



AN EVALUATION OF THE USE OF ONLINE PROGRAMMING SIMULATOR TO INCREASE THE PARTICIPATION RATE OF CLASSROOM STUDENT ATTENDANCE

¹Riad Sahara, ²Syahid Abdullah, ³Cian Ramadhona Hassolthin, ⁴Muhammad Ikhwani Saputra

^{1,2,3,4}Prodi PJJ Informatika, Universitas Siber Asia, Indonesia

*Corresponding Author? E-mail: riadsahara@lecturer.unsia.ac.id

Abstract

The Informatics Distance Learning Study Program at UNSIA is one of the study programs that employs a significant number of practicum-type courses as part of its learning process. The implementation of the practicum is carried out through joint simulations to achieve 21st-century graduate competencies. The implementation of learning for practicum-type courses is carried out through the utilization of the Learning Management System (LMS) and Zoom. In practicum-type courses, students are required to install the software necessary for the lecture process, particularly for joint simulations. A significant number of students have encountered difficulties in installing the requisite software. These issues led to a dearth of student engagement during the joint simulations conducted via Zoom, particularly in terms of active participation. The implementation of an appropriate online programming simulator (OPS) is expected to enhance participation in practicum-type courses during synchronous sessions, thereby facilitating the acquisition of the greatest possible learning. The results of the analysis conducted before the implementation of OPS revealed that the lowest active class participation rate was 36.7% (22 students) out of a total of 60 students, while the highest active class participation rate was 50.0% (30 students) out of a total of 60 students. Following the implementation of OPS, the lowest participation rate was 83.3% (53 students) of the total 60 students, while the highest active class participation rate reached 96.7% (58 students) of the total 60 students.

Keywords: Class Participants, E-Learning, Higher Education, Online Programming Simulator

INTRODUCTION

The Law Number 20 of 2003 explains that education is a conscious and planned effort to create learning activities and learning processes so that students and educators actively develop their potential to have the capabilities and skills needed by themselves, society, and the state (Widiastuti et al., 2022). In the implementation of the learning process in education in the 21st century learning era, the use of information technology has become mandatory (Kholid, 2020; Rosnaeni, 2021). The rapid development of information technology at this time has shifted the effectiveness of conventional learning models towards new learning models based on the use of technological media with its role (Rahman et al., 2020).

The role of information technology, particularly in the context of higher education, offers a plethora of opportunities for the effective teaching and learning process. Indeed, it is anticipated that the use of information technology will enhance student participation (Kusuma et al., 2021). Some information technology products currently employed in the field of learning are learning management systems and video conferencing. In accordance with the contemporary trends in learning, the shift has occurred from a traditional offline learning model to an online-based learning model, which is facilitated by the utilization of LMS and video conference applications such as Zoom. The utilization of e-learning media in blended learning or full online learning is one of the strategies employed to encourage students to

engage in learning optimally. The utilization of LMS media in learning activities necessitates a high degree of independence, awareness, and responsibility, particularly among students, to ensure the success of their learning (Samini et al., 2023). E-learning media offers teachers the convenience of preparing a variety of learning activities for students (Andayani et al., 2023).

Universitas Siber Asia (UNSIDA) is one of the higher education institutions that employ the fully online learning model for all of its study programs. UNSIDA is committed to producing graduates who possess the diverse skills and competencies required to thrive in the 21st century. In the 21st century, college graduates are expected to possess a range of abilities that enable them to thrive in an increasingly competitive landscape. These abilities, collectively known as 21st-century competencies, include creativity, critical thinking skills, communication, and collaboration (Magfirah, 2021). The Informatics Distance Learning Study Program at UNSIDA is one of the study programs whose learning process incorporates a significant number of practicum-type courses. Some learning processes that require hands-on activities or practicum, as exemplified by the online learning model, are transferred to a form of joint simulation (Sari et al., 2023). Practicum can facilitate student success in learning practicum-type courses (Sunardi & Suchyadi, 2020). Practical activities with joint simulations can facilitate the development of a range of skills in students, including independence, creativity, discipline, critical thinking, responsibility, scientific attitudes, and others (Muhtadea Mardhatilla, 2021).

