

Implementation of Employability Skills: Making of Robot Transporter Trainer with DualShock Control 3 Base on ESP32

Edy Sulistiyol¹, Isfandiar Naufal Farisi², Muhammad Syariffuddien Zuhrie³,
Setya Chendra Wibawa⁴, Agus Dwi Ramdhani⁵

^{1,2,3,4} Universitas Negeri Surabaya, Indonesia

⁵ Vocational High School (SMK) Negeri 1 Kalianget Sumenep

Email: ¹edysulistiyo@unesa.ac.id, ²isfandiar.18023@mhs.unesa.ac.id,

³zuhrie.syarif@unesa.ac.id, ⁴setyachendra@unesa.ac.id,

⁵ramdhani@smkn1kalianget.sch.ac.id

Abstract

As the industrial era 4.0 signs of progress and technology advances, particularly in the field of robots, the world of education must adapt to these changes, particularly in Vocational High Schools. The purpose of the research is to create a trainer learning media and a robot transporter module using dual shock 3 control based on ESP32 that is feasible to use based on the results of observations made on the expertise of Industrial Electronics Engineering at Vocational High State Schools (SMK) Negeri 1 Kalianget Sumenep Madura. The validity, practicality, and efficacy of the medium are used to determine the level of media feasibility. Pre-experimental research design with One-Shot Case Study design using the research technique R&D (Research and Development). The trainer is categorized as very valid with a percentage of 92.63 percent, the module is categorized as very valid with a percentage of 83.64 percent, and the question instrument is categorized as valid with a percentage of 77.50 percent, according to the validity assessment conducted on 20 students from Vocational High School SMK Negeri 1 Kalianget Sumenep Madura Island Indonesia. The practicality of learning media receives an average score of 88.65%, indicating that it is very practical. Learning outcomes and student competency ratings with an average of 79.50 percent are used to assess the effectiveness of learning media. The results of the students' scores are normally distributed with $\text{sig} = 0.335 > 0.05$ in the normality test, and the t-test is obtained with $t\text{-test} = 8.779$, $df = 19$ with 95 percent confidence level ($= 0.05$) and t table value = 1.729 in the t-test. As a result of these findings, the value of t count = $8.779 > t$ table = 1,729 H_0 is ruled out, indicating that the Trainer Transporter Robot learning media has a large impact on the KKM value and may be classified as a viable learning medium.

Keywords— Employability skills, Transporter Robot, Trainer, Module, ESP32

I. INTRODUCTION

Development Industry 4.0 era now[1] it's very developed progress, especially the world of robotics where can robots help man in work several jobs[2]. Of course, in the industrial world moment this should started from education, education should keep up with the development era so that it doesn't leave behind will industrial era advance digitization moment this[3].

The application of employability skills[4] in all fields is currently very much needed. One of the

in the field of education, so that education graduates can later apply the results of the educational process is the skill of using Information Communication and Technology (ICT)[5]. Education is something important need for we all, progress the naturally should existence progress source power qualified human being, to achieve progress that's one method to do enhancement quality education man past education. Education is not only just Upgrade ability academic[6], non-academic to share in progress education. Academic education moment this of course there is

various type problem in activity that is one of the learning processes teach participants students who have difficulty accept theory or what the energy says educator or teacher like referenced statement from[7].

Existence factors related to influencing and hindering participant education in understanding material on activities study teach in school, visible obstacle nor no-look, one his namely the lack of teaching media qualified in learning process activities teach especially at Vocational High School (SMK) is institution specialized education as school producer source power ready man work and face the current digital era this naturally the need qualified facilities so that you can print source power superior human[8]. Effort makes it easy student accept learning related knowledge and skills participant educate, need a tool help teaching media for make it easy activity study teach good for teachers and participants learn to understand and support participants' abilities educate activity study teach[9]. It is hoped that the media add interests and talents as well as beneficial in life socialize a day.

