International Journal of Scientific Engineering and Science
Volume 8, Issue 10, pp. 42-46, 2024. ISSN (Online): 2456-7361

The Effectiveness of Mobile Learning to Improve Students' Learning Independence in Online-Based Learning

Andi Hudiah[1], Darlan Sidik[2]
[1]Department of Family Welfare Education, Universitas Negeri Makassar, Indonesia
[2]Department of Electrical Engineering, Universitas Negeri Makassar, Indonesia
Email address: a.hudiah@unm.ac.id

Abstract**—***This study aims to determine the effectiveness of implementing mobile learning as one of the strategies for delivering online-based instructional design courses and its impact on the learning independence of students at the Faculty of Engineering. Students' learning independence refers to the initiative of students to learn, the desire to master competencies, self-confidence, responsibility for their academic duties, and not relying on their peers. The researcher employed a descriptive quantitative approach, using Cluster Random Sampling as the sampling technique. A total of 32 first-semester students from the 2021-2022 academic year were sampled. Data collection techniques included questionnaires and interviews. The findings show that: (1) the students are highly responsive to the use of mobile learning in the Instructional Design course, as evidenced by questionnaire analysis score of 77%; (2) mobile learning positively impacts the learning independence of students, with an average score of 76%; (3) hypothesis test results along with questionnaire and interview analysis indicate a significant correlation between mobile learning usage and student learning independence in the Instructional Design course. The use of mobile learning as the primary indicator in the Design Learning course received a very positive response. This is attributed to the effective utilization of class time, particularly in meeting assignment deadlines.*

Keywords**—** *mobile learning, learning independence, online based learning*

I. INTRODUCTION

Higher education plays a crucial role in improving the quality of human resources in universities. The National Education System Law No. 20 of 2003 states that the function of national education is to develop capabilities and shape the character and civilization of a dignified nation to educate the nation, aiming to develop students into individuals who are faithful and pious to God Almighty, possess noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (Article 3 of Law No. 20/2003). The success of learning cannot be separated from the success of the learning process itself, as students undergo both knowledge and personal development during this process. The National Education System (SISDIKNAS) in article 1, Section 20 of Law No. 20/2003 defines learning as an interaction process between students and educators or instructors and learning resources within a learning environment. The interactions within this learning process include: 1) interaction between lecturers and students; 2) interaction between lecturers, students, and learning resources; 3) interaction between students and learning resources; 4) interaction between students; and 5) interaction between lecturers, students, and their social and environmental surroundings (Rusman, 2016:58). The communication interaction mentioned can occur either face-to-face or online using smartphone devices (Ardiansyah, 2020).

In the conceptual implementation of learning, several key components must be considered, such as learning outcomes, teaching materials, learning strategies, media, and evaluation. Achieving learning objectives is closely tied to instructional design and how students are organized in the learning process. One way lecturers can organize students is by fostering student independence in learning (Hariyanti, 2020).

Currently, education is undergoing changes, particularly in its learning systems, with the implementation of the independent curriculum, which significantly affects students' independence in studying course materials. Universities like UNM have altered their academic routines to adopt two learning strategies known as online and offline services based on Learning Management Systems (LMS). Online learning services strengthen the achievement of the independent learning curriculum (Sidik & Syafar, 2019).

The independent learning-based curriculum, coupled with online delivery strategies, has become one of the primary methods of conducting lectures in the face of the digital era. Various online learning strategies now offer learning applications (Sherina, 2020). Online learning is conducted through various applications (Suhada et al., 2020). Online learning connects students with their learning resources (databases, experts/instructors, libraries) that are physically distant or remote, but can still communicate, interact, or collaborate via network connections, either directly (synchronous) or indirectly (asynchronous). This is viewed as a primary indicator of lecture delivery, alongside another key indicator: independent learning (Butler, 2023; Attewell, J. 2005). The variety of interactive application choices serves as both a medium and a support tool for implementing lectures.

The use of online media is one solution to enable students to effectively engage with lecture materials, ensuring that the content delivered can be applied successfully (Mustakim, 2020). The application of the independent curriculum with online learning systems demands more from students in terms of independent study (Tahir & Darwis, 2021), as each course typically has a fixed time allotment. For example, the

instructional design course, which accounts for 3 credits, is broken down into three main components: 50 minutes of face-to-face instruction, 60 minutes of structured assignments, and 60 minutes of independent tasks per credit.

