.
- To analyze the predictive effect of professional courses performance on skills certification outcomes.
- To explore the impact of different preparation strategies on students' professional courses performance.
- To provide practical pedagogical recommendations that may help improve students' pass rates of skills certification.

2. Literature Review

This chapter reviews relevant theoretical frameworks and empirical studies concerning the skills certification system, learning motivation, and professional courses performance. These components serve as the key constructs in understanding students' preparedness and success in skills certification within the vocational education context.

2.1 Skills Certification System and Educational Policies

Since its implementation in the 1970s, Taiwan's skills certification system has been a cornerstone in validating the technical competencies of students enrolled in vocational senior high schools (Su, 2019). This system not only serves as an indicator of professional qualifications but also plays a vital role in linking vocational education to the labor market. Through skills certification, students demonstrate their readiness for industry standards, thereby enhancing their employability and career mobility (Yeh, Pai, & Shu, 2020).

However, recent policy trends have led to an overemphasis on pass rates of skills certification as a key performance metric for schools. While this has incentivized institutions to prioritize certification outcomes, it has also led to concerns that teaching practices may become overly exam-oriented, potentially undermining authentic skill development (Kuo & Lyau, 2021). The challenge for educators, therefore, lies in designing instructional approaches that uphold the dual goals of certification success and genuine professional competence. This necessitates the integration of practice-based learning and motivational strategies that support both short-term exam performance and long-term career growth.

2.2 Learning Motivation and Skills Certification Outcomes

Learning motivation has been widely recognized in educational psychology as a critical determinant of academic engagement and achievement. According to self-determination theory (Ryan & Deci, 2000), learning motivation can be categorized into intrinsic motivation, which is driven by personal interest and curiosity, and extrinsic motivation, which is prompted by external rewards such as grades, certifications, or future job prospects.

In the context of vocational education, skills certification acts as a clear extrinsic goal, potentially enhancing students' commitment to their studies (Chen, 2012). When students perceive certification as a valuable step toward their career aspirations, they are more likely to invest effort and demonstrate sustained engagement in learning activities. Research has shown that students with higher levels of learning motivation are more proactive in reviewing course content, participating in class, and seeking out additional learning resources. These behaviors are strongly associated with higher academic performance and better preparation for skills certification.

Furthermore, motivated students tend to adopt effective coping strategies when facing academic challenges. For instance, they are more resilient in managing certification-related stress, and more likely to seek support from peers and instructors. As such, learning motivation not only influences performance indirectly through its impact on study habits but may also play a direct role in enhancing students' readiness for certification exams (Yeh, Pai, & Shu, 2020).

2.3 The Importance of Professional Courses in Vocational Education

Professional courses constitute the academic core of vocational senior high school curricula. These courses are specifically designed to provide students with the domain-specific knowledge and technical skills required for success in skills certification and future employment. Typically, professional courses are divided into two major components: theoretical instruction and practical training. The former introduces fundamental principles and methodologies, while the latter emphasizes hands-on experience and skill application (Kuo & Lyau, 2021).

To ensure that students meet national certification standards, the content and structure of professional courses must remain closely aligned with industry

requirements. As technological advancements and market trends evolve, so too must the curricula, in order to equip students with up-to-date, relevant skills.

The quality of professional courses is a decisive factor in determining students' performance in skills certification. Well-designed courses not only enhance knowledge retention but also foster deeper understanding and application of concepts. Instructional strategies such as case-based teaching, competency-based assessments, and simulation-based practice have been shown to improve both academic outcomes and certification success rates. Therefore, continuous curriculum reform and pedagogical innovation are essential to bridging the gap between classroom learning and certification demands.

3. Research Method

This chapter outlines the quantitative research methods employed in this study to examine the relationships among learning motivation, professional courses performance, and the pass rates of skills certification. It details the research subjects, variable design, data collection procedures, and statistical analysis strategies.

3.1 Subjects

The research subjects were students enrolled in a vocational senior high school located in Kaohsiung, Taiwan, all of whom were participating in the class c skills certification for mechanical engineering CAD. These students had completed relevant professional courses and were actively preparing for certification, making them appropriate participants for investigating the factors influencing certification outcomes.