Learning media [10] that is tools used as a medium of delivery information certain to participant educate. In media education is used as tools that can used by energy educator or teacher for convey information related Theory learning to participant educate. Own media start from language Latin "medius" which means middle, intermediary or introduction. In the world of education, that " the media in general " can say that human, media, or something capable thing participant educate earn that is knowledge, skills self and attitude". With the interactions that take place with learning media assistance could help and make it easier participant educate in understand theory related to what was delivered by the teacher by effective of several expert statement related to the media[11], the media are required could deliver and deliver an information to achieve objective specifically in field education, so that participants educate could understand aspect related to learning media that[12].

At the institution formal education in Vocational High School (SMK) a few competences basic must could achieve participant educate[13], thing that has applied to participants learn at (SMK) Negeri 1 Kalianget Sumenep Madura. It is existing schools' class or majoring in Electronic Engineering Industry (TEI) which majors in the eye lesson controller System Robotics (PSR) in class XII TEI. In majors the specifically eye lesson controller System Robotics (PSR) party school constrained with the minimum facility, or the teaching media used as support eye lesson that. In the observations made, participants educate not yet understand about Theory about robotics as microcontroller specifically robot transporter where is the robot use different control that is with Dual Shock 3 or PlayStation joystick 3 which is how can PS 3 joystick can used as transporter robot control[14]. Due to lack of development robot transporter in the world of education as well as progress technology, with existence a learning media " Development " Trainer Transporter Robot with Control Dual Shock 3 based on ESP32 as a Learning Media in Subjects controller System Robotics at SMK, State Vocational High School" is expected could help power educator in give and deliver Theory to participant educate to get understanding Theory so that competence base could achieved[15].

Robot transport is a simple robot, just use two dc motors and 2 pieces wheel as robotic actuators, as well as two servo fruit as gripper object to be brought. Transporter robot the use ESP32 microcontroller equipped with Bluetooth and Wi-Fi, for control robot movement as well gripper use Dual Shock 3 or the usual called Joystick PlayStation 3. With depend on connectivity Bluetooth, joystick the capable connected with robots and can controlling robots Wireless as well as connectivity from Joystick it is very fast[16]. Use Joystick PlayStation 3 on robots because from aspect efficiency and effectiveness compared with Android application on Smartphone and very suitable used as robot controller so that could make it easy in teaching inner trainer learning.

After did observation at SMK continued study for produce learning media shaped robot transporter trainer with control dual shock 3 decent ESP32 based used as a learning medium at SMK.

Formulas research problem this use three criteria include[17]: (1) Validity trainer transporter robots and modules as learning media. (2) Practicality trainer transporter robots and modules as learning media. (3) Effectiveness trainers and modules robotic transporter with control dual shock 3 ESP32 based. On the formula problem the expected study related robot transporter trainer with control dualshock3 ESP32 based capable overcome existing problems as well as add new knowledge and understanding in the field of cognitive and psychomotor at SMK.

Objective from research conducted for make learning media shaped a robot transporter trainer with control decent ESP32 based DualShock 3 used as a learning medium at SMK with Proof that (1) learning media trainers and valid modules are used. (2) Learning media trainers and modules practical used. (3) Learning media trainers and modules effective used.

Trainer Transporter Robot With control DualShock 3 based on ESP 32 equipped with Module contains worksheets that can be used as a medium of use Trainer Transporter Robot With control DualShock 3 based on ESP 32. This robotic transporter trainer using ESP32 as microcontroller used as control main on robot, ESP32 itself already be equipped Bluetooth and Wi-fi as possible connectivity used. Transporter robots use two DC motors and two fruit wheels as actuator as well as 2 servos as gripper or claws for take goods. Robots on the move with use controller in the form of DualShock 3 or normal called PlayStation 3 joysticks. Joystick use connectivity Bluetooth to get connected with ESP32. Use The joystick on the transporter robot can be make it easy in control and maneuver of the robot and there are a number of buttons on the Joystick that can customized. Robot transporter is also equipped with voltage sensor use divider resistor circuit connected

voltage with ESP32 for read the analog value of the sensor. There is component addition such as buzzer and led indicator that will combined with voltage sensor for know the level tall low battery on robot and battery on joystick and be equipped with 16 x 2 I2C LCD as the place showing indicators provided.