In the UNSIDA Informatics Distance Learning Study Program, the implementation of learning for practicum-type courses is carried out by utilizing the Learning Management System (LMS) and Zoom to facilitate joint simulations between teachers and students. Although this learning model is still relatively novel, teachers and students must be able to adapt to learning models based on online learning systems (Akhriza, 2020). In the majority of theoretical courses, students do not require any additional software tools to engage in the learning process. In contrast, students enrolled in practicum-type courses are required to install the requisite software for the lecture process, particularly for joint simulations. A significant number of students encounter difficulties in installing the requisite software, including issues with downloading, installing, configuring, and utilizing the software effectively. These difficulties result in a lack of student engagement during joint simulations conducted via Zoom, which are conducted in real-time. This will undoubtedly influence the student learning evaluations in terms of the level of absorption of the taught material.

Previous research indicates that the learning process, which is characterized by hands-on activities or practicum, is transferred to a form of joint simulation in this online learning model (Sari et al., 2023). This is consistent with the Student-Centered Learning (SCL) approach, where the locus of learning has shifted from the teacher to the learner. In this study, the learners are students (Samuel & Santosa, 2018). Joint simulations can fully realize the role of students in learning, with lecturers assuming a more facilitative role. The implementation of learning for practicum-type courses is carried out by utilizing the Learning Management System (LMS) and Zoom to conduct joint simulations of teachers and students. This learning model presents significant challenges for teachers attempting to implement online learning, particularly for those instructing practicum courses (Muhsin Arifin et al., 2022), such as Web Programming I (HTML). Existing obstacles include the use of an appropriate online simulator for joint simulation as a substitute for direct practice in a computer lab (Akhriza, 2020; Magfirah, 2021; Muhsin Arifin et al., 2022; Sari et al., 2023). Consequently, an appropriate online simulator, such as the Online Programming Simulator (OPS), should be employed as a tool in the learning process.

Based on the aforementioned issues and supported by prior literature studies, researchers are interested in identifying solutions through the utilization of the Online Programming Simulator, which can be readily employed by students for joint simulation in learning. This is the primary rationale for researchers conducting research and subsequently formulating two problem formulations. The first is to determine the optimal Online Programming Simulator to be utilized as software during joint simulations in synchronous sessions for Web Programming I (HTML) courses. The second problem formulation is to determine how to increase the number of participants in a joint simulation in a synchronous session for Web Programming I (HTML) after the use of the Online Programming Simulator in the learning process.

Students are not required to engage in other activities to utilize OPS software during a synchronous session, during which they may participate in a joint simulation. Researchers will recommend an online programming simulator that is appropriate for use, particularly for web programming I (HTML) courses, which are of the practicum course type. This is consistent with the hypothesis or research objectives that are to be produced from the research conducted, namely the existence of an online programming simulator that is to be used as software during joint simulations in synchronous sessions for web programming I (HTML) courses. Furthermore, the objective is to enhance student engagement in joint simulations in synchronous sessions for Web Programming I (HTML) following the utilization of the Online Programming Simulator in the learning process.

The utilization of an optimal online programming simulator is anticipated to enhance student engagement in practicum activities conducted in real-time, thereby maximizing the learning potential. The selection of an appropriate online programming simulator will undoubtedly facilitate learners or students in participating in joint simulations in synchronous sessions for Web Programming I (HTML) courses. This is because the use of the online programming simulator allows students to engage in the learning process without the need for special software that requires additional effort in terms of installation and use. Another anticipated outcome of the research is an increase in the number of participants in the joint simulation in synchronous sessions for Web Programming I (HTML) following the use of the Online Programming Simulator in the learning process. The Online Programming Simulator is designed to be user-friendly, which is expected to facilitate optimal learning outcomes and positively impact the evaluation of learning.

RESEARCH METHODS

The Research Subject

The subjects utilized by researchers in this study were all students enrolled in the Web Programming I course of the Informatics Distance Learning Study Program of UNSIA. The total number of students in the course was approximately 60. The research subjects were selected based on the feasibility of fulfilling the research objectives.

