Analysis of students with the wrong major based on the metacognitive dimension

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ABSTRACT

Students with the wrong major always encounter academic conflicts because this greatly affects the development of their metacognitive skills. Therefore, this study aims to analyze (1) the percentage of students with the wrong major (2) the impact and factors that cause children to select the wrong majors (3) students' learning activities with the wrong major. This study used a descriptive quantitative approach comprising a population of mechanical engineering students. The participants were selected using proportional stratified random sampling. Data were collected through questionnaires and interviews. The validity test was performed using the product moment method from Karl Person. Moreover, data were analyzed by employing factors and descriptive statistical techniques. The results showed that 59% and 41% of students agreed and refused that they are in the wrong major. *Second*, the influencing factors include seeking opportunities to enter college, degree demand in the work context, parental coercion, study program profiles, and job prospects. However, the most influencing factor is seeking opportunities to enter college. *Third,* the wrong study program causes students to feel inferior to others. *Fourth*, there is a negative influence of the wrong major on metacognitive, particularly in planning development where children have difficulty managing time to achieve their goals.

Keywords: impacts factors, metacognitive dimension, students, wrong major

INTRODUCTION

In this life, education means the formation of "general intelligence" which is the development of the mind and consciousness from moral, aesthetic, and philosophical forms (Kritis & Pavlidis, 2012). It is expected to help students develop attitudes such as religiosity, sociality, gender, justice, democracy, honesty, integrity, independence, fighting power, and responsibility (Halstead & Taylor, 2000; Wardani, 2010). Suwartini et al (2017) emphasized that the Indonesian people need large and quality resources to support the implementation of a good education. Professional teachers have an important role in organizing good education (Zahro, 2019). Besides that, the student's role is central because they are agents of change and control who tends to become the nation's next generation (Sukmawansyah et al., 2019). For years, children often have complex problems, greater academic demands, and high levels of stress while in college (Bhujade, 2017; Harris & Marlowe, 2011).

Selecting a major is one of the problems often faced by students (Sithole et al., 2017). A study carried out in California concluded that students often have difficulty in selecting a major because the choices available are complex. Previous studies also stated that those at Raden Intan Lampung State Islamic University always select the wrong major. Therefore, students have difficulties when developing the material that is being tested (Masriah et al., 2018). Even though students in the industrial era 4.0 and the era of digital society 5.0 are required to have adequate competence (Nurjanah et al., 2022; Sudana et al., 2020). Son et al., (2020) showed that students want to quit and retake university entrance tests since they are not comfortable attending lectures. According to Pratiwi & Wardana (2016), about 56% and 90% of them were in the wrong major and forced to follow their parents' wishes, respectively.

Irene Guntur, an educational Psychologist from Integrity Development Flexibility (IDF) emphasized that 87% of students are in the wrong major in Indonesia. The analysis also appealed to young people or new college graduates that their hearts and skills will be undeveloped when working in the wrong major (Harahap, 2014). In 2020, about 50% of students from one of the engineering majors felt unfit for the department (Primayasa & Baharsyah, 2020).

Academic conflicts including low GPAs, repeating courses, extending lectures, skipping classes, lack of motivation, being lazy to study, as well as having difficulties understanding courses are one of the problems experienced by students (Zeng et al., 2019). Student success is indicated through a high score that is calculated with an average value called the Grade Point Average (GPA) (Tampil et al., 2015). Therefore, it is necessary to develop metacognitive skills to improve education quality (Sumampouw, 2011).

According to Caia (2019), cognitive strategies mostly focus on using self-knowledge to predict learning outcomes. This skill refers to awareness and in-depth understanding of a person's processes and products (Arslan & Akin, 2014; Astikasari & Murti, 2011). Metacognition regulation is one of the components that are related to academic achievement and supports good learning in university (Abdelrahman, 2020; Damopolii & Nunaki, 2017).

Nurman *et al* (2018) showed that students' metacognitive skills were still in the risk category. According to Narang & Saini (2013), children are associated with self-knowledge when they achieve a high level of academics. Wolters (2003) emphasized metacognitive abilities and motivational beliefs are needed to understand, monitor, and direct student learning. Therefore, selecting the wrong major tends to influence their metacognitive skills. This effect appears in the form of losing interest in the lecture material being taught. It causes students to become lazy in attending class, feel bored when completing assignments, and be less eager to develop learning materials. This is an important case to be identified since institutions innovate and treat students in the wrong major differently.