Robot gripper using two servo fruit, i.e., one as the other claw again as arm. In part claws only use 1 servo as one claws, for side claws yes use design with Where is the gear concept? when the clamps attached to the servo can move claws the only one again without need add number of servos. clamped object shaped cube with size 6x6x6 cm as figure 1 and 2. Excess from use PlayStation 3 joystick that is with shape easy grasped and familiar with participant educate as well as several buttons that can set in accordance will as well as distance range decent wireless far from Bluetooth smartphones so more flexible with easy programming algorithm understood as well as use Arduino IDE app with C language that can easy understandable. With simple components, control flexible and easy joystick used as well as components on easy robots for understand and use make mark more on this transporter robot. Following this is shape physique from Trainer transporter robot, design hardware and controller Dual Shock 3 or PlayStation 3 joystick used as figure 3.

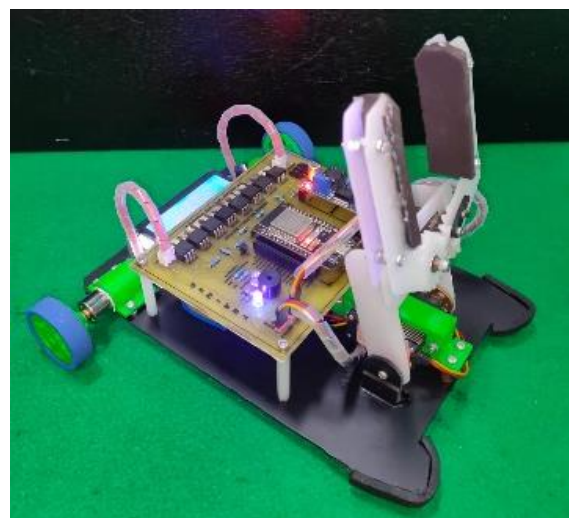


Figure 1. Shape Physical and *Hardware* Design Trainer Robot Transporter

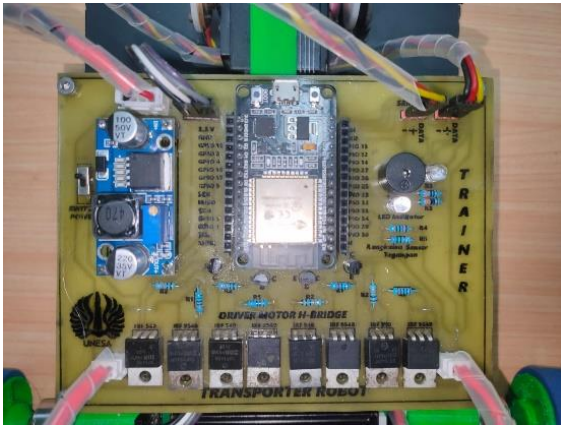


Figure 2. Shape Physical and Hardware Design Trainer Robot Transporter



Figure 3. Controller DualShock 3 or PlayStation 3 joystick used.

Robotic transporter module has 4 worksheets to use participant educate for know method use trainer that. Job sheet the among others, namely:

1. Connect *Dualshock3* on ESP32 and Making Program Show Button Output *Dualshock3* on 16x2 I2C LCD
2. Voltage Sensor Programming and Display mark Output on 16x2 I2C. LCD
3. Wiring and Programming Servo Actuator as Gripper/Capit Use Control *DualShock 3* On Robot Transporter.
4. Wiring and Programming Suite Capit DC Motor Actuator Use *DualShock 3* Analog Control on Robot Transporter