Based on the time constant for the instructional design course of 3 credits, which is 170 minutes x 3 credits x 16 meetings, the total duration of instructional design lectures to be completed in one semester is 8,160 minutes. This reality leads to the consequence of implementing the mobile learning model (Sidik, 2018).

Online learning presents challenges for students, requiring them to sharpen their study methods. Independent learning has become an effective study pattern for students in the digital era (Sidik, 2019). This aligns with the opinion of Darr & Fisher (Runisah, 2018), who state that for university students to become independent, they must actively engage with problems, enabling them to observe, think, and follow the reasoning of others to continuously seek solutions (Sidik, 2020). In this situation, students must take the initiative, analyze their needs, formulate goals, apply strategies for problem-solving, select relevant resources, and self-evaluate their performance. Therefore, independent learning is a learning activity driven more by the learner's self-will, choice, and responsibility.

Learning independence is one of the characteristics of students who take the initiative to learn, have a desire to master competencies, are self-confident, responsible for their academic duties, and do not rely on their peers (Tahir & Darwis, 2021). Independent learning becomes a process in active learning, where students self-organize to enhance their own competencies. According to Miarso (2004), independent learning involves organizing a learning program in such a way that students can choose their learning resources and determine their own learning progress. Thus, self-confidence is one of the internal characteristics of students that significantly influences independent learning. Students who take responsibility for their independent learning are capable of improving their understanding of their learning competencies.

Delivering lecture material in universities using devices like smartphones plays an essential role in the continuity of lectures, making learning less monotonous and helping lecturers deliver lecture content (Guntur et al., 2017). As technology advances in education, learning media not only support the delivery of lecture material but also motivate students and foster a desire to continuously engage with the lecture material.

The learning media used to deliver course content can capture the attention, interest, and thoughts of students to achieve learning goals (Kristanto, 2016). The use of mobile learning helps students increase their learning independence, one example being the use of smartphones (Attewell, 2005).

Nearly all university students in Indonesia own a smartphone. Learning media that utilize mobile learning can enhance students' learning independence (Runisah, 2018), and lectures can become more effective by facilitating student learning anytime and anywhere (Kurniawan, 2020). Thus, mobile learning becomes an additional tool for students to explain lecture materials (Basak, 2018), as mobile learning leverages smartphones, which are easy and practical to carry anywhere and provide a different learning experience (Sidik, 2020).

The instructional design course, with a total lecture duration of 8,160 minutes, is one of the courses that responds to the online learning system. The instructional design course focuses on instructional design components and strategies, delivered through online learning (Suparman, 2014). According to Ramayulis (2008), the main principles of instructional design lectures are: a) Student-centered, which acknowledges that students have different characteristics (Sidik, 2018; Callender, 2016). These differences can be seen in various aspects, such as: a) differences in interests and attention; differences in learning styles (kinesthetic, auditory, visual, and intellectual); and differences in intelligence. b) Learning by doing, meaning that instructional design courses at universities aim to provide students with direct experiences of ongoing learning. c) Developing vocational or technical skills, which explains that instructional design courses not only optimize students' internal individual abilities but also help them build relationships with others (Suparman, 2024). Interaction allows students to improve their understanding and deepen conceptual knowledge. d) Developing curiosity, meaning that instructional design courses are expected to optimize students' instructional design competencies, which impact learning achievement in each course and other areas of knowledge (Ramayulis, 2008; Sidik, 2019). The scope and formulation of the problem are: (1) How effective is the use of mobile learning on the learning independence of FT UNM students in the instructional design course during the odd semester of 2021-2022? Is the instructional design course the subject being studied? (2) Do students have a high desire that fosters learning independence in studying the instructional design course? The purpose of this study is to determine the effectiveness of mobile learning on students' online learning independence and the impact of using mobile learning via smartphones on the learning independence of FT UNM students in the online-based instructional design course.

II. Research Method

The approach used in this study is quantitative, aiming to systematically, accurately, and factually describe the facts and characteristics of the population or detail and elaborate the learning phenomenon (Yusuf, 2014). The research method employed is an experimental method, which aims to test predetermined hypotheses (Sugiyono, 2017). Experimental research is used to investigate the effects between the independent variable and the dependent variable in controlled conditions (Sugiyono, 2015). The variables used include the independent variable (mobile learning) and the dependent variable (learning independence). Data collection techniques used in this study include questionnaires and interviews, with correlation analysis using SPSS version 20.

