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Investigating Student Learning Outcome Using Quizizz in Engineering Students

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Abstract

Material control throughout the manufacturing and distribution process is a cycle that needs to be considered in material handling and technology identification so that the production system in the automation industry runs according to its workflow. Industrial automation in vocational learning must be provided so that students have insight related to the field of automation. Vocational learning needs to use appropriate and modern media in the era of digitalization. The purpose of this study was to determine the performance of Quizizz media for industrial automation learning outcomes. The research design used was a one-group pretest posttest pre-experimental design. The sample group used was 66 students of industrial automation courses in the Mechanical Engineering Vocational Education Study Program. The research method used is the T test. The T test is used to determine the average posttest value. The level of statistical significance used is 5% (alpha). From the results of the study, it was found that there was an increase in insight related to transport equipment; storage systems; unitizing equipment; identification and tracking systems; and automatic identification and data capture (AIDC). The use of quizizz media has a role in active, interactive, fun, and modern learning in the era of digitalization.

Keywords: Quizizz, Material Handling, Technology Identification, Industrial Automation, Vocational Learning

INTRODUCTION

The use of online platforms is an innovation in learning because the potential of online platforms can be used as tools, methods/techniques, and vocational learning media in the digitalization era. Innovations in education are intended to increase learning productivity and efficiency and/or improve the quality of learning, especially in this case e-learning is more attractive to students because it motivates them to learn, provides an interactive learning environment, allows direct feedback in context, can promote learning even among anxious learners, and provide opportunities for learners to learn collaboratively and meaningfully [1], [2] 21st century vocational learning requires appropriate and modern learning media so that it can improve the atmosphere and learning environment that is active, fun, enjoyable, and meaningful. Several application tools that can be utilized as learning media to support the effectiveness of learning among others are Edmodo, Socrative, Kahoot, Schoology, and Quizizz [3]. Based on several studies, Quizizz is positively received among teachers because of its effectiveness, feasibility, ease of use, and motivating nature, and brings many positive

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benefits for students such as improving learning abilities, developing knowledge, creating a fun learning environment, useful for reducing daily test cheating [2][4].

E-learning in vocational education as a learning medium using the internet [5][6][7][8]. Learning materials in e-learning are also called e-materials. E-materials improve learning strategies that can be adopted by students in vocational education and training [9][10][11]. The e-learning method is beneficial for every student and is very effective because e-learning provides space, time and cost benefits for students and educators, and can be used as a supporting tool in assessing affective, cognitive, psychomotor, and soft skills aspects in optimizing vocational education [12][13][14][15].

Vocational learning must be in line with industrial transformation, especially jobs in industry 4.0. The learning process in vocational education begins when teachers and students interact in relation to learning certain vocational learning content [16]. Industrial automation or autonomous robots is one of the pillars of Industry 4.0 [17]. Embedded Systems have been present in modern industrial automation for decades, the scope and complexity of their applications is constantly growing consisting of assemblies of mechanical and electrical components commanded via digital controllers [18][19].

Adoption of the use of industrial technology 4.0 in the manufacturing sector strategy to identify and understand the key determinants in designing industrial automation technology processes, as well as the different sensing and driving mechanisms involved in a centralized environment (one machine or an entire factory) using modern techniques and practices so that achieve a sustainable competitive advantage in the manufacturing industry [17][20].

Industrial automation courses in higher education are learning to know, analyze, identify, and develop integrated mechanization, electricity, and information technology through optimization of flow in the production line. Material control throughout the manufacturing and distribution process is a cycle that needs to be considered in material handling and technology identification so that the production system in the automation industry runs according to its workflow. Material handling and technology identification in industrial automation courses related to: 1) Transportation Equipment; 2) Storage Systems; 3) Unitizing Equipment; 4) Identification and Tracking Systems; and 5) Automatic Data Capture (ADC) or Automatic Identification and Data Capture (AIDC).

The purpose of this study was to determine the performance of Quizizz media for industrial automation learning outcomes. The research questions are:

1) Can the use of Quizizz learning media improve the ability to understand transportation equipment?
2) Can the use of Quizizz learning media improve the ability to understand storage systems?
3) Can the use of Quizizz learning media improve the ability to understand unitizing equipment?
4) Can the use of Quizizz learning media improve the ability to understand identification and tracking systems?
5) Can the use of Quizizz learning media improve the ability to understand Automatic Capture (ADC) or Automatic Identification and Data Capture (AIDC)?