II. RESEARCH METHODOLOGY

A. Method Study

Researcher To do study with use type method research and development or R&D[18]. This Method has 10 stages to do however steps used only 7 stage final that is Step analysis and

reporting. In 3 stages final is only used as Step production mass product / something researched. Study this produce product in the form of robot transporter trainer with control DualShock 3 based on ESP 32 which will be tested in a limited scope that is to the participants educate class XII (SMK) Negeri 1 Kalianget Sumenep Madura on the eyes lesson controller system robotics with notice the validity, practicality, and effectiveness of the trainer. The stages in the R&D research used researcher following figure 4:

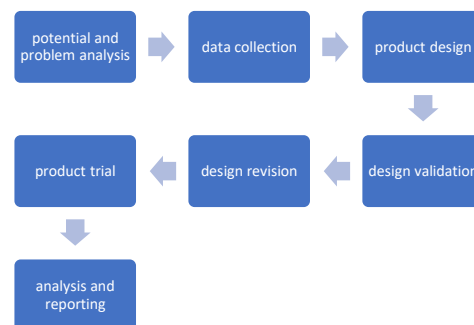


Figure 4. Stages Method Study Research and Development (R&D)[19]

B. Research Design

In Research conducted with use design pre-experimental design with design one shot case study, design this used in trainer transporter robots with control DualShock 3 based on ESP 32. Research this only there is one variable group and not compared with group else, for comparison alone use mark competence after using the trainer and Mod that was tested with mark KKM standard on the eye lesson controller system Robotics at SMK. Paradigm design One-shot case studies like under this:

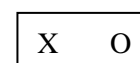


Figure 5. Research Design One-Shot Case Study

Information:

X= Treatment (treatment) given to one variable (Independent variable) with using learning media Trainer Transporter Robot with control Dualshock3 Based on ESP 32.

O = Result value learn from participants educated after done treatment (Treatment)

C. Method Data Collection

The process of data collection is carried out objective and open. Data collection is carried out by a number of methods or techniques used. Following the method used in data collection. The method that will be used, namely: (1). Observation with sheet evaluation requirement (2) Validation product (3) Questionnaire respondents and (4) Learning Outcome Test in the form of test choice double and test performance.

D. Instrument Evaluation

Instrument assessment on research includes (1) Validation Sheets, *Trainers*, and Modules; (2) Questionnaire sheet respondent participant educate; (3) Rating participant educate on aspects knowledge (cognitive) and skills (psychomotor).

E. Assessment of Learning Results Participant Educate

Validity and practicality from *trainers* and modules as a learning medium class XII Electronic Engineering Industrial Vocational High School from aspect realm cognitive and psychomotor.

In count mark participant educate in realm cognitive or knowledge use formula as following.

$$Nk = \frac{b}{n} \times 100 \text{ (True score)} \quad (1)$$

Information

Nk = Cognitive Value (Knowledge)

b = Earning Score Student

n = Maximum Score Question

To mark psychomotor (Skills) participants educate in understanding Theory related *trainer* and module, used formula as following.

$$Np = \frac{b}{n} \times 100 \text{ (True score)} \quad (2)$$

Information

Np = Psychomotor Value (Skills)

After get results calculation mark cognitive and psychomotor, then look for average value with use formula as following.

$$Nt = \frac{Nk+Np}{2} \quad (3)$$

Information

Nt = Total competency score participant educate

III.RESULTS AND DISCUSSION

Product

Study related to learning media for Upgrade Knowledge, skills, interests, and understanding participant educate in learning then in the research conducted produce product in the form of *Trainer robot transporter* use control *dual shock 3* based on ESP32 packet as figure 6 and 7. On the trainer there are an ESP32-based transporter robot, the robot controller is *dual shock 3* or *joystick PlayStation 3* and the modules used as complementary learning media. Following is appearance or shape product from the trainer and the resulting module



Figure 6. Box *Trainer* Shape



Figure 7. Shape *Transporter Robots* and controllers *dual shock 3*

Validation Results Product

Research conducted for make a learning media for high school students of course needed a validation by experts in the field for know level validity from the resulting product. Validation conducted by three validators or media experts with provision two teacher or lecturer an expert in Electrical Engineering at the Universitas Negeri Surabaya and one teacher majoring in Elin (Electronics Industry) at SMK with sheet evaluation validation for validate *Trainer*, Learning Module, and assessment instrument. Table 1 show the percentage level for validity of product.