Metacognitive is defined as 'thinking about thinking' to improve students' learning and understanding (Febrina & Mukhidin, 2019). This skill focus on a person's ability to learn, determine, and organize relevant knowledge-seeking strategies (Rohmania et al., 2021). Therefore, metacognitive relates to students' learning processes and strategies to discover their achievements.

This skill consists of a personal task and strategic knowledge (Flavell, 1979). (Smiley, 1977) divided metacognitive knowledge into three categories: procedural, declarative, and conditional. According to Schraw et al (2006), the three sub-components of this skill are conditional (about when and why to learn), declarative (about what the learning content is), and procedural (about how the person uses the learning). Schraw & Dennison (1994) emphasized that metacognitive includes planning, information management, understanding monitoring, strategy, and evaluation.

Based on previous studies, this skill relates to several aspects which have been neglected by students. It showed that about 87% of students are in the wrong major in Indonesia. This is supported by unstructured data which showed they were wrong in selecting the major or study program. Therefore, this study aims to analyze students in terms of the metacognitive dimension. It examines the Department of Technology and Vocational Education, Teacher Training and Education Faculty, Sebelas Maret University. This is carried out with the hope of minimizing student errors in selecting majors.

METHOD

This study was carried out at the Department of Technical and Vocational Education, Faculty of Teacher Training and Education, Sebelas Maret University. A number of 244 mechanicals, building with informatics, and computer engineering students in the entry years of 2018, 2019, and 2020 were selected as the participants using descriptive quantitative. The determination of the entry years was based on the intensity and interaction of data sources on campus development. Furthermore, (Bungin, 2011) as cited by (Utaminingsih & Maskan, 2019) developed the determination of the number of samples using Slovinovin equation with a standard deviation of 5%.

According to Natsir (2004), as cited by (Utaminingsih & Maskan, 2019) the number of samples in each entry year was determined using a proportional stratified random sampling technique. Table 1 shows the total population of the participants.

Table 1. Number of Students, populations, dan samples

No	Study Program	Class of 2018	Class of 2019	Class of 2020
1	Mechanical Engineering	63	78	73
2	Building Engineering	67	78	66
3	Informatics and	62	65	72

Computer Engineering			
Number of sub-populations	192	221	211
Number of the total populations		629	
Number of sub-samples	76	86	82
Number of the total sample		244	

Data were collected using questionnaires and interview methods. The questionnaire is distributed online through the Google Form application. To increase the participation and meaningful understanding of the participants, two open discussions were conducted with the theme of overcoming the wrong major problem.

Table 2. Factor Indicators for Students with the Wrong Major

Variable	Dimension	Indicator	Question Number
Students with the Wrong Major	**Intrinsic**	Own interests/desires	2
		Expertise/Skills	2
	Extrinsic	Closest Person Influence	2
		Environmental Influence	2
		Economic Influence	1
		Major characteristics	2

This study involved students who select the wrong major with its effect and metacognitive skills as the independent and dependent variables, respectively. In its measurement, students with the wrong major, the effect of the wrong major, and metacognitive skills are developed using the concept of Nugrahini (2018), Zainuddin (2016), and Schraw *et al*. (2006), respectively. Variables, indicators, and research instrument-forming items are shown in Tables 2 to 4.

Table 3. Impact Indicators for Students with the Wrong Major

Variable	Indicator	Item
The Impact of Students with the Wrong Major	Academic Conflict	3
	Psychological Conflict	3
	Social Conflict	2

Table 4. Indicators of Students' Metacognitive

Variable	Dimension	Indicator	Number of Items
Metacognitive	Knowledge	Declarative Knowledge	3
		Procedural Knowledge	3
		Conditional Knowledge	3
	Skills	Developing Plans	3
		Information management strategy	3
		Monitor implementation	3
		Prediction strategy	3
		Evaluating actions	3

The validity test of the questionnaire is carried out by employing the product moment method from Karl Person. Data were analyzed using descriptive statistical techniques. This study begins with data collection, followed by calculating the percentage of students who feel they are in the wrong major through data analysis techniques. Otherwise, the effect of the wrong major on metacognitive skills is presented through descriptive analysis with the help of SPSS. Regression analysis is used to predict the dependent variable based on the value of the independent ones. Moreover, the interviews are carried out using a non-structured method, indicating that there are open discussions. Unstructured interviews are intended for the participants to provide actual information. Data were analyzed descriptively after passing through a series of meaningful identification and reduction.

