Investigating Enrollment Motivations and Instructional Objectives among Vocational High School Students in the Mechanical Engineering Group

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Abstract

This study aims to investigate the factors influencing students' enrollment motivations and their perceptions of instructional objectives within the Mechanical Engineering Group at vocational high schools. Five key dimensions are examined: reasons for program selection, level of understanding of the program, instructional goals, future development, and overall learning experiences. A survey is administered to students enrolled in various departments of the Mechanical Engineering Group at a public vocational high school in Changhua County. Data are analyzed using SPSS through one-way ANOVA, Pearson correlation analysis, and regression analysis. The results indicate significant differences in all five dimensions across grade levels at the 0.05 significance level. Parents' occupations also significantly influence students' reasons for selecting a program. Additionally, all dimensions are positively correlated at both the 0.05 and 0.01 significance levels, suggesting strong relationships among students' motivations, perceptions, and learning outcomes.

Keywords: vocational high school, mechanical engineering group, reasons for department selection, one-way ANOVA

1. Introduction

After graduating from junior high school in Taiwan, students entering high school must decide whether to attend an academically oriented general high school, a skill-focused technical high school, or a specialized high school. In the 2021 academic year, 47.9% of students enrolled in general high schools, 39.5% in technical high schools, 4.2% in practical skills programs, and 4.2% in comprehensive high schools. Students who choose technical high schools must select one of fifteen major clusters and a specific discipline within that cluster. For those who are uncertain about their interests, aptitudes, or the characteristics of various programs, comprehensive high schools provide an exploratory first year, after which students may decide whether to pursue a vocational track in their second year [1].

In traditional families, the perception that "general high schools are superior to vocational high schools" often shapes students' educational choices, with placement commonly determined by academic performance rather than personal preference [2]. However, approximately 80% of students report that their school choices are primarily self-directed, guided by personal interests, abilities, and aptitudes [3]. Students may select the Mechanical Engineering Group for various reasons, including family expectations, personal interest, and peer influence. These factors influence not only their program selection but may also indirectly shape their future university majors and career paths.

The Mechanical Engineering Group plays an essential role in Taiwan's industrial and technical development, making it crucial to understand students' motivations and perceptions related to enrollment. Clarifying these factors will help educators evaluate program design, enhance instructional planning, and support students' career development. Driven by the rapid

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advancement of technologies such as Industry 4.0 and advanced manufacturing systems, the demand for specialized talent within these fields continues to grow. Industry 4.0 requires highly skilled technicians, engineers, and doctoral-level professionals who are well prepared for research, development, and manufacturing [4]. However, designing a curriculum that integrates knowledge with the associated practical know-how remains a major challenge for the academic world." To address this pedagogical challenge, it is imperative to identify and cultivate promising industrial talent as early as the secondary education stage. Introducing students to foundational knowledge during high school can provide a foundation for more advanced technical training in higher education and help prepare them for future employment in relevant industrial sectors.

2. Literature

Factors influencing junior high school graduates' decisions to attend technical high schools include program characteristics, curriculum content, teaching facilities, learning environments, and instructional quality [5]. In addition, factors such as distance from home, anticipated expenses, and family background also affect students' choices of school type. When considering their future educational pathways, secondary school students require sufficient information about available programs and their academic and professional opportunities to support appropriate decision-making [6]. Furthermore, when choosing a field of study, students take into account personal preferences, parental advice, teacher recommendations, available information, and the influence of role models [7]. These findings indicate that students' educational and career decisions are influenced by various personal and contextual factors. In vocational education, self-efficacy, social environment, and career guidance and counselling have been identified as important factors associated with students' career decision-making [8]. Students' willingness to choose specific courses can also be interpreted as a form of motivation, representing their commitment to achieving learning goals [9]. In addition, students' career exploration involves exploring both themselves and their environment to gather career-related information, with this process being associated with personal, cognitive, and contextual factors [10]. The purpose of this study was to investigate how the aforementioned factors influence students' decisions to enroll in the Mechanical Engineering Group at vocational high schools.

Learning objectives communicate the purpose of instruction by specifying what students are expected to know and be able to do after completing a course of study, and they also provide a foundation for course design and assessment [11]. Program teaching objectives, often referred to as behavioral objectives, are operational statements describing observable student behaviors and can be categorized into cognitive, affective, and psychomotor domains [12]. External evaluations can also be conducted based on these domains. Observable behaviors are considered valid objectives because they can be monitored, measured, manipulated, and classified; conversely, behaviors that cannot be observed or assessed cannot be regarded as legitimate objectives [13]. Learning motivation is a crucial factor in students' achievement of instructional objectives, stemming from both intrinsic motivation to acquire knowledge and extrinsic incentives or rewards [14]. The instructional design process typically includes establishing objectives, selecting materials, designing learning experiences, and evaluating outcomes [15]. According to Tyler's curriculum design model, program-specific instructional objectives may include provisional general objectives, precise educational objectives, and the selection, organization, and evaluation of student learning experiences [16]. From the learner's perspective, setting learning goals is a central component of self-regulated learning, influencing cognitive and behavioral processes throughout the learning cycle [17]. Learning goals shape self-regulated learning by guiding orientation, enabling adjustment, and promoting continual self-evaluation [18]. For vocational senior high schools, instructional objectives aim to develop entry-level professionals equipped with foundational technical competencies through systematic and structured instruction [19].

