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Implementation Of E-Module To Improve Learning Outcomes Of Reading Calipers Of Size 0.1, 0.02, 0.05 Mm In Motorcycle Engineering Students

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Abstract

Reading vernier caliper measurements is a fundamental competency for vocational high school students, especially those in the field of motorcycle engineering. This skill is necessary for accurate measurement of components during practical learning and technical work. The study aims to examine the implementation of electronic modules to improve student learning outcomes in vernier caliper measurements with resolutions of 0.1 mm, 0.02 mm, and 0.05 mm. A quantitative quasi-experimental design with two pre-test–post-test groups was used. The analyzed dataset included 58 students: 29 in the control group and 29 in the experimental group. Data were collected through learning outcome tests conducted before and after instruction. The analyses included descriptive statistics, Shapiro–Wilk normality tests, Levene homogeneity tests, independent sample t-tests, and Mann–Whitney tests for N-Gain. The available results showed no statistically significant difference in pre-test scores ($p = 0.540$), while post-test scores differed significantly ($p < 0.001$). The mean N-Gain was 0.549 (54.85%) in the experimental group and 0.272 (27.20%) in the control group. The Mann–Whitney test showed a significant difference in the distribution of N-Gain ($U = 223{,}000$; $Z = -3.072$; $p = 0.002$), with a higher average rating for the experimental group. These findings suggest that learning outcomes tended to improve in the group using electronic modules. Conclusions should be interpreted based on the study design and verification of the final data.

Keywords: e-module, learning outcomes, vocational education, caliper vernier

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INTRODUCTION

The development of digital technology has driven changes in various aspects of education, including the way teachers present materials and the way students access learning resources. Learning is no longer limited to printed books and direct explanations in the classroom, but can be complemented by digital resources that can be accessed more flexibly. The use of technology in learning needs to be directed towards helping students understand the material, practice independently, and obtain feedback that supports the achievement of competencies. Technology is not the end goal of learning, but rather a means that must be chosen based on the characteristics of the material, the needs of the students, and the goals to be achieved.

In vocational education, learning requires integration between conceptual understanding and the application of procedures. Students need to understand the working principles of a tool when applying this knowledge in practice. One of the basic competencies that are important for students of the Motorcycle Engineering Expertise Program is reading measurement results using calipers. This skill is necessary when students measure component dimensions, check size suitability, and perform vehicle maintenance and repair work. Mistakes in reading the measuring tool can lead to errors in determining the condition of components and making technical decisions. Learning is a process designed to help students acquire knowledge, skills, and attitudes in accordance with educational objectives. In vocational education, this process is closely related to the competencies needed on the job. Therefore, learning activities ideally connect concept explanations, procedure demonstrations, exercises, and evaluations. Students are not only required to remember information, but also apply knowledge to complete tasks that resemble work situations. The principles of attention, motivation, activity, hands-on experience, repetition, reinforcement, and individual differences as summarized in the proposal are important considerations in designing learning. In measurement materials, hands-on experience with tools remains important, while digital teaching materials can serve as supports before, during, or after exercises. The combination of learning resources allows students to learn procedures, observe examples, and then practice and check their understanding.

Reading calipers is not just about recognizing numbers on a scale. Students need to understand the functions of the measuring jaw, the main scale, the nonius scale, the implied line, and the accuracy of the tool. In this material, students must also distinguish how to read calipers with an accuracy of 0.1 mm, 0.02 mm, and 0.05 mm. This difference in accuracy demands accuracy in identifying scale lines and calculating measurement results. If learning relies

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only on verbal explanations and limited examples, students could potentially memorize steps without understanding the relationship between the main scale and the nonius scale.

Learning media is a means that aids in the delivery of information and learning interactions. The media chosen must be appropriate to the purpose, characteristics of the material, the condition of the student, and the facilities available. Digital media can expand access to material and provide opportunities for students to repeat explanations without relying entirely on face-to-face time. However, the use of digital media must be accompanied by clear instruction and targeted learning assignments.

E-modules are electronic teaching materials that are systematically organized and allow users to study units of material independently or with the guidance of a teacher. A good e-module structure usually includes an identity and learning objectives, material descriptions, illustrations, examples, exercises, summaries, and evaluations. The content should be organized from basic concepts to application so that students can understand the relationships between the steps. In this study, the e-module was positioned as a treatment variable in the experimental group.