RESULT

A total of 25.5%, 33.5, and 41.1% of students vote strongly agree, agree, and disagree that they are in the wrong major. The details are shown below:

Table 1. S1 Indicator

S1				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	28	11.2	11.2	11.2
	don't agree	75	29.9	29.9	41.0
	neutral	84	33.5	33.5	74.5
	agree	50	19.9	19.9	94.4
	strongly agree	14	5.6	5.6	100.0
	Total	251	100.0	100.0	

a. Factors of Student with Wrong Major

1) Factor Analysis of Students with the Wrong Major

Table 2. KMO (Kaiser Meyer Olkin) and Bartlett's Tests

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.637
Bartlett's Test of Sphericity	Approx. Chi-Square	187.205
	Df	36
	Sig.	0.000

The KMO MSA value is 0.637 > 0.50 and the Bartlett's Test value is Sig 0.000 < 0.05. This shows the factor analysis can be continued because it has fulfilled the requirements.

Table 3. Anti-Image Matrics Test

Anti-image Matrices		

		S3	S4	S6	S7	S9	S10	S5	S8	S2
Anti-image Correlation	S3	0.636[a]	0.248	0.108	0.139	-0.014	-0.132	0.163	-0.101	0.137
	S4	0.248	0.582[a]	0.128	0.036	0.029	-0.137	-0.207	0.059	-0.208
	S6	0.108	0.128	0.646[a]	-0.361	0.090	-0.238	0.008	-0.112	-0.226
	S7	0.139	0.036	-0.361	0.699[a]	-0.096	-0.005	0.052	-0.164	-0.112
	S9	-0.014	0.029	0.090	-0.096	0.564[a]	-0.442	0.011	-0.098	-0.030
	S10	-0.132	-0.137	-0.238	-.005	-0.442	0.568[a]	-0.151	0.039	-0.013
	S5	0.163	-0.207	0.008	0.052	0.011	-0.151	0.627[a]	-0.190	0.017
	S8	-0.101	0.059	-0.112	-0.164	-0.098	0.039	-0.190	0.661[a]	-0.056
	S2	0.137	-0.208	-0.226	-0.112	-0.030	-0.013	0.017	-0.056	0.751[a]

a. Measures of Sampling Adequacy (MSA)

Table 3. shows that the Anti Image Correlation output has the letter "a". This indicates all factors are eligible for analysis when the Measure of Sampling Adequacy (MSA) value is > 0.50.

Table 4. Communalities Test

Communalities		
	Initial	Extraction
Desire	1.000	0.591
Parent	1.000	0.658
Opportunity	1.000	0.649
Title	1.000	0.635
Product Profile	1.000	0.656
Work prospect	1.000	0.690
Nearby	1.000	0.448
Economy	1.000	0.285
Interest	1.000	0.475

Based on Table 4. the output results test explains all the factors when the extraction value is > 0.50. It also indicates that the components of the closest person, economy, and interest have a value of < 0.5, therefore, this factor is omitted.

Table 5. *Rotated Component Matrix*

Rotated Component Matrix

	Component		
	1	2	3
Demand	0.798	0.041	0.103
Title	0.794	0.022	0.059
Parent	-0.086	0.803	0.083
Desire	-0.285	-0.668	0.254
Study Program Profile	0.108	-0.005	0.803
Work prospect	0.170	0.146	0.800

In this analysis results, the factors are grouped into 3 based on the largest correlation value. Table 5. shows the largest correlation value obtained from components 1, 2, and 3 consisting of desire and parents, study program profile, and job prospects in the order of demands.

b. Impact of Students with the Wrong Major

Table 6. Statistics Description on the Impact of Students with Wrong Majors

Descriptive Statistics						
	N	Minimum	Maximum	Sum	Mean	Std. Deviation
S11	148	1	5	422	2.85	0.999
S12	148	1	5	493	3.33	0.950
S13	148	1	5	448	3.03	0.947
S14	148	1	5	512	3.46	1.013
S15	148	1	5	423	2.86	1.003
S16	148	1	5	513	3.47	1.133
Valid N (listwise)	148					

Table 6. shows that the most impact experienced by students with the wrong major is the S16 statement which contains "I feel inferior to others". The following are the details.

