Attractive Digital Learning Media to improve Psychomotor abilities in Practicum Learning of Vocational School Students

I Nengah Eka Mertayasa[1], Ketut Agustini[2], Dessy Seri Wahyuni[3], Nyoman Sugihartini[4], I Gede Bendesa Subawa[5] and I Ketut Andika Pradnyana[6]

{eka.mertayasa@undiksha.ac.id[1], ketutagustini@undiksha.ac.id[2], seri.wahyuni@undiksha.ac.id[3], sugihartini@undiksha.ac.id[4], bendesa.subawa@undiksha.ac.id[5], ipradnyana@undiksha.ac.id[6]}

Universitas Pendidikan Ganesha[1,2,3,4,5,6]

Abstract. The change in the way students learn and teach has shifted from conventional to digital. This requires teachers to be creative in changing the packaging of teaching materials into an attractive digital form. The purpose of this study is to find out how significant the influence of attractive digital learning media developed on student practicum learning. The population in this study was all 10th-grade students of computer and network engineering at a vocational high school in Singaraja. Samples were determined by cluster random sampling technique. The research design used Posttest Only Control Group Design. Data collection uses interview methods, observation, and psychomotor ability tests. the result of the post-test is that the learning outcomes of the experimental class practicum increased significantly compared to the control class. The t-test obtained results that there was a significant influence of the use of attractive digital learning media on students' psychomotor abilities

Keywords: attractive digital learning media, psychomotor abilities, vocational schools

1 Introduction

Rapid technological development requires an education system that can provide globally competitive human resources (HR) [1]. The demands of this education system ensure that national education policy effectively and efficiently prepares human resources from school age for future challenges by taking advantage of technological advances, including advances in communication and information technology. need to be adjusted to A growing education sector means increased human capacity [2].

Education is a form of embodiment of a human culture that is dynamic and full of development, so changes and developments in education are what occur in line with changes in the culture of life [3]. Changes to improve education at all levels must be implemented on an ongoing basis. One of the changes the government has made to education is to improve the existing curriculum [4]. Innovative and creative learning in the classroom is certainly expected so the application of learning models at every level of school is a learning model that is demanding for students to think creatively-productively [5].

IConVET 2022, October 06, Singaraja, Indonesia

DOI 10.4108/eai.6-10-2022.2327426

Learning media play an important role in communicating learning content from teachers to students. Today, digital learning media has grown rapidly as one of the digital learning media and has been able to attract the attention of many stakeholders in both education and industry [6]. Independent learning as an attitude or action carried out by an individual who grows from within in the form of growing awareness of the importance of learning [7]. In self-study a person has confidence that what is learned will be beneficial to his life. The level of independence that each learner has when receiving lessons is not the same. This difference in the level of student independence is influenced by the characteristics of each learner.

We conducted a preliminary survey on the development of teaching materials for data communication subjects, and succeeded in developing printed teaching materials for data communication modules. Existing products are now distributed in several schools and used as a supplement to the learning process. However, given the current state of a more student-centered learning process and the use of digital media to remotely connect students and teachers, current learning media are no longer relevant to the learning process. Students in the learning process are interested in presenting materials digitally [8].

Various digital media have been developed by adopting textbook learning resources that have been applied so far. In fact, the development of teaching materials using digital media has not completely improved the quality of the learning process [9]. The digital media that have been developed so far lacked the elements to motivate students to learn, and they were unable to increase the autonomy of their learning. Learning outcomes are sub-optimal as media depictions of measuring devices are still monotonous and uninteresting or interactive. Moreover, existing digital learning media are not yet able to optimally contribute to the learning process [10]. The under-contribution of digital media in today's digital age contributes to the lack of optimal outcomes in student learning.

The gap that occurs between efforts and reality is caused by learning media that are not in accordance with the characteristics of student practicum learning. Learning with digital media only refers to the suitability of the content with the conventional subject matter. The use of this digital media in learning will make students less able to interpret the subject matter because the way students interpret the material is different, especially in conditions of low psychomotor abilities of students. Psychomotor abilities are achievements possessed by a person in the form of a manipulation skill that involves the performance of muscles and all physical strength. This will make a person visible whether or not they have reached the measured standard.

