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CHARACTER IN MODERATING HARD SKILLS TO IMPROVE STUDENT SKILLS: BUILDING MODELING AND INFORMATION DESIGN VOCATIONAL SCHOOL

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Abstracts

The Industrial Era 4.0 requires vocational school graduates to have high competency to support their readiness to enter the world of work. This Research aims to examine the influence of hard skills on student competency and Character in moderating hard skills in increasing vocational student competency. This study uses a quantitative approach with a research instrument in the form of a questionnaire. The population in this study were all students of the State Vocational High School (SMK-N) in the field of expertise in Building Modeling and Information Design (DPIB) in Surabaya, Indonesia. The total population is 197 students, using the Slovin formula at an error rate of 5%, a minimum sample size of 132 respondents is obtained. The data in this study were analysed using SEM-PLS analysis techniques with the help of the SmartPLS version 3 program. The research results show: (1) Hard skills positively affect student competence. The higher the hard skills a student has, the higher the student's competence; (2) The student's Character or attitude has a positive effect on the student's competence, the better the student's Character or attitude during learning, the higher the student's competence; (3) The student's Character or attitude can mediate the influence of hard skills on student competence, the high level of hard skills possessed by students will improve the student's Character or attitude during learning which can then increase student competence.

Keywords: Hard Skills, Character, Competence, Vocational School, Student Skill.

INTRODUCTION

The current industrial era 4.0 requires vocational high school graduates to have high competence to support readiness to enter the world of work. Based on the Surabaya Central Bureau of Statistics Survey, in 2022, an open unemployment rate of 7.62% was observed. (Badan Pusat Statistik Surabya, 2023). The labour absorption of graduates from Public and Vocational High Schools is still low because the competence of graduates is still low. The high unemployment rate in Indonesia is caused by the low level of competence in Indonesia's human resources. Unemployment in an area is caused by a lack of skills of prospective job seekers (Jena, 2020). Indonesia needs to reform the education system, especially now that the ASEAN free market has been opened, so foreign labour mobility is easier, and job competition is tighter. Indonesia needs to reform education, especially vocational education, so graduates have high competence and are easily absorbed by the world of work.

Graduate competencies include several aspects, but hard skills are the main aspect that must be focused on. Hard skills are the skills needed in the 21st-century workforce, such as the ability to think critically, the ability to link knowledge with the real world, mastery of the use of digital

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technology, the ability to communicate well and the ability to collaborate. Hard skills are one factor that dominantly influences vocational school graduates' competence. Skills are central to determining student graduate competencies (Al Harrasi et al., 2023). Good competence will affect the knowledge, skills and attitudes required in the world of work (Rosidah & Sutirman, 2023). Schools must identify the skills and competencies required by the industry (Nikolajenko-Skarbalė et al., 2021). The low skills of students are not only due to poor school-industry relations but also due to a lack of understanding of employer perceptions, preferences and expectations (Doherty & Stephens, 2023).

School failure, at an international level, is a problem that affects most educational systems (Martínez-Valdivia & Burgos-Garcia, 2020). Schools must implement learning models with competencies for the labour market (Lizcano et al., 2020). One of the skills in Vocational High Schools that is much needed in the world of work is Building Modelling and Information Design. However, in fact, the level of absorption of graduates with this expertise is still quite low. Even though there is quite a lot of job availability for this expertise, many architectural and building drawing services offer online and offline services, so the absorption of graduates should be high. The large number of unemployed vocational school graduates is a consideration for schools to manage the programme well (Mahmudah et al., 2022). Based on this phenomenon, researchers are interested in examining the effect of hard skills on student competence and Character in moderating hard skills in influencing the competence of vocational school students in the field of expertise in Building Modelling and Information Design.

LITERATURE REVIEW

Hard Skills and Competence

Hard skills and competencies expected of professionals are undergoing marked change, with clear implications for educators, role perceptions and professionals themselves (Bernhard & Russmann, 2023). Hard skills are one factor that dominantly influences vocational school graduates' competence. Hard skills are the requirements and technical knowledge needed by a person to carry out tasks in accordance with their field (Setiana et al., 2019). Students with high hard skills tend to be highly interested in learning and motivated to master many of the skills they need when facing work problems.