Potential advantages of e-modules include ease of access, flexibility of learning time, structured presentation of materials, and opportunities to repeat exercises. Potential drawbacks include device or connection limitations, distractions when using digital devices, and the risk of students reading only without doing exercises. Therefore, the benefits of e-modules should be evaluated based on learning outcomes and not enough to be assumed from their digital format alone.

The results of the initial observations at SMK Walisongo Semarang showed an average score of 62.5, with 10 out of 29 students (31.25%) achieving the completeness score used in the initial observation, while 19 students (68.75%) had not achieved completeness. The preliminary findings suggest that there is still room for improvement in reading learning in the short term. However, the initial observation data is the context of the problem in learning and needs to be distinguished from the experimental data analyzed in this article.

One alternative to support learning is the use of electronic modules or e-modules. E-modules are digital teaching materials that are systematically organized so that students can learn the material through electronic devices. Depending on the design, e-modules can contain concept descriptions, drawings, scale illustrations, example completion steps, exercises, and evaluations. These presentations have the potential to help students repeat parts that are not yet understood and learn at their own pace. In learning measuring tool reading skills, clear

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illustrations and step-by-step examples can help students relate the position of the scale line to the measurement results.

The use of e-modules does not automatically result in better learning. The quality of the content, the accuracy of the illustrations, the suitability of the exercises for the learning objectives, the ease of use, and the role of the teacher still determine the benefits of the media. The e-modules need to be organized according to the competencies to be achieved and used as part of the directed learning activities. Therefore, an empirical evaluation is needed to find out whether the learning outcomes of students who use e-modules are different from those of students who participate in comparative learning. In this study, three focuses are identified, namely the feasibility of e-modules based on expert assessment, the effect of e-module use on learning outcomes, and its effectiveness compared to previous learning. The data available in this conversation mainly includes pre-test, post-test, and N-Gain scores in the experimental and control groups. Therefore, this article focuses on an empirical analysis of learning outcomes and their improvement. Learning outcomes are the achievements that students obtain after participating in the learning process and are assessed based on the goals set. In this study, learning outcomes were operationalized as caliph reading test scores. The pretest describes the ability before treatment, while the posttest describes the ability after learning. The comparison of the two scores provides information about the final results and the changes that occurred.

N-Gain is used to describe improvement by considering the opportunities for improvement that are still available. The formula used is g = (posttest − pretest)/(maximum score − pretest), with a maximum score of 100. N-Gain values can be negative if the posttest is lower than the pretest, zero if there is no change, and positive if the score increases. The categories often used in educational research divide N-Gain into low ($g < 0.30$), moderate ($0.30 \leq g < 0.70$), and high ($g \geq 0.70$). These categories are used as descriptive summaries and do not replace inferential tests.

Researcher Yunus (2024) on e-modules to study the practice of reading lathe calipers and Dias (2012) research on the use of modules in motorcycle training. This study provides context that the development of teaching materials can be relevant for practical competence. However, findings from other research topics, subjects, and designs cannot be directly considered as evidence of the results of this study. This article still bases its conclusions on data collected from the analyzed research groups.

The gap that must be answered is the need for more specific evidence regarding the application of e-modules for caliper reading materials with an accuracy of 0.1 mm, 0.02 mm, and

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0.05 mm in Motorcycle Engineering students. This material has clear procedural characteristics and requires reading accuracy. By comparing the results of the pretest, posttest, and N-Gain between the experimental and control groups, the research can provide an empirical picture of the differences in learning outcomes that accompany the implementation of the e-module.

Based on this background, the objectives of this study are: (1) to analyze the differences in initial learning outcomes between the experimental group and the control group; (2) to analyze the differences in learning outcomes after learning; and (3) to compare the improvement in learning outcomes based on N-Gain. Practically, the results of the study are expected to be considered by teachers and schools in choosing appropriate learning media for technical measurement competencies. Academically, this study adds empirical reports on the use of digital teaching materials in vocational learning, in particular the reading skills of measurement tools.

