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E-Learning is Effectively Used for Management for IT Service Courses

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***Abstract*— This development research ailems to develop learning media (E-Learning) for employee class in management for IT service courses at Metamedia University. E-Learning is designed to improve student learning outcomes, so students can fully understand the material provided. This study uses the Instructional Development Institute development method. IDI procedures are defining, developing, and evaluating. The type of data is primary data where the data obtained from media experts, lecturers and students. Data were analysed using Descriptive Data Analysis Techniques which describe the validity, practicality, and effectiveness of using E-Learning. The results obtained from this research and development are as follows; (1) The validity of E-Learning is stated to be very valid in terms of content and interest with a total validity value of 84%, while the design aspect is stated to be valid with a total value of 85% (2) The practicality of E-Learning is based on the lecturer's response after through validation is stated to be practical with a total score of 87.5%, while the practicality of E-learning based on student responses after going through validation is stated to be practical with a total score of 80% (3) The results obtained from this study are E-Learning is effectively used by employee class students with a graduation rate of 48 student or 89% of 54 students. Based on the findings of this study, it was concluded that E-Learning is valid, practical and effective for use as a learning medium.**

***Keywords*—Effectiveness, E-learning, Practicality**

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I. INTRODUCTION

Education is an important part of a country's progress (Ali dkk., 2023; Nasir dkk., 2024; Yu dkk., 2023).Today, the national education system aims to ensure the global competitiveness of learners. Several factors determine the achievement of student learning outcomes in educational institutions. They are internal and external factors. Internal factors consist of students' motivation, interests, and talents; meanwhile, external factors consist of curriculum, lecturer, learning methods, costs, facilities and infrastructure, and the environment. If these factors are maximized, it will

expedite the learning process and support optimal learning outcomes (Khabbali, Seghroucheni, & Ziti, 2023; Lei dkk., 2022; Yar, Henna, McAfee, & Gharbia, 2023). Learning outcomes are generally used as a measure of learning success. Learning outcomes can be measured using a series of tests or evaluations. Learning outcomes indicate the quality of educational programs obtained through the learning process.

The industrial revolution 4.0 in education has been influenced by the development of digital technology. This development raises new ideas in learning. It resulted in a paradigm shift that was originally more passive for students or teacher-centered learning (TCL) to become more active for students or student-centered learning (SCL). Students have changed from passive recipients of knowledge to positive knowledge seekers, thereby realizing fundamental educational reforms. In addition, the current COVID-19 pandemic leaves educational institutions with no choice but to adopt virtual learning media to promote safety and comply with social distancing protocols.

In Padang City, Metamedia University is a private university in great demand by the public. That is due to the high quality of Metamedia University compared to other institutions in Padang City. Metamedia University pays close attention to all matters, such as student and lecturer discipline, facilities and infrastructures, and syllabus achievements in all courses (Chen dkk., 2023; Du, Yao, Li, & Liu, 2022; Liu, Zhang, Ding, & He, 2023). Higher education has been transformed in recent times in response to major changes, including digital technology, interactive design, and delivery.

Employee class students are those who are already working full-time or have time constraints that make it difficult for them to attend college full-time. They follow a higher education program specifically designed to allow them to develop their careers while still working. The main difference between employee classes and regular classes lies in the course schedule and tuition fees. Nonetheless, the academic rights obtained by students in both types of classes remain the same. The employee class program has been endorsed by the Government in the Law of the Republic of Indonesia Number 20 on the National Education System, which affirms the principle of an open and flexible education system. Employee class lecture schedules are usually scheduled after working hours, usually between 16:20 and 21:00.

Of the many courses at Metamedia University, Management for IT Service is a course that must be mastered by students, because the Management for IT Service course teaches how to enable students to plan, design, manage, and improve information technology services in organizations/companies (Lai, 2023; Levy, Maman, Shabtai, & Elovici, 2024; L. Zhang, Wang, Shen, & Nie, 2023). Some of the main topics discussed in this course include service strategy, service design, service transition, service operations, continuous service improvement.