Table 1. percentage of category[20]

Category	Percentage (%)
Very Valid	82% to 100 %
Valid	63% to 81 %
Less Valid	44% to 62 %
Invalid	25% to 43 %

Validation performed on *Trainer Transporter Robot* carried out by media experts, there are two aspect which is assessed, that is aspect content and construction *trainers*. For results validation contents *trainers* get percentage of 90.63% and the results validation on construction *robot transporter trainer* got percentage of 94.64%. After got second results, the average percentage of the total obtained from validation *trainers* by 92.63%. So that from validation average result *trainer* done could concluded that level validity *robot transporter trainer* uses control *DualShock 3* based on ESP32 is categorized as very valid. Graphic result trainer validation is shown in Figure 8.

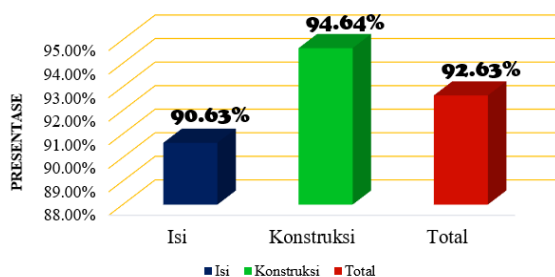


Figure 8. Graph of Validation Results *Trainer*

Next validation carried out on the *Robot Transporter* Module carried out by media experts, on assessment validation there are five aspects assessment, that is aspect content, construction, material, questions, and language in the module as table 8. For results validation contents module got percentage of 87.50%, the result validation on construction module get percentage of 85.71%, the result validation Theory module get percentage of 85.00 %, yield validation on construction question get percentage of 80.00%, and the results validation on language got percentage of 80.00%. the average percentage of the total obtained on validation module of 83.64%. So that could conclude, level validity *robotic transporter* module uses control *DualShock 3* based on ESP32 is categorized as very valid. Graphic result validation module can be found in figure 9.

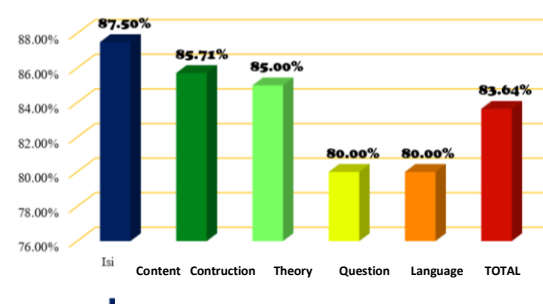


Figure 9. Module Validation Results Graph

Next validation instrument questions made by the teacher or teacher of SMK, there are two aspect evaluation that is on the aspect cognitive and aspects psychomotor, results validation obtained on the aspect cognitive percentage 80.00%, and results validation on aspect psychomotor get percentage by 75.00%. The total average obtained on validation instrument question get percentage by 77.50% so that instrument questions used for test participant educate categorized as valid for tested. Result of chart validation instrument question can be found in figure 10.

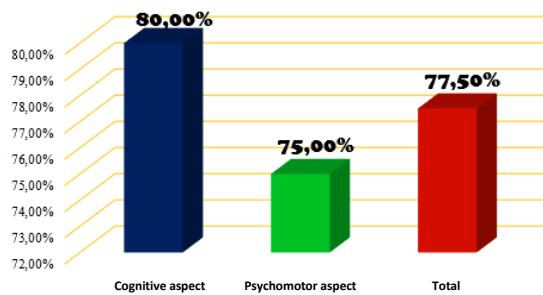


Figure 10. Graph of Validation Results Instrument Question

Practical Results Product

In To do study related the resulting product, of course should know practicality from product used. For know practicality product that is with to do evaluation questionnaire response to participant educate as reject measuring level practicality product or learning media *trainer* and *robot transporter* module use control *DualShock 3* based on ESP32 used on the eyes lesson System controller Robotics in the Department of Electronic Engineering Industry SMK.