METHODS

The research design used was a one-group pretest posttest pre-experimental design, it can be seen in Figure 1. In pre-experimental design research, the intervention is carried out by researchers on a single subject or a treatment group, then the behavior of that group is observed [21].

Data collection techniques using pretest and posttest. The research target was given several case study questions of industrial automation to be solved using quizzzz media about material handling and technology identification. The instrument used is a test question. The research instrument can be seen in Table 1. The data analysis technique used descriptive statistics and inferential statistics, namely t-test.

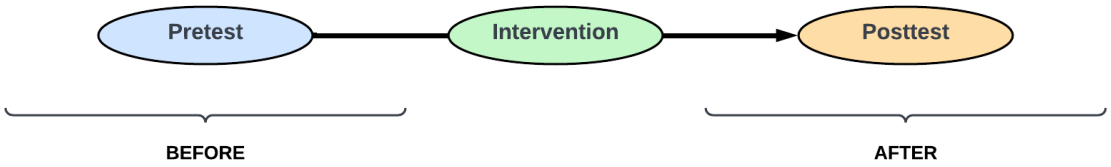

Figure 1. Research Design

Table 1. Research Instruments

No	Instrument			
	Rated Aspect	Item No.	*Total Question*	*Score*
1	Ability to Understand Transportation Equipment	1	1	20
2	Ability to Understand Storage Systems	2	1	20
3	Ability to Understand Unitizing Tools	3	1	20
4	Ability to Understand Identification and Tracking Systems	4	1	20
5	Ability to Understand Automatic Capture (ADC) or Automatic Identification and Data Capture (AIDC)	5	1	20

The research procedure is shown in Figure 2.

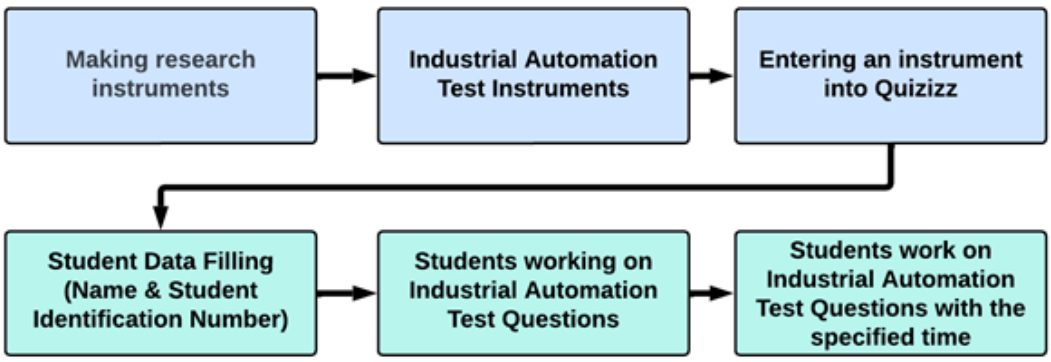

Figure 2. Using Quizizz in Industrial Automation Courses

RESULT AND DISCUSSION

The results of the study obtained pretest and posttest values as in Table 2, Figure 2, and Figure 3.

Table 2. Research Instruments

Variable		Instrument		
		Question	***Mean Score of Pre-Test***	***Mean Score of Post-Test***
A.	Material Handling	Understanding of transport equipment	10	18.8
		Understanding of storage systems	8	16
		Understanding of unitizing equipment	7.2	14.8
		Understanding of identification and tracking system	8.8	16.8
B.	Identification Technology	Understanding of Automatic Data Capture (ADC) or Automatic Identification and Data Capture (AIDC)	9.6	18

The activity of using Quizizz for industrial automation courses can be seen in Figure 3.