This method made the students unable to explore their potential, and the learning process became boring. Integrating the vision of the students and the teaching team allows for customization of experiences that support the students' learning processes (Ferrer & Elipane, 2024; Luo, Lu, Yin, Lu, & Weng, 2023; Zhu dkk., 2024).
Table 1. Total number of employee classes attending IT service management and computer network management design courses even semester 2023/2024.

Tabel 1. Percentage of Learning Outcomes for mid semester for the academic year 2023/2024

Class	Total Students	≥ 70	Total Students	< 70	Total Students
2 SI T	29	62.07%	18	37.93%	11
2 SI M	25	80%	20	20%	5

Source: Academic Office

From Table 1 it can be seen that the learning outcomes of students in classes 2 SI T and 2 SI M at Metamedia University in the course of management for IT Service are classified as moderate. In class 2 SI T there are still 11 students, and 2 SI M 5 students who are still below the Minimum Completion Criteria (KKM) standard set at 75

II. METHOD

A. Research Methods

The research method used is the development research method. The type of development method chosen is the IDI (Instructional Development Institute) method. The IDI method applies development principles that are suitable for learning media development (Huang, 2023; Lu & Ji, 2024; Santos, Pedro, Carvalho, & Ferreira, 2023). The IDI method applies a design and development process

consisting of 3 stages, needs analysis, system development and system development evaluation.

B. Data collection instruments

Validity

The first instrument is a validity instrument. The validity instrument was used to determine the validity of the E-learning. E-learning was validated by experts and lecturers. The validated aspects are content and design aspects of E-learning. The validity instrument uses a Likert scale. On a Likert scale, the variables will be measured and explained into variable indicators.

Practicality

The second instrument is the practicality instrument (Dahal dkk., 2023; Khoiri dkk., 2024; Oktavia & Zaim, 2024). Practicality instrument is used to determine the practicality of E-Learning. Practicality of E-Learning is tested through lecturer and student responses. Practicality instrument uses Likert scale. On a Likert scale, the variables will be measured and explained into variable indicators.

Effectiveness

The third instrument is the effectiveness instrument. The effectiveness of E-learning is seen from the number of students who pass / learning outcomes in learning to all course at Metamedia University. Learning outcomes are obtained by giving tests to students who have been given using E-learning that has been valid and practical. The passing standard uses Minimum Mastery Criteria with a score of >75.

C. Test Subjects

This study uses the descriptive data analysis technique to explain the valid, practical, and effective learning level using E-learning implemented in management for IT service course at Metamedia University. Analysis of the validity level.

The validity analysis stages:

The validator provides answers with a choice of criteria:

- 5 = highly valid, 4 = valid, 3 = quite valid, 2 = less valid, 1 = not valid.
- Calculating validator scores on each question indicator.
- The percentage formula for analyzing validity data uses:

percentage = Score of each item Ideal score item x 100%

$$persentage = \frac{\sum Score\ of\ each\ item}{\sum Score\ of\ ideal\ item}\ x\ 100\%$$

Table 2 explains the level of achievement and categories of validity data analysis.

Table 2. Level of acquisition of validity (Maulana, Firdian, & Rahmelina, 2021).

Gain Rate (%)	Group
90 – 100	highly valid
80 – 89	Valid
65 – 79	Quite Valid
55 – 64	Less Valid
0 – 54	Not valid

Analysis of the Practicality level.

The validity analysis stages:

The validator provides answers with a choice of criteria:

- 5 = highly valid, 4 = valid, 3 = quite valid, 2 = less valid, 1 = not valid.
- Calculating validator scores on each question indicator.
- The percentage formula of practicality data analysis is:

$$persentage = \frac{\sum Score\ of\ each\ item}{\sum Score\ of\ ideal\ item}\ x\ 100\%$$

Table 3 explains the level of achievement and categories of practicality data analysis.