The results obtained in the questionnaire response participant educate for practicality *robot transporter trainer* get percentage of 88.54%, and the results evaluation for practicality module *robot transporter* get percentage by 88.75%. Average percentage of total obtained for *trainers* and modules *robot transporter* use control *DualShock 3* based on ESP32 by 88.65%. So that could conclude, level the validity of the *trainer* and *transporter robot* module use control *ESP32* based *DualShock 3* categorized very valid. Graphic result questionnaire response participant educate can be found in figure 11.

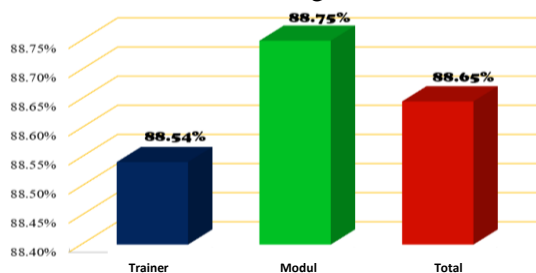


Figure 11. Graph of Questionnaire Results Response Participant Educate

Normality Test

Before To do analysis with the t-test, that is perform normality test for know how the results of the data to be t-tested are feasible or no. For perform normality test use help *Software* or application computer called SPSS (*Statistical Product and Service Solution*). Table 2 below is normality test results that have been done.

Table 2. Normality Test Results

Tests of Normality	Kolmogorov-Smirnov ^a		Shapiro-Wilk			
	Statistics	df	Sig.	Statistics	df	Sig.
Test Results Learn	.191	20	.054	.948	20	.335

Normality test that has been done based on table 5 above, can is known for the normality test carried out use level trust by 95% (= 0.05), and the number of respondent or df as many as 20 participants educate . In table 2 there are two table that is table Kolmogorov-Smirnov and Shapiro-Wilk, for Kolmogorov-Smirnov table is used if df (number respondents) 50, and the Shapiro-Wilk table is used if df (50), because tested respondents totalling 20 or not enough of 50 respondents so table used is Shapiro-Wilk. Basis of decision taken from normality test this, namely (1) if Sig. > 0.05 data or sample normally distributed, (2) if Sig. < 0.05 then data or sample not normally distributed. In table 5, the value of Sig. is 0.335 which is where mark the more of (0.335>0.05). From the results obtained, it can be drawn conclusion that data or sample obtained normally distributed and data ready t-test was performed.

T-test

T-test on data analysis or the sample under study for know what the data under study own ratio with the population is mean that has there is with help SPSS *software*. Average population used is KKM value used at SMK Negeri 1 Kalianget Sumenep Madura Next is results analysis t-test calculation with help SPSS *software*

Table 3. T-Test Results One Sample Statistics
One-Sample Statistics

	N	mean	Std. Deviation	Std. Error Mean
Results Test Learn	20	79.5000	4.83953	1.08215

In table 3 related *one-sample statistical* t-test results, the resulting analysis that the average (*mean*) obtained participant educate related mark result of competence of 79,500 with total respondent as many as 20 participants learn, the results obtained in accordance or same with average result performed calculation with *software Microsoft excel* that is 79.50%. Which means the average value end competence student fulfil criteria minimum completeness (KKM) of 70. For know ratio the influence of the studied learning media to results competence participant educates class seen in results *One- sample T-Test test* is shown in table 7 below.