To enhance accessibility and efficiency, the study adopted a convenience sampling approach. A total of 107 questionnaires were distributed and collected,

achieving a 100% response rate. This sample size was deemed sufficient for conducting subsequent statistical analyses using JASP software.

3.2 Interview Protocol

This study incorporates three major research variables: learning motivation and professional courses performance as independent variables, and the pass rates of skills certification as the dependent variable.

- Learning Motivation: Based on self-determination theory (Ryan & Deci, 2000), this construct is divided into intrinsic motivation and extrinsic motivation. The questionnaire was designed to assess both dimensions using multiple items rated on a likert scale, ranging from "Strongly Disagree" to "Strongly Agree."
- Professional Courses Performance: This variable was operationalized using students' actual academic scores in professional courses, as reported by the school. These scores were considered objective indicators of students' technical and theoretical proficiency.
- Pass Rates of Skills Certification: Treated as a binary dependent variable, certification outcomes were coded as "1" for students who passed and "0" for those who did not. This data was self-reported by students via the questionnaire.

3.3 Data Collection and Analysis

To obtain empirical data, a structured questionnaire was distributed in both paper-based and online formats. The instrument consisted of three main sections:

- Demographic information: Collected background data including gender, field of study, and weekly preparation time.

- Learning motivation: Measured students' levels of intrinsic and extrinsic motivation toward skills certification.
- Professional courses performance and certification outcomes: Captured academic scores and self-reported certification results.

The questionnaire was administered in both paper-based and online formats to maximize accessibility and convenience for students, thereby enhancing the overall response rate. A two-week response period was designated following distribution, after which the data underwent initial screening and cleaning procedures to eliminate incomplete or invalid entries.

To examine the proposed hypotheses, the study employed a series of statistical analyses using a quantification method. The analytical procedures were as follows:

- Descriptive statistics: This step involved summarizing the fundamental characteristics of the dataset, including measures such as the mean and standard deviation for students' learning motivation and professional courses performance.
- Correlation analysis: The Pearson product-moment correlation coefficient was used to assess the strength and direction of linear relationships among learning motivation, professional courses performance, and the pass rates of skills certification. This analysis served to preliminarily evaluate whether statistically significant associations existed among the variables.
- Logistic regression: To further explore the predictive relationships, logistic regression analysis was conducted. In this model, the pass rates of skills certification were designated as the dependent variable, while learning motivation and professional courses performance were treated as independent variables. This analysis aimed to

determine the extent to which each independent variable contributed to the likelihood of passing the certification, based on calculated odds ratios and significance levels.

4. Data Analysis and Discussion

4.1 Sample Structure Analysis

A total of 107 questionnaires were distributed, all of which were successfully retrieved, resulting in a 100% response rate. After initial screening, all 107 responses were deemed valid, yielding a 100% valid response rate. The following presents an analysis of the subjects' demographic characteristics, including gender, weekly preparation time, preparation methods, and skills certification results.

- Gender Distribution

Among the 107 respondents, 86 were male (80.37%), and 21 were female (19.63%). This reflects the gender composition of the sampled vocational senior high school students participating in the Class C skills certification for mechanical engineering CAD.

Table 4.1 *Gender Frequency Distribution*

Gender	Frequency	Percentage
Male	86	80.37%
Female	21	19.63%
Total	107	100%

- Weekly Preparation Time

Regarding weekly study time dedicated to skills certification preparation, 53.27% of students (n = 57) studied for less than 5 hours per week. Meanwhile, 28.97% (n = 31) studied 5–10 hours weekly, 12.15% (n = 13) studied 11–15 hours, and only 5.61% (n = 6) prepared for over 15 hours.

Table 4.2 *Weekly Preparation Time Distribution*

Weekly Preparation Time	Frequency	Percentage
Less than 5 hours	57	53.27%
5–10 hours	31	28.97%
11–15 hours	13	12.15%
Over 15 hours	6	5.61%
Total	107	100%

- Preparation Methods

The most common preparation method was participation in after-school programs or tutoring, reported by 56 students (52.34%). Self-directed learning was reported by 22 students (20.56%), followed by online learning (14.02%), group study (11.22%), and no preparation (1.87%).