Many factors lead to the low psychomotor abilities of students. In the learning process, an important factor influencing low psychomotor ability is the presentation of less interesting material in the learning process [11]. Many learning media are still conventional, prioritizing the presentation of complete material without heeding the innovative elements and appeal of the learning media on offer. This condition is exacerbated by the current learning landscape, which relies heavily on the presentation of content using interactive online media and does not reduce the amount of material presented in the learning process. Learning media, responsible for the decline in psychomotor performance in students, have a direct impact on the quality of material acceptance by students [12]. Low psychomotor abilities of students lead to low student practicum learning outcomes in a learning process.

Based on the above issues, there is a need for digital learning media presented in an engaging and interactive way to motivate students in the classroom and enable them to understand

learning concepts that require precision and imagination. . One of them is digital learning media packaged in an engaging and interactive way. Engaging and interactively packaged digital learning media should improve students' psychomotor skills, comprehend and accept learning materials, and influence students' understanding of learning. In addition, by studying at home according to the student's characteristics, the student can independently understand the lesson.

2 Method

The research method used in this study is Quantitative Research with experimental methods with a posttest-only control group design research design. The quantitative research method of experimentation can be interpreted as a research method used to find the influence of certain treatments or treatments on others under controlled conditions. In this design, the experimental class gets the treatment while the control class gets the treatment.

Table 1. Schema post-test control group design

Group	Treatment	Posttest
Experiment	X	O
Control	-	O

The experimental group was given treatment, namely in the learning process using interactive digital learning media. Meanwhile, in the control group, the learning process was carried out using conventional media of printed books and presentations. Both groups were given the same final test as an assessment tool to determine the results of the psychomotor abilities of students from the two groups [13].

This research was carried out at SMK in Singaraja. The population in this study was grade 10 students of computer and network engineering at a vocational high school in Singaraja consisting of 3 schools. Sampling was carried out using the cluster random sampling technique. In this study, sampling was carried out by compiling the learning outcomes of data communication subjects in the previous semester, then 2 classes were selected that had an average and standard deviation that was not much different.

The data that wants to be known in this study is the result of students' psychomotor abilities in practicum learning. The data collection technique used is in the form of a test of the results of psychomotor abilities. The tests used have met the elements of basic competencies used and indicators of assessing psychomotor aspects.

Data on the results of students' psychomotor abilities were taken by providing post-tests to students after applying learning activities using attractive digital learning media with and applying conventional learning activities. The hypotheses in this study were analyzed using the t-test.

3 Findings and discussion

Description of Post-Test Results Data for Experimental Group Students

Based on the data on measuring the results of psychomotor abilities of 25 students of the experimental group, data on the frequency distribution of psychomotor ability posttest scores

were obtained that the highest score of students was 40 and the lowest score of students was 29. The distribution of the posttest data of the experimental group is presented in Table 1.

Table 1. Frequency Distribution of Experimental Group Post Test Results

Interval	Observation Frequency (F)	Relative Frequency (%)	Compulsive Frequency (%)
29 – 30	3	12	12
31 – 32	3	12	24
33 – 34	3	12	36
35 – 36	9	36	72
37 – 38	3	12	84
39 – 40	4	16	100
Total	25	100	

Based on the calculation results, a category of psychomotor skills of experimental group students was obtained as shown in Table 2.

Table 2. Categories of Experimental Group Psychomotor Ability Results Data

Score Range	Categories	Frequences	Presentage (%)
$30 \leq \overline{X}$	Excellent	22	88
$23 \leq \overline{X} < 30$	Good	3	12
$17 \leq \overline{X} < 23$	Good Enough	0	0
$10 \leq \overline{X} < 17$	Not Good Enough	0	0
$\overline{X} < 10$	Very Bad	0	0
Total		25	100

Based on Table 2, the data on the results of the psychomotor abilities of the Experimental group can be presented in the form of a histogram as Figure 1.