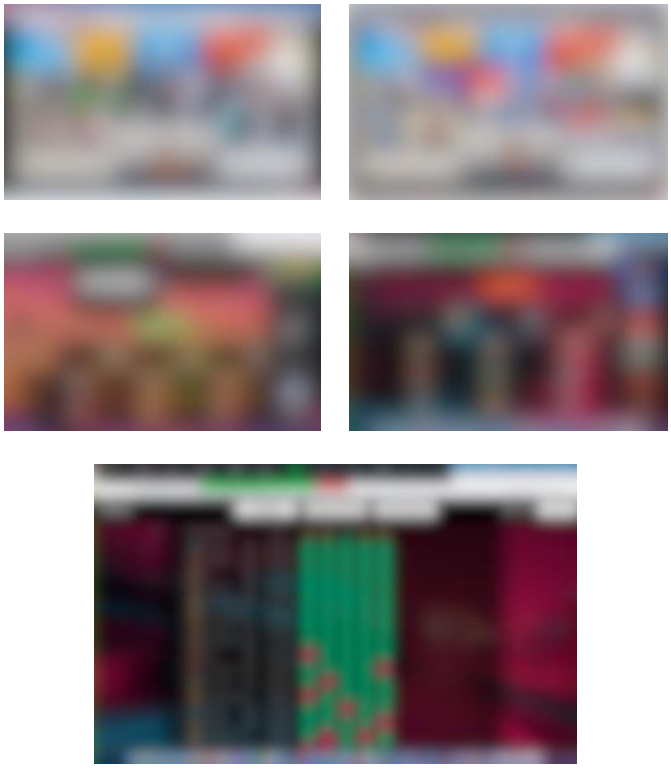

Figure 3. Using Quizizz in Industrial Automation Courses

From the results of the Paired T-Test in Figure 3, it shows that the highest mean score indicator at pre & post-test is Understanding of Transport Equipment. This is probably because vehicles are the things we see on the road most of the time. The gap

between the two shows that there is an improvement in students' knowledge and understanding after attending lectures.

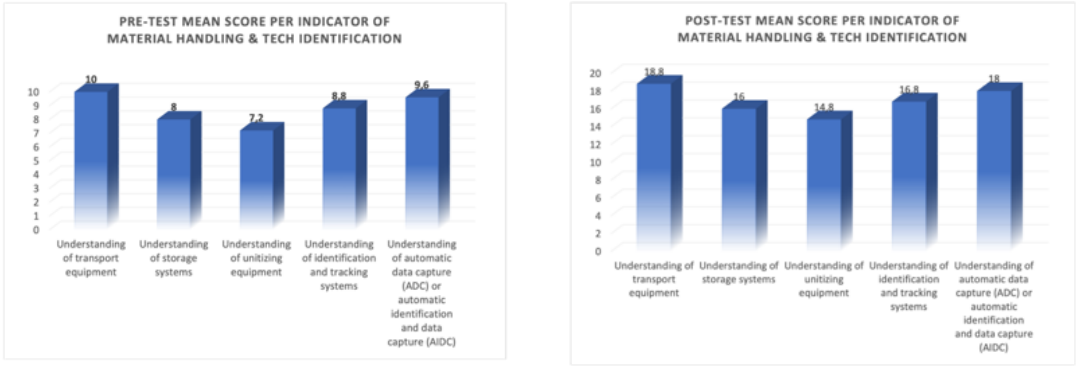

Figure 4. The average value of the pretest and posttest of each variable

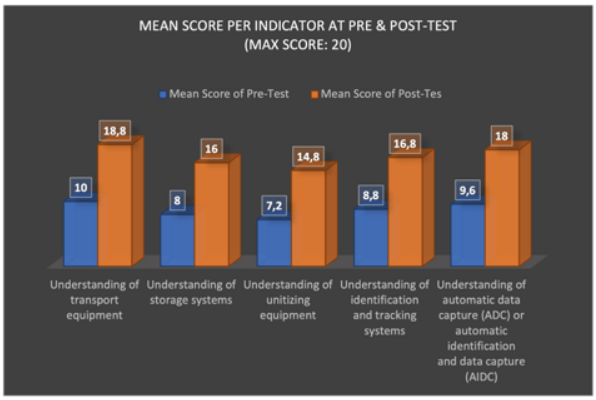

Figure 5. The average value of the pretest and posttest of all variables

From the results of the Paired T-Test in Figure 3, it shows that the highest mean score indicator at pre & post-test is Understanding of Transport Equipment. This is probably because vehicles are the things we see on the road most of the time. The gap between the two shows that there is an improvement in students' knowledge and understanding after attending lectures.

From the results of the Paired T-Test in Table 3, it shows that the p-value statistics is less than α, so it could be concluded that Quizziz can be improving student's understanding of Transport Equipment.