3. Research Method

This study adopted a survey questionnaire methodology. The questionnaire items were developed based on factors influencing students' program choices and their personal backgrounds, and the initial draft underwent expert review. Following

the expert evaluation, a pilot questionnaire was administered, and SPSS was used to analyze reliability and validity to determine whether the items were appropriate for inclusion. After revisions based on the pilot test results, the finalized questionnaire was distributed, and the collected data were analyzed statistically.

3.1 Research subjects

The participants in this study were students enrolled in the day program of the Mechanical Engineering Group at a public industrial vocational high school in Changhua County. The distribution of students by department was as follows: 211 from Mechanical Engineering, 211 from Mechatronics Engineering, 102 from Drafting and Design, 100 from Foundry Engineering, and 94 from Machine Mold Engineering. As the Mechanical Engineering Group constitutes the largest departmental group in this school, it provided a sufficiently large sample size for subsequent statistical analysis.

3.2 Research tools

The questionnaire used in this study consisted of five dimensions:

(1) Reasons for choosing the program
(2) Level of understanding of the program
(3) Instructional objectives of the program
(4) Future development prospects
(5) Learning experience

Responses were measured using a five-point Likert scale. Upon completion of the initial draft, the questionnaire was reviewed and revised by three experts to ensure content validity. All three experts are current professors at higher education institutions with interdisciplinary expertise in education and engineering. A pilot test was then conducted, with questionnaires distributed to technical high schools across multiple counties and cities. The distribution of programs, counties/cities, and participants is summarized in Table 1.

Table 1 Distribution of pilot questionnaires

Program	Region	Number of Participants
Mechanical Engineering	Changhua County	162
Mechatronics Engineering	Tainan City	64
Drafting and Design	Changhua County	100
Foundry Engineering	New Taipei City	142
Machine Mold Engineering	Changhua County	57
Total	-	525

3.3 Research process

During the research process, a self-developed questionnaire was employed. After the initial draft was completed, it was reviewed by subject-matter experts, and revisions were made accordingly. Following the expert review, a pilot test was conducted. After the pilot questionnaires were collected, independent-samples t-tests and reliability analyses were performed using SPSS. Critical ratio (CR) values and Pearson's product–moment correlation coefficients were calculated, and internal consistency was assessed using Cronbach's α. Items with a significance level greater than .05, a corrected item–total correlation below .30, or whose removal improved overall internal consistency were eliminated. Based on these analyses, the final version of the questionnaire was refined and administered as the formal survey for subsequent statistical analysis.

After the completed formal questionnaires were collected, all responses were screened. Questionnaires containing irregularities or incomplete answers were removed, and only valid and fully completed questionnaires were retained for analysis. Four analytical methods were then applied:

(1) Descriptive statistics (frequency distribution, percentage, mean, and standard deviation) were used to examine participants' background variables and their responses regarding reasons for choosing the program, level of understanding of the program, instructional objectives, future development prospects, and learning experience.

(2) One-way analysis of variance (one-way ANOVA) was used to analyze differences among students with different background characteristics across the five dimensions: reasons for choosing the program, level of understanding of the program, instructional objectives, future development prospects, and learning experience.

(3) Pearson's product–moment correlation analysis was conducted to explore the relationships among the five dimensions: reasons for choosing the program, level of understanding of the program, instructional objectives, future development prospects, and learning experience.

(4) Regression analysis was performed to examine the predictive power of reasons for choosing the program and the four additional dimensions—level of understanding of the program, instructional objectives, future development prospects, and learning experience.

4. Results

The study sample consisted of 672 students who provided valid questionnaire responses from the Mechanical Engineering Group in the day-division program of a public industrial vocational high school in Changhua County. The distribution of participants across departments was as follows: 202 from Mechanical Engineering, 207 from Mechatronics Engineering, 99 from Drafting and Design, 96 from Foundry Engineering, and 68 from Machine Mold Engineering, yielding a total sample size of 672 students. Table 2 presents the descriptive statistics for the dimensions across all departments, with mean scores ranging from 3.50 to 4.49, indicating an overall level of agreement on the measured dimensions.