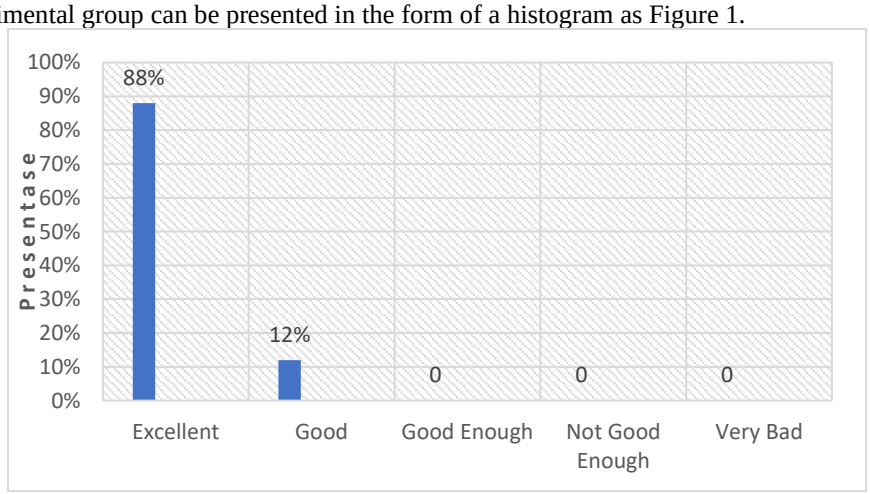

Figure 1. Histogram of Experimental Group Psychomotor Ability Results

Description of Post Test Data Results of Student Control Group

Based on the data on measuring the results of psychomotor abilities of 27 students of the control group, data on the frequency distribution of posttest scores of the results of psychomotor abilities of the control group were obtained. It is known that the student's highest score is 34 and the student's lowest score is 18. The distribution of the posttest result data of the control group is presented in Table 3.

Table 3. Frequency Distribution of Control Group Post Test Results

Interval	Observation Frequency (F)	Relative Frequency (%)	Compulsive Frequency (%)
18 – 20	3	11.11	11.11
21 – 23	3	11.11	22.22
24 – 26	7	25.92	48.14
27 – 29	8	29.62	77.77
30 – 32	2	7.40	85.18
33 – 35	4	14.81	100
Total	27	100	

Based on the calculation results, a category of psychomotor skills of control group students was obtained as shown in Table 4.

Table 4. Categories of Psychomotor Ability Result Data Control Group

Score Range	Categories	Frequences	Presentage (%)
$30 \leq \overline{X}$	Excellent	6	22,22
$23 \leq \overline{X} < 30$	Good	15	55,56
$17 \leq \overline{X} < 23$	Good Enough	6	22,22
$10 \leq \overline{X} < 17$	Not Good Enough	0	0
$\overline{X} < 10$	Very Bad	0	0
Total		27	100

Based on Table 4.4 the data on the results of the psychomotor abilities of the control group can be presented in the form of a histogram as figure 2.

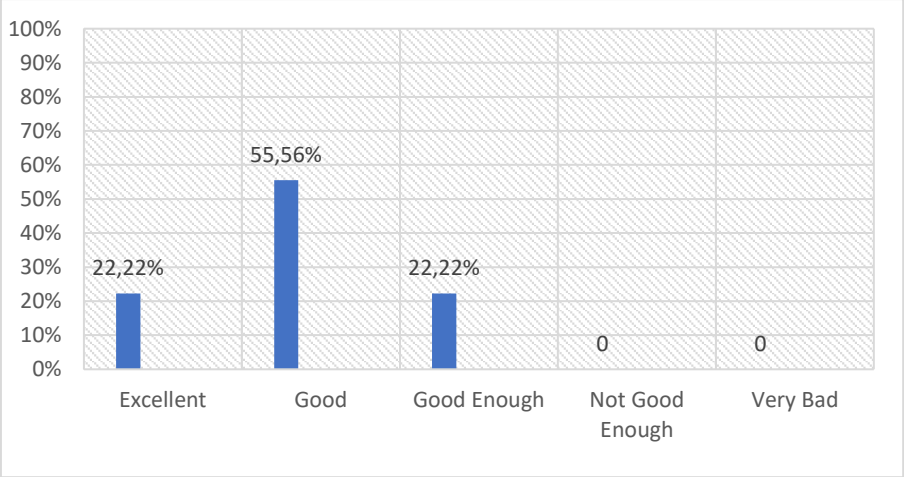

Figure 2. Histogram of Control Group Psychomotor Ability Results

Prerequisite Analysis and Hypothesis Testing
Data Normality Test Results
Experimental group normality test
Based on the analysis carried out in Table 4, the following is presented a summary of the results of the normality test for the experimental group using the Kolmogorov-Smirnov SPSS test. The basis for decision-making on the Kolmogorov-Smirnov SPSS test is as follows:
By Significance Value

a. If the asymp value is significant < 0.05 then H1 is accepted.
b. If the asymp value is significant > 0.05 then Ho is accepted.