RESEARCH METHODS

The study used a quantitative approach with a quasi-experimental design of two pre-test–post-test groups. The experimental group received learning with the support of e-modules, while the control group followed comparative learning according to the study plan. Both groups underwent pre- and post-learning tests. This design allowed researchers to compare initial ability, final results, and improved scores between groups.

Table 1. Research design of two pre-test–post-test groups

Groups	Pre-tests	Pengobatan	Post-tests
Eksperimen	O_1	Learn to use e-modules	O_2
Controls	O_3	Comparative/conventional learning	O_4

Note: O_1 and O_3 are pre-test scores; O_2 and O_4 are post-test scores. A quasi-experimental design is used because group divisions follow available classes, rather than random placement of individuals. Therefore, group equivalence is checked through pre-test results, but the results do not guarantee all characteristics of the two groups are completely the same.

This research proposal establishes the research context for students of the Motorcycle Engineering Expertise Program at SMK Walisongo Semarang. The analyzed dataset contains 58

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students, consisting of 29 students from the control group and 29 students from the experimental group.

An independent variable is the use of electronic modules in learning to read calipers. Bound variables are the students' learning outcomes on caliper reading materials with an accuracy of 0.1 mm, 0.02 mm, and 0.05 mm. Pre-exam scores are used to describe initial ability, post-exam scores are used to describe post-learning outcomes, and N-Gain is calculated to summarize relative improvement based on a maximum score of 100.

Learning outcome data was obtained through an objective test in the form of multiple choice with a total of 25 items given before and after learning. The pretest was used to determine students' initial abilities, while the posttest was used to determine the achievement after learning. The test items were organized based on the reading term reading indicators, including reading the measurement results with different precisions, analyzing the main and nonius scales, and evaluating reading accuracy.

General research procedures include the preparation of learning tools and instruments, the provision of pre-tests for both groups, the implementation of learning according to the treatment of each group, post-test administration, data processing, and statistical analysis. In the experimental group, e-modules are used as learning resources to support the understanding of reading materials in the short term. In the control group, learning is carried out using a comparative approach listed in the research design.

Data were analyzed using SPSS. Descriptive statistics were used to summarize the number of students, averages, and standard deviations. Normality was checked with the Shapiro–Wilk test in each group, while the homogeneity of variance was checked using the Levene Test. Pre-test and post-test differences between groups were checked via an independent sample t-test according to the assessed assumptions. The increase was calculated using N-Gain per student, then the difference in N-Gain distribution between groups was analyzed with the Mann–Whitney U.

The significance level used was 0.05. The SPSS significance value displayed as 0.000 was reported as $p < 0.001$, not $p = 0.000$. In the Mann–Whitney test, the interpretation was based on U, Z, and Asymp values. Sig. (2-tail), accompanied by an average rating to indicate the direction of the rating difference. The average rating is not the same as the average raw score, so it is not interpreted as a direct mean difference.

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RESULTS AND DISCUSSION

Descriptive Statistics

The analyzed data consisted of 58 students with a balanced number, namely 29 students in the control class and 29 students in the experimental class. Descriptive statistics showed that the average pre-test of the control class was 52.45, while the experimental class was 53.83. After learning, the average post-test exam of the control class was 67.00 and the experimental class was 79.41.

Table 2. Average pre-test and post-test results

Groups	N	Rata-rata Pretest	Post-Trace-to-Track Test	Average change
Controls	29	52,45	67,00	14,55
eksperimen	29	53,83	79,41	25,58

The table shows that the average post-test of the experimental group was about 12.41 points higher than that of the control group. Descriptively, the experimental group also showed a larger change in average score. These descriptive numbers need to be maintained consistent with the final datasheet and SPSS output used in the analysis.

Normality Test

Table 3. Shapiro–Wilk normality test results

variabel	Groups	Sig. Shapiro–Wilk	Result α = 0.05
Pre-tests	Controls	0,095	Not rejecting normality
Pre-tests	Eksperimen	0,760	Not rejecting normality
Post-tests	Controls	0,390	Not rejecting normality
Post-tests	Eksperimen	0,726	Not rejecting normality

The significance values at the pretest and posttest in both groups were more than 0.05. Thus, the results of the Shapiro–Wilk test showed no significant deviation of normality in the four distributions. This decision does not prove that the data should be normal, but suggests that the test did not find sufficient evidence to refute the assumption of normality.