The low labour absorption of vocational high school graduates indicates a lack of competence on the part of graduates. Hard skills are influenced by three aspects, namely knowledge, skills and attitudes in learning (Rosidah & Sutirman, 2023). Vocational school students do not fully understand competence's influence on their employability (Parts et al., 2013). Students will only understand the impact of competencies after working in the industry. Students valued the importance of various competencies but never measured the extent to which the competencies acquired were to be developed (Puiggalo Allepus et al., 2023). Hard skills constitute a characteristic feature of vocational schools towards working professionals. Competence is an advantage for a vocational school graduate in building confidence at work (Denizci Guillet et al., 2019).

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Students with high hard skills tend to have high competence in their field.

H1: Hard Skills have a positive effect on competency

H2: Hard Skills influence character (attitude)

Character (Attitude) and Competence

Character and attitude contribute to vocational school students' high and low competence. Character strengths contribute to developing a student's pre-career stage before entering the workforce. Character strengths can be developed through practice and influenced by the environment and an individual's personal experiences (Naddaf & Lavy, 2023). The importance of character strengths in the development of vocational school graduates in shaping professional competence to promote students' well-being and ethical behaviour when working (Antera, 2021; Villacís et al., 2023). Character can be developed through collaborative learning and knowledge in student competency development. Increasingly rapid changes must be accompanied by changes in Character in forming personal competence (Bernal Guerrero et al., 2020). Good Character and attitude when participating in the learning process tend to have high competence compared to students with poor attitudes and character during the learning process. Character education must be implemented well to support the success of learning (Nair & Fahimirad, 2019). Forming student character can increase students' self-confidence, self-esteem and sense of belonging (Xie et al., 2023). So that the Character formed in students will impact the learning environment. Based on this description, the hypothesis in this study is as follows,

H3: Character (attitude) influences competence

H4: *Hard Skills influence competence through Character (attitude)*

METHOD

Design

This study uses a quantitative approach with a research instrument in the form of a questionnaire. The questionnaire used is the result of adoption from several previous studies that have been further adapted to the sample conditions. All instruments use a Likert scale of 1-5, with gradations of answers 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. The research conceptual framework can be seen in Figure 1.

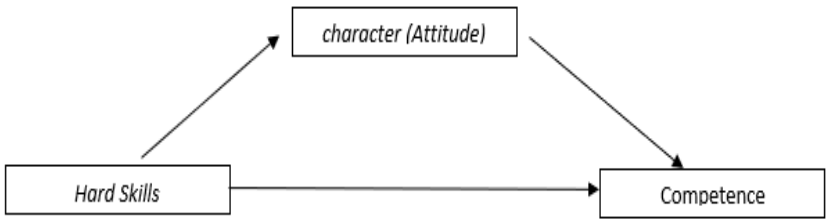

Figure 1: Framework Research

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Population and Sampling

The population in this study were all students of the State Vocational High School (SMK-N) in the field of expertise in Building Modeling and Information Design (DPIB) in Surabaya who were in the second semester of the 2021/2022 academic year carrying out Field Work Practices.

The total population is 197 students, using the Slovin formula at an error rate of 5%, a minimum sample size of 132 respondents is obtained. Thus, the number of participants in this study was 132.

$$n = \frac{N}{1 + (e^2.N)} = \frac{197}{1 + (e^2.197)} = 132$$

Instrument

The competency variable instrument has 31 question items, divided into two measurement dimensions: measurement for competencies related to student skills and measurement of competencies related to student attitudes during the learning process. In the skills dimension, there are six measurement indicators, namely diagnosing sketch drawings, identifying materials and tools needed for drawing, making work schedules, doing drawing work, saving drawings and making reports on drawing results, while in the attitude dimension, there is only one measurement indicator, namely the ability to cooperate with colleagues and the social environment at work.

The Hard Skills instrument has 37 question items, divided into two measurement dimensions, namely cognitive and psychomotor, where the cognitive dimension has three measurement indicators, namely knowledge in the field of building engineering drawings, knowledge in the field of construction basics and knowledge in the application field.

In contrast, the psychomotor dimension is measured by four measurement indicators: building drawing skills, basic construction skills, software application skills and detailed civil building drawing skills. The Character instrument has 27 question items divided into 4 measurement dimensions: openness, Conscientiousness, Conscientiousness, Agreeableness and Neoriticism.

Analysis Data

The data in this study were analysed using SEM-PLS analysis techniques with the help of the SmartPLS version 3 program. SEM-PLS is used because the research model to be estimated is quite complex. After all, the model contains mediating and moderating variables. In addition, SEM PLS does not require a minimum and maximum number of samples, so it will be very good if the sample obtained is small, SEM-PLS is used to avoid bias in the analysis results caused by data abnormalities. SEM-PLS is one of the analytical techniques robust to data abnormality issues.