Table 4. One-Sample Test T- Test Results
One-Sample Test

Test Value = 70					
95% Confidence					
	t	df	Sig. (2-tailed)	Mean Difference	Interval of the Difference
				Lower	Upper
Results Test Learn	8,779	19	.000	9.5000	7.2350 11.7650

In table 4 The results of the *One-Sample T - Test* get mark t_{count} of 8,779 and the acquisition of sig.(2-tailed) of 0.000 with level 95% confidence (= 0.05) and df worth 19 because total respondent or participant educate totalling 20 or only one group (n-1) then obtained mark $t_{\text{table}} = 1,729$. Based on base taking decision where if ratio results from t_{count} with t_{table} . If result $t_{\text{count}} > t_{\text{table}}$ then H_0 is rejected and H_1 accepted, if results $t_{\text{count}} < t_{\text{table}}$ then H_0 accepted and H_a rejected. According to the results of the t-test that have been done with

results analysis that is mark $t_{\text{count}} = 8,779 > t_{\text{table}} = 1,729$. From result that, according to from base taking decision i.e., H_0 rejected and H_1 accepted.

IV. CONCLUSION

According to the results from research that has been over carried out on learning media robot transporter trainer use control DualShock 3 based on ESP32, can be drawn conclusion namely the robot transporter trainer media fulfills a number of aspects including (1) Level of validity trainers and modules validated by 3 expert validators media with average validity results on the trainer with the percentage by 92.63% with level validity i.e. very valid, the average result of the validity of the module with the percentage of 83.64% with level validity which is very valid, and the results of the average validity of the question instrument get a percentage of 77.50% with level validity that is invalid. With so trainers, modules, and instruments learning could use as a learning medium. (2) Practicality level robot transporter trainer use control DualShock 3 based on the acquired ESP32 from results analysis to questionnaire the response given to student got a percentage of 88.65% and can be categorized as robot transporter trainer use control DualShock 3 based on ESP32 is very practical for use in the learner. (3) Effectiveness Level robot transporter trainer use control DualShock 3 based on ESP32 obtained with to do analysis and testing normality and t-test with sample results study competence student with aspect cognitive (knowledge) and psychomotor (skills). The average value of students obtained of 79.50% with total participants educating as many as 20 students and the value compared is set KKM value school of 70. The results obtained in performing normality test i.e. data or sample normally distributed if the data is a normal step next perform a t-test. the results of the data obtained after t-test that is $t_{\text{count}} = 8,779 > t_{\text{table}} = 1,729$. with this could be concluded that learning media robot transporter trainers use control DualShock 3 based on ESP32 effect good and significant against the average of results learn and value competence

participant educate class XII TEI to KKM value set. So that it can be applied to other schools, as well as the application of employability skills can be established.