Table 7. Indicator S16

	S16			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	3.4	3.4	3.4
	Disagree	32	21.6	21.6	25.0
	Neutral	29	19.6	19.6	44.6
	Agree	53	35.8	35.8	80.4
	Strongly agree	29	19.6	19.6	100.0
	Total	148	100.0	100.0	

Table 7. shows that 35.8% of students who are in the wrong major agree they feel inferior to others.

2) Metacognitive Variables

a. M9 Statement

The statement reads "I manage my time well to achieve my goals".

Table 8. M9 Indicators

	M9				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	1.6	1.6	1.6
	Disagree	33	13.1	13.1	14.7
	Neutral	94	37.5	37.5	52.2
	Agree	98	39.0	39.0	91.2
	Strongly agree	22	8.8	8.8	100.0
	Total	251	100.0	100.0	

Table 8. shows that 37.5% of students select neutral when still unsure about managing a good time to achieve their goals. The remaining 13.2% and 1.6% voted to disagree and strongly disagree respectively.

1. **Prerequisite Test**

a. **Normality Test**

The Kolmogorov-Smirnov normality test was used because the sample recommended for testing is > 100. In this study, the residual value is normally distributed when the significance value is > 0.05. Meanwhile, the residual value is not normally distributed provided the significance value is < 0.05.

Table 9. Data Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		251
Normal Parameters[a,b]	Mean	0.0000000
	Std. Deviation	8.35605672
Most Extreme Differences	Absolute	0.044
	Positive	0.044
	Negative	-0.036
Test Statistic		0.044
Asymp. Sig. (2-tailed)		0.200[c,d]

Table 9. shows that the normality test produces a significance value of 0.200 >0.05. Therefore, the data is normally distributed.

b. **Linearity Test**

The linearity test was conducted to determine the relationship between variables. There is a linear relationship between the independent and dependent variables provided the significance

value of deviation from linearity > 0.05. Meanwhile, there is no linear relationship between the variables when the significance value is < 0.05.

Table 10. Data Linearity Test

		Sum of Squares	df	Mean Square	F	Sig.
	ANOVA Table					
Between Groups	(Combined)	5455.308	43	126.868	1.880	0.002
	Linearity	1968.804	1	1968.804	29.174	0.000
	Deviation from Linearity	3486.504	42	83.012	1.230	0.175
Within Groups		13969.417	207	67.485		
Total		19424.725	250			

Table 10. shows that the significance value of Deviation from Linearity is 0.175 >0.05. Therefore, there is a linear relationship between the independent and dependent variables.

2. Simple Linear Regression Test

This regression test is used to determine the influence between the independent and dependent variables. In this study, the variable X is the student with the wrong major, while the Y is metacognitive. The following are the details of the regression test:

Table 11. Correlation or Model Summary

Mode 1	R	R Square	Adjusted R Square	Std. An error in the Estimate
		Model Summary		
1	0.318[a]	0.101	0.098	8.373
a. Predictors: (Constant), Student with the Wrong Major				

The above model explains the magnitude of the R-value of 0.318. Based on the output, the R^2 is 0.101, indicating the effect of students with the wrong major on metacognition is 10.1%.

Table 1.15 Significance Value

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Coefficients				
		B	Std. Error	Beta		
1	(Constant)	94.055	2.425		38.778	0.000
	The student with the Wrong Major	-0.294	0.055	-0.318	-5.299	0.000
a. Dependent Variable: Metacognitive						

Based on the output of the table, the value of constant (a) and the regression coefficient (b) is 94.055 and -0.294 respectively. Therefore, the regression equation is indicated as follows:

$\hat{Y} = a + b\ X$....(1)

$Y = 94.055 - 0.294X$

The value of the constant variable and the regression coefficient is 94.055 and -0.294 respectively. This shows that the constant value of the student with the wrong major and metacognitive skills tends to decrease by -0.294. There is a negative relationship between variables X on Y.

3. Hypothesis Test

Table 12. T count and Significance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	94.055	2.425		38.778	0.000
	A student with the wrong major	-0.294	0.055	-0.318	-5.299	0.000
a. Dependent Variable: Metacognitive						

Coefficientsᵃ

Based on the output, the significance level is 0.000 <0.05. Therefore, students with the wrong major tend to affect metacognitive skills. Based on the t-count value of -5.299 > t-table 1.650947, children with variable X negatively affect Y.