The Research Stages

The research commenced with the selection and preparation of an appropriate online programming simulator (OPS) as simulator in the implementation of learning in synchronous sessions for joint simulation. The selection of an Online Programming Simulator is made by the instructor based on their experience of using the simulator and the accuracy of its implementation in the learning process. The selected Online Programming Simulator will be made available to students for use. Subsequently, the number or level of student participation in synchronous sessions for joint simulations is to be analyzed before and after the use of the Online Programming Simulator. The results of the observation and analysis will yield the

number or level of student participation in synchronous sessions for joint simulations. The results of the analysis will undoubtedly prove to be a highly valuable input for curriculum developers and educators in identifying more effective and engaging classroom learning strategies.

The stages of the research conducted are shown in the figure below:

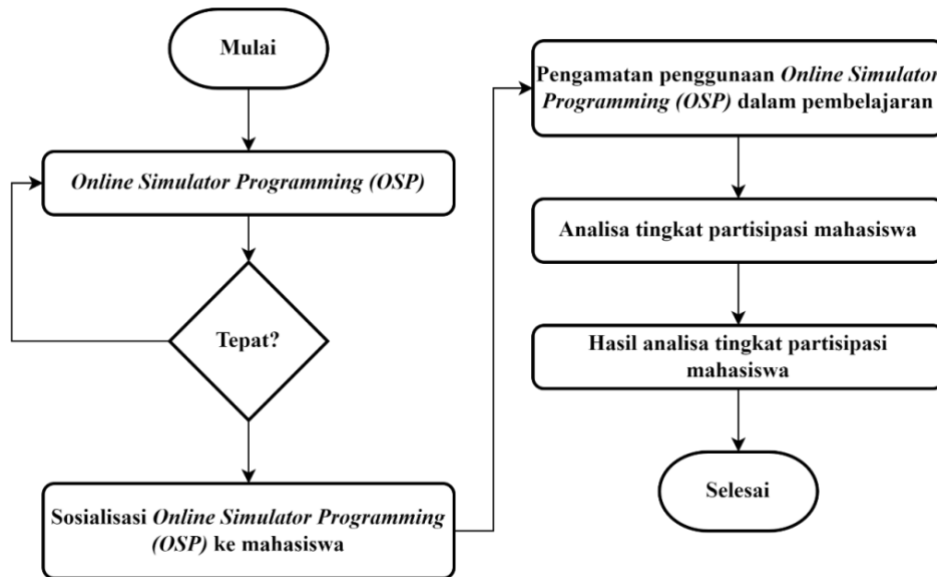


Figure 1. The stages of the research

The Data Collection Techniques

The data collection technique employed by the researchers in this study is observation. This technique is well-suited to the needs of research in the field of simple survey statistics. (Wibowo, 2019).

The Data Analysis Technique

The researchers employed quantitative data analysis techniques for the data analysis procedures they undertook. This technique is the most appropriate for the data to be processed in the research, as it is numerical and can be calculated using arithmetic operations or simple statistical formulas.

THINKING FRAMEWORK

This study examines the relationship between the use of an online programming simulator and increased student participation in the learning process. The utilization of the Online Programming Simulator enables students to engage in the learning process without the necessity of utilizing specialized software that necessitates effort in its installation and use. The Online Programming Simulator is designed to be user-friendly, which is expected to result in increased student participation in the learning process. This, in turn, should lead to enhanced learning outcomes and a more positive evaluation of the learning experience. This leads to the conclusion that there is a clear relationship between the proper use of the online programming simulator and an increase in student participation in the pursuit of optimal learning outcomes.

The Application of Learning Management Systems (LMS) in the Learning Process

Learning Management System (LMS) is a system or platform used to manage online learning. However, the use of LMS is not only limited to learning that is carried out online but can also be used as a learning tool with an offline implementation mode (Sahara et al., 2023).