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Homogeneity Test

Table 4. Levene homogeneity test results

variabel	Sig. Levene	Verdict
Pre-tests	0,148	Variance can be considered homogeneous
Post-tests	0,282	Variance can be considered homogeneous

The significance value of Levene in the pretest is 0.148 and the posttest is 0.282. Both are greater than 0.05, so the assumption of variance similarity is not rejected. Thus, the interpretation of the t-test can refer to the same line of variance assumption, as long as the final SPSS output table number has been verified.

Differences in Pre-Test Results

Table 5. Pre-test difference test results

Statistics	Value
Sig. (2-tailed)	0,540
Side Significance	0,05
Verdict	There is no significant difference

The pre-test difference test yielded p = 0.540, greater than 0.05. These results showed that there was no statistically significant difference in the pre-test average between the control group and the experimental group. Descriptively, the difference in the mean pretest between the two groups was about 1.38 points. These findings support that the initial abilities of the two groups are relatively comparable according to pre-test scores, but do not mean that all student characteristics of the two groups are identical.

Differences in post-test results

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Table 6. Post-test difference test results

Statistics	Reported values
Sig. (2-tailed)	< 0.001
Side Significance	0,05
Average control	67,00
Average experiments	79,41
Average difference	12.41 points

Post-test test results showed a significance of p < 0.001. Because the value was less than 0.05, there was a statistically significant difference in the post-test mean between the two groups. The post-test average of the experimental group was higher than that of the control group. These findings showed a difference in final achievement after learning.

Post-test results show statistically significant differences. Statistical values t and degrees of freedom are not listed as they need to be re-verified using the final output of the SPSS.

Analisis N-Gain

Table 7. Average N-Gain control groups and experiments

Groups	N	Rat-rat in-gain	Percentage	Category rata-rata
Controls	29	0,272	27,20%	Low
eksperimen	29	0,549	54,85%	Medium

The average N-Gain of the control class was 0.272 or 27.20%, while the experimental class was 0.549 or 54.85%. With the categories used, the average N-Gain of the control group belonged to the low category and the experimental group belonged to the medium category. Descriptively, the relative increase of the experimental group was higher.

This category applies to the group's average score and does not mean that all students in the group are in the same category. Individual N-Gain scores may vary. A negative score indicates a post-test score is lower than a pre-test and should not be removed without a reason supported by an answer sheet check.

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Mann–Whitney test on N-Gain

Table 8. Average rating and total N-Gain rating

Groups	N	Average Rank	Number of Ranks
Controls	29	22,69	658,00
eksperimen	29	36,31	1.053,00

Table 9. Mann–Whitney test results

Statistics	Value
Mann–Whitney U	223,000
Wilcoxon W	658,000
Z	- 3,072
Asymp. Sig. (2-oak)	0,002

The results of the Mann–Whitney test showed U = 223,000, Z = −3,072, and p = 0.002. Since p < 0.05, the null hypothesis regarding the absence of difference in the distribution of N-Gain was rejected. The average score of the experimental group of 36.31 was higher than that of the control group of 22.69, so the N-Gain in the experimental group tended to be higher.

These results are consistent with the higher descriptive mean of N-Gain in the experimental group. However, Mann–Whitney tested for differences in distribution or ranking, rather than differences in mean directly. Therefore, the correct conclusion is that there is a significant difference in the distribution of N-Gain and the direction of ranking in favor of the experimental group.

Discussion of findings

The pretest results showed p = 0.540, so the difference in initial ability was not statistically significant. The mean of the control pretest was 52.45 and the experiment was 53.83. This average proximity supports the comparison of post-learning outcomes because no significant initial differences were found based on the tests used. However, an insignificant p-value is not evidence of perfect equivalence. Factors such as previous learning experience, motivation, ability to read pictures, and habits of using measuring tools may remain different.

Initial ability checks are important in quasi-experimental research because groups are

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usually formed based on existing classes. By examining pre-tests, researchers obtain information on whether the initial scores of the two groups differ significantly. In this study, the pre-test results did not show significant differences; however, the interpretation of the final results should still be based on a combination of initial scores, final scores, and improvements.