From the results of the Paired T-Test in Table 4, it shows that the p-value statistics is less than α, so it could be concluded that Quizziz can be improving student's understanding of Storage Systems.

From the results of the Paired T-Test in Table 5, it shows that the p-value statistics is less than α, so it could be concluded that Quizziz can be improving student's understanding of Unitizing Equipment.

From the results of the Paired T-Test in Table 6, it shows that the p-value statistics is less than α, so it could be concluded that Quizziz can be improving student's understanding of Identification and Tracking Systems.

From the results of the Paired T-Test in Table 7, it shows that the p-value statistics is less than α, so it could be concluded that Quizziz can be improving student's understanding of ADC or AIDC.

Table 3. T-Test: Understanding of Transport Equipment

	T-Test	
	Mean Score (Before)	***Mean Score (After)***
Mean	10	18.54545455
Variance	4.553846154	4.251748252
Observations	66	66
Pearson Correlation	0.615355892	
Hypothesized Mean Difference	0	
df	65	
t Stat	-37.70455759	
P(T<=t) one-tail	3.35159E-46	
t Critical one-tail	1.668635976	
P(T<=t) two-tail	6.70318E-46	
t Critical two-tail	1.997137908	

Table 4. T-Test: Understanding of Storage Systems

	T-Test	
	Mean Score (Before)	***Mean Score (After)***
Mean	8	16
Variance	11.32307692	9.846153846
Observations	66	66
Pearson Correlation	0.909192188	
Hypothesized Mean Difference	0	
df	65	
t Stat	-46.31414471	
P(T<=t) one-tail	8.43344E-52	
t Critical one-tail	1.668635976	
P(T<=t) two-tail	1.68669E-51	
t Critical two-tail	1.997137908	

Table 5. T-Test: Understanding of Unitizing Equipment

s	**T-Test**	
	Mean Score (Before)	***Mean Score (After)***
Mean	7.212121212	14.84848485
Variance	3.062004662	3.822843823
Observations	66	66
Pearson Correlation	0.809944578	
Hypothesized Mean Difference	0	
df	65	
t Stat	-53.53970489	
P(T<=t) one-tail	8.64505E-56	
t Critical one-tail	1.668635976	
P(T<=t) two-tail	1.72901E-55	
t Critical two-tail	1.997137908	

Table 6. T-Test: Understanding of Identification and Tracking Systems

	T-Test	
	Mean Score (Before)	***Mean Score (After)***
Mean	6.484848485	16.60606061
Variance	5.792074592	3.565501166
Observations	66	66
Pearson Correlation	0.421840667	
Hypothesized Mean Difference	0	
df	65	
t Stat	-34.98610701	
P(T<=t) one-tail	3.46606E-44	
t Critical one-tail	1.668635976	
P(T<=t) two-tail	6.93212E-44	
t Critical two-tail	1.997137908	

Table 7. T-Test: Understanding of ADC or AIDC

	T-Test	
	Mean Score (Before)	***Mean Score (After)***
Mean	9.696969697	18.06060606
Variance	5.445221445	4.057808858
Observations	66	66
Pearson Correlation	0.815646992	
Hypothesized Mean Difference	0	
df	65	
t Stat	-50.15950169	
P(T<=t) one-tail	5.43078E-54	
t Critical one-tail	1.668635976	
P(T<=t) two-tail	1.08616E-53	
t Critical two-tail	1.997137908	

From the results of the Paired T-Test in Table 7, it shows that the p-value statistics is less than α, so it could be concluded that Quizziz can be improving student's understanding of ADC or AIDC.

CONCLUSIONS

The conclusions in this study are:

a. The use of the Quizizz application can improve students' skills in material handling and technology identification.
b. Using the Quizizz application in industrial automation courses can improve the ability to:
    1) Understanding of Transport Equipment
    2) Understanding of Storage Systems
    3) Understanding of Unitizing equipment
    4) Understanding of Identification and tracking systems
    5) Understanding of Automatic data capture (ADC) or automatic identification and data capture (AIDC)
c. The use of Quizizz media has a role in active, interactive, and modern learning in the era of digitalization, especially industrial automation courses.

The suggestion that can be given by researchers is that the use of Quizizz media can be used as an assessment medium for active, interactive, modern, fun online learning outcomes.

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