Table 5. Results of the Normality Test of Experimental Group Learning Outcomes

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Eksperimen	.145	25	.187	.942	25	.161

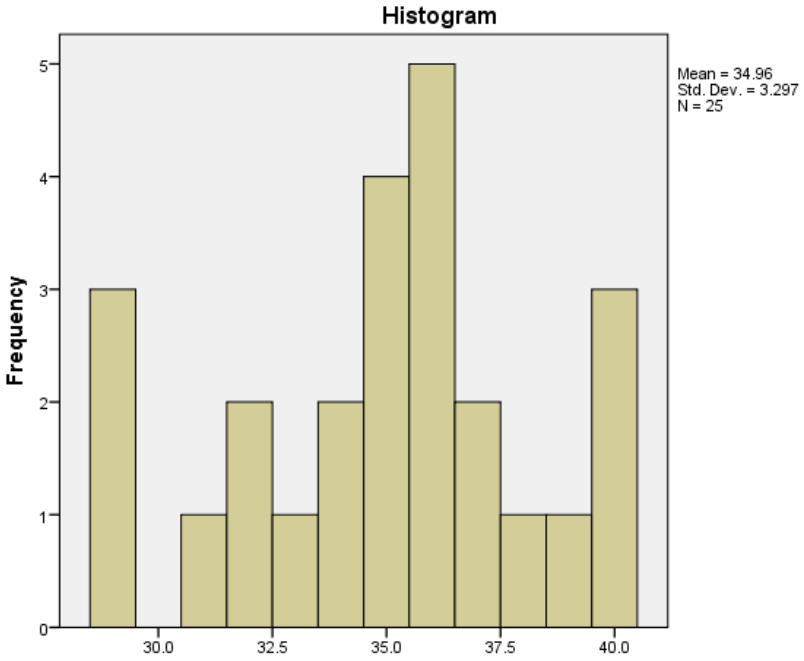

Figure 4. Experimental Group Normality Test Histogram

Based on the results of the post-test calculations of the experimental group using SPSS 21.0, from the analysis output showed the value of Kolmogorov-Smirnov with probability (Asymp. Sig.) of 0.187. Because the significant value > 0.05, the study data of the experimental group were normally distributed.

1. Test the normality of the control group

Based on the analysis carried out in Table 4, the following is presented a summary of the results of the normality test for the control group using the Kolmogorov-Smirnov SPSS test. The basis for decision-making of the Kolmogorov-Smirnov SPSS test is as follows:

By Significance Value

a. If the asymp value is significant < 0.05 then H1 is accepted.
b. If the asymp value is significant > 0.05 then Ho is accepted.

Table 6. Normality Test Results of Control Group Learning Outcomes

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Control	.075	27	.200*	.973	27	.694