The experimental group's posttest average of 79.41 was higher than the control of 67.00, and the statistical test showed a $p < 0.001$. These results show a significant difference in the final outcome. In the context of reading time frames, e-modules could potentially support students repeating material, learning examples gradually, and reviewing reading procedures in scale. Well-designed digital materials can provide structure to the learning process, especially when concepts involve the relationship between the main scale and the nonius scale. However, an explanation of how the e-module affects learning outcomes needs to be linked to the features of the e-module that are actually used. If the e-module provides reading illustrations, counting examples, and step-by-step exercises, this can be a reasonable pedagogical explanation. If these features are not available, the discussion should be adjusted. Articles must not claim animation, automated feedback, video, or specific interactivity without proof that such features are present in the research medium.

Significant post-test differences support the benefits of using e-modules in the context of the group being studied. However, the terms 'influence' or 'effectiveness' need to be used with caution. The semi-experimental design supports the evaluation of differences between groups, but does not eliminate all possible influences of other factors. Documentation of treatment implementation, similarity of learning times, and teaching equivalence will reinforce interpretation.

N-Gain provides an overview of the improvement relative to the available improvement opportunities. The mean result of 0.549 in the experimental group was in the moderate category, while 0.272 in the control was in the low category. This difference suggests that, according to the N-Gain measure, the experimental group experienced a greater descriptive improvement. The N-Gain calculation complements the post-test comparison because it takes into account the initial score. However, N-Gain also has limitations. The value depends on the pre-test score and the maximum score, can be sensitive when the initial score is close to the maximum score, and does not replace the change analysis with appropriate statistical methods. Therefore, the N-Gain results are best presented with pre-test and post-test scores and inferential tests. The $p=0.002$ value in the Mann–Whitney test shows a significant difference in the distribution of N-Gain

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between the two groups. The higher average experimental score indicates the direction of difference in favor of the experimental group. These findings are consistent with the larger average N-Gain values in the experimental group. Thus, some forms of analysis provide a uniform picture: the experimental group had a higher post-test average, a higher average N-Gain, and a higher N-Gain rating.

Nevertheless, statistical statements should remain specific. Mann–Whitney does not test for mean similarity in the same sense as the t-test. If the form of distribution is different, the difference in results may reflect differences in location, distribution, or form of distribution. Therefore, the phrase 'significant difference in N-Gain distribution' is more accurate than calling it 'significant mean difference in N-Gain' based on this test.

Research findings can be a consideration for productive teachers to integrate digital learning resources into measurement materials. Teachers can use e-modules as preparation before demonstrations, companion materials while students work on exercises, or repetition resources after exercises. The use of e-modules should not replace hands-on experience using calipers, as procedural skills also require skills in holding tools, positioning jaws correctly, reading scales, and maintaining measurement accuracy.

Teachers can use the test results to identify parts of the material that are still difficult for students. For example, if a student incorrectly defines a distracting nonius line, advanced learning can emphasize visual examples and exercises that gradually increase in complexity. If students understand the reading of the scale but mistakenly call the results, the exercises can be focused on calculation procedures. This approach connects digital media with the diagnosis of learning difficulties, rather than simply presenting the material in an electronic format.

For schools, the implementation of e-modules can support the development of teaching materials that can be used across time and place, as long as adequate tools are available. Schools need to consider ease of access, readability of scale images, suitability of content with the curriculum, and material updates. Periodic evaluations are needed to ensure that media remains relevant to the competencies students need.

CONCLUSION

Based on the analysis of 58 students consisting of 29 students in the control class and 29 students in the experimental class, it can be concluded that there was no significant difference in initial ability based on pre-test scores ($p = 0.540$). After studying, the experimental class post-test

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average of 79.41 was higher than that of the control class of 67.00, with a statistically significant difference ($p < 0.001$).

The N-Gain analysis showed an average of 0.549 (54.85%) in the experimental class and 0.272 (27.20%) in the control class. The Mann–Whitney test showed a significant difference in the distribution of N-Gain ($U = 223{,}000$; $Z = -3.072$; $p = 0.002$), with the average score of the experimental class (36.31) higher than that of the control class (22.69). These results showed that the improvement in learning outcomes in the experimental group tended to be higher than in the control group.