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RESULTS

Respondent Demography

Respondent demographics are basic information consisting of school origin and gender. Respondent demographics can be seen in Table 1.

Table 1: Demography Respondent

No	Vocational Schools	Gender			Percentage (%)	
		Male	Female	Total	Male	Female
1	SMK N A Surabaya	61	4	65	93,8%	6,2%
2	SMK N B Surabaya	19	3	22	86,4%	13,6%
3	SMK N C Surabaya	41	4	45	91,1%	8,9%
Total		121	11	132	91,7%	8,3%

Source: Primary Data (school name disguised)

Description of Research Variables

The description of the variables in the research is the result of respondents' questionnaire measurements. The variable description can be seen in Figure 2.

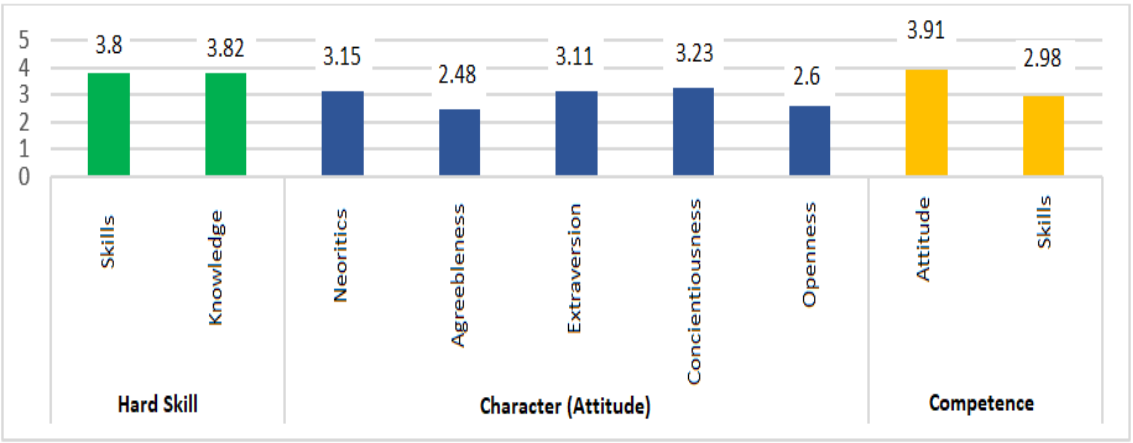

Figure 2: Variable Description

Figure 2 shows that the best level of student knowledge relates to software application skills. In contrast, knowledge of Civil Building engineering drawings and the basics of civil building construction still needs to be improved. While skills in engineering drawings for civil buildings and software applications are good, skills in the basics of civil building construction and detailed drawings of civil buildings still need improvement. Figure 2 shows the five dimensions measuring character: conscientiousness, extraversion, and neoriticism. This means that the student's Character is best in terms of conscientiousness, extraversion and neoriticism, while in terms of openness and agreeableness, it still needs improvement. This means that in terms of being careful when working, openness to other people and openness to pressure is good, but openness to new things and openness to agreements still need to be improved. Figure 2 shows

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two dimensions, namely the skills and attitudes dimensions. The results of this study show that competence in terms of attitudes at work tends to be more prominent than students' skills at work. Students' attitudes when working are very good, but in terms of work skills, many students still need training to improve their work skills.

Analysis SEM PLS

Outer Model Testing

Convergent validity testing is carried out to determine the level of validity of each relationship between the indicator and its latent construct. Indicator testing is declared valid if it has a loading factor value > 0.7 and between constructs below 0.9 is valid. Outer Model test results can be seen in Table 2.

Table 2: Convergent Validity

Variabel	Indikator	Loading Factor 1st order	Loading Factor 2nd order	Cut Value	Validitas
Hard Skills (X1)	X1.1	0.859	0.914	0.7	valid
	X1.2	0.826	0.932	0.7	valid
	X1.3	0.924	0.954	0.7	valid
	X2.1	0.832	0.933	0.7	valid
	X2.2	0.824	0.891	0.7	valid
	X2.3	0.897	0.906	0.7	valid
	X2.4	0.99	0.906	0.7	valid
Character (Z)	Z1	0.874	-	0.7	valid
	Z2	0.814	-	0.7	valid
	Z3	0.913	-	0.7	valid
	Z4	0.818	-	0.7	valid
	Z5	0.896	-	0.7	valid
Competence (Y)	Y1	0.799	0.902	0.7	valid
	Y2	0.889	0.894	0.7	valid
	Y3	0.897	0.948	0.7	valid
	Y4	0.944	0.95	0.7	valid
	Y5	0.815	0.943	0.7	valid
	Y6	0.844	0.91	0.7	valid

Composite Reliability and Cronbach Alpha

Composite Reliability measures the true reliability value of a variable, while Cronbach Alpha measures the lowest value of the reliability of a variable. The test measurement results can be seen in Table 3.