Table 3. Practicality Gain Gate (Maulana & Firdian, 2019).

Gain Rate (%)	Group
90 – 100	Highly practical
80 – 89	practical
65 – 79	Quite Practical
55 – 64	Less practical
0 – 54	Not practical

Table 4 describes the level of achievement and the categories of effective data analysis.

Table 4. Effectiveness gain rate (Maulana & Firdian, 2020)

Gain Rate (%)	Group
90 – 100	Very effective
80 – 89	Effective
65 – 79	Quite Effective
55 – 64	Less Effective
0 – 54	Not Effective

The standard applied as an indicator of success in learning outcomes is Minimum Mastery Criteria, 70 (source of academic policy).

III. RESULT AND DISCUSSION

A. Result

Validity Acquisition Data

Validity acquisition data can be seen in Table 5:

Table 5. The acquisition of validity test from experts

Validation Aspect	Total Score	Validity Value (%)	Criteria
E-Learning Content	46	84	Valid
E-Learning Design	55	85	Valid
Total Score/Value Validity/Category	101	84.50	Valid

Table 5 shows the result of the learning validity test using E-learning in the management for IT service Course. E-learning content gets a validity value 84% and E-learning design gets a validity value 85% (Mulya & Juwita, 2022; Siswanto, Harjanta, Suminar, & Suyidno, 2022; Y. Zhang, Duan, & Wei, 2024). On average, all online learning validation result using E-learning for content and design with valid values 84.50%. Learning design of all course using E-learning is declared valid as a learning media.

Practicality Acquisition Data

Practicality data based on educator responses can be seen in Table 6 as follows:

Table 6. Acquisition practicality data based on educator responses

R1 = Lecturer 1 R2 = Lecturer 2

R3 = Lecturer 3

Section	R1	R2	R3	Average	
Easy to Operate	90	80	100	90	Highly Practical
Time Effectiveness	80	65	85	76.66	Practical
Media Interpretation	90	75	90	85	Practical
Equivalence	100	80	86.66	88.88	Practical
Average	**90**	**75**	**91.66**	**87.5**	**Practical**

Table 6 shows the results of Practicality test data for the use of E-learning for all courses from teaching staff. The practicality of using E-learning in the aspect of "Easy to Operate E-Learning" gets highly practical value 90%. The practicality of using E-learning in the aspect of "Time Effectiveness" gets practical value 76.66%. The practicality of using E-learning for "Media Interpretation" aspect gets practical value 85%. Practicality of E-learning from the aspect of equivalence with a practical value 88.88%. The average practicality of E-learning from 4 aspects is practical 87.5%. The use of E-learning for all courses is practical to use.

Practicality Test Data Based on Students' Responses

Practicality test acquisition data from students can be seen in Table 7 as follows:

Table 7. Recap assessment from students

Measurement Section	Sum	Criteria
The simplicity of Using E-Learning	83.71	Practical
Time effectiveness of E-Learning usage	78.09	Practical
The attractivity of using E-Learning	78.2	Practical
Average	80	Practical

Table 7 indicates the results of the practicality test using E-learning for all course based on students' responses. The practicality of using E-learning for each aspect of simplicity, effectiveness, and attractiveness gets practical value 83.71%, 78.09%, 78.2%. The average of all learning validation results using E-learning for the three aspects gets practical value 80%. It can be concluded that using E-learning for all course is

Measurement	Sum	Criteria

practical as the learning media based on student assessments.

Effectiveness

The result of total graduated and non-graduated students can be seen in table 8:

Table 8. The Effectiveness Result

No	Class	Graduated	Non Graduated
1	2 SI T	25 (86%)	4 (14%)
2	2 SI M	23 (92%)	2 (8%)

Table 7 data on students who passed and did not pass all courses at Metamedia University using E-Learning. The number of students who pass the 2 SI T Class is 86% and 14% who fail. The number of students who graduated in the 2 SI M Class was 92% and those who did not graduated were 2%. After combining the number of students who have graduated in each study program, the percentage that has passed is 89% (effective) (Ni dkk., 2023; Tambak, Hamzah, Purwati, Irawan, & Umam, 2022; Yanto, Kabatiah, Sardi, & Zaswita, 2024). The use of E-learning in management for IT Service at Metamedia University is effective.