Table 4.3 *Preparation Methods Distribution*

Preparation Method	Frequency	Percentage
After-school programs	56	52.34%
Self-directed learning	22	20.56%
Online learning	15	14.02%
Group study	12	11.22%
No preparation	2	1.87%
Total	107	100%

- Skills Certification Results

Of the total respondents, 58 students (54.21%) passed the skills certification, while 49 (45.79%) did not. The near-equal distribution of outcomes suggests the need

for further investigation into predictive factors such as academic performance and preparation methods.

Table 4.3 *Certification Results Distribution*

Certification Result	Frequency	Percentage
Pass	58	54.21%
Fail	49	45.79%
Total	107	100%

4.2 Descriptive Statistics

This section presents descriptive statistics for the two key variables: learning motivation and professional courses. The analysis includes the calculation of mean scores and standard deviations based on student responses measured on a five-point likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

- Learning Motivation

The descriptive results indicate that students generally demonstrated moderate to high levels of learning motivation, with a clear emphasis on extrinsic motivational factors. Among the four items assessed, the statement regarding enhancing career competitiveness through passing the skills certification received the highest average score (M = 3.486, SD = 1.102). This suggests that most students viewed certification success as a strategic means to strengthen their future employability.

In contrast, the item reflecting intrinsic motivation, specifically the enjoyment of learning professional knowledge, yielded the lowest mean score (M = 3.047, SD = 1.119). This discrepancy implies that while students recognized the

practical benefits of skills certification, their engagement with course content may be more goal-driven than interest-driven.

Table 4.5 *Descriptive Statistics Table For Learning Motivation*

Item	Mean	SD
I study Professional Courses because I am interested in this knowledge.	3.047	1.119
I study Professional Courses to achieve better Skills Certification results.	3.290	1.182
I hope to pass the Skills Certification to enhance my career competitiveness.	3.486	1.102
Passing the Skills Certification is very important for my career development.	3.271	1.278

- Professional Courses

With respect to students' perceptions of their professional courses, the findings suggest a generally positive evaluation. Students agreed that the curriculum design supported the acquisition of relevant skills for skills certification, as reflected by a mean score of 3.467 (SD = 1.058). However, slightly lower agreement was observed regarding the applicability of acquired knowledge to practical certification tasks (M = 3.112, SD = 1.216).

These results indicate that while the course content is seen as aligned with certification goals, there may be a gap between theoretical instruction and hands-on application, highlighting the need for better integration between learning and practice.

Table 4.6 *Descriptive Statistics Table For Professional Courses*

Item	Mean	SD
The curriculum design of Professional Courses helps me acquire the skills required for Skills Certification.	3.467	1.058
The knowledge I acquire in Professional Courses can be flexibly applied to the practical operations of the Skills Certification.	3.112	1.216

- Professional Courses Performance

The analysis of students' professional courses performance reveals a distribution pattern across various score intervals. As shown in Figure 1, the majority of students fell within the mid-range categories. Specifically, 41 students (38.32%) scored between 41 and 50 points, making it the most frequently observed range. Additionally, 28 students (26.17%) scored between 61 and 70 points, and 16 students (14.95%) were in the 51–60 range.

At the lower end of the spectrum, 1 student (0.93%) scored between 21–30, while 7 students (6.54%) fell in the 31–40 range. At the higher end, 8 students (7.48%) scored between 71–80, 5 students (4.67%) achieved scores between 81–90, and only 1 student (0.93%) reached the 91–100 range.

This distribution suggests that while a majority of students demonstrated moderate achievement in professional courses, relatively few attained high scores. The data highlight a concentration of performance in the 41–70 point range, indicating a potential gap in either conceptual mastery or practical application, which may influence students' success in skills certification.

