

## Welding engineering student learning outcomes in SMAW subjects: The effect on interest in entrepreneurship

Rendi Purnawirawan\*, Yoto Yoto, Syarif Suhartadi

Universitas Negeri Malang, Indonesia

**Abstract:** This study aims to determine the influence of the learning outcomes of Shielded Metal Arc Welding (SMAW) subjects on the entrepreneurial interest of students at SMK Negeri 1 Udanawu, Blitar Regency. This research method is quantitative Research. Data collection techniques in this study used questionnaire and documentation methods. Data analysis uses validation tests, reliability tests, and simple linear regression analysis. The results showed that the F-count of 93.931 was greater than the F-table by 4.00. The significance of F by 0.002 was smaller than the  $\alpha$  of 0.05, so the study results could be concluded that the variable learning outcomes of the SMAW subject had a significant effect on the variable of entrepreneurial interest of students. The results showed an R-value of 0.834, meaning that the relationship between the learning outcomes of Manual Arc Welding (SMAW) subjects and the entrepreneurial interest of students at SMK Negeri 1 Udanawu, Blitar Regency was very strong. This level of relationship can be categorized as a very strong relationship. This can be seen from the correlation value of 0.834 and the coefficient value between 0.800-1.000, which states the level of a very strong relationship. The value of the coefficient of determination is 71.5%, while the remaining 28.5% is influenced by other independent variables that were not studied in this study.

**Keywords:** SMAW, entrepreneurship, learning outcomes

## Hasil belajar siswa teknik pengelasan pada mata pelajaran SMAW: Efeknya terhadap minat berwirausaha

**Abstrak:** Penelitian ini bertujuan untuk mengetahui pengaruh hasil belajar mata pelajaran Shielded Metal Arc Welding (SMAW) terhadap minat berwirausaha siswa SMK Negeri 1 Udanawu Kabupaten Blitar. Metode penelitian ini adalah penelitian kuantitatif. Teknik pengumpulan data pada penelitian ini menggunakan metode angket dan dokumentasi. Analisis data menggunakan uji validasi, uji reliabilitas, dan analisis regresi linier sederhana. Hasil penelitian menunjukkan Fhitung sebesar 93,931 lebih besar dibandingkan Ftabel sebesar 4,00. Signifikansi F sebesar 0,002 lebih kecil dari  $\alpha$  sebesar 0,05 sehingga hasil penelitian dapat disimpulkan bahwa variabel hasil belajar mata pelajaran SMAW berpengaruh signifikan terhadap variabel minat berwirausaha siswa. Hasil penelitian menunjukkan nilai R sebesar 0,834, artinya hubungan antara hasil belajar mata pelajaran SMAW dengan minat berwirausaha siswa SMK Negeri 1 Udanawu Kabupaten Blitar sangat kuat. Tingkat hubungan ini dapat dikategorikan sebagai hubungan yang sangat kuat. Hal ini terlihat dari nilai korelasi sebesar 0,834 dan nilai koefisien antara 0,800-1,000 yang menyatakan tingkat hubungan sangat kuat. Nilai koefisien determinasi sebesar 71,5%, sedangkan sisanya sebesar 28,5% dipengaruhi oleh variabel independen lain yang tidak diteliti dalam penelitian ini.

**Kata Kunci:** SMAW, kewirausahaan, hasil belajar

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\*Corresponding author: [rendi.purnawirawan.2205518@students.um.ac.id](mailto:rendi.purnawirawan.2205518@students.um.ac.id)

## INTRODUCTION

The basic characteristics of vocational education learning in vocational school emphasize problem-solving skills and higher-order thinking, where learning is constructed from knowledge previously possessed for problem-solving (Irwanto, 2022). In other words, learning in vocational school is designed to train students in various problem-solving patterns in knowledge, skills, and attitudes. The process can run well if there is a role from the teacher.

Vocational High School is one of the upper secondary schools that prioritizes learning through 70% practice and 30% theory (Khotimah et al., 2020). With the demand for certain skills with learning that prioritizes these practices, students are expected to have the skills, abilities, and desire to become entrepreneurs (Kartika et al., 2022). Vocational students who are studying at school are formed so that later, after graduating from school, the students will not only hunt for jobs and fill job opportunities that already exist in the world of work but also create their business opportunities (Halid, 2022; Shobariyah et al., 2022). However, Vocational High School graduates contribute to unemployment rates that cannot be said to be small compared to graduates of other education levels; they experience anxiety in deciding what the next step will be taken after graduation because students are trained to become graduates ready to work. Still, graduates from universities currently prioritize the demands in the field.