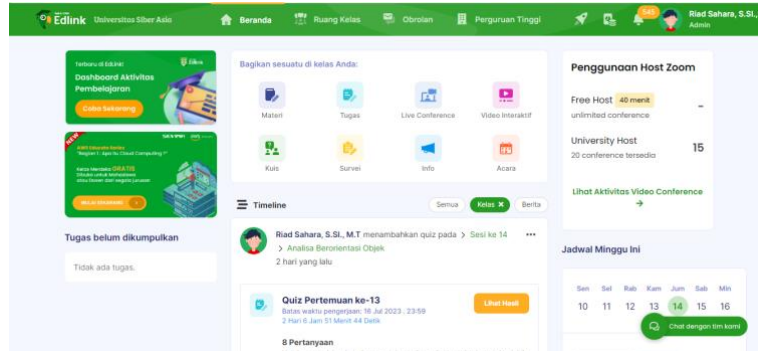


Figure 2. Learning Management Systems (LMS) (SEVIMA, 2021).

Online Programming Simulator (OPS) as a Learning Tool

The Online Programming Simulator (OPS) plays a pivotal role in the organization of learning, particularly within the context of distance learning. OPS offers a plethora of web resources, which provide users with both free and paid access to a diverse array of activities. These activities encompass a spectrum of formats, including tournaments, games, static situations, fault-finding, testing, and more. These activities serve to elucidate the fundamental principles of writing program code and facilitate the deepening of users' knowledge in the field of programming (Zinovieva et al., 2021).

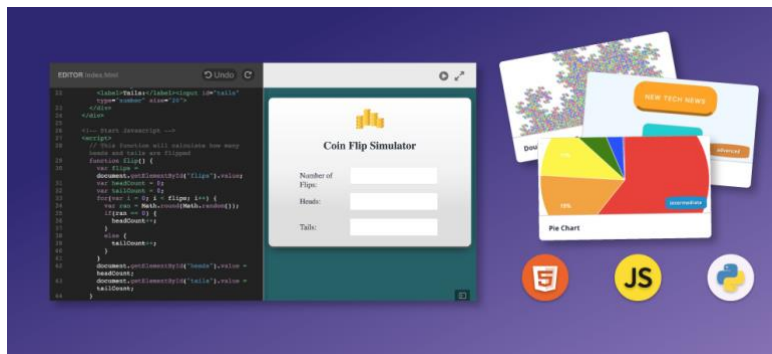


Figure 3. Online Programming Simulator (OPS) - Tynker Code Editor (Tynker, 2018)

The Way to Increase Student Participation in Learning

The development of information technology provides numerous solutions to enhance the effectiveness of the learning process and is anticipated to boost student engagement in the implementation of learning (Kusuma et al., 2021). The quality of the learning itself, as well as the achievement of learning objectives for students as expected by educators or teachers, largely determines effective learning (Bararah, 2020).

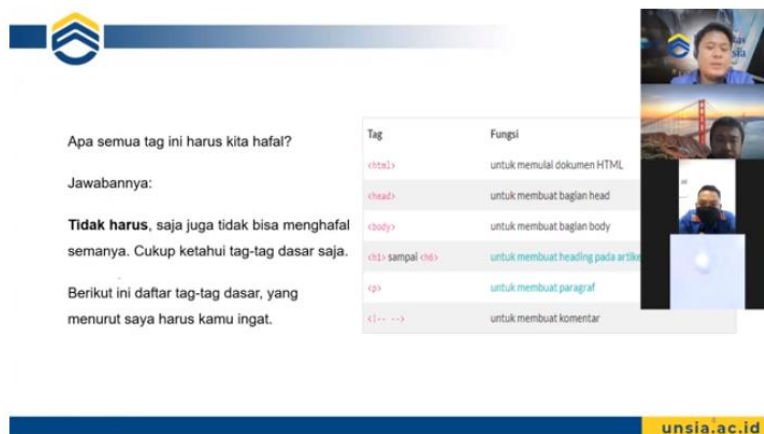


Figure 4. The Example of Student Participated Learning

RESULT AND DISCUSSION

Result of the Research

OPS Implementation in Increasing Class Participation Rate

Here are some examples of Online Programming Simulator (OPS) that can be implemented as a tool in classroom learning:

