



Students' Learning Outcomes in Productive Courses: A Comparative Study Vocational High School and Senior High School Graduates

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Abstract. This descriptive-comparative study compares how vocational and high school graduates learned in productive courses. In this study, learning outcomes serve as the sole variable. The sample in this study represented 50% of the overall population, comprising 146 students from three batches, 2018, 2019, and 2020. This study used documentation procedures for data gathering and descriptive and comparative methods for data analysis. Data for the study were gathered from the learning outcomes of productive courses. Vocational high school graduates attained the most excellent scores, including in the outstanding category, with a percentage of 64.70% and an average score of 3.41. Learning outcomes of productive courses from students who graduated from senior high school have the highest scores in the outstanding category with a 44.00% average value of 3.28 and a significance value of 0.401. It indicates that the value is $0.401 > 0.05$. This requirement demonstrates that H_0 is approved, indicating variations in the learning outcomes of productive subjects for vocational and high school graduates in 2018, 2019, and 2020 in the Automotive Engineering Education Department.

Keywords: Learning Outcomes · Graduates · Vocational

1 Introduction

Education is considered a deliberate human effort to create better human resources. The government offers schools and other educational institutions at various levels. There are numerous types of schools at the Senior High School (SMA), Vocational High Schools (SMK), and Madrasah Aliyah (MA) to prepare students who want to advance their education at university institutions. In the meantime, vocational high schools equip students with the skills necessary to succeed in the workplace through their majors and programs of study.

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After secondary school, there is higher education, which includes university-organized programs leading to a diploma, a bachelor's degree, a master's degree, a specialist's degree, and a doctoral degree [1].

Universitas Negeri Makassar (UNM) is one of the State Universities in Eastern Indonesia, which consists of several faculties that organize academic education according to their fields. Based on the Universitas Negeri Makassar Education Manual [2], admitting students go through several ways of accepting new students for the Automotive Engineering Education study program, namely National Selection to Enter State Universities (SNMPTN), Joint Selection to Enter State Universities (SBMPTN), and Independent Pathway.

One of the Faculty of Engineering majors at Makassar State University is the Automotive Engineering Education Study Program. This major is one of the majors that students are interested in, both graduates from Vocational High Schools (SMK) and Senior High Schools (SMU) and Madrasah Aliyah (MA).

These students have distinct learning experiences, depending on their educational backgrounds. Students in the Automotive Engineering Education Study Program from vocational and senior high schools must attend all classes until they finish. The Automotive Engineering Education Study Program at Universitas Negeri Makassar aspires to give these students the same chance to put high learning outcomes into reality after the classes.

Because vocational high school graduates are accustomed to the environment of the occupational practice, they should have a higher possibility of achieving superior learning outcomes than senior high school graduates in terms of practicum. However, compared to senior high school, vocational high school graduates are better since they have been exposed to theoretical learning since high school, according to statistics on the value of academic learning outcomes.

1.1 Literature Review

Learning is a process of changing individual behavior through interaction with the environment. The behavior change should be in a positive direction. If these changes are negative behavior, then it cannot be said to be learning [3].

Learning is an effort by a person to obtain a new change in behavior as a whole due to his own experience in interaction with the environment. Learning is a long and complex process, both mental processes, processes of adaptation to the environment, and processes through experience, training, and practice [4]. The result of learning is a relatively permanent change in individual behavior. Changes in behavior include changes in knowledge (cognitive), skills (psychomotor), and attitude (affective).

Learning outcomes are a general concept that refers to learning achievement. Learning outcomes and learning achievement are two things that are closely related. Learning achievement is the mastery of skills developed by subjects, indicated by test scores or the value framework given [5].

Someone is said to carry out learning activities if he has achieved the learning outcomes, namely changes in behavior. This aligns with the fact that learning achievement results from individuals, which are changes in individuals manifested in behavior patterns, skills, and knowledge that can be seen in the learning outcomes themselves.