The data collection process used questionnaires to gather information about the respondents' characteristics and other traits, presented in a series of written questions (Arikunto, 2013). The research was conducted online via Google Meet and WhatsApp groups to coordinate the distribution of the questionnaires through Google Forms. The WhatsApp group functioned as a substitute for face-to-face classes. The questionnaires were distributed in the form of a link that students, as respondents, could access, and the responses were

automatically collected, accessible to the researcher once the students completed their independent and structured tasks.

The study population consisted of students registered in the odd semester who had attended at least 10 instructional design lectures, totaling 68 students. The sampling technique used was cluster random sampling, where the population was randomly selected without considering levels within the population (Arikunto, 2013). The research sample consisted of 30 students who had enrolled in the Instructional Design course during the odd semester of 2021-2022.

Interviews were conducted as a form of direct interpersonal communication through devices, where the researcher and interviewee took turns speaking and listening to obtain information. The researcher interviewed three lecturers in charge of the instructional design course, holding the rank of associate professor, from three study programs, and two teaching assistants about mobile learning and students' learning independence in online-based learning. The interviews with the lecturers and students were conducted online during the 6th and 12th lectures at the FT UNM micro-teaching lab.

III. Results and Discussion

The results of interviews and questionnaire responses indicate a significant influence between the use of devices (smartphones) as mobile learning tools and students' learning independence in the instructional design course conducted online. Interviews were conducted with three lecturers responsible for the instructional design course, focusing on aspects related to mobile learning and factors influencing students' learning independence on active participation of students in the course. The lecturers explained that student participation during online learning showed a significant increase compared to face-to-face learning, although the results were not exceptionally high (approximately 87%). This outcome was attributed to various factors, such as the adjustment process to distance learning with lecturers and the less conducive home study environment. However, students remained highly motivated due to the availability of diverse learning resources. This result demonstrates that students' optimistic participation in the course was marked by the timely completion of independent assignments. The conclusion drawn from the lecturers' opinions was that students' learning independence was categorized as good.

Two teaching assistants revealed that students generally viewed the instructional design course as important. Although students found online learning more effective than face-to-face learning, they showed initiative in identifying barriers (Hariyanti, 2020). For example, when students did not understand certain materials, they immediately asked the lecturer via smartphone or searched for additional resources online using their smartphones. The assignments given by the lecturers were completed well and submitted on time, making the course more effective. This initiative aligns with indicators of learning independence and the use of smartphones as a mobile learning tool. Utilizing smartphones for mobile learning significantly influenced students' learning independence.

The assessment of students regarding the effectiveness of mobile learning (smartphones) was conducted through a questionnaire containing 15 statements using a Likert scale. The questionnaire was distributed to 32 students. The questions were based on nine indicators: clarity of material explanation, alignment of course content with learning objectives, clarity of learning stages, readability of course materials, ease of using applications, accessibility of learning services, clarity of course materials, student motivation in learning, and students' responses to learning services (Mustakim, 2020). Below is the recapitulation of the percentage of student responses regarding the use of mobile learning as the primary indicator of the study, presented in Table 1.

TABLE 1. Recapitulation of Questionnaire on Mobile Learning Use.

No.	Indicator	Percentage (%)
1.	Clarity of Material Explanation	58.8
2.	Alignment of Course Content with Learning Goals	68.9
3.	Clarity of Learning Stages	75
4.	Readability of Course Materials	54
5.	Ease of Using Device Applications (smartphones)	67
6.	Ease of Learning Services	77
7.	Clarity of Course Materials	82.6
8.	Student Motivation in Learning	72.6
9.	Student Response to Smartphone Use	76.4
	Average	70.26

Based on Table 1, which summarizes the students' responses to the questionnaire, the results indicate that the percentage of student responses regarding the use of mobile learning for each indicator can be described as follows: (1) The clarity of the teaching material was rated at 59.8%, suggesting that the majority of students agree that the clarity of the material presented through mobile learning is adequate for educational purposes; (2) The alignment of course content with learning objectives was rated at 68.9%, indicating that most students believe that the mobile learning utilized meets the standards for the congruence of course materials with the intended learning outcomes; (3) The clarity of the learning stages received a score of 75%, reflecting that a majority of students concur that the mobile learning approach has satisfied the clarity standards for learning phases; (4) The readability of the course materials was rated at 54%, which implies that most students agree that the mobile learning has achieved the necessary standards for material readability; (5) The ease of using the smartphone application was rated at 67%, indicating that the majority of students find the mobile learning tools to be user-friendly; (6) The accessibility of learning services scored 77%, demonstrating that most students agree that mobile learning provides them with convenient learning opportunities; (7) The clarity of the course content received a rating of 82.6%, suggesting that most students agree that mobile learning effectively aids them in comprehending the materials presented; (8) The motivation of students to learn was rated at 72.6%, indicating that the majority of students believe that mobile learning enhances their motivation to engage in learning activities; and (9) Students' responses to the use of smartphones scored 76.4%, suggesting that most