B. Discussion

Validity test results discussion

Validity is the accuracy in performing the measurement function (Abuhmaid, 2020). The aspects of E-learning that are measured for validity are content aspects and design aspects. Before measuring the validity of the content aspects and design aspects, an indicator validation is carried out on each statement used. The results of the questionnaire validation from experts for each question item on the content aspect were declared valid by getting a score of (85%). Based on the results of the expert's assessment, the validation questionnaire for the content aspect is valid to use. The results of the questionnaire validation from experts for each question item on the design aspect were declared very valid by getting a score of (90%). Based on the results of the expert's assessment, the validation questionnaire for the content aspect is very valid to use. Based on the results above, it can be concluded that the questionnaire to measure the validity of E-learning from the aspects of content and design is very appropriate to be used by respondents.

The questionnaire instrument that has been valid from the content aspect is then given to the E-learning expert for assessment. The questionnaire instrument for this aspect is divided into 2 parts, namely the E-learning content and interest in using E-learning. The number of statements assessed by the expert amounted to 11 statements. From the content part, the expert assessed that the E-learning developed refers to the curriculum, teaching materials in accordance with the curriculum, clear learning objectives, supports understanding of concepts, uses simple sentences and is easy to understand. In the interest group, experts assessed the characteristics and increased student interest in learning using E-learning.

Based on the assessment that has been done by the expert, from the content aspect, it gets a valid score (84%). This means that the E-learning developed has referred to the curriculum, teaching materials are in accordance with the curriculum, learning objectives are clear, have supported understanding of concepts, use simple sentences and are easy to understand. Based on the assessment that has been done by the expert, from the interest aspect, it gets a very valid score (90%) (Bhola & Kumar, 2024; Cheng & Fur, 2023; Singh dkk., 2024). This means that the development of E-learning is very suitable for the characteristics of students and greatly increases student interest in learning. The average value of the validity of E-learning learning media from the content and interest aspects is valid with a value of (85%).

The questionnaire instrument that has been valid from the design aspect is then given to the E-learning expert for assessment. The questionnaire instrument for this aspect is divided into 2 parts, namely the E-learning display section and the lingo in E-learning (Kumar & Koul, 2024; Yaniawati, Maat, Supianti, & Fisher, 2022; Yusuf & Widyaningsih, 2022). The number of statements assessed by the expert amounted to 12 statements. From the display section, the expert assesses the menu, instructions, colours, buttons and icons of E-learning. In the linguistic group, the expert assessed that the language is easy to understand and simple and is in accordance with good and correct language rules.

Based on the assessment conducted by experts, the display aspect received a valid score

(84%). This means that the menu, instructions, colours, buttons and icons of the developed E-learning are simple and easily understood by students. Based on the assessment that has been done by experts, from the language aspect it gets a very valid score (85%). This means that the development of E-learning is simple and very easy to understand and in accordance with good and correct language rules. The average value of the validity of E-learning learning media from the display and language aspects is valid with a value of (84.50%).

Discussion of practicality test results

Practicality is related to the application of E-learning media during the learning and teaching process. The application of E-learning learning media is equipped with clear instructions that make it easier for lecturers and students to use it. The level of practicality of E-learning learning media is assessed by lecturers and students who take management for IT Service. The first step in assessing the practicality level of E-learning is to validate the practicality questionnaire for each statement item to the E-learning expert. This activity is carried out to determine the validity level of each statement item that will be asked to lecturers and students who have taken the course.