Table 2 Statistical analysis of dimensions

Dimension	N	M	SD
Average: Reasons for Choosing the Program	672	3.68	.596
Average: Understanding the Program Level	672	3.49	.747
Average: Program Teaching Objectives	672	3.24	.738
Average: Future Development Prospects	672	3.82	.601
Average: Learning Experience	672	3.36	.611

4.1 One-way analysis of variance of background variables

A one-way independent analysis of variance (one-way ANOVA) was conducted on the five dimensions to determine whether responses differed significantly according to students' backgrounds, particularly grade levels and parental occupations. Table 3 presents the items that demonstrated statistically significant differences across grade levels, while Table 4 shows the items that reached statistical significance across parental occupations.

Table 3 Items showing significant variance by grade level

Topic and Variable	Significance
(1) Reasons for Choosing the Program	-
I want to study in the same program as my close friends.	.040
(2) Level of Understanding the Program	-
Through course content, teachers, and parents, I have a general understanding of the industries I can pursue after graduation.	.023

Table 3 Items showing significant variance by grade level (continued)

Topic and Variable	Significance
I believe I understand the current overview of industrial development.	.047
(3) Program Teaching Objectives	-
Regarding the specialized subjects I have taken, I believe I possess the ability to operate CNC machine tools.	.000
Regarding the specialized subjects I have taken, I believe I possess the ability to read technical drawings.	.041
Regarding the specialized subjects I have taken, I believe I have a solid understanding of relevant professional laws and regulations.	.005
I believe I can troubleshoot most mechanical failures.	.011
I understand the scope tested in the Mechanical Engineering Group in the Unified Examination.	.000
(4) Future Studies	-
I will apply for a program related to the Mechanical Engineering Group in the Unified Examination.	.001
(5) Learning Experience	-
I have made good friends in this program.	.019
The teachers in the department teach in an engaging way.	.006
The school's specialized equipment is comprehensive and adequate.	.001

Note: *p<.05; p**<.01; ***p<.001

Table 4 Items showing significant variance by parental occupation

Topic and Variable	Significance
(1) Reasons for Choosing the Program	-
Family members are employed in related industries.	.050
(2) Level of Understanding the Program	-
I am aware of the practical subjects that will be studied in this program.	.018
When choosing this program, I already had a general understanding of its curriculum.	.031
Through course content, teachers, and parents, I have a general understanding of the industries I can pursue after graduation.	.012
I am aware of the future career paths related to this program.	.015
(3) Program Teaching Objectives	-
Regarding the specialized subjects I have taken, I believe I possess the ability to use computer-aided design and manufacturing with numerical control.	.001
I understand the scope tested in the Mechanical Engineering Group in the Unified Examination.	.016
(4) Future Studies	-
I will apply for a program related to the Mechanical Engineering Group in the Unified Examination.	.001
(5) Learning Experience	-
The specialized subjects in my program are interesting.	.027
I have made good friends in this program.	.004
My family supports my decision to pursue this program.	.008

Note: *p<.05; p**<.01; ***p<.001

4.2 Pearson's product–moment correlation between various dimensions

Pearson's product–moment correlation analysis was conducted to examine the relationships among the five dimensions. As shown in Table 5, all dimensions were positively and significantly correlated with one another. According to commonly

accepted interpretation criteria, correlation coefficients below .30 are considered weak, those between .30 and .70 are moderate, and those above .70 are strong. Among the observed correlations, the relationship between level of understanding of the program and learning experience was the strongest, with a coefficient of .660, indicating a moderate positive correlation.

Table 5 Pearson's correlations between variables

		Reasons for Choosing the Program	Level of Understanding the Program	Program Teaching Objectives	Future Studies	Learning Experience
Reasons for Choosing the Program	Pearson correlation	1	.467**	.414**	.417**	.495**
	Significance (two-tailed)	-	.000	.000	.000	.000
Level of Understanding the Program	Pearson correlation	.467**	1	.553**	.441**	.660**
	Significance (two-tailed)	.000	-	.000	.000	.000
Program Teaching Objectives	Pearson correlation	.414**	.553**	1	.390**	.571**
	Significance (two-tailed)	.000	.000	-	.000	.000
Future Studies	Pearson correlation	.417**	.441**	.390**	1	.465**
	Significance (two-tailed)	.000	.000	.000	-	.000
Learning Experience	Pearson correlation	.495**	.660**	.571**	.465**	1
	Significance (two-tailed)	.000	.000	.000	.000	-
**Correlation is significant at the 0.01 level (2-tailed).						