students have a favorable view of mobile learning in relation to their educational experiences. Overall, the percentage of student responses regarding the use of mobile learning was 70.26%, categorized as strong or high (Kountur, 2005).

The assessment of students' learning independence was based on a questionnaire comprising 12 statements utilizing a Likert scale. This questionnaire was administered to a total of 30 students from the Faculty of Engineering at UNM, with the intervention involving the use of mobile learning via smartphones. The questionnaire was designed based on six indicators: (1) independence from others, (2) disciplined behavior, (3) self-confidence, (4) initiative-based behavior, (5) sense of responsibility, and (6) self-control. The following is a summary of the data collected from the distribution of the learning independence questionnaire based on these indicators.

TABLE 2. Summary of Student Learning Independence Questionnaire.

No.	Indicator	Percentage (%)
1	Independence from Others (Self-reliance)	76.9
2	Self-Confidence	78.5
3	Disciplined Behavior	75.0
4	Sense of Responsibility	70.3
5	Initiative-Based Behavior	79.4
6	Stable Self-Control	79.8
	Average	76.65

Based on the analysis results presented in Table 2, the percentages of students' learning independence according to the indicators are as follows: (1) Independence from Others (Self-reliance) is at 76.8%, indicating that the majority of students agree that they do not rely on others in their learning processes and are capable of addressing their learning difficulties independently; (2) Self-Confidence is at 77.2%, showing that most students feel confident in their abilities and in the answers they provide when completing assignments; (3) Discipline in Behavior stands at 74%, suggesting that a significant portion of students exhibits disciplined behavior regarding their studies; (4) Sense of Responsibility is reported at 70.3%, indicating that many students acknowledge their responsibilities in learning; (5) Initiative-Based Behavior is at 76.8%, which reveals that most students take initiative in their learning activities; and (6) Self-Control is at 72%, denoting that a considerable number of students exercise self-control in their learning efforts. Overall, students' learning independence has an average percentage of 75.37%, categorizing it as strong based on data analysis and questionnaire interpretation.

The research design employed an experimental approach with a quantitative method, directly involving the use of students' smartphones during the learning process and analyzing statements from two indicators. The results indicate that the use of mobile learning is classified as strong, with an average percentage of 76.65%. Furthermore, students' learning independence is also classified as strong, with an average percentage of 75.37%. It is assumed that mobile learning based on online platforms utilizing smartphones can foster students' learning independence (E. Solihin, 2020). The researcher conducted a hypothesis test to determine the impact of mobile learning on students' learning independence. The results of the questionnaire response analysis using SPSS version 20 can be summarized in Table 3.

TABLE 3. Result of Hypothesis Testing.

Model	Unstandardized		Standardized Coefficients	T	Sig
	B	Std. Error	Beta		
(Constanta)	31.459	7.818	-	4.028	.0.000
Response	.484	.107	.650	4.528	.0.000

The results of the hypothesis test using SPSS version 20 yielded a calculated t-value of 4.528, compared to a critical t-value of 1.701. Since the calculated t-value is greater than the critical t-value, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This outcome indicates a significant effect of mobile learning on the learning independence of students in the Design Learning course at FT UNM during the odd semester of 2021-2022.

Based on the findings from the questionnaire and the analysis of the interviews presented, it has been demonstrated that the use of mobile learning significantly influences the learning independence of FT UNM students in the Design Learning course through an online system. Thus, mobile learning has emerged as an effective online delivery strategy that positively impacts the learning independence of FT UNM students in the odd semester of 2021-2022.