The results of the validity assessment of the practicality questionnaire for each statement item conducted by E-Learning experts are valid 85%. Based on the results of the expert's assessment, the practicality questionnaire is valid and appropriate for use. After the practicality questionnaire is declared valid for use, the next step is to give the practicality questionnaire to lecturers and students who take the course. The process of filling out the practicality questionnaire to lecturers and students is done online using google form. The content of the practicality questionnaire is divided into 4 parts, the first is the ease of using E-learning, the second is the effectiveness of time to use E-learning, the third is the interpretation of E-learning and the last is the Equivalence of E-Learning.

The results of the lecturer's assessment of the practicality of using E-learning for the equivalence section received a practical value 88.88%. Based on the results of the assessment, it means that the E-learning developed can be aligned with other learning media such as power point, interactive multimedia, edmodo web-based learning, and others. The use of E-learning can be used as one of the variations of learning media that is effective and efficient to use. Based on the questionnaire statement items filled in by the lecturer, the lecturer also conducted an overall assessment of the use of E-learning for all courses. The results of the assessment of the lecturer on the overall practicality of the use of E-learning received a practical value 87.5%. Based on this assessment, E-learning used by lecturers in all courses is practical to use.

Practicality testing of the use of E-learning for all courses is also carried out to students through filling out questionnaires that have been valid at the previous stage. Practicality testing of the use of E-learning for all courses is also carried out based on student experience in using E-learning. The contents of the questionnaire testing the practicality of using E-learning all courses are divided into 3 parts. The first part asks about the ease of operation of using E-learning. The second asks about the effectiveness of using E-learning and the third is the attractiveness of E-learning.

Discussion of effectiveness test results

The effectiveness of using E-learning is seen from the ability of students to be actively involved in the learning process and make it easier to understand the learning material provided. The effectiveness of using E-learning in management for IT Servicer courses can be applied if the E-learning used is valid and practical.

IV. CONCLUSIONS

After conducting research and analysis of the application of E-learning to the learning outcomes of 2023/2024 even semester students at Metamedia University. Several conclusions were found:

1. The resulting learning media is E-learning. E-learning contains the arrangement of course material, availability of assignment menus, attendance lists, chat, discussion forums, glossaries, lessons, quizzes, surveys, URLs, wikis and workshops.
2. The results obtained from this research and development are as follows; (1) The validity of E-Learning is stated to be very valid in terms of content and interest with a total validity score of 84%, while the design aspect is stated to be valid with a total score of 85% (2) Practicality of E-Learning based on lecturer responses after going through

validation it was stated to be practical with a total score of 87.5%, while the practicality of E-learning based on student responses after going through validation was stated to be practical with a total score of 80% (3) The effectiveness of E-Learning was effective in increasing student learning outcomes which was marked by the large number of students who passed was 89%.

REFERENCES

Abuhmaid, A. M. (2020). The efficiency of online learning environment for implementing project-based learning: Students' perceptions. *International Journal of Higher Education*, *9*(5), 76–83. https://doi.org/10.5430/ijhe.v9n5p76

Ali, M., Kaddoum, G., Li, W.-T., Yuen, C., Tariq, M., & Poor, H. V. (2023). A Smart Digital Twin Enabled Security Framework for Vehicle-to-Grid Cyber-Physical Systems. *IEEE Transactions on Information Forensics and Security*, *18*, 5258–5271. Scopus. https://doi.org/10.1109/TIFS.2023.3305916

Bao, L., Tran, S. V.-T., Nguyen, T. L., Pham, H. C., Lee, D., & Park, C. (2022). Cross-platform virtual reality for real-time construction safety training using immersive web and industry foundation classes. *Automation in Construction*, *143*. Scopus. https://doi.org/10.1016/j.autcon.2022.104565

Bhola, A., & Kumar, P. (2024). Farm-Level Smart Crop Recommendation Framework Using Machine Learning. *Annals of Data Science*. Scopus. https://doi.org/10.1007/s40745-024-00534-3