4.3 Predicting program understanding from reasons for program selection

A regression analysis was conducted with reasons for choosing the program as the independent variable and the level of understanding of the program as the dependent variable. As shown in Table 6, the significance level was $p < .001$. The Durbin–Watson statistic was close to 2, indicating that the residuals were largely independent. Table 7 presents the analysis of variance (ANOVA) results, which also indicate a significance level of $p < .001$. Table 8 shows that all tolerance values exceeded .10 and that all variance inflation factor (VIF) values were below 10, suggesting no multicollinearity concern in this single-predictor model. Fig. 1 illustrates that the observed data closely follow the normal distribution curve, suggesting that the assumption of normality is reasonably met. Fig. 2 shows that the data points align closely with the diagonal line in the normal probability plot, further supporting normality and corroborating the results from Fig. 1. Fig. 3 demonstrates that the residuals are dispersed in an approximately rectangular pattern, indicating that the assumptions of normality, linearity, and homoscedasticity are satisfied.

Table 6 Durbin–Watson test: predicting the level of understanding the program by reasons for choosing the program

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson test
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.467[a]	.218	.217	.661	.218	186.539	1	670	.000	2.020
a. Predictors: (Constant) Reasons for Choosing the Program										
b. Dependent Variable: Level of Understanding the Program										

Table 7 Analysis of variance: predicting the level of understanding of the program from reasons for choosing the program

Model		Sum of squares	df	Mean square	F	Significance
1	Regression	81.534	1	81.534	186.539	.000[b]
	Residual	292.851	670	.437	-	-
	Total	374.386	671	-	-	-
a. Dependent Variable: Level of Understanding the Program						
b. Predictors: (Constant) Reasons for Choosing the Program						

Table 8 Explanatory power of the reasons for choosing the program in predicting the level of understanding of the program

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance	Collinearity Statistics	
		Estimated value of β	Standard Error	Beta distribution			Tolerance	VIF
1	(Constant)	1.920	.118	-	16.336	.000	-	-
	Reasons for Choosing Program	.585	.043	.467	13.658	.000	1.000	1.000
a. Dependent Variable: Level of Understanding the Program								

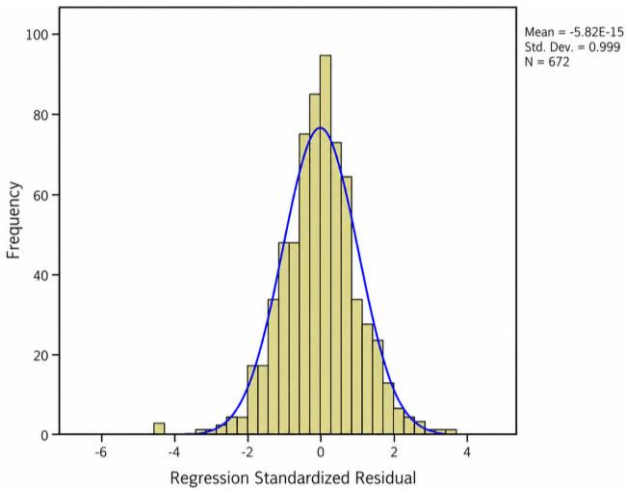


Fig. 1 Histogram of regression standardized residuals

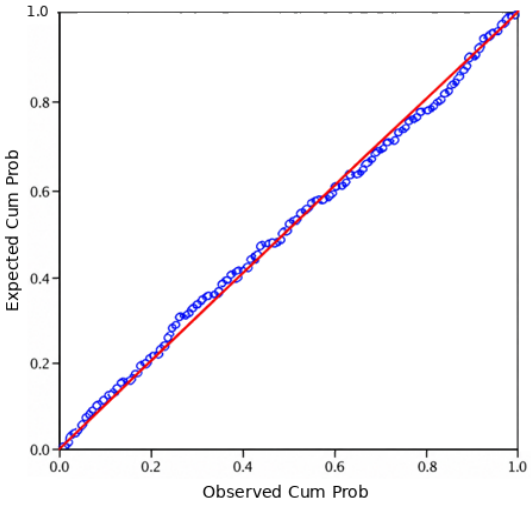


Fig. 2 Normal P-P plot of regression standardized residuals

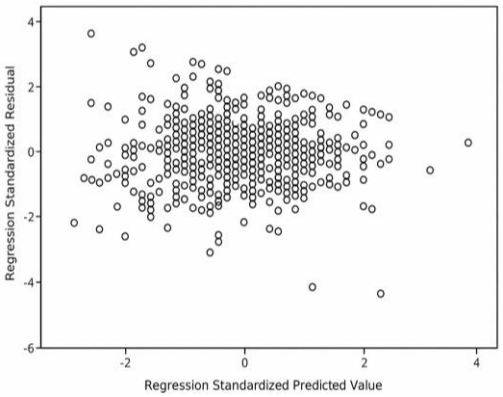


Fig. 3 Scatterplot of regression standardized residuals

4.4 Predicting program teaching goals using the level of understanding

A regression analysis was conducted with the level of understanding of the program as the independent variable and the instructional objectives of the program as the dependent variable. As shown in Table 9, the significance level was $p < .001$. The Durbin–Watson statistic of 1.448 suggests that the residuals were approximately independent. Table 10 presents the analysis of variance (ANOVA), which also revealed a significance level of $p < .001$. Table 11 shows that all tolerance values exceeded .10 and all VIF values were below 10, indicating that multicollinearity was not present.