IV. CONCLUSION

The use of mobile learning as the primary indicator in the Design Learning course received a very positive response. This is attributed to the effective utilization of class time, particularly in meeting assignment deadlines. The second main indicator, students' learning independence, also yielded favorable results across all sub-indicators. The application of mobile learning, as the first primary indicator with nine sub-indicators, produced noteworthy results that warrant attention from the researcher. There is a significant difference between the indicators of course material and the readability of the course content, as evidenced by markedly different numerical values. This disparity is likely due to the inconsistent application of learning design during the course. The characteristics of students' learning independence, represented by the second primary indicator with six sub-indicators, indicate that the responsibility for learning is rated positively, while self-control in learning is rated very positively. This finding calls for attention from instructors during course implementation, as the completion time for assignments—rated positively—may reflect differing expectations among students regarding the Design Learning course. The results of the hypothesis test indicated that the calculated t-value was greater than the critical t-value. Consequently, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This implies that the overall results of the research indicate a significant effect of mobile learning on the learning independence of students in the Design Learning course at FT UNM during the odd semester of 2021-2022.

ACKNOWLEDGMENT

The completion of this article would not have been possible without the support and assistance of the Head of the Research and Community Service Institute at Universitas Negeri Makassar, who granted permission for the research and provided guidance over approximately eight effective months. The researchers who contributed data and analysis related to the primary research indicators. The students who served as research subjects, providing data through the research instruments, as well as the laboratory assistants in the Electronics Engineering Education program who consistently assisted in data collection until completion.