Learning results are information based on objective and sufficient data about indicators of changes in behavior and personal learners [6]. Learning results are behavior patterns, values, notions, attitudes, appreciation, and skills [7].

Reveals that the learning outcomes of senior high school graduates in theoretical courses are very satisfying [8]. The learning outcomes of senior high school graduates in practical classes are unsatisfactory. In contrast, the learning outcomes of vocational high school graduates in theory courses are unsatisfactory, and the learning outcomes of vocational high school graduates in practical lessons are very satisfying.

Learning outcomes have a classification based on their domain. According to Bloom's citation of [9], in general, the classification of learning outcomes is divided into three domains, namely:

- a. The psychomotor domain relates to the learning outcomes of skills and the ability to act. There are six psychomotor aspects: reflex movements, fundamental movement skills, perceptual abilities, harmony or accuracy, complex movement skills, and expressive and interpretive movements.
- b. The cognitive sphere pertains to acquiring intellectual skills and encompasses six dimensions: memory or knowledge, comprehension, application, analysis, synthesis, and evaluation.
- c. The affective domain focuses on developing attitudes and includes five dimensions: acceptance, response or reaction, assessment, organization, and internalization.
- d. The psychomotor domain pertains to the attainment of skills and the ability to perform actions. It involves six aspects: reflex movements, fundamental movement skills, perceptual abilities, precision or accuracy, complex movement skills, and expressive and interpretive movements.

The level of student learning outcomes is influenced by many existing factors, both internal and external. These factors greatly influence efforts to achieve student learning outcomes and can support implementing learning process activities to achieve learning objectives.

Productive courses are vocational learning that focuses on a unique ability given to students, according to the selected expertise program. Productive learning is shown in the laboratory/installation of each department; productive courses that are programmed in the Automotive Engineering Education Study Program department are Motorcycle Technology, Welding Technology, Machine Work, Painting Technology, Automotive Chassis, Automotive Electrical and Electronics, Heavy Equipment Technology, Car AC System and several other productive courses. The productive subjects studied were Car AC Systems and Welding Technology. The reason for choosing these courses was that both had yet to be studied by Vocational High School students majoring in Automotive Engineering.

1.2 Car AC System Course

In the learning process, students should understand both theory and practice. The Car AC System course theory is a reference for practical activity. If an error occurs in using theory, it will cause errors in practical exercises. The second activity in the Car AC

System course is a practical activity. Practicum is a fundamental step and a way to prove the theory. In other words, practice is work based on theory [10].

The Department of Automotive Engineering Education has a Car AC Systems course every student must program. The aim of the Car AC System course is that students can explain the systems that work on car vehicle air conditioners. Students can demonstrate car air conditioning and its advantages and disadvantages. They can understand the air conditioning components in cars that cool the vehicle.

1.3 Welding Technology Course

Welding engineering technology courses study the classification and workings of welding. Welding classification can be divided into three: liquid, pressure, and brazing [11]. In the learning process, students should master both theory and practice. The aim of this course is that students can understand and explain and operate welding techniques in actual practice. For example, they can operate SMAW and other welding machines and apply the theories obtained in class.

2 Methods

Research Design: This study employs a descriptive-comparative research design to investigate the learning outcomes of productive courses for students graduating from vocational high schools and senior high school in the Automotive Engineering Education study program.

Population and Sample: The study population is all vocational high schools and senior high school graduates from 2018 to 2020 in the Automotive Engineering Education study program, totaling 146 people. The sample size is 73, 50% of the total population, and it was taken using a proportional random sampling technique.

Data Collection: The data collection technique used in this study is the documentation technique. The researchers will collect data about the learning outcomes of productive courses for students graduating from vocational high schools and senior high school in 2018, 2019, and 2020 at the Automotive Engineering Education Department, Universitas Negeri Makassar. The data will be collected from the official academic records of the students.

Data Analysis: The data collected will be analyzed using descriptive and comparative statistics. Descriptive statistics will describe the learning outcomes of productive courses for students graduating from vocational high schools and senior high schools in 2018, 2019, and 2020. Comparative statistics will be used to compare the learning outcomes of the two groups of students (vocational high school and senior high school graduates) regarding their performance in productive courses. The data will be analyzed using SPSS software.