Fig. 4 illustrates that the observed data closely follow the normal distribution curve, suggesting that the assumption of normality is reasonably met. Fig. 5 shows that the data points align closely with the diagonal line in the normal probability plot, further supporting the assumption of normality and confirming the results shown in Fig. 4. Fig. 6 demonstrates that the residuals are distributed in an approximately rectangular pattern, indicating that the assumptions of normality, linearity, and homoscedasticity are satisfied.

Table 9 Durbin–Watson test: predicting program teaching objectives by the level of understanding the program

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson test
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.553[a]	.306	.305	.615	.306	295.378	1	669	.000	1.448
a. Predictors: (Constant) Level of Understanding the Program										
b. Dependent Variable: Program Teaching Objectives										

Table 10 Analysis of variance: predicting program teaching objectives by the level of understanding of the program

Model		Sum of squares	df	Mean square	F	Significance
1	Regression	111.792	1	111.792	295.378	.000[b]
	Residual	253.197	669	.378	-	-
	Total	364.989	670	-	-	-
a. Dependent Variable: Program Teaching Objectives						
b. Predictors: (Constant) Level of Understanding the Program						

Table 11 Explanatory power of the level of understanding the program in predicting program teaching objectives

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance	Collinearity Statistics	
		Estimated value of β	Standard Error	Beta distribution			Tolerance	VIF
1	(Constant)	1.329	.113	-	11.710	.000	-	-
	Reasons for Choosing Program	.547	.032	.553	17.187	.000	1.000	1.000
a. Dependent Variable: Level of Understanding the Program								