Table 1. Open unemployment rate according to the highest education completed in 2019-2022

Education	2019	2020	2021	2022
PS	58,709	59,209	59,712	60,220
JHS	47,410	39,344	32,650	27,095
SHS	148,455	158,957	166,544	171,783
VHS	73,344	73,343	73,342	73,341
Diploma	6,966	4,260	2,605	1,593
University	48,204	53,973	60,434	67,667
Sum	383,088	389,086	395,287	401,699

Source : BPS – Sakernas. Note: PS = Primary School, JHS = Junior High School, SHS = Senior High School, VHS = Vocational High School

Table 1 presents data on how vocational school graduates contribute to the second largest unemployment rate. The government has made efforts to overcome this problem. One of the programs carried out by the government is to adjust the school curriculum to the employee competencies needed by companies. The government is also strengthening the entrepreneurial sector. Aligning the competence of students with the needs of entrepreneurship is a special concern of the government.

The manual arc welding (SMAW) subject is taught to provide knowledge and skills related to company needs or the ability to be entrepreneurial in terms of skills (Irawan et al., 2023). Weldability is a technical skill that involves joining or joining metals using a process of heating and joining with additional metals (usually in the form of filler wires) to

form a strong and functional structure (Santoso, 2023; Noviansyah et al., 2021). Someone with good welding skills can consider opening a welding service business. The need for welding services exists in various sectors, such as the construction industry, automotive, manufacturing, etc. An interest in entrepreneurship can drive a person to develop a business focused on welding services, which can be a significant source of income (Mustikawati et al., 2013; Putri et al., 2021).

In addition, welding skills can open opportunities for entrepreneurs to develop innovative products involving metals (Setiawan et al., 2023). For example, welding can manufacture metal furniture, home décor, or metal artwork. Entrepreneurial interest can encourage exploring new ideas and creativity by using welding skills to produce unique and interesting products.

Previous Research related to this theme is Research that examines the correlation between learning outcomes in SMAW and entrepreneurial interest from students taking the Welding Engineering Expertise program. The results showed that there was a positive relationship between academic achievement in these subjects and students' interest in running independent businesses (Amiruddin & Susanti, 2022). A previous study focused on how motivation links SMAW learning outcomes to students' entrepreneurial interests. Results show that students with high intrinsic motivation tend to have better learning outcomes in those subjects and greater interest in entrepreneurship (Mardikaningsih et al., 2023).

**External Factors Influencing Entrepreneurial Interest:** Another study analyzes external factors influencing entrepreneurial interest among Welding Engineering learners. One factor identified was support from the school and family environment, which could modulate the relationship between learning outcomes and entrepreneurial interest (Rochani & Suharsono, 2023). A comparative study examined how SMAW learning outcomes' influence on entrepreneurial interest differed between students in the Welding Engineering expertise program and other engineering expertise programs. The findings suggest that such influence may vary depending on the specifics of the skill program (Azis et al., 2020). Another study evaluated the impact of the SMAW subject curriculum on the development of students' entrepreneurial interests (Arjono et al., 2023). The results indicate that the emphasis on practical and applicable aspects in the curriculum can increase students' interest in applying welding skills in a business context.

As an entrepreneur, having welding skills can help in product development and improvement. Learners can create new product prototypes, modify existing products, or make repairs to defective products. It can be a valuable asset in managing the learners' own business. Based on these problems, researchers researched the influence of smaw subjects' learning outcomes on the entrepreneurial interest of students of the welding engineering expertise program at SMK Negeri 1 Udanawu.

## **METHOD**

This research method is quantitative Research. Determination of the location of the study using the purposive area method. The number of respondents was 65 students. The respondents used in this study were class XII students of Welding Engineering at SMK Negeri 1 Udanawu, Blitar Regency, East Java. Data collection techniques use the questionnaire method as the main method and observation, interview, and documents as

supporting methods. Data analysis techniques use validation tests, reliability tests, and simple linear regression analysis. The data analysis method used is the qualitative descriptive method

## RESULTS

Validity testing is carried out to determine whether a questionnaire is valid or not for each of these variables. The validity test that has been carried out in this study is shown in Table 2.