Table 1. List of Online Programming Simulator (OPS) for Simulation in Learning

Online Programming Simulator (OPS)	Link
HTML Virtual Labs – A MHRD Govt of India Initiative	https://html-iitd.vlabs.ac.in/
One Compiler – HTML Online Code Editor	https://onecompiler.com/html
Programiz – Online HTML Editor	https://www.programiz.com/html/online-compiler/
Tutorials Point	https://www.tutorialspoint.com/online_html_editor.php
W3Schools	https://www.w3schools.com/html/default.asp
OnlineGDB.com	https://www.onlinegdb.com/online_html_compiler
DecSoft HTML Compiler	https://www.decsoftutils.com/htmlcompiler
SoloLearn	https://www.sololearn.com/compiler-playground/web
Replit	https://replit.com/languages/html
All in One HTML Compiler	https://chrome.google.com/webstore/detail/all-in-one-html-compiler/kjoieegokhlfbfjppnfcokkkfdmghk?page=1&hl=id&itmlang=bg

Based on the OPS mentioned above, some were socialized and tested as a tool in the Web Programming I (HTML) class learning as can be seen in Figure 5, below.

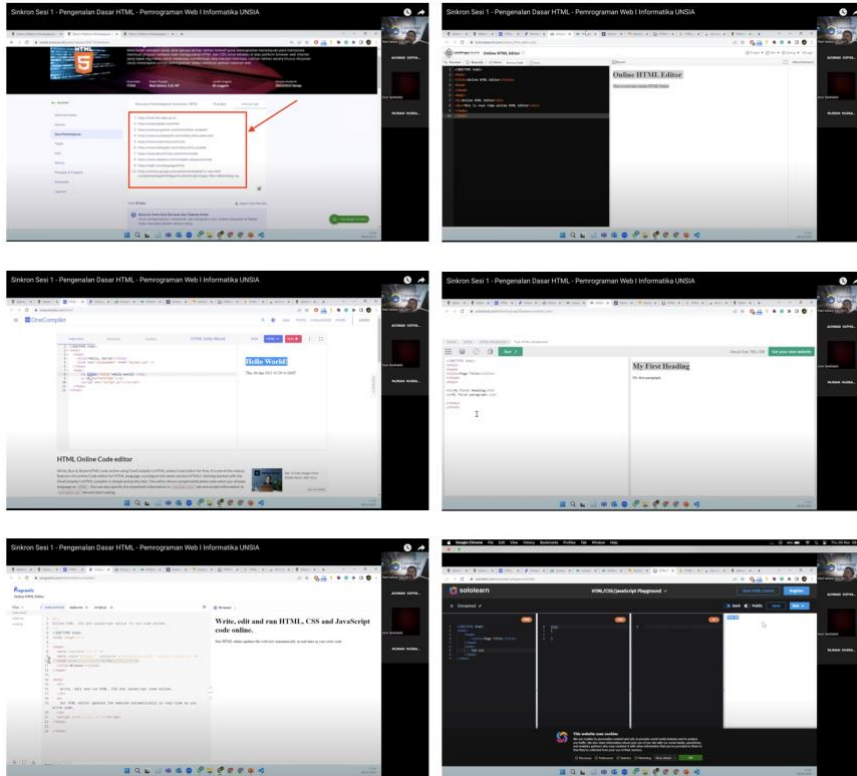


Figure 1. The Online Programming Simulator (OPS) as an Assistance Tool in Classroom Learning in Web Programming I Course

The results of several OPS trials indicated that OPS from W3Schools with the domain <https://www.w3schools.com/html/default.asp> was the optimal choice. The selection results are based on the ease of use of OPS and also include comprehensive learning resources, as well as case studies of the implementation of learning resource materials that are highly relevant to Web Programming I (HTML).