Table 3: *Composite Reliability*

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
X	0.936	0.940	0.948	0.724
Y	0.934	0.937	0.947	0.719
Z	0.915	0.920	0.936	0.746

The required Cronbach's alpha value is > 0.7 in measuring construct reliability, and the composite reliability necessary value is > 0.7. The results of the construct reliability test in

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Table 5 show that Cronbach's alpha value for all constructs is > 0.7, and the composite reliability value for all constructs is > 0.7, which means that all constructs in the SEM PLS model are reliable.

Goodness of Fit Model PLS

The goodness of fit of the SEM PLS model can be seen from the R Square, Q Square and SRMR model values. The test results can be seen in Table 4.

Table 4: Goodness of Fit Model

Endogen Construct	R^2	Adjusted R^2	Criteria	Q^2	Predictive Relevance	SRMR
Character (Z)	0.602	0.600	Moderate	0.442	big	0.097 (Fit)
Competence (Y)	0.508	0.503	Moderate	0.355	big	

The R square value shows the model's strength in predicting endogenous variables. The R Square value ranges from 0-1 and is categorised into three categories: strong, moderate and weak. R square value >0.67 indicates the PLS model is in a strong category, an R Square value between 0.33 – 0.67 indicates that the PLS model is in the moderate category and an R Square value between 0.19 – 0.33 shows that the PLS model is in the weak category. Meanwhile, the Q Square value of the model shows the level of predictive relevance of the model. The Q square value is categorised into three categories, namely small, medium and large, a Q square value of 0.02 – 0.15 is declared small, a Q square value of 0.15 – 0.35 is declared medium, and a Q square value of >0.35 is declared large. The SRMR model is related to the sample's ability to explain the population. SRMR values are categorised into two categories: perfect model fit if SRMR <0.08; the model is fit if SRMR is between 0.08 – 0.10 and not if SRMR > 0.10. The analysis results in Table 4 show that the SEM PLS model is estimated to fit with the data analysed because it has model strength in the moderate category (quite strong), high predictive relevance and the SRMR value of the model is within the fit criteria. Therefore, this model can be considered suitable for testing research hypotheses. The results of the SEM-PLS model can be seen in Figure 3.

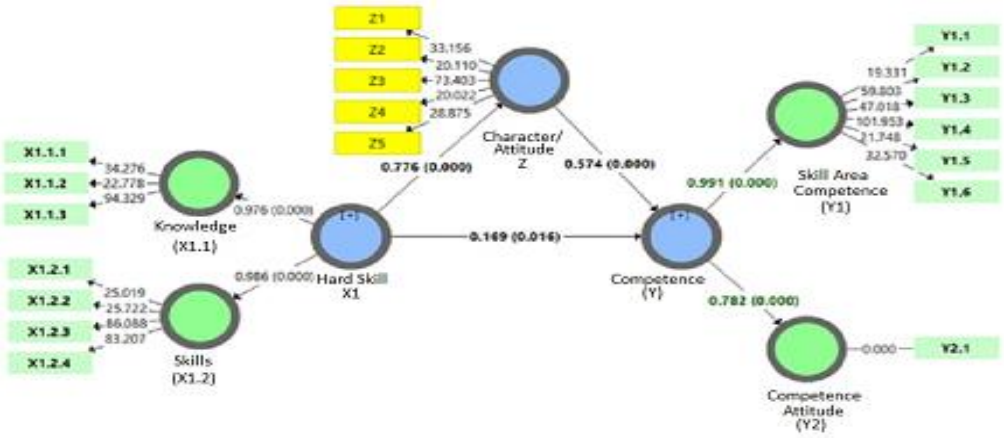

Figure 3: Model SEM-PLS

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Hypothesis Testing

Hypothesis testing is the result of testing data obtained based on SEM-PLS analysis. The results of the hypothesis test can be seen in Table 5.