Table 2. Validity test results

Item	r <sub>count</sub>	r <sub>table</sub>	Decision
X.1	0.621	0.196	Valid
X.2	0.583	0.196	Valid
X.3	0.600	0.196	Valid
X.4	0.647	0.196	Valid
X.5	0.440	0.196	Valid
X.6	0.508	0.196	Valid
X.7	0.745	0.196	Valid
X.8	0.495	0.196	Valid
X.9	0.559	0.196	Valid
X.10	0.454	0.196	Valid
X.11	0.441	0.196	Valid
X.12	0.638	0.196	Valid
X.13	0.565	0.196	Valid
X.14	0.503	0.196	Valid
X.15	0.557	0.196	Valid
Y.1	0.595	0.196	Valid
Y.2	0.534	0.196	Valid
Y.3	0.561	0.196	Valid
Y.4	0.549	0.196	Valid
Y.5	0.596	0.196	Valid
Y.6	0.669	0.196	Valid
Y.7	0.514	0.196	Valid
Y.8	0.583	0.196	Valid
Y.9	0.400	0.196	Valid
Y.10	0.139	0.196	Negative

Based on the data in Table 2, it is found that the calculated r for each item is above the r table. From the results of the validity calculations in the table above, it can be seen that r count > r table there are 25 questionnaires that are declared valid and 1 questionnaire r count < r table is declared negative, all 24 questionnaires are declared valid because r count

is more than r table but there is 1 questionnaire that is declared negative because the result is less than the total r table, namely 0.1966.

Meanwhile, the data reliability test results obtained table data as in the following table:

Table 3. Reliability test results of learning results (X)

Cronbach's Alpha	N of Items
0.840	15

The results of the reliability test on the learning outcome variable (X) can be seen that Cronbach's alpha on this variable is higher than the basic value, namely  $0.840 > 0.60$ . These results prove that all statements in the variable questionnaire (X) are declared reliable. Meanwhile, for the reliability test results on the variable of interest (Y), the following data were obtained:

Table 4. Reliability Test Result of interest in entrepreneurship (Y)

Cronbach's Alpha	N of Items
0.725	9

The results of the reliability test on the second variable or interest in entrepreneurship variable (Y) can be seen in table 4.6. The results produced from this variable are 0.725, indicating that Cronbach's alpha is  $0.725 > 0.60$ . From these results it can be concluded that all statements on this variable are declared reliable or trustworthy.

Table 5. Regression data results

Model		Sum of square	df	Mean Square	F	Sig.
1	Regression	150.795	1	150.795	10.991	0.002
	Residual	699.318	51	13.712		
	Total	850.113	52			

The effect of learning outcomes of manual arc welding (SMAW) subjects on the entrepreneurial interest of students in the Welding Engineering department of SMK Negeri 1 Udanawu was analyzed using simple regression analysis. Based on the table data above, the following data is showed that the F-count of 10.991 was greater than the F-table by 4.00. The significance of F by 0.002 was smaller than the  $\alpha$  of 0.05, so the results of the study could be concluded that the variable learning outcomes of SMAW subjects had a significant effect on the variable of entrepreneurial interest of students. The results showed an R-value of 0.834, meaning that the relationship between the learning outcomes of manual arc welding (SMAW) subjects and the entrepreneurial interest of students at SMK Negeri 1 Udanawu was very strong. This level of relationship can be categorized as a very strong relationship. This can be seen from the correlation value of 0.897, including the coefficient value between 0.800-1.000, which states a very strong relationship level. The value of the coefficient of determination is 71,5%, while the remaining 28.5% is influenced by other independent variables that were not studied in this study. Based on the results of the study, there is an influence between the value of manual arc welding (SMAW) subjects on

entrepreneurial interest in class XII students majoring in Welding Engineering at SMK Negeri 1 Udanawu.

## DISCUSSION

This study's results show a significant positive influence between the value of manual arc welding (SMAW) subjects and entrepreneurial interest in class XII students majoring in Welding Engineering at SMK Negeri 1 Udanawu. A positive relationship shows that the better the value of manual arc welding (SMAW) subjects obtained by class XII students majoring in Welding Engineering at SMK Negeri 1 Udanawu will increase students' interest in entrepreneurship.