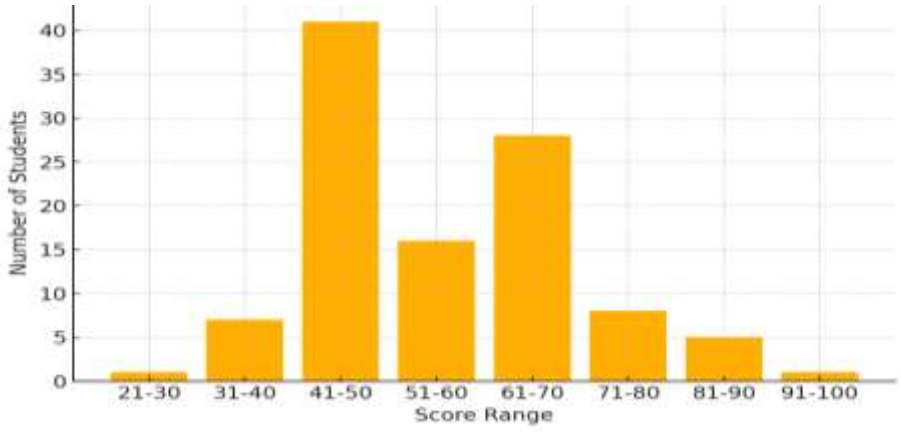

Figure 4.1 *Distribution of Professional Courses Performance*

4.3 One-Way ANOVA: Effects of Preparation Methods on Professional Courses Performance

To determine whether different preparation methods result in statistically significant differences in students' professional courses performance, a one-way analysis of variance (ANOVA) was conducted. The independent variable was the type of preparation method employed by students (e.g., self-directed learning, online learning, group study, after-school programs, or no preparation), while the dependent variable was the students' academic performance in professional courses.

The ANOVA results revealed a statistically significant difference in professional courses performance across different preparation methods, $F(4, 102) = 2.987$, $p = 0.022$, $\eta^2 = 0.105$. This indicates that 10.5% of the variance in academic performance can be attributed to the preparation strategy adopted.

Table 4.7 *Preparation Methods and Professional Courses Performance*

Source of Variation	Sum of Squares	df	Mean Square	F	p	η^2
Between Groups	2113.143	4	528.286	2.987	0.022	0.105

Post-hoc comparisons revealed that students who participated in group study had the highest average score (M = 60.67), although their scores showed greater variability (coefficient of variation = 0.339). In contrast, students who used online learning resources had the most stable performance (CV = 0.173) but recorded lower average scores (M = 46.80). Students attending after-school programs achieved relatively high and stable performance (M = 56.55; CV = 0.225), making this the most consistently effective preparation method.

Notably, students who reported no preparation scored the lowest (M = 42.50), though the sample size for this group was extremely small (n = 2), limiting generalizability.

Table 4.8 *Mean Scores by Preparation Method*

Preparation Method	N	Mean	SD	SE	CV
Self-directed learning	22	51.14	11.62	2.48	0.227
Online learning resources	15	46.80	8.09	2.09	0.173
After-school programs	56	46.80	12.75	1.70	0.225
Group study	12	60.67	20.59	5.94	0.339
No preparation	2	42.50	26.16	18.50	0.616

These findings underscore the influence of preparation strategy on academic performance in professional courses. Group-based and structured programs appear to offer advantages in fostering content mastery, though consistency varies. The results suggest that instructional designers and educators may consider incorporating collaborative or guided learning models to improve course outcomes, particularly in preparation for skills certification.

4.4 Pearson Correlation Analysis

To examine the relationships among learning motivation, professional courses performance, and perceived course helpfulness for skills certification, a Pearson product-moment correlation analysis was conducted. This method allows for assessing the strength and direction of linear associations between continuous variables.

The results, summarized in Table 9, indicate a moderate positive correlation between learning motivation and professional courses performance ($r = 0.416$, $p < .001$). This suggests that students with higher levels of motivation tend to perform better in their professional courses.

Additionally, a moderate positive correlation was also found between learning motivation and students' perception of course helpfulness in preparing for skills certification ($r = 0.239$, $p = .013$). This implies that more motivated students are more likely to perceive their coursework as relevant and supportive of certification success.

A weaker, yet still statistically significant, correlation was observed between professional courses performance and perceived course helpfulness ($r = 0.215$, $p = .026$), indicating that students with stronger academic performance are also more likely to view their courses as practically beneficial.