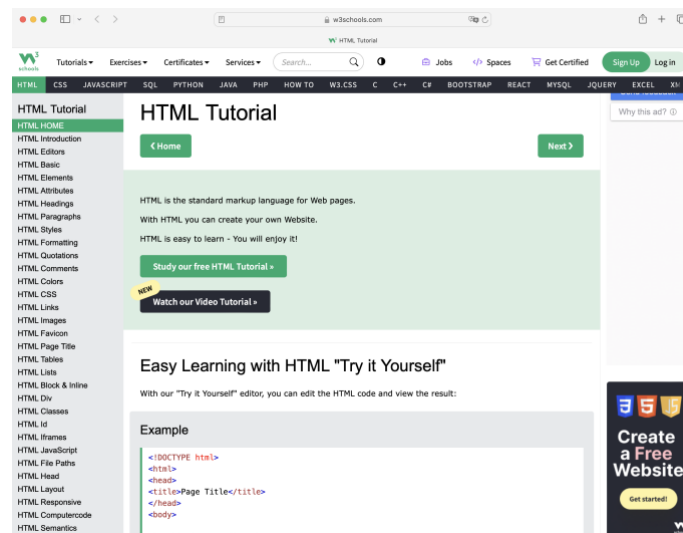


Figure 2. OPS From W3Schools – HTML Tutorial

Discussion

The Impact of OPS Implementation on Classroom Participation Rates in Learning

The analysis of the impact of OPS implementation was carried out by researchers in the Web Programming I class of the UNSIA Informatics PJJ Study Program. The total class participants were 60 students. In the 1st Learning Session until the 5th session, OPS has not been implemented. OPS was implemented in the 6th Learning Session to the 16th session.

Table 2. Analysis of Classroom Participation in Learning Before and After OPS Implementation

Learning Session	Before OPS Implementation					After OPS Implementation										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Active Classroom Participation	30	24	22	25	30	35	51	55	55	52	50	55	56	53	57	58
Percentage of Active Class Participation (%)	50	40	36	41,6	50	58,3	85	91,6	91,6	86,6	83,3	91,6	93,3	88,3	95	96,67
Non-Active Classroom Participation	30	36	38	35	30	25	9	5	5	8	10	5	4	7	3	2
Non-Active Class Participation Percentage (%)	50	60	63,3	58,3	50	41,67	15	8,3	8,3	13,3	16,6	8,33	6,67	11,6	5	3,33

The table 2 above shows the number of class participants before and after the implementation of OPS in the classroom learning process. Before the implementation of OPS, the lowest active class participation rate was 36.67% (22 students) out of a total of 60 students, and the highest active class participation rate was only 50.00% (30 students) out of a total of 60 students. After the implementation of OPS, the lowest participation rate was 58.33% (35 students) out of a total of 60 students because of the first session using OPS, the highest active class participation rate could even reach 96.67% (58 students) out of a total of 60 students. For the S curve in Table 2. can be seen in Figure 7. below.

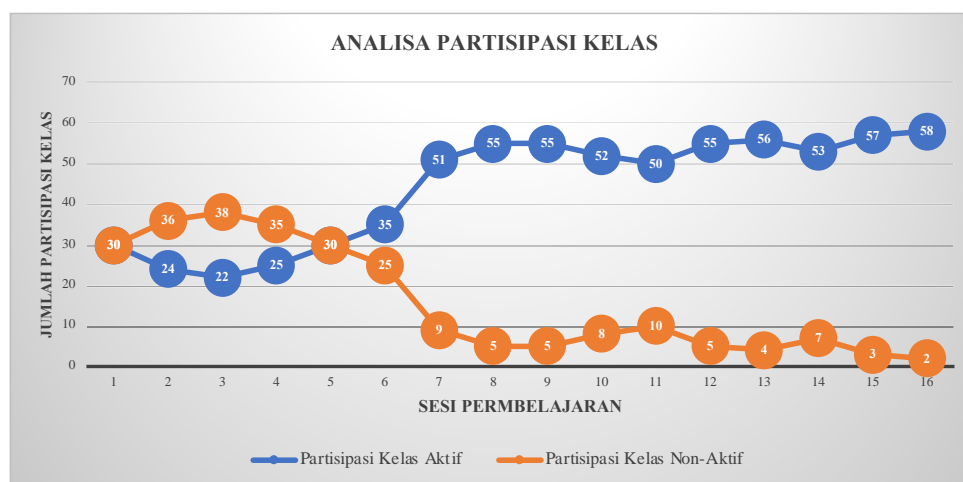


Figure 3. The Graph of Class Participation Rate Before and After OPS Implementation