Table 1. Test for Normality of Student vocational high school and senior high schools

Graduates	Sig. (2-tailed)	Result
Senior High School	0.174	Normal
Vocational High School	0.231	

Table 2. Homogeneity Test Result

Graduates	N	Variants	Sig.
Senior High School	53	0.390	0.486
Vocational High School	20	0.529	

3 Result and Discussion

3.1 Description of Data Analysis

3.1.1 Inferential Statistical Analysis

Inferential statistics is a statistical analysis technique that examines sample data and uses the findings for the population. Using the t-test, this technique is performed to test hypotheses. Prior to performing the t-test, a necessary similarity test is performed.

3.1.2 Normality Test

The normality test in this study was conducted using Statistical Package for the Social Sciences (SPSS) software with the Kolmogorov-Smirnov Test (Table 1).

The normality test results show that vocational high school graduates' and senior high school graduates' learning outcomes have normally distributed data. The normality test shows a value of 0.174. For students from vocational high schools and 0.231 for students from senior high schools. With a level of 5% (0.05), the value of Asymp. Sig. (2-tailed) > 0.05.

3.1.3 Homogeneity Test

The homogeneity test of this study was carried out using SPSS software with the Levene Statistical test (Table 2).

The homogeneity test results show that the value of Sig. of 0.486 while the significant level is 5% (0.05). Thus, the value is $0.486 > 0.05$. This can be interpreted that the data on the learning outcomes of Productive courses for students graduating from vocational high school and senior high schools are homogeneous.

3.1.4 Hypothesis Testing

The hypothesis is as follows: Hypothesis zero (H_0) there are differences in learning outcomes for Productive courses for students graduating from vocational high school

Table 3. Independent Sample Test Results

Graduates	N	Sig. (2-tailed)
Senior High School	73	0.401
Vocational High School	73	

and senior high schools, and the Hypothesis alternative (H_a) is that there is no difference in results studying Productive courses for students graduating from vocational high school and senior high schools at the Department of Automotive Engineering Education, Makassar State University (Table 3).

From the table above, the Asymp. Sig. (2-tailed) for the two-tailed test is 0.401, which means the value of $0.401 > 0.05$. This condition indicates that H_0 is accepted, meaning that there are differences in the learning outcomes of Productive courses for students graduating from vocational high school and senior high school in the Department of Automotive Engineering Education. That educational background when students take high school education does not have a significant effect on learning achievement when they are in college.

3.2 Discussion

This research was conducted to determine whether there is a significant difference in learning outcomes between vocational high schools and senior high schools in the Automotive Engineering Education Department at Makassar State University. Based on descriptive statistical analysis, it was found that the average value of the learning outcomes of vocational high school graduates was 3.41 with a standard deviation of 0.62472, while the average value of senior high school graduates was 3.28 with a standard deviation of 0.72765, the minimum score is 0, and the maximum score is 4. The description of learning outcomes shows that students who graduated from vocational high school and senior high schools have excellent learning outcomes. This is because students in the Automotive Engineering Education Department participate in the lecture process from start to finish regardless of school origin, so students who graduated from vocational high school and senior high schools have the same opportunities. The research results and comparison of learning outcomes for vocational high school and senior high school graduates align with previous research results.

4 Conclusion

Based on the research and data analysis results, several conclusions are drawn. Learning outcomes for Productive courses from vocational high school graduates have an average score of 3.41. With a percentage of 64.70%, the best grade received by 33 pupils falls into the exceptional category. Learning Outcomes for Productive Courses from students who graduate from senior high schools have an average score of 3.28. The highest score obtained by 11 students is included in the outstanding category with a percentage of

44.00%. These findings indicate that vocational high school graduates and senior high school graduates had different learning outcomes for productive courses, with vocational high school graduates slightly outperforming senior high school students.

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