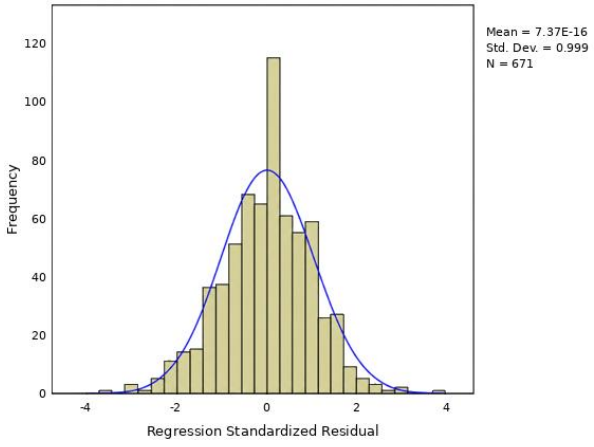


Fig. 4 Histogram of regression standardized residuals

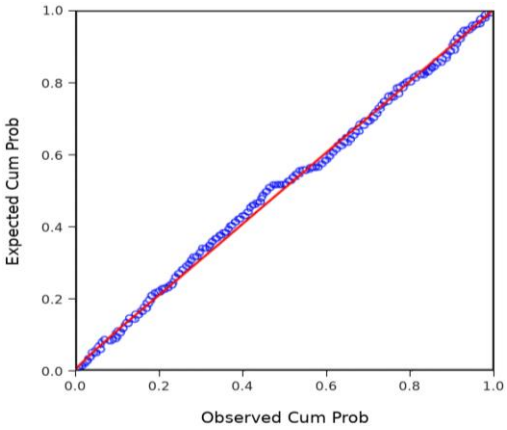


Fig. 5 Normal P-P plot of regression standardized residuals

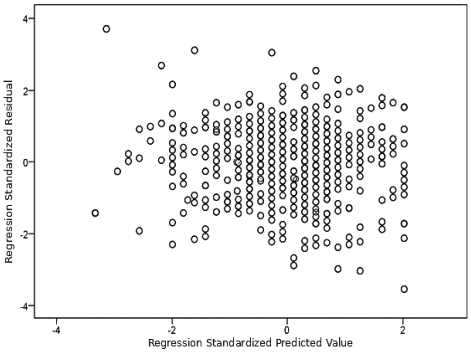


Fig. 6 Scatterplot of regression standardized residuals

4.5 Predicting program teaching objectives based on the reasons for choosing the program

A regression analysis was performed with reasons for choosing the program as the independent variable and the instructional objectives of the program as the dependent variable. As shown in Table 12, the regression model reached statistical significance ($p < .001$). The Durbin–Watson statistic of 1.423 suggests that the residuals were nearly independent. Table 13 presents the analysis of variance (ANOVA), which likewise indicated a significance level of $p < .001$. Table 14 shows that all tolerance values exceeded .10 and that all VIF values were below 10, indicating that multicollinearity was not present. Fig. 7 illustrates that the observed data roughly follow the normal distribution curve, suggesting that the assumption of normality is reasonably met. Fig. 8 shows that the data points align closely with the diagonal line in the normal probability plot, further supporting the assumption of normality and aligning with the pattern shown in Fig. 7. Fig. 9 demonstrates that the residuals are dispersed in an approximately rectangular pattern, indicating that the assumptions of normality, linearity, and homoscedasticity of residuals are satisfied.

Table 12 Durbin–Watson test: predicting program teaching objectives based on the reasons for choosing the program

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson test
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.414a	.171	.170	.672	.171	138.468	1	669	.000	1.423
a. Predictors: (Constant) Reasons for Choosing Program										
b. Dependent Variable: Program Teaching Objectives										

Table 13 Analysis of variance: predicting program teaching objectives based on the reasons for choosing the program

Model		Sum of squares	df	Mean square	F	Significance
1	Regression	62.590	1	62.590	138.468	.000b
	Residual	302.399	669	.452	-	-
	Total	364.989	670	-	-	-
a. Dependent Variable: Program Teaching Objectives						
b. Predictors: (Constant) Reasons for Choosing the Program						

Table 14 Explanatory power of the reasons for choosing the program in predicting program teaching objectives

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance	Collinearity Statistics	
		Estimated value of β	Standard Error	Beta distribution			Tolerance	VIF
1	(Constant)	1.862	.120	-	15.573	.000	-	-
	Reasons for Choosing Program	.513	.044	.414	11.767	.000	1.000	1.000
a. Dependent Variable: Program Teaching Objectives								