Chen, X., Jiang, J., Li, Z., Qi, H., Li, Q., Liu, J., … Deng, Y. (2023). An online continual object detector on VHR remote sensing images with class imbalance. *Engineering Applications of Artificial Intelligence*, *117*. Scopus. https://doi.org/10.1016/j.engappai.2022.105549

Cheng, Y. H. G., & Fur, K. T. (2023). From Internet Celebrity to Teacher – The Evolutionary Challenge of Design Courses. Dalam Coman A. & Vasilache S. (Ed.), *Lect. Notes Comput. Sci.*: *Vol. 14026 LNCS* (hlm. 31–48). Springer Science and Business Media Deutschland GmbH. Scopus. https://doi.org/10.1007/978-3-031-35927-9_3

Dahal, N., Pant, B. P., Luitel, B. C., Khadka, J., Shrestha, I. M., Manandhar, N. K., & Rajbanshi, R. (2023). Development and Evaluation of E-Learning Courses: Validity, Practicality, and Effectiveness. *International Journal of Interactive Mobile Technologies*, *17*(12), 40–60. Scopus. https://doi.org/10.3991/ijim.v17i12.40317

Du, G., Yao, G., Li, C., & Liu, P. (2022). An Offline-Merge-Online Robot Teaching Method Based on Natural Human-Robot Interaction and Visual-Aid Algorithm. *IEEE/ASME Transactions on Mechatronics*, *27*(5), 2752–2763. Scopus. https://doi.org/10.1109/TMECH.2021.3112722

Ferrer, G. R., & Elipane, L. E. (2024). Assessing the Effectiveness of Cerebry as an Online Instructional Tool in Enhancing Student Learning in Mathematics. *ACM Int. Conf. Proc. Ser.*, 222–227. Association for Computing Machinery. Scopus. https://doi.org/10.1145/3670013.3670063

Huang, X. (2023). Design and Application of English Assisted Learning System Based on Mobile Learning Platform. Dalam Macintyre J., Zhao J., & Ma X. (Ed.), *Procedia Comput. Sci.* (Vol. 228, hlm. 231–240). Elsevier B.V. Scopus. https://doi.org/10.1016/j.procs.2023.11.027

Khabbali, H., Seghroucheni, Y. Z., & Ziti, S. (2023). Agile pedagogy: Using scrum and project based learning for enhanced educational experiences. *Colloq. Inform. Sci. Technol., CIST*, 445–449. Institute of Electrical and Electronics Engineers Inc. Scopus. https://doi.org/10.1109/CiSt56084.2023.10410018

Khoiri, A., Sibyan, H., Muryanto, S., Agussuryani, Q., Hannan, I. A., Misbah, M., … Sedon, M. F. (2024). DEVELOPMENT OF E-LEARNING ETHNO SOCIOSCIENTIFIC ISSUES (ESSI) "WASTE AND ITS HANDLING" TO EMPOWER STUDENTS' CREATIVE THINKING SKILLS. *Journal of Engineering Science and Technology*, *19*(5), 1617–1644. Scopus. Diambil dari Scopus.

Kumar, D., & Koul, S. (2024). Investigating students' perception about LMS-based online examination practices. *International Journal of Information and Learning Technology*, *41*(1), 36–60. Scopus. https://doi.org/10.1108/IJILT-12-2022-0219

Lai, C. (2023). An Optimal VR-Game Content Control Strategy based on User Physiological Conditions. *Int. Conf. Eng. Emerg. Technol., ICEET*. Dipresentasikan pada 9th International Conference on Engineering and Emerging Technology, ICEET 2023. Institute of Electrical and Electronics Engineers Inc. Scopus. https://doi.org/10.1109/ICEET60227.2023.10525841