Table 4.9 *Pearson Correlation Matrix*

Variables		**Learning Motivation**	**Course Performance**	**Course Helpfulness**
Learning Motivation	Pearson r	-		
	p	-		
Course Performance	Pearson r	0.416	-	
	p	< .001***	-	

Course	Pearson r	0.239	0.215	-
Helpfulness	*p*	0.013*	0.026*	-

$p < .001$***, $p < .01$**, $p < .05$*

These findings confirm that students' learning motivation is meaningfully associated with both their academic performance and their perception of how effectively professional courses prepare them for skills certification. Although the effect sizes are moderate, they highlight the importance of fostering motivation as a mechanism for improving learning outcomes and perceived instructional quality.

4.5 Logistic Regression Analysis

To further explore the predictive power of learning motivation and professional courses performance on the pass rates of skills certification, a logistic regression analysis was conducted. The model was constructed with pass/fail certification outcome as the dependent variable (coded as 1 = pass, 0 = fail), and both learning motivation and professional courses performance as independent variables.

- Model Summary and Significance

The regression model yielded a statistically significant result for professional courses performance, indicating a positive relationship between course scores and the likelihood of passing the skills certification. Specifically, the odds ratio for professional courses performance was Exp(B) = 1.091, $p < .001$, with a 95% confidence interval of (1.045, 1.140). This suggests that each additional point in professional course score increased the odds of passing certification by approximately 9.1%.

Conversely, the effect of learning motivation was not statistically significant. The odds ratio was Exp(B) = 1.150, p = .063, with a 95% confidence interval that included 1. Although the direction of the coefficient was positive, the result does not provide sufficient statistical evidence to support a meaningful impact on the certification outcome.

Table 4.10 *Logistic Regression Predicting Pass Rates of Skills Certification*

Predictor	**B**	**SE**	**Exp(B)**	**Z**	**P**	**95%CI (Exp(B))**
Intercept	-6.299	1.429	-	-4.407	< .001	-
Learning Motivation	0.140	0.075	1.150	1.856	0.063	(0.992, 1.334)
Professional Courses Performance	0.087	0.022	1.091	3.914	< .001	(1.045, 1.140)

- Interpretation

The analysis confirms that professional courses performance is a statistically significant predictor of students' success in skills certification. Higher course scores are associated with greater odds of passing, highlighting the importance of academic preparation in vocational training contexts. While learning motivation showed a positive trend, its effect was not statistically significant in this model, suggesting that its influence may be indirect—possibly mediated through course performance rather than directly affecting certification outcomes.

These findings imply that efforts to improve professional courses performance, such as curriculum alignment, targeted feedback, and enhanced teaching strategies, may have a more immediate impact on pass rates of skills certification than motivational factors alone.

5. Results and Discussion

This chapter synthesizes the key findings from the statistical analyses presented in Chapter 4 and discusses their implications in the context of vocational education and skills certification. The results are interpreted in relation to the study's objectives, followed by recommendations for practice.

5.1 Summary of Key Findings

- Learning Motivation and Pass Rates of Skills Certification

Although the logistic regression analysis revealed a positive coefficient for learning motivation, the effect did not reach statistical significance (p = .063). This indicates that learning motivation, by itself, may not directly predict students' pass rates of skills certification. However, correlation analysis showed that learning motivation was moderately and positively associated with professional courses performance (r = 0.416, p < .001), suggesting that its influence may be indirect—primarily through enhanced academic performance.

These findings highlight the complexity of motivational variables in certification contexts. While motivation plays a critical role in shaping learning behaviors and persistence, its predictive power for certification outcomes may depend

on its interaction with other variables such as instructional quality or assessment strategies.

- Professional Courses Performance as a Predictor

The study confirmed that **professional courses performance** is a significant predictor of success in **skills certification**. The **logistic regression** model demonstrated that higher academic performance significantly increased the likelihood of passing certification exams (*Exp(B)* = 1.091, $p < .001$). This finding reinforces the importance of aligning course content and instructional strategies with certification standards to ensure that students are not only engaged, but also adequately prepared for assessment.

- Impact of Preparation Methods

The one-way ANOVA revealed statistically significant differences in professional courses performance across preparation strategies ($F(4, 102) = 2.987$, $p = 0.022$). Students who participated in group study and after-school programs performed better than those who relied solely on self-study or online resources. This suggests that structured and collaborative learning environments can enhance academic outcomes and indirectly improve readiness for skills certification.