REFERENCES

- [1] K. van Lopik, M. Sinclair, R. Sharpe, P. Conway, and A. West, "Developing augmented reality capabilities for industry 4.0 small enterprises: Lessons learnt from a content authoring case study," *Comput. Ind.*, vol. 117, p. 103208, 2020, doi: 10.1016/j.compind.2020.103208.
- [2] R. M. Sari, Sumarmi, I. K. Astina, D. H. Utomo, and Ridhwan, "Increasing Students Critical Thinking Skills and Learning Motivation Using Inquiry Mind Map," *Int. J. Emerg. Technol. Learn.*, vol. 16, no. 3, pp. 4–19, 2021, doi: 10.3991/ijet.v16i03.16515.
- [3] S. L. Stockero, "Transferability of teacher noticing," *ZDM - Math. Educ.*, 2020, doi: 10.1007/s11858-020-01198-y.
- [4] E. Sulistiyol and S. C. Wibawa, "Innovation assessment with employability skills for vocational students in the electrical field," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 830, no. 4, 2020, doi: 10.1088/1757-899X/830/4/042092.
- [5] S. C. Wibawa, "Vector quantization based color blindness test images," *J. Eng. Sci. Technol.*, vol. 12, no. Special Issue 10, pp. 65–75, 2017.
- [6] E. Sulistiyol, D. Kustono, Purnomo, and E. Sutaji, "The implementation of Project-Based Learning in courses Audio Video to Improve Employability Skills," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 336, no. 1, 2018, doi: 10.1088/1757-899X/336/1/012038.
- [7] S. C. Wibawa, I. M. Arsana, Mashudi, M. Sahlan, and F. A. Rachmaningrum, "Development of Vocational Online Examination: A Case Study of Computer Systems," in *1st Vocational Education International Conference (VEIC 2019)*, 2019, vol. 379, no. Veic, pp. 329–332, doi: 10.2991/assehr.k.191217.053.
- [8] Y. Takahashi, "The theoretical problems of the transferability of management style," *The Internationalization of Japanese Business: European and Japanese Perspectives*. pp. 156–176, 2019, doi: 10.4324/9780429311963-15.
- [9] C. Khalaf, "How to assess the transferability of worker skills: A hybrid clustering approach," *J. Reg. Anal. Policy*, vol. 51, no. 1, pp. 67–78, 2021, [Online]. Available: https://api.elsevier.com/content/abstract/s_copus_id/85109083223.
- [10] M. C. Cuc, "The Influence of Media on Formal and Informal Education," *Procedia - Soc. Behav. Sci.*, vol. 143, pp. 68–72, 2014, doi: 10.1016/j.sbspro.2014.07.359.
- [11] Z. Sleiman, "Is there proof of transferability of laparoscopic psychomotor skills from the simulator laboratory to the operating room? Results from a systematic review," *Journal of Obstetrics and Gynaecology*, vol. 42, no. 2, pp. 181–187, 2022, doi: 10.1080/01443615.2021.1904216.
- [12] S. C. Wibawa, E. Sulistiyol, N. G. A. G. E. Martiningsih, E. Handoyo, and A. Johan, "Moodle mobile development in enjoyable learning in computer system subjects," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 830, no. 3, 2020, doi: 10.1088/1757-899X/830/3/032017.
- [13] P. Andersson, "Maintaining Competence in the Initial Occupation: Activities among Vocational Teachers," *Vocat. Learn.*, vol. 11, no. 2, pp. 317–344, 2018, doi: 10.1007/s12186-017-9192-9.
- [14] P. Heisig, P. J. Clarkson, and S. Vajna, *Modelling and Management of Engineering Processes - Concepts, Tools and Case Studies*. 2012.
- [15] P. Alto, "Future Work Skills," 2020.
- [16] E. Graf, in *Higher Education Resources in Higher Education Institutions*, vol. 107, no. 442. 2015.
- [17] Y. Røe, M. Rowe, N. B. Ødegaard, H. Sylliaas, and T. Dahl-Michelsen, "Learning with technology in physiotherapy education: Design, implementation and evaluation of a flipped classroom teaching approach," *BMC Med. Educ.*, vol. 19, no. 1, pp. 1–8, 2019, doi: 10.1186/s12909-019-1728-2.
- [18] B. Sujatmiko, S. C. Wibawa, D. A. Dermawan, and H. A. Ongge, "Computer Based Test (CBT) using Moodle-based High Order Thinking Skills in network design subjects," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 1098, no. 5, p. 052112, 2021, doi: 10.1088/1757-

- 899x/1098/5/052112.
- [19] G. Muruganatha, “Developing Of E-Content Package By Using ADDIE Model,” *Int. J. Appl. Res.*, vol. 1, no. 3, p. 52, p 52–54, 2015, [Online]. Available: <http://www.allresearchjournal.com/vol1issue3/PartB/pdf/67.1.pdf>.
- [20] T. Wrahatnolo, S. C. Wibawa, and A. Wahono, “The Implementation of Edmodo Using Cooperative Learning Model in Operating System,” in *5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018)*, 2019, vol. 299, no. Ictvet 2018, pp. 396–399, doi: 10.2991/ictvet-18.2019.90.