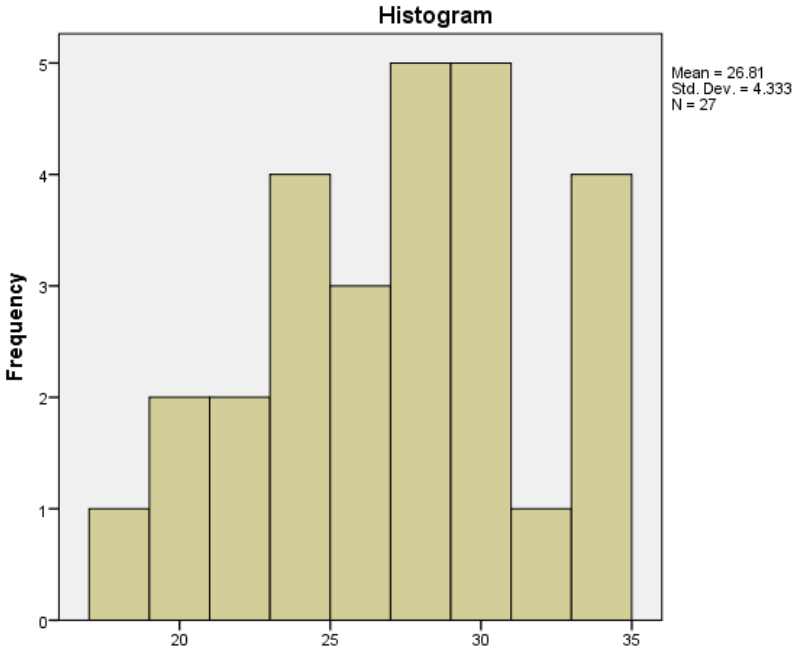

Figure 6. Control Group Normality Test Histogram

Based on the results of the post-test calculations of the control group using SPSS 21.0, from the analysis output showed the value of Kolmogorov-Smirnov with probability (Asymp. Sig.) of 0.200. Because the significant value of > 0.05, the data on the learning outcomes of the control group were normally distributed.

Variance Homogeneity Test

The results of the variance homogeneity test for the study data of the experimental group and the control group using SPSS based on decision making on the SPSS variance homogeneity test are as follows:

By Significance Value

a. If the asymp value is significant < 0.05 then H1 is accepted.
b. If the asymp value is significant > 0.05 then Ho is accepted.

Table 7. Variance Homogeneity Test Results

		Levene Statistic	df1	df2	Sig.
data	Based on Mean	2.138	1	50	.150
	Based on Median	2.047	1	50	.159
	Based on Median and with adjusted df	2.047	1	47.977	.159
	Based on trimmed mean	2.134	1	50	.150

Based on the results of calculating the homogeneity of the experimental group and the control group using SPSS 21.0, from the analysis output showed a probability value (Sig.) of 0.150.

Because the significant value > 0.05, the learning outcomes data of the experimental group and the control group are said to be homogeneous.

Hypothesis Testing
The results of the research hypothesis test using SPSS based on decision making on the SPSS hypothesis test are as follows:
By Significance Value

a. If the significant value < 0.05 then H1 is accepted.
b. If the significant value > 0.05 then Ho is accepted.

Based on the calculated t value and t table:

a. If the value of t counts > of t of the table, then H1 is accepted.
b. If the value of t counts < of t of the table, then Ho is accepted.

Table 8. Hypothesis Test Results

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	2.138	.150	7.582	50	.000	8.145	1.074	5.987	10.303
Equal variances not assumed			7.662	48.249	.000	8.145	1.063	6.008	10.282

In Table 4.16, you can see the value of Fcount = 2.138 and probability (sig.) = 0.150. Since the probability (sig.) > 0.05, the two population variances are the same.

Based on the calculation of thitung with ttabel, if the calculation > ttabel then H0 is rejected and H1 is accepted. From the calculation results obtained thitung = 7.582 and ttabel = 1.671, so that thitng > ttabel (7.582 > 1.671), then it was decided that H0 was rejected, meaning that H1 was accepted, this means that there is a significant influence in the application of attractive digital learning media on students' psychomotor abilities.
Overall, the findings obtained both from descriptive analysis and based on the results of t-test analysis, a decision can be made that attractive digital learning media has a better influence compared to learning without using e-modules. This is because theoretically attractive digital learning media is able to make it easier for students to find subject matter and is able to streamline student time to be able to study at home and is not limited to only being able to study at school, the way students learn becomes more organized and in accordance with existing

learning indicators, students become more independent in doing the projects given [14]. Through the content on attractive digital learning media, can facilitate students to be able to increase student activities both in classroom learning and studying at home. Thus, through this media, students are not only facilitated by the material but students can structure and learn independently without the need for direction from the teacher [15].