Lei, W., Wang, S., Zhang, N., Wen, H., Hou, W., Lin, H., & Han, Z. (2022). Adaptive Decision-Making Framework for Federated Learning Tasks in Multi-Tier Computing. *INFOCOM WKSHPS - IEEE Conf. Comput. Commun. Workshops*. Dipresentasikan pada INFOCOM WKSHPS 2022 - IEEE Conference on Computer Communications Workshops. Institute of Electrical and Electronics Engineers Inc. Scopus. https://doi.org/10.1109/INFOCOMWKSHPS54753.2022.9798193

Levy, E., Maman, N., Shabtai, A., & Elovici, Y. (2024). AnoMili: Spoofing Hardening and Explainable Anomaly Detection for the 1553 Military Avionic Bus. *IEEE Transactions on Aerospace and Electronic Systems*, *60*(6), 7738–7753. Scopus. https://doi.org/10.1109/TAES.2024.3418757

Li, Z., Zuo, C., & Chen, Q. (2023). Deep learning-assisted slightly off-axis digital holographic quantitative phase imaging. Dalam Zhou C., Poon T-C., Cao L., & Yoshikawa H. (Ed.), *Proc SPIE Int Soc Opt Eng* (Vol. 12768). SPIE. Scopus. https://doi.org/10.1117/12.2688338

Liu, Z., Zhang, Y., Ding, Z., & He, X. (2023). An Online Active Broad Learning Approach for Real-Time Safety Assessment of Dynamic Systems in Nonstationary Environments. *IEEE Transactions on Neural Networks and Learning Systems*, *34*(10), 6714–6724. Scopus. https://doi.org/10.1109/TNNLS.2022.3222265

Lu, R., & Ji, F. (2024). Design and implementation of a virtual teacher teaching system algorithm based on facial expression recognition in the era of big data. *Applied Mathematics and Nonlinear Sciences*, *9*(1). Scopus. https://doi.org/10.2478/amns.2023.2.00053

Luo, Y., Lu, Z., Yin, X., Lu, S., & Weng, Y. (2023). Application Research of Vertical Federated Learning Technology in Banking Risk Control Model Strategy. *Proc. - IEEE Int. Conf. Parallel Distrib. Process. Appl., Big Data Cloud Comput., Sustain. Comput. Commun., Soc. Comput. Netw., ISPA/BDCloud/SocialCom/SustainCom*, 545–552. Institute of Electrical and Electronics Engineers Inc. Scopus. https://doi.org/10.1109/ISPA-BDCloud-SocialCom-SustainCom59178.2023.00103

Maulana, I. T., & Firdian, F. (2019). Project-based learning model practicality on local network devices installation subject. *International Journal of Emerging Technologies in Learning*, *14*(15), 94–106. https://doi.org/10.3991/ijet.v14i15.10305

Maulana, I. T., & Firdian, F. (2020). Development of Problem-Based Basic Computer Network Teaching Tools. *Journal of Education: Theory, Research, and Development*, *21*, 671–676. http://dx.doi.org/10.17977/jptpp.v5i5.13523

Maulana, I. T., Firdian, F., & Rahmelina, L. (2021). E-Learning effective during the Covid-19 era. *Elementary Education Online*, *20*(2), 179–188. https://doi.org/10.17051/ilkonline.2021.02.20

Mulya, R., & Juwita, M. D. (2022). E-learning Courseware Development for Power Electronics Course. *International Journal of Interactive Mobile Technologies*, *16*(3), 66–81. Scopus. https://doi.org/10.3991/IJIM.V16I03.27723

Nasir, M., Riaz, K., Zulfiqar, M. H., Mateen Fawad, M., Khan, A., Wang, B., & Bermak, A. (2024). Accessible Remote Electronic Education: Affordable DIY Paper-based Tunable RC Oscillator Circuits. *IEEE Conf. Technol. Sustain., SusTech*, 226–229. Institute of Electrical and Electronics Engineers Inc. Scopus. https://doi.org/10.1109/SusTech60925.2024.10553508