DISCUSSION

Based on the quantitative data analysis, 25.5%, 33.5%, and 41.1% of students selected agree, neutral, and refused they were in the wrong major respectively. The data showed that only 41.1% did not select the wrong major. After conducting in-depth interviews, about 5 students who selected neutral were indicated to have no stability in their major. The word "neutral" indicates less enthusiasm about learning. This is related to the major that failed to match their interests. There is an element of compulsion when selecting a study program. However, there are several influencing factors when taking a major such as parental requests, suggestions from closest friends or relatives, and seeking opportunities to enter college.

The results showed that the analysis factors were divided into 3 groups. The first group consists of seeking opportunities to enter college and the demands of a bachelor's degree in the world. This was indicated by Anggraini & Surjaningrum (2012) and Salsabila (2021) that prospective students consider a low passing grade when selecting majors. The demands of a bachelor's degree are highlighted by (Woo & Park, 2017) that children select majors based on extrinsic factors, including the lack of job opportunities.

Furthermore, the second group consists of self-will and parental coercion. It is emphasized by Al Ghifari (2021) that students taking these majors are not purely of their own accord. The parental demand or coercion factor is in line with the survey results of the Center for

Entrepreneurship Development at Udayana University where 56% of students feel they are in the wrong major and 90% of them are forced to follow their parents' wishes (Pratiwi & Wardana, 2016). This is also expressed by (Ayucedar et al., 2021) that a study program is determined by the parents.

The third group consists of the profile and the job prospects of the majors. This is in line with ICCN that 50.55% of external factors including parental advice, following friends' choices, lack of research on the department profile, and assuming they easily secure work cause students selecting the wrong study program (Ayucedar et al., 2021). Furthermore, Anggraini & Surjaningrum (2012) explained that a lack of knowledge or information about the majors causes children to select incorrectly.

Students with the wrong major can also have an impact on themselves and others. Based on the quantitative analysis results, children with a wrong study program feel inferior to others. This is indicated by Zainuddin (2016) that students with the wrong major have social conflicts, including negative labeling, being ignored and not being close to their friends in the department, feeling inferior, being belittled, as well as conflicts with lecturers and parents.

At the end of descriptive and regression analysis, there is a negative influence of students with the wrong major on metacognitive. This shows that children's knowledge and metacognitive skills are low when they are in the wrong study program. It is also expressed by Nurman et al (2018) that students' metacognitive skills are still in the very risky category related to learning materials. The descriptive analysis results showed the lowest points were in the indicators of metacognitive skills development planning which contained "I manage my time well to achieve my goals".

This shows that students with the wrong major fail to manage their time well and achieve the goals they are pursuing. Coupled with the density of learning activities that makes students tired quickly, reduces enthusiasm, and reduces student achievement (Suharno et al., 2018). According to Febrina & Mukhidin (2019), metacognitive skills help to improve children's learning and understanding. This is in line with Caia et al (2019) and (Tosun & Senocak (2013) that students with high skills can evaluate and adjust their goals to a more precise level, become better at planning, as well as properly manage information.

CONCLUSION

Based on the discussion above, the analysis results and hypotheses formulated as well as a 95% confidence level of $\alpha = 0.05$, concludes:

1. From the class of 2018 - 2020, a total of 25.5%, 33.5%, and 41.1% of students in Technology and Vocational Education of the Teacher Training and Education Faculty at Sebelas Maret University select agree, neutral, and refused that they are in the wrong major.

2. The analysis results showed there are influencing factors when selecting a major. They include parental coercion, seeking opportunities to enter college/low-grade passing, demands for a bachelor's degree in the context of work, lack of information about the study profile, and looking at job prospects.

3. Students with the wrong major mostly feel inferior to others. This is included in social conflict for children with the wrong study program

4. There is an influence between students with the wrong major and metacognitive.

   a. In this study, there is a negative influence of children with the wrong major on metacognitive with variables Y and X to be 94.055 and – 0.294 respectively.

   b. The influence of students with the wrong major on metacognitive is 10.1%

   c. Students with the wrong major failed to properly manage their time to achieve the desired goals.

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