Operationally both study groups are given the same material but the media used are different. The difference also lies in the way students are in the learning process and the way students learn. In the attractive digital learning media, students have prepared complete material, practicum tutorials, related problems as well as assignments, and the right steps in learning in accordance with learning indicators. Meanwhile, in conventional learning, students look for their own material, look for their own tutorials, and the material obtained by students is not necessarily in accordance with learning indicators. So that student is not structured in learning or practicum. The result of this research is a systematically arranged learning device, containing learning materials, methods, and goals based on core competencies, base competencies, and competency performance indicators, to provide guidance and provide guidance for self-study activities. Matching electronic modules. Opportunity for students to test themselves through the exercises presented in the electronic modules above [16].

The obstacle contained in this study is that the scores of student practicum learning outcomes in the experimental group that apply attractive digital learning media have been able to reach the very good category but the difference in the average group score by using attractive digital learning media with the average score of the group with conventional learning has not reached very high. The obstacles that arise in this study are caused by several things.

First, the teacher's presence in the classroom is very short, so it does not accommodate the implementation of learning as a whole. This can hinder students in completing projects given by subject teachers. This obstacle is in accordance with the opinion about factors that affect student learning outcomes which states that the school social environment, such as teachers, administration, classmates, and the availability of learning time can affect the learning process of a student [17]. The harmonious relationship between the four can be a motivation for students to study better at school [18]. The solution that can be done to overcome obstacles in this study is the researcher's way of filling in the absence of teachers in learning and implementing learning in accordance with the learning implementation plan that has been prepared.

Secondly, learning facilities such as laptops and internet connections have not been obtained optimally, there are still some students who do not bring laptops or have an internet connection at every meeting in learning. This can reduce student activities to access materials and tutorials during learning activities [19]. Instrumental factors, namely learning devices in the form of hardware, such as school buildings, learning tools, learning facilities, and sports fields have a major influence in determining student learning outcomes [20]. The solution that researchers can do in this research constraint is to display the e-module on the LCD Projector in front of the class so that students can read and see video tutorials in the e-module. In addition to these solutions, students who do not carry laptops are allowed to use school computers with a note of not damaging existing facilities. A solution that can be done to overcome the constraints of a limited internet connection is to suggest that students buy paid wi-fi vouchers that are in school.

Based on theoretical and operational considerations, the implications of this research when viewed from the understanding of learning according to constructive understanding are the

activities of students to build their own knowledge. Students must gain the experience of hypothesizing, looking for answers, imagining, and discovering in an effort to develop new constructions, so that the achievement of learning outcomes becomes better. So the learning media that can accommodate the achievement of better learning outcomes is attractive digital learning media

4 Conclusion

This study found that learning activities with attractive digital learning media significantly affect the psychomotor abilities of grade 10 students in vocational high schools. Learning activities of computer network materials assisted by attractive digital learning media showed better results in students' psychomotor abilities compared to conventional learning activities.

References

[1] S. Kim, Y. Wang, and C. Boon, "Sixty years of research on technology and human resource management: Looking back and looking forward," *Hum. Resour. Manage.*, vol. 60, no. 1, 2021, doi: 10.1002/hrm.22049.

[2] Y. J. Utama and A. Ambariyanto, "Improving Research Capacity at Universitas Diponegoro, Indonesia," *J. Sustain. Perspect.*, vol. 1, no. 1, 2021, doi: 10.14710/jsp.2021.11205.

[3] H. Darmadi, "Educational Management Based on Local Wisdom (Descriptive Analytical Studies of Culture of Local Wisdom in West Kalimantan)," *JETL (Journal Educ. Teach. Learn.*, vol. 3, no. 1, 2018, doi: 10.26737/jetl.v3i1.603.

[4] P. A. Igwe, U. C. Okolie, and C. V. Nwokoro, "Towards a responsible entrepreneurship education and the future of the workforce," *Int. J. Manag. Educ.*, vol. 19, no. 1, 2021, doi: 10.1016/j.ijme.2019.05.001.

[5] Y. S. Chang, Y. H. Chien, K. C. Yu, H. C. Lin, and M. Y. C. Chen, "Students' innovative environmental perceptions and creative performances in cloud-based m-learning," *Comput. Human Behav.*, vol. 63, 2016, doi: 10.1016/j.chb.2016.06.032.