Ni, T., Li, J., Zhang, X., Zuo, C., Wang, W., Xu, W., … Zhao, Q. (2023). Exploiting Contactless Side Channels in Wireless Charging Power Banks for User Privacy Inference via Few-shot Learning. *Proc Annu Int Conf Mobile Comput Networking*, 1105–1119. Association for Computing Machinery. Scopus. https://doi.org/10.1145/3570361.3613288

Oktavia, Y., & Zaim, M. (2024). Development of the BROSING Model in Scientific Article Writing Learning. *International Journal of Information and Education Technology*, *14*(8), 1078–1089. Scopus. https://doi.org/10.18178/ijiet.2024.14.8.2136

Santos, C., Pedro, L., Carvalho, A. R., & Ferreira, A. L. (2023). Designing and validating the gamification strategy model of a digital platform to promote extracurricular projects in K-12 schools the GENE gamification strategy model. *Iberian Conf. Inf. Syst. Technol., CISTI*, *2023-June*. IEEE Computer Society. Scopus. https://doi.org/10.23919/CISTI58278.2023.10211925

Setyosari, P., Kuswandi, D., & Ulfa, S. (2023). Creative Problem Solving Process Instructional Design in the Context of Blended Learning in Higher Education. *Electronic Journal of E-Learning*, *21*(2), 80–97. Scopus. https://doi.org/10.34190/ejel.21.2.2653

Singh, M., Smitham, P., Jain, S., Day, C., Nijman, T., George, D., … Nimon, G. (2024). Exploring the viability of Virtual Reality as a teaching method for knee aspiration. *Virtual Reality*, *28*(3). Scopus. https://doi.org/10.1007/s10055-024-01027-7

Siswanto, J., Harjanta, A. T. J., Suminar, I., & Suyidno, S. (2022). Digital Learning Integrated with Local Wisdom to Improve Students' Physics Problem-Solving Skills and Digital Literacy. *J. Phys. Conf. Ser.*, *2392*(1). Institute of Physics. Scopus. https://doi.org/10.1088/1742-6596/2392/1/012025

Tambak, S., Hamzah, M. L., Purwati, A. A., Irawan, Y., & Umam, M. I. H. (2022). Effectiveness of Blended Learning Model Based on Problem-Based Learning in Islamic Studies Course. *International Journal of Instruction*, *15*(2), 775–792. Scopus. https://doi.org/10.29333/iji.2022.15242a

Yaniawati, P., Maat, S. M., Supianti, I. I., & Fisher, D. (2022). Mathematics mobile blended learning development: Student-oriented high order thinking skill learning. *European Journal of Educational Research*, *11*(1), 69–81. Scopus. https://doi.org/10.12973/EU-JER.11.1.69

Yanto, D. T. P., Kabatiah, M., Sardi, J., & Zaswita, H. (2024). Evaluating the Practicality of Android-Based Courseware in Enhancing Electrical Circuit Proficiency among Vocational Students. *International Journal of Interactive Mobile Technologies*, *18*(2), 27–42. Scopus. https://doi.org/10.3991/ijim.v18i02.46341

Yar, A., Henna, S., McAfee, M., & Gharbia, S. S. (2023). Air Pollution Monitoring Using Online Recurrent Extreme Learning Machine. *Ir. Conf. Artif. Intell. Cogn. Sci., AICS*. Dipresentasikan pada 2023 31st Irish Conference on Artificial Intelligence and Cognitive Science, AICS 2023. Institute of Electrical and Electronics Engineers Inc. Scopus. https://doi.org/10.1109/AICS60730.2023.10470534

Yu, X., Ye, K., Chen, Z., Yi, J., Chen, X., Liu, B., & Xu, C. (2023). A Semi-supervised Learning Based Method for Identifying Idle Virtual Machines in Managed Cloud: Application and Practice. Dalam Zhang Y. & Zhang L.J. (Ed.), *Lect. Notes Comput. Sci.*: *Vol. 14209 LNCS* (hlm. 65–82). Springer Science and Business Media Deutschland GmbH. Scopus. https://doi.org/10.1007/978-3-031-44836-2_5