REFERENCES

[1]. Ardiansyah, A and Nana, N, (2020) Peran Mobile Learning sebagai Inovasi dalam Meningkatkan Hasil Belajar Siswa pada Pembelajaran di Sekolah," Indonesian Journal of Educational Research and Review, 3(1), pp. 47. doi: 10.23887/ijerr.v3i1.24245.
[2]. Arikunto, S. (2013). Prosedur Penelitian: Suatu Pendekatan Praktik. Jakarta: Rineka Cipta.
[3]. Attewell, J. (2005). Mobile Technologies and Learning. Learning and Skills Development Agency.
[4]. Butler, D. L. (2023). Qualitative approaches to investigating self-regulated learning: Contributions and challenges. In Using qualitative methods to enrich understandings of self-regulated learning (pp. 59–63). Routledge.
[5]. Callender, J., Fagin, L., Jenkins, G., Lester, J., Smith, E. (2016) Mental Health of Students in Higher Education Royal College of Psychiatrists. London.
[6]. Hariyanti, D. (2020). Identifikasi hambatan mahasiswa dalam pelaksanaan pembelajaran biologi secara daring selama pandemi covid-19 di Kabupaten Jember. ALVEOLI, Jurnal Pendidikan Biologi , 12-21.
[7]. Kountur, R. (2005). Metode Penelitian. Penerbit PPM.
[8]. Kumar Basak, S., Wotto, M., & Bélanger, P. (2018). E-learning, M-learning and D-learning: Conceptual definition and comparative analysis. E-Learning and Digital Media, 15(4), pp. 191-216. https://doi.org/10.1177/2042753018785180.
[9]. Kurniawan. (2020). Pembelajaran Online Berbasis Proyek Salah Satu Solusi Kegiatan Belajar Mengajar di Tengah Pandemi Covid-19. Jurnal Ilmiah Profesi Pendidikan, 66.
[10]. Malyana, A (2020). Pelaksanaan Pembelajaran Daring dan Luring Dengan Metode Bimbingan Berkelanjutan Pada Guru Sekolah Dasar Di Teluk Betung Utara Bandar Lampung. Jurnal Ilmiah Pendidikan Dasar Indonesia.
[11]. Miarso, Y. (2004). Menyemai Benih Teknologi Pendidikan. Jakarta: Kencana Prenada Group, 251.
[12]. Mustakim. (2020). Efektivitas Pembelajaran Daring Menggunakan Media Online Selama Pandemi Covid-19 Pada Mata Pelajaran Matematika. Jurnal Al Asma: Journal of Islamic Education, 1–12.
[13]. Nugraha, A. (2018) Faktor – Faktor Yang Mempengaruhi Penggunaan Smartphone Dalam Aktivitas Belajar Mahasiswa Teknologi Pendidikan Universitas Negeri Yogyakarta, E-Jurnal Prodi Teknologi Pendidikan, 7(3).
[14]. Rachmat, A., & Krisnadi, I. (2020). Analisis Efektifitas Pembelajaran Daring (Online) Untuk Siswa SMK Negeri 8 Kota Tangerang Pada Saat Pandemi Covid 19. Magister Teknik Elektro Universitas Mercu Buana, 1–7.
[15]. Ramayulis. (2008). Metodologi Pendidikan Agama Islam. Jakarta: Kalam Mulia, 95- 103.
[16]. Rikizaputra, R and Sulastri, H. (2020) Pengaruh E-Learning dengan Google Classroom terhadap Hasil dan Motivasi Belajar Biologi Siswa, Lectura : Jurnal Pendidikan, vol. 11, no. 1, pp. 106–118, doi: 10.31849/lectura.v11i1.37
[17]. Runisah. (2018). Peningkatan Kemandirian Belajar Matematika Siswa SMP Melalui Model Learning Cycle 5e Dengan Teknik Metakognitif. Jurnal Edukasi dan Sains Matematika (JESMAT), 14.
[18]. Rusman. (2016). Pembelajaran Tematik Terpadu. Jakarta: Rajawali Pers.
[19]. Sherina, S. Z. & W. (2020). Efektivitas Pembelajaran Basis Online Di IAIN Tulungagung Dengan Adanya Kebijakan Physical Distancing Era Pandemi Covid 19. Jurnal Geram (Gerakan Aktif Menulis), 83–89.
[20]. Sidik, D and Syafar, F. (2018). "Students' Adoption of Mobile Learning: An Investigation in Indonesia Higher Education" in 32nd IBIMA Conference, Seville, Spain.
[21]. Sidik, D and Syafar, F (2019). Investigasi Faktor-Faktor yang Mempengaruhi Adopsi Pembelajaran Menggunakan Mobile Learing pada Perguruan Tinggi. Laporan Hasil Penelitian DIPA 2019. Lembaga Penelitian UNM.
[22]. Sidik, D. (2019). Pendidikan Era 21 dan Adopsi Model Pembelajaran: Kajian pada Pembelajaran Pendidikan Teknik Elektronika. V. 4-9.
[23]. Sidik, D., Syafar, F. Exploring the factors influencing student's intention to use mobile learning in Indonesia higher education. *Educ Inf Technol* **25**, pp. 4781–4796 (2020).
[24]. Simatupang, N. I., Rejeki, S., Sitohang, I., Patricia, A., Simatupang, I. M., Pendidikan, P., Universitas, K., & Indonesia, K. (2020). Efektivitas Pelaksanaan Pengajaran Online Pada Masa Pandemi Covid-19 Dengan Metode Survey Sederhana. Jurnal Dinamika Pendidikan, 1–7.
[25]. Solihin, E and Sukardi, S. (2020) Pengaruh Penerapan Sistem Control Valve Cooler 1 Berbasis Microcontroller ATmega 2560 Terhadap Moisture Pakan After Mixing dengan Bagging Off di PT. Japfa Comfeed Indonesia, Tbk. Unit Padang," JTEV (Jurnal Teknik Elektro dan Vokasional), 6(2). doi: 10.24036/jtev.v6i2.108549.
[26]. Solviana, M. D. (2020). Pemanfaatan Teknologi Pendidikan di Masa Pandemi Covid-19: Penggunaan Fitur Gamifikasi Daring di Universitas Muhammadiyah Pringsewu Lampung. Journal of Biology Education Research, 1–14.
[27]. Sugiyono. (2017). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Alfabeta.
[28]. Sugiyono. (2015). Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R & D. Penerbit Alfabeta.
[29]. Suhada, I., Kurniati, T., Pramadi, A., Listiawati, M. (2020). Pembelajaran Daring Berbasis Google Classroom Mahasiswa Pendidikan Biologi Pada Masa Wabah Covid-19. Jurnal Digital Library UIN Sunan Gunung Jati, 1–9.
[30]. Suparman, A. (2014),. Desain Instruktional Modern: Panduan Para Pengajar dan Inovator Pendidikan. Jakarta: Penerbit Erlangga.
[31]. Tani, S. and Ekawati, E. Y. Peningkatan Kemandirian Belajar Peserta Didik pada Materi Teori Kinetik Gas Melalui Penerapan Media Pembelajaran Interaktif Berbasis iSpring Suite 8. Jurnal Materi dan Pembelajaran Fisika, 7(2):13-16.
[32]. Tahir and Darwis. (2021). Belajar Mandiri dan Pembelajaran Berbasis Daring di Perguruan Tinggi. Journal of Educational Technology, Curriculum, Learning, and Communication, 1(1):28- 34.
[33]. Yunus, M. (2014). Metode Penelitian: Kuantitatif, Kualitatif dan Penelitian Gabungan. Jakarta: Prenada Media Group.