CONCLUSION

The implementation of the Online Programming Simulator (OPS) in the learning process represents an optimal solution for use as a co-simulation tool in practicum-type courses, such as Web Programming I (HTML). In conjunction with the selected OPS, namely W3Schools, this combination is particularly advantageous as it is based on the ease of use of

OPS and is also equipped with comprehensive learning resources, including case studies of the implementation of learning resource materials that are highly relevant to Web Programming I (HTML) Course. The increase in the number of class participants before and after the implementation of OPS in the classroom learning process for joint simulation in practicum-type courses is statistically significant. Prior to the implementation of OPS, the highest proportion of active class participants was 50.00% (30 students) out of a total of 60 students. Following the implementation of OPS, the highest number of active class participants can reach 96.67% (58 students) out of a total of 60 students. This is indicative of success in increasing the number of class participants engaged in joint simulation following the implementation of OPS in the learning process.

REFERENCES

- Akhriza, T. M. (2020). Gamifikasi Pembelajaran Online Untuk Peningkatan Partisipasi Mahasiswa Di Masa Pandemi Covid-19. *Seminar Nasional Teknologi Informasi Dan Komunikasi STI&K (SeNTIK)*, 83–91.
- Andayani, D., Ruselli Puspa, V., Muhammad, N., & Istiqlal, Y. (2023). Hubungan Tingkat Partisipasi Mahasiswa pada E-Learning Mata Kuliah Botani Tumbuhan Tinggi Berbasis RQA dengan Hasil Belajar Mahasiswa The Relationship Between Student Participation Rates in E-Learning Vascular Plant Subject Based on RQA with Student Learning Outcomes. *Jurnal JEUMPA - Jurnal Pendidikan Sains & Biologi*, 10(1), 166–175. <https://doi.org/10.33059/jj.v10i1.7611>
- Bararah, I. (2020). Pengelolaan Sarana Dan Prasarana Pendidikan Dalam Meningkatkan Kualitas Pembelajaran. *Jurnal Mudarrisuna: Media Kajian Pendidikan Agama Islam*, 10(2), 351–370. <https://doi.org/10.22373/jm.v10i2.7842>
- Kholid. (2020). Pentingnya Literasi Digital Bagi Guru Pada Lembaga Pendidikan Tingkat Dasar Dan Implikasinya Terhadap Penyelenggaraan Kegiatan Belajar Mengajar. *Jurnal Horizon Pedagogia*, 1(1), 22–27.
- Kusuma, S. H., Kholis, N., Syibly, M. R., Safitri, J., & Krismono. (2021). Meningkatkan Partisipasi Peserta Didik Melalui Flipped dan Blended Learning Sebagai Upaya Optimalisasi Capaian Pembelajaran pada Mata Kuliah Wajib Universitas. *Refleksi Pembelajaran Inovatif*, 3(1), 385–397.
- Magfirah. (2021). Penggunaan Social Networking Tools dan LMS untuk Meningkatkan Partisipasi Mahasiswa dalam Pembelajaran Kolaboratif Online Use of Social Networking Tools and LMS to Increase Student Participation in Online Collaborative Learning. *Jurnal Kreatif Online (JKO)*, 9(2), 20–26. <http://jurnal.fkip.untad.ac.id/index.php/jko>
- Muhsin Arifin, M., Handono, S. B., & Harijanto, A. (2022). Efektivitas Penggunaan Simulasi Phet Dalam Pembelajaran Online Terhadap Hasil Belajar Siswa. *Jurnal Pembelajaran Fisika*, 11(1), 16–27. <https://doi.org/https://doi.org/10.19184/jpf.v11i1.30612>
- Muhtadea Mardhatilla, Z. (2021). PhET Simulation Sebagai Penunjang Pembelajaran IPA Secara Online Selama Pandemi Covid-19. *Proceeding of Integrative Science Education Seminar*, 441–448. <https://prosiding.iainponorogo.ac.id/index.php/pisces>
- Rahman, M. A., Amarullah, R., & Hidayah, K. (2020). Evaluasi Penerapan Model Pembelajaran E-Learning pada Pelatihan Dasar Calon Pegawai Negeri Sipil. *Jurnal Borneo Administrator*, 16(1), 101–116. <https://doi.org/10.24258/jba.v16i1.656>
- Rosnaeni, R. (2021). Karakteristik dan Asesmen Pembelajaran Abad 21. *Jurnal Basicedu*, 5(5), 4341–4350. <https://doi.org/10.31004/basicedu.v5i5.1548>