[6] L. Magis-Weinberg, A. Ballonoff Suleiman, and R. E. Dahl, "Context, Development, and Digital Media: Implications for Very Young Adolescents in LMICs," *Front. Psychol.*, vol. 12, 2021, doi: 10.3389/fpsyg.2021.632713.

[7] K. Nachimuthu and Head, "Student Teacher's Attitude Towards Online Learning During Covid-19," *Int. J. Adv. Sci. Technol.*, vol. 29, no. 6, 2020.

[8] I. N. E. Mertayasa, I. G. B. Subawa, K. Agustini, and D. S. Wahyuni, "Impact of cognitive styles on students ' psychomotoric abilities on multimedia course practicum Impact of cognitive styles on students ' psychomotoric abilities on multimedia course practicum," in *International Conference on Vocational Education and Technology (IConVET) 2020*, 2021, pp. 1–9. doi: 10.1088/1742-6596/1810/1/012056.

[9] H. Li, "Visual Communication Design of Digital Media in Digital Advertising," *J. Contemp. Educ. Res.*, vol. 5, no. 7, 2021, doi: 10.26689/jcer.v5i7.2312.

[10] M. H. Lin, H. C. Chen, and K. S. Liu, "A study of the effects of digital learning on learning motivation and learning outcome," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 13, no. 7, 2017, doi: 10.12973/eurasia.2017.00744a.

[11] T. L. Chen, Y. C. Lee, and C. Sen Hung, "A Study on the Effects of Digital Learning Sheet Design Strategy on the Learning Motivation and Learning Outcomes of Museum Exhibition Visitors," *Educ. Sci.*, vol. 12, no. 2, 2022, doi: 10.3390/educsci12020135.

[12] B. Ramdhan, "Hands-On Contextual Learning Experimentation on Psychomotor Abilities," *Rep. Biol. Educ.*, vol. 1, no. 1, 2020, doi: 10.37150/rebion.v1i1.814.
[13] R. F. Mustofa and Y. R. Hidayah, "The effect of problem-based learning on lateral thinking skills," *Int. J. Instr.*, vol. 13, no. 1, 2020, doi: 10.29333/iji.2020.13130a.
[14] B. Stadlinger, S. Jepsen, I. Chapple, M. Sanz, and H. Terheyden, "Technology-enhanced learning: a role for video animation," *Br. Dent. J.*, vol. 230, no. 2, 2021, doi: 10.1038/s41415-020-2588-1.
[15] R. Roemintoyo and M. K. Budiarto, "Flipbook as Innovation of Digital Learning Media: Preparing Education for Facing and Facilitating 21st Century Learning," *J. Educ. Technol.*, 2021, doi: 10.23887/jet.v5i1.32362.
[16] W. Huang, R. D. Roscoe, S. D. Craig, and M. C. Johnson-Glenberg, "Extending the Cognitive-Affective Theory of Learning with Media in Virtual Reality Learning: A Structural Equation Modeling Approach," *J. Educ. Comput. Res.*, vol. 60, no. 4, 2022, doi: 10.1177/07356331211053630.
[17] L. A. Pauli, M. B. Correa, F. F. Demarco, and M. L. Goettems, "The school social environment and oral health-related quality of life in children: a multilevel analysis," *Eur. J. Oral Sci.*, vol. 128, no. 2, 2020, doi: 10.1111/eos.12679.
[18] S. Tannert and A. Gröschner, "Joy of distance learning? How student self-efficacy and emotions relate to social support and school environment," *Eur. Educ. Res. J.*, vol. 20, no. 4, 2021, doi: 10.1177/14749041211024784.
[19] M. Z. Haron, M. M. M. Zalli, M. K. Othman, and M. I. Awang, "Examining the teachers' pedagogical knowledge and learning facilities towards teaching quality," *Int. J. Eval. Res. Educ.*, vol. 10, no. 1, 2021, doi: 10.11591/ijere.v10i1.20780.
[20] A. Sobandi, T. Yuniarsih, Rasto, and Adman, "Learning Facilities: Can It improve the vocational school productivity?," *J. Educ. Soc. Res.*, vol. 10, no. 4, 2020, doi: 10.36941/jesr-2020-0074.