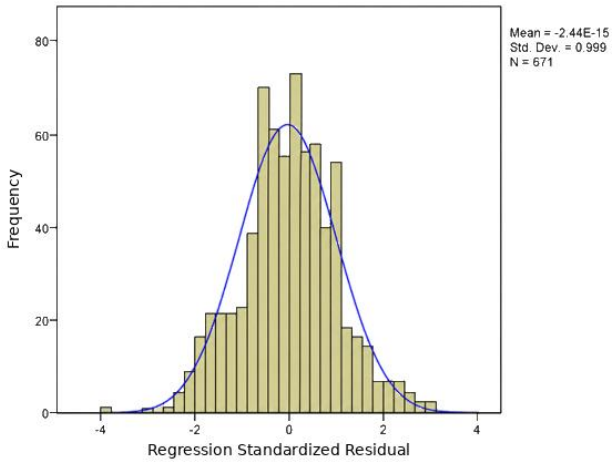


Fig. 7 Histogram of regression standardized residuals

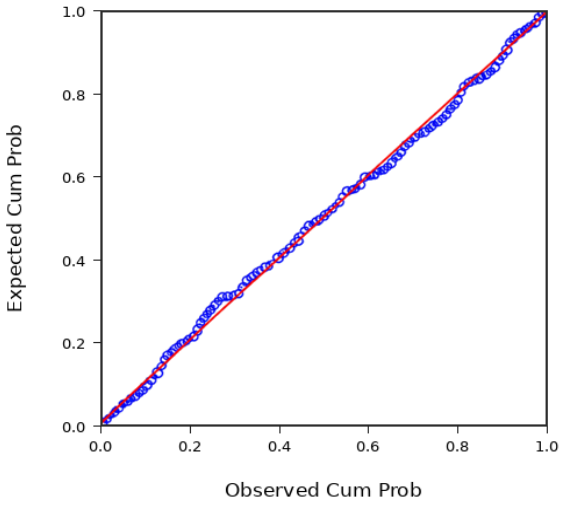


Fig. 8 Normal P-P Plot of regression standardized residuals

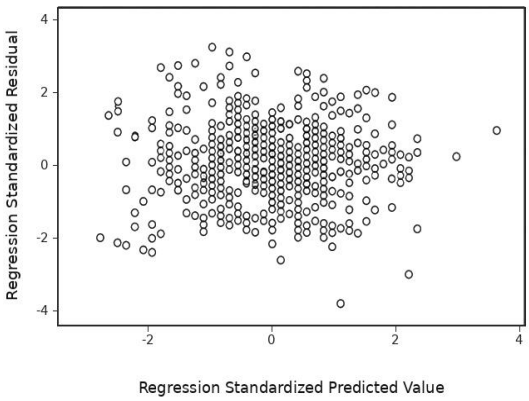


Fig. 9 Scatterplot of regression standardized residuals

4.6 Predicting learning experience based on program teaching objectives

A regression analysis was conducted with the instructional objectives of the program as the independent variable and learning experience as the dependent variable. As shown in Table 15, the regression model reached statistical significance ($p < .001$). The Durbin–Watson statistic was 1.750, which is close to 2.0, suggesting that the residuals were nearly independent. Table 16 presents the analysis of variance (ANOVA), which likewise indicated significance at $p < .001$. Table 17 shows that all tolerance values exceeded .10 and that all variance inflation factor (VIF) values were below 10, indicating that multicollinearity was not present. Fig. 10 illustrates that the observed data roughly follow the normal distribution curve, suggesting that the assumption of normality is reasonably met. Fig. 11 shows that the data points align closely with the diagonal line in the normal probability plot, providing further support for normality and corresponding with the pattern shown in Fig. 10. Fig. 12 demonstrates that the residuals form an approximately rectangular distribution, indicating that the assumptions of normality, linearity, and homoscedasticity are satisfied.

Table 15 Durbin–Watson test: predicting learning experience based on program teaching objectives

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson test
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.571[a]	.326	.325	.502	.326	323.147	1	667	.000	1.750
a. Predictors: (Constant) Program Teaching Objectives										
b. Dependent Variable: Learning Experience										

Table 16 Analysis of variance (ANOVA): predicting learning experience based on program teaching objectives

Model		Sum of square	df	Mean square	F	Significance
1	Regression	81.383	1	81.383	323.147	.000[b]
	Residual	167.981	667	.252	-	-
	Total	249.365	668	-	-	-
a. Dependent Variable: Learning Experience						
b. Predictors: (Constant) Program Teaching Objectives						

Table 17 Explanatory power: predicting learning experience based on program teaching objectives

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance	Collinearity Statistics	
		Estimated value of β	Standard Error	Beta distribution			Tolerance	VIF
1	(Constant)	1.832	.087	-	20.967	.000	-	-
	Reasons for Choosing the Program	.473	.026	.571	17.976	.000	1.000	1.000
a. Dependent Variable: Learning Experience								