Table 5: Testing Hypothesis

No	Hypothesis	Result	Conclusion
1	Hard Skills have a positive effect on competency	0.169**	supported
2	Hard Skills influence character (attitude)	0.776***	supported
3	Character (attitude) influences competence	0.574***	supported
4	Hard Skills influence competence through Character (attitude)	0.445***	supported
One Tail Test; result: path coefficient with p-value star; Star of p value: *) sig. level 10%; **) sig. level 5%; ***) sig. level 1%			

DISCUSSION

Vocational High School graduates with high hard skills tend to have high competencies, while graduates with low hard skills tend to have low competencies. In addition to hard skills, students' character (attitude) during the learning process has also been proven to affect their competence positively. Students with good Character and attitude during the learning process tend to have high competence compared to students with poor attitudes and Character during the learning process. Therefore, character education needs to be implemented well in vocational schools to support learning success. This study's results align with the results of (Misbah et al., 2022) that the factors of student character and attitude during the learning process also affect the high level of student competence. Students appreciate the opportunity to think creatively and independently develop solutions to assignments (Boettcher et al., 2023).

Hard skills significantly affect the high and low competence of vocational school graduates. The higher the hard skills possessed by vocational school graduates, the higher the competence of these graduates, and vice versa. Graduates with low hard skills tend to have low competence, making it difficult to be absorbed by the industry. One of the strategies to improve the competence of graduates is by optimising the role of academic supervisors, improving hard skills, and synchronising programs and curricula implemented by vocational schools (Zakiy, 2021). competencies are practical so that vocational schools work with industry to have workplace-based learning (Pang et al., 2019).

The high level of hard skills can shape the Character and attitude of students during the learning process. Hard skills that are formed in students can improve student competence through the formation of Character and attitude during the learning process. Technology-based curriculum can influence students' hard skills competencies (Usman et al., 2024). Students with high hard skills will have high motivation, interest and attitude during the learning process. Graduates with good skills will reduce the unemployment rate (Sally et al., 2021).

This Research shows that hard skills are important in improving student competence. Good competence will make it easier for students to be absorbed in the world of work. Character as a variable can mediate the effect of hard skills on competence. In curriculum development,

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teachers must be able to pay attention to student development by understanding students' social, cultural, emotional, and intellectual Characteristics (Ana et al., 2022).

Students with good Character and attitude during the learning process tend to have high competence compared to students who have poor attitude and Character during the learning process (Misbah et al., 2022). Student characteristics as an aspect of individual quality consist of interests, attitudes, learning motivation, learning styles, thinking abilities and initial abilities of students. Students with high hard skills tend to have high motivation and attitude during learning. Hard skills and Character formed in students are closely related, whereas high hard skills can help shape the Character and attitude of students during the learning process.

Hard skills formed in students can improve student competence through the formation of Character and attitude during the learning process. Vocational schools must have the courage to formulate a curriculum to improve students' career services, counselling, skills and competencies (Alanazi & Benlaria, 2023). Vocational schools can give students access to hard skill development customised learning experiences for hard skill development needs (Martin et al., 2023). Vocational schools should be able to provide curriculum instruments that can assist students in understanding workplace behaviours so that it becomes a bridge for graduates to be easily accepted for employment (Fertig et al., 2022). The influence of innovation ability, knowledge and skills is completely moderated by Character and personality (Wang et al., 2022).

CONCLUSION

Hard skills have a positive effect on graduate competence, and they have a positive impact on student character (attitude) during the learning process. Student character (attitude) during learning has a positive effect on graduate competence, and Character can mediate the impact of hard skills on the competence of Vocational High School graduates. Skills are an important factor in employability in companies and must be considered by vocational schools. Recommendations Vocational schools can use the model proposed in this article to maximise existing human resources to improve student skills. Impact on Society This Research highlights the importance of skills and attitudes in the world of work, which will reduce the percentage of unemployment among vocational school graduates.

Efforts to improve student competence in the future require special attention to students' hard skills and interpersonal skills. Schools should pay more attention to character building and hard skills in students. Strengthening students' hard skills and Character requires special attention in its implementation to make graduates who are ready to work. Future Research More Research is needed to test the soft skills found in the literature and to define the most important skills from a general perspective of the world of work. One of the reasons for the lack of skilled graduates is the gap between industry and academia, so further Research is needed related to industry perceptions of the need for vocational school Modeling Design and Building Information.

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