- Sahara, R., Abdullah, S., Saputra, M. I., & Hassolthine, C. R. (2023). Integration Design of Academic Information Systems And Learning Management Systems Using Web Services Rest-Based External Database. *Jurnal Ilmiah FIFO*, 14(2), 205. <https://doi.org/10.22441/fifo.2022.v14i2.010>
- Samuel, D., & Santosa, S. (2018). Peningkatan Antusiasme Dan Kedalaman Kajian Belajar Mahasiswa Melalui Pembelajaran Berbasis Silabus Individual. *Portal Jurnal Elektronik Universitas Kristen Satya Wacana (UKSW)*. <https://core.ac.uk/works/69986518>
- Sari, L., Harahap, D. S., Surjati, I., Ningsih, Y. K., & Fitriana, R. (2023). Pelatihan Penggunaan Simulator Online sebagai Alat Bantu Ajar Materi Rangkaian Listrik. In *Jurnal Pengabdian Masyarakat Ipteks* (Vol. 9, Issue 1).
- SEVIMA, F. (2021, February 17). *Pengertian Learning Management System (LMS), Manfaat & Penerapannya*. <https://sevima.com/pengertian-learning-management-system/>
- Sunardi, O., & Suchyadi, Y. (2020). Praktikum Sebagai Media Kompetensi Pedagogik Guru Sekolah Dasar. *Jurnal Pendidikan Dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, 03, 124–127. <http://journal.unpak.ac.id/index.php/jppguseda>
- Samini, Trisiana, A., & Jumanto. (2023). Analisis Penerapan Model Self Directed Learning Terhadap Kemandirian Dan Hasil Belajar Peserta Didik Kelas V Di SDN 01 Wonorejo Kecamatan Gondangrejo Tahun Pelajaran 2022/2023. *Journal on Education*, 06(01), 7941–7959.
- Tynker. (2018, October 5). *Code the Web: HTML, JavaScript, CSS and Python with Live Preview*.
- Wibowo, I. T. (2019). Proses Difusi Inovasi Program Sakti (Studi Kasus Proses Difusi Inovasi Program Sistem Aplikasi Keuangan Tingkat Instansi (Sakti) Ditjen Perbendaharaan Di D.I. Yogyakarta Tahun 2018). *Jurnal Perbendaharaan, Keuangan Negara Dan Kebijakan Publik*, 4(4), 323–337. <https://doi.org/https://doi.org/https://doi.org/10.33105/itrev.v4i4.139>
- Widiastuti, F., Amin, S., & Hasbullah, H. (2022). Efektivitas Metode Pembelajaran Case Method Dalam Upaya Peningkatan Partisipasi dan Hasil Belajar Mahasiswa pada Mata Kuliah Manajemen Perubahan. *Edumaspul - Jurnal Pendidikan*, 6(1), 728–731.
- Zinovieva, I. S., Artemchuk, V. O., Iatsyshyn, A. V., Popov, O. O., Kovach, V. O., Iatsyshyn, A. V., Romanenko, Y. O., & Radchenko, O. V. (2021). The use of online coding platforms as additional distance tools in programming education. *Journal of Physics: Conference Series*, 1840(1). <https://doi.org/10.1088/1742-6596/1840/1/012029>