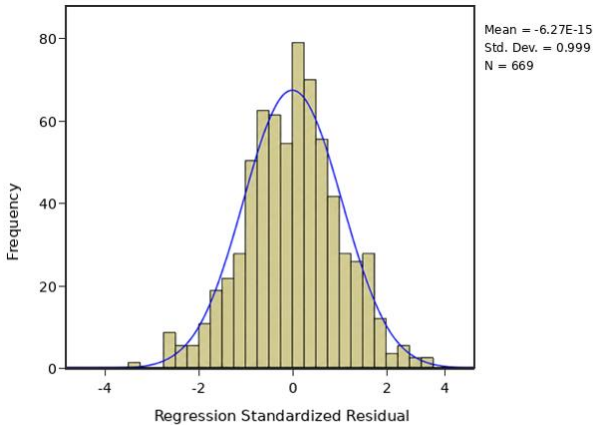


Fig. 10 Histogram of regression standardized residuals

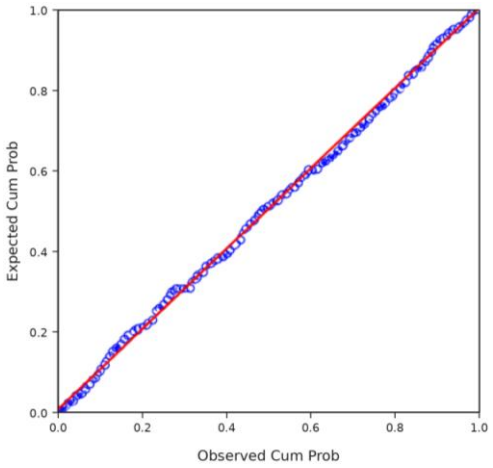


Fig. 11 Normal P-P plot of regression standardized residuals

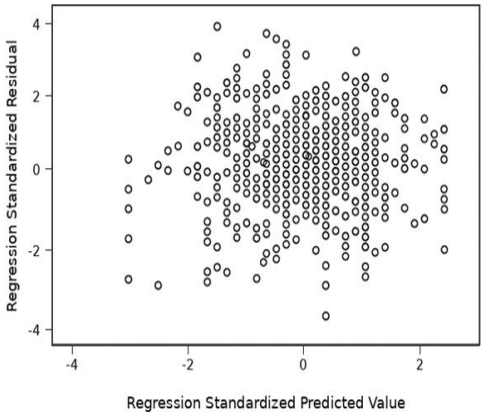


Fig. 12 Scatterplot of regression standardized residuals

5. Discussion

The results revealed significant positive correlations among the five dimensions, suggesting that students' program selection, understanding of the program, perceptions of program teaching objectives, future development, and learning experience are interrelated. This may reflect the emphasis of vocational education on professional and practical training, through which students' understanding of their programs may be associated with how they perceive the purposes of professional learning. The literature indicates that students consider program characteristics, curriculum content, teaching facilities, learning environments, and instructional quality when choosing technical high schools [5]. In addition, sufficient information about available educational pathways and their academic and professional opportunities can support students in making appropriate educational decisions [6]. Therefore, vocational education should not only provide professional knowledge and skills but also help students better understand their programs and connect their current learning with future development.

Students' understanding of their programs significantly predicted their perceptions of program teaching objectives, which were also positively related to learning experience. A clearer understanding of the curriculum and professional field may help students recognize the purposes of professional courses and practical training. The literature indicates that instructional design involves establishing objectives, selecting materials, designing learning experiences, and evaluating outcomes [15], while Tyler's curriculum design model also emphasizes the relationship between instructional objectives and the selection, organization, and evaluation of learning experiences [16]. In addition, learning goals can guide students' self-regulated learning processes [17, 18]. Therefore, teachers should clearly explain course objectives and connect professional knowledge and practical skills with engineering applications and workplace contexts to help students establish clearer learning directions more effectively.

Regarding program selection, the reasons for choosing a program significantly predicted students' understanding of the program. Students with clearer reasons for their choices may be more likely to seek relevant information before enrollment. Personal preferences, parental advice, teacher recommendations, available information, and role models can influence students' choices of fields of study [7]. In vocational education, students' career decision-making is also associated with factors such as self-efficacy, social environment, and guidance and counselling [8]. Students' willingness to choose specific courses can further reflect their motivation to achieve learning goals [9]. Therefore, schools should provide sufficient program information before students make their choices so that they can select programs based on their interests, abilities, and understanding of the relevant professional fields.

Finally, the relationships among the five dimensions suggest that career exploration may be a continuous process rather than a single decision made before entering vocational high school. The literature indicates that students' career exploration involves exploring themselves and their environment to gather career-related information and is associated with personal, cognitive, and contextual factors [10]. Therefore, career exploration can begin in junior high school through technical arts education programs, school visits, and senior high school and vocational high school education fairs, helping students identify their interests and become familiar with different professional fields. After entering vocational high school, professional courses, practical training, and information on further education and employment can help students continue exploring their directions, thereby linking program selection, professional learning, and career development throughout their process.

6. Conclusion

This study employed a questionnaire-based research design to investigate five dimensions among students in the Mechanical Engineering Group: reasons for choosing the program, understanding of the program, perceptions of program teaching objectives, future development prospects, and learning experience. Following data collection, descriptive statistics, one-way analysis of variance (one-way ANOVA), Pearson's product–moment correlation analysis, and regression analysis were performed to examine the distribution of responses, differences across student background variables, relationships among the five dimensions, and their predictive relationships. Based on the findings derived from these analyses, the following conclusions are drawn:

(1) Significant correlations were found among all five dimensions, indicating strong interrelationships among students' enrollment motivations, understanding of the program, perceptions of instructional objectives, future development planning, and learning experiences.

(2) The predictive relationships among the dimensions differed in strength, with the strongest effects observed in the following order: enrollment motivations predicting levels of understanding, instructional objectives predicting learning experiences, levels of understanding predicting instructional objectives, and enrollment motivations predicting instructional objectives.

(3) Junior high school teachers are encouraged to integrate career exploration activities into subject instruction across different disciplines. For instance, science and chemistry courses may introduce relevant occupations and professional practices to help students gain a better understanding of various career fields. Through early exposure to career-related information, students may be better able to identify their interests and aptitudes, thereby supporting more informed decisions regarding future educational pathways and career development. Students who actively seek information about their intended programs before enrollment—through teachers, online resources, or other channels—tend to experience smoother academic adjustment, benefiting from clearer expectations regarding curriculum content, program characteristics, and future career pathways.

(4) Given the substantial differences between technical high schools and general high schools, linking specialized course content to real-world applications during instruction may help students build interest, reduce learning anxiety, and develop a clearer understanding of instructional objectives.

(5) Future research could expand the study population to include students from different counties and cities, as well as students with varying levels of academic achievement, to examine differences across regions and academic performance levels. Alternatively, longitudinal studies could be conducted to investigate whether individual students exhibit changes in the five dimensions across different grade levels throughout their vocational high school education.

Conflicts of Interest

The authors declare no conflict of interest.

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