Thus, the research findings support the use of e-modules as an alternative learning medium for caliper size reading materials in Motorcycle Engineering students. However, conclusions regarding effectiveness need to consider quasi-experimental designs, limitations of measurement focusing on the cognitive domain, and the need for final verification of all statistics against the original SPSS output.

RECOMMENDATIONS

Based on the results of the research, Motorcycle Engineering teachers can use e-modules as companion materials before demonstrations, during exercises, and after caliper reading exercises. The use of e-modules needs to be combined with hands-on practice so that students not only understand scale readings theoretically, but also are skilled in using measuring tools. Schools are advised to pay attention to the availability of devices, the readability of illustrations, the suitability of materials with competencies, and periodic evaluations of digital teaching materials.

BIBLIOGRAPHY

Akkerman, S. F., & Bakker, A. (2012). *Crossing the Line Between School and Work During an Internship*. 153–173. https://doi.org/10.1007/s12186-011-9073-6

Astri Azani, Sarmila Sarmila, & Gusmaneli Gusmaneli. (2024). The Essence of Learning and Learning. *Mutiara : Journal of Research and Scientific Works*, *2*(3), 17–37. https://doi.org/10.59059/mutiara.v2i3.1183

Berlin, A. W., Apriliaswati, R., Rezeki, Y. S., & Tanjungpura, U. (2022). *Developing an E-Module of Islamic Reading Text Materials*. *7*(1), 24–40.

Berliner, D. C. (2001). Learning *and learning from expert teachers*. *35*, 463–482.

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Erin, A., Cahyani, M., Mayasari, T., & Sasono, M. (2020). *The Effectiveness of Project-Based Learning Electronic Modules with STEM Integration on the Creativity of Vocational School Students*. *4*(1), 15–22. https://doi.org/10.20527/jipf.v4i1.1774

Hikmawan, T., & Sarino, A. (2018). *The impact of electronic media basic edmodo on student learning motivation in vocational high schools*. *3*(1), 226–233.

Husnah, M., Nurlisa, S., Fazira, N. A., & Lubis, R. Y. (2023). Calibration of Digital Thrust (Vernier Calliper) with Check Caliper and Gauge Block Based on JIS Standard B.7507:2016. *Physics Navigation : Journal of Physics Education*, *4*(5), 104–112.

Information, B. T. (2010). *Teaching staff of the Department of Economic Education – Yogyakarta State*

University 1. VIII(2).

Isnaeni, N., & Hildayah, D. (2020). 330005-Media-learning-in-formation-int-7De7E6Bd (1). *Journal of Syntax Transformation*, *1*(5), 148–156.

Journal, I., & Vol, I. E. (2025). *BASIC FACTS OF LEARNING AND LEARNING IN SCHOOLS Ananda Bunga Mutiara Dani Nasution 1, Hilmy Hamdani 2, Asep Lukman Hamid 3*. *3*(1), 69–79.

Vocational, M. (2011). *2011 "Indonesia Extraordinary" Department of PTBB FT UNY, 3*. *77*, 1–13.

Kurniawan, T., Program,), Education, S., & Guru, P. (2025). Improving the Measurement Competency of Vocational School Students by Using Long-Term Uses through Project-Based Learning Models. *Journal of Vocational Science and Technology*, *2*, 87–94.

Lastri, Y. (2023). Development and Utilization of E-Module Teaching Materials in the Learning Process. *Journal of Education Imagery*, *3*(3), 1139–1146. https://doi.org/10.38048/jcp.v3i3.1914

Lim, J., Chong, S., Yunos, J., & Spahat, G. (2005). *Development and Evaluation of Electronic Modules for Pneumatic Technology*. *2*(3), 25–33.

Mahnun, O. N. (2012). *LEARNING MEDIA (Study of Media Selection Steps and Their Implementation in Learning). 37*(1).

Naidu, D., & Freer, T. J. (2013). Evidence supporting tooth width measurement methods: Part I. Vernier calipers to stereophotogrammetry. *Australian Orthodontic Journal*, *29*(2), 159–163. https://doi.org/10.2478/aoj-2013-0018

Ortho, M., & Orthodonti, M. S. (2005). *DENTAL CONGESTION AND ITS RELATIONSHIP WITH TOOTH SIZE*. *25*(June), 47–52.