The topic of "Welding engineering student learning outcomes in SMAW subjects: The effect on interest in entrepreneurship" involves investigating the relationship between students' academic achievements in Shielded Metal Arc Welding (SMAW) subjects and their interest in entrepreneurship within the context of the Welding Engineering Expertise Program at a vocational school (SMK). This study likely draws upon various theories and existing research to understand the underlying mechanisms that connect academic performance with entrepreneurial inclinations. One potential theoretical framework that could underpin this research is the Theory of Planned Behavior (TPB). The TPB suggests that individual behaviors, such as pursuing entrepreneurship, are influenced by three main factors: attitudes toward the behavior, subjective norms (social influences), and perceived behavioral control. In this context, the theory could be used to analyze how students' perceptions of their SMAW learning outcomes (attitudes), the encouragement or expectations from peers and family regarding entrepreneurship (subjective norms), and their perceived ability to engage in entrepreneurial activities (perceived behavioral control) collectively shape their interest in entrepreneurship.

Another relevant theory might be Self-Determination Theory (SDT), which focuses on the role of intrinsic motivation in driving behavior. If students feel a sense of autonomy, competence, and relatedness in their learning and skill development through SMAW, they might be more inclined to explore entrepreneurship as a means of applying their newfound welding skills in a self-driven context. As for the existing research, it would be important to review previous studies that examine factors influencing entrepreneurial interest among vocational school students or those specifically in welding-related programs. These studies could provide insights into the significance of academic achievements, the impact of practical training, the role of role models, and the influence of the school environment on students' entrepreneurial aspirations.

One theoretical framework that holds promise in this context is the Theory of Planned Behavior (TPB). Ajzen argues that an individual's intention to engage in a behavior is shaped by their attitude towards the behavior, subjective norms, and perceived behavioral control (Simanjutak & Putra, 2021). Within this study, the academic outcomes in SMAW subjects can significantly influence how students perceive their capacity to embark on entrepreneurial ventures within the welding field. The TPB, with its emphasis on cognitive processes, provides a lens through which to comprehend the nexus between academic proficiency and the inclination toward entrepreneurship. Likewise, Self-Determination Theory (SDT) emerges as a pertinent framework. SDT can be used as an effort to explain a person's motivation for deciding to carry out an action or behavior (Deci & Ryan, 2008).

This theory asserts that intrinsic motivations, including autonomy, competence, and relatedness, are key drivers of behavior. When applied to this study, the learning outcomes in SMAW can potentially foster a sense of competence and autonomy, thereby enhancing students' inclination to channel these skills into entrepreneurial endeavors, aligning their aspirations with their inherent motivations. Drawing from previous research, the exploration of the connection between academic achievements and entrepreneurial intentions has been a subject of scholarly interest. Studies in vocational schools and technical disciplines have examined how academic performance influences the desire to engage in entrepreneurial activities.

Additionally, research focusing on the impact of vocational education underscores the role of practical training in shaping students' entrepreneurial ambitions. Likewise, research conducted by (Paço et al., 2011) shows that there is a positive influence between entrepreneurial education and entrepreneurial activity in the process of creating a business and becoming an entrepreneur. By scrutinizing the experiences of role models and the influence of the educational environment, prior research has highlighted the various factors that mold students' entrepreneurial inclinations. Furthermore, cross-disciplinary insights from fields such as business education and entrepreneurship studies could offer valuable perspectives. These disciplines have extensively studied the interplay between education, skills acquisition, and entrepreneurial motivation, potentially enriching the understanding of how learning outcomes in SMAW may fuel students' entrepreneurial aspirations. In summation, by critically engaging with pertinent theories and prior research, the study endeavors to illuminate the intricate connections between academic achievements and entrepreneurial interests among students in the Welding Engineering Expertise Program. This comprehensive approach not only contextualizes the research within existing knowledge but also lays the foundation for a nuanced exploration that can advance our comprehension of the factors that contribute to students' entrepreneurial trajectories.

## CONCLUSION

This research has revealed that there is a factor that contributes to students' interest in entrepreneurship. This research concluded that student learning outcomes in the Manual Arc Welding (SMAW) subject had an effect on students' interest in entrepreneurship. This influence contributes 69.5% and the rest is influenced by other factors. Based on the results of the research, the following suggestions can be put forward: (1) It is necessary to prepare and improve learning achievement at SMK Negeri 1 Udanawu; (2) Apart from improving learning achievement in the Manual Arc Welding (SMAW) subject, it also increases the cultivation of an entrepreneurial spirit so that students master and have an entrepreneurial nature. The cultivation of entrepreneurial spirit can take shape by involving parents in supporting students' entrepreneurial interests. They can provide moral and material support and help understand the risks and benefits of entrepreneurship.

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