5.2 Practical Implications

Based on these findings, several instructional and institutional recommendations can be proposed:

- Enhance Course Design and Assessment Alignment

Given the strong predictive power of professional courses performance, educators should prioritize curriculum alignment with certification standards. This includes integrating simulated certification tasks, formative assessments, and real-world application scenarios into daily instruction.

- Support Motivation Through Structured Guidance

While learning motivation did not directly predict certification outcomes, it remains positively correlated with academic performance. Instructors can foster motivation by clarifying certification benefits, providing frequent feedback, and incorporating goal-setting activities that link course content to career trajectories.

- Promote Collaborative Learning Models

The superior performance of students engaged in group study indicates the value of peer interaction and cooperative problem-solving. Schools may consider implementing structured peer-led sessions or skill workshops that mimic certification conditions.

- Invest in After-School Programs

Results suggest that after-school programs provide both consistent and effective preparation for skills certification. Schools should continue to invest in or expand such programs, ensuring accessibility for students who may lack external support resources.

6. Conclusion

This study examined the relationships among learning motivation, professional courses performance, and the pass rates of skills certification among students in vocational senior high schools in Taiwan. Through a series of statistical analyses—including descriptive statistics, correlation analysis, one-way ANOVA, and logistic regression — the study produced several key insights relevant to both educational researchers and practitioners in vocational education.

6.1 Summary of Research Findings

- Learning Motivation and Certification Outcomes

While learning motivation did not have a statistically significant direct effect on the pass rates of skills certification, it was positively associated with professional courses performance. This suggests that motivation plays an indirect but meaningful role in shaping academic outcomes, which in turn influence certification success.

- Professional Courses Performance as a Key Predictor

Students' professional courses performance was found to be a significant and robust predictor of their skills certification outcomes. Those who achieved higher academic scores were significantly more likely to pass the certification exams, underscoring the importance of course-related competencies.

- Effect of Preparation Methods

Different preparation methods significantly influenced students' performance in professional courses. Structured formats such as after-school programs and group study were associated with better outcomes than self-directed or informal learning strategies.

6.2 Educational Implications

Based on the findings, the following implications for vocational education practice are proposed:

- Curriculum Design

Instruction in professional courses should be closely aligned with the knowledge and skills assessed in skills certification. This includes embedding simulated assessments and scenario-based learning into classroom practice.

- Motivational Support

Although motivation alone may not guarantee certification success, it remains a critical factor in student engagement. Schools should implement strategies that enhance both intrinsic and extrinsic motivation, such as mentorship programs, clear goal-setting, and recognition systems.

- Learning Environment Optimization

Emphasis should be placed on collaborative and guided learning environments. Educators should encourage group-based learning, and schools should

allocate resources to sustain effective after-school programs that reinforce certification readiness.

6.3 Limitations and Suggestions for Future Research

Several limitations should be acknowledged. First, the study utilized convenience sampling, which may limit the generalizability of the findings. Second, skills certification outcomes were self-reported, which could introduce bias. Future research should consider longitudinal data collection, broader sampling across regions or fields, and incorporate external validation of certification results.

Moreover, future studies could explore mediating variables, such as self-efficacy, anxiety, or instructional quality, to better understand how learning motivation translates into academic and certification outcomes.

References

Chen, C. -Y. (2012). A Study of Learning Attitude, Learning Strategy and Social Support Affect the Skills Certification Result of Students in Machinery Program of Vocational Senior High School. *Secondary Education*, (5), 1-14.

Kuo, H. -J., & Lyau, N. -M. (2021). A study on the influence of technical and vocational education act on technical and vocational education. *Secondary Education*, 72(2), 75-88.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.

Su, J. -J. (2019). An Investigation of the Status of Skill Certification Among Technical High School Students and the Enhancement Effects of Quality Improvement in Technical High Schools on Skill Certification Outcomes. *Taiwan Education Review*, (716), 59-70.

Yeh, T. -M., Pai, F. -Y., & Shu, Y. -L. (2020). The Effects of Learning Behavior, Teaching Style and Learning Environment on the Learning Effectiveness of the Industrial Vocational Senior High School Students' Skill Test. *Across-Strait Vocational Education Journal*, 4(1), 85-101.