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Results, L. (2023). *Development of an e-module ecosystem based on inquiry learning to improve student learning outcomes*. *12*(1), 94–103.

Patel, & Goyena, R. (2019). Calibration of Measuring Clock Thrust Time (Dial Calliper). *Journal of Chemical Information and Modeling*, *15*(2), 9–25.

Education, D., Islam, A., & Langsa, I. (2018). *THE ESSENCE OF EFFECTIVE LEARNING By: Fakhrurrazi ∗ ABSTRACT. XI*(1), 85–99.

Usage, E., Results, E. T., Cognitive, B., & Material, p. (2021). *Journal of Basicedu*. *5*(3), 1625–1631.

Perrin, A. (2015). *Social Media Use: October*, 2005–2015.

Purwanto, A., Nurjayadi, M., Suluya, R., & Ichsan, I. Z. (2020). *EM-SETS : Integrated electronic module of the Postgraduate Program of Environmental Education and Technology in Natural Science Learning, State University of Jakarta, Indonesia*. *29*(03), 7014–7025.

Rahma, K. A., Nugroho, A. S., & Mulyaningrum, E. R. (2023). *E - Biodiversity Module as an Implementation of Research Results on Medicinal Plant Species and Their Utilization in Kayen Village*. *15*(1), 71–75.

Rahman, S. A., Widjaya, A., Nasrullah, N., Arrazaq, F., Teknik, F., & Langlangbuana, U. (2023). *DEVELOPMENT OF INNOVATIVE DEEP LEARNING MODELS AS COMMUNITY SERVICES TO IMPROVE*. [EOS][EOS] *[EOS]5*(2), 125–135.

Saleh, M. S., Syahruddin, Saleh, M. S., Azis, I., & Sahabuddin. (2023). *Learning Media*. https://repository.penerbiteureka.com/publications/563021/media-pembelajaran

Sanova, A., Bakar, A., Kurniawan, D. A., & Aldila, F. T. (2022). *Digital Literacy on the Use of E-Modules for Students' Independent Learning in the Learning Process and Outcome Evaluation*. *11*(1), 154–164.

Sastrawidana, D. K. (2022). Journal of *Mathematics and Natural Sciences Education. 12* (September), 700–713.

Sciences, B. (2015). *Author's personal copy Author's personal copy*. *25*, 232–238.

School, D. I., & Vocational, M. (no BACK DATE). *MODEL OF ENTREPRENEURIAL CHARACTER EDUCATION*. 140–147.

Sholeh, B., Hufad, A., & Fathurrohman, M. (2023). *The Utilization of Interactive Electronic Modules in Independent Learning According to Student Capacity*. *9*(2), 665–672.

Sitepu, E. N. (2022). *Digital-Based Learning Media*. *1*, 242–248. https://doi.org/10.34007/ppd.v1i1.195

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Smit, K., Brabander, C. J. De, & Martens, R. L. (undated). *Scandinavian Education Journal Student- and teacher-centered learning environments in secondary pre-vocational education: Psychological needs, and motivation*. *October 2014*, 37–41. https://doi.org/10.1080/00313831.2013.821090

Smk, P., Studi, M., & Dan, T. (2016). *Analysis of the implementation of dual system education in vocational schools for 3 years and 4 years*. *39*(1), 87–98.

Stensvold, D., Viken, H., Steinshamn, S. L., Dalen, H., Støylen, A., Loennechen, J. P., Reitlo, L. S., Zisko, N., Bækkerud, F. H., Tari, A. R., Sandbakk, S. B., Carlsen, T., Ingebrigtsen, J. E., Lydersen, S., Mattsson, E., Anderssen, S. A., Singh, M. A. F., Coombes, J. S., Skogvoll, E., ... Wisløff, U. (2020). *Impact of five-year exercise training on all-cause mortality in older adults—Generation 100 study: a randomized controlled trial*. https://doi.org/10.1136/bmj.m3485

Sudrajat, H., & Hariati, R. H. (2021). *The essence of lifelong education that must be instilled in elementary school students*. 253–262.

Uwaifo, V. O. (2010). *Technical education and its challenges in Nigeria in the 21st century*. *5*(2), 40–44.

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