Implementation of Learning Management System in Face-To-Face and Virtual Learning on Students' Cognitive Abilities on Biology Materials

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Abstract. Biology learning has characteristics with living creatures as objects. These objects are concrete and can be sensed by the learner. During the recovery process from Biology learning during the Covid 19 pandemic, various innovations have been carried out on a massive scale. One of the learning innovations carried out is using LMS in Biology learning which aims to organize learning which contains teaching materials, questions, collecting assignments and attendance lists related to learning at school carried out online and offline. This research aims to analyze the influence of LMS on learning at school on the cognitive learning outcomes of students in classes that implement virtual and face-to-face learning. This type of research is a descriptive using4 classes, namely class 1 using LMS for virtual face-to-face learning, class 2 learning online without LMS, class 3 using LMS face-to-face learning and class 4 learning face-to-face without LMS. The research was carried out in the 2022-2023 academic year at Banjarmasin High School with a sample of 176 students. The results of students' cognitive learning data were tested using Kruskall Wallis. Based on the research results, it is known that there are differences in the cognitive learning outcomes of students with Asymp scores. Sig. (2-tailed) was 0.000<0.004, apart from that, based on the results of further tests carried out, the class that used LMS and face-to-face learning had a better average cognitive score than the other three classes. Apart from that, the use of LMS and virtual face-to-face learning can help students to improve cognitive learning outcomes when compared to classes that only use virtual face-to-face learning. This shows that the use of LMS can help students improve cognitive learning.

Keywords: Face-to-Face Learning, Learning Management System, Virtual Learning.

Introduction

Education in the 21st century is related to the development of the digital era so that teachers adapt to using information technology. One of the effects of the pandemic is that learning activities have changed, namely the implementation of distance learning (PJJ) which utilizes virtual face-to-face learning. Teaching and learning activities involve technology in packaging material to be taught to students. Online learning is not

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limited by space and time, interaction between educators and students takes place anytime and anywhere and has the advantage of making students more active [1]. One device that can help online learning is the Learning Management System. A standard LMS supports an inclusive learning environment for academic progress with interceding structures that promote online collaborative groups, professional training, discussions, and communication among other LMS users [2].

One of the lessons learned during the pandemic is implementing hybrid learning. Web-based LMS is used for learning in schools and is expected to improve the quality of learning. Online learning through LMS is easy to implement, practical, and effective in improving student learning outcomes [3]. Students can access learning materials digitally. The LMS contains teaching materials, materials, learning videos and questions related to wetlands. One of the teaching materials that will be used is a module containing Biology material so that students understand it more contextually. Integration in classroom to involve teacher training to understand not only technological and instrumental technology but also what is beginning to be called pedagogical and content [4] LMSs are beneficial for all students for those students who have some difficulties [5] [6].

Several approaches used in face-to-face and virtual learning using LMS are implemented through Based on the results of previous research, it is known that the use of flipped classrooms assisted by LMS influences student learning outcomes in Biology material [3] in addition to improving students' metacognitive skills [8] Apart from that, the use of LMS can help students' generic science skills [9][7]

Based on the results of interviews, it is known that the learning carried out during the pandemic and during the ongoing recovery learning has been carried out face-to-face and virtually. Some students are not used to using digital components such as handouts, such as (1) students are used to using learning videos to visualize learning. visuals in Biology learning are related to interpretive aspects that represent entities/elements presented in the form of photos, tables, charts, and diagrams [10]. (2) the use of examples around students makes it easier for students to observe and recognize biological objects.

It is hoped that the addition of LMS will enable learning outcomes to be proof of the success that students have achieved, where each activity can give rise to something. learning outcomes in achieving problem solving abilities [11] aspects contained in learning outcomes. Then learning outcomes are changes in knowledge, attitudes, interests, and skills that individuals gain from a long process [12]

The aim of this research is to analyze the influence of LMS on learning at school on the cognitive learning outcomes of students in classes that implement virtual and face-to-face learning, apart from that the research aims to explain.

2 Method

This is empirical research designed to test a predetermined hypothesis or to provide a general picture of existing conditions, and sometimes relationships, without manipulating variables or attempting to establish cause and effect. The population of all students

in Banjarmasin. Those 3 schools got an A for accreditation, which means they have met a predetermined quality standard. For sampling, this study used the purposive sampling technique. This sampling in the study was of 180 students. The students are class X high school students in the 2021–2022 academic year. Learning outcome instruments were based on cognitive tests to assess students' abilities after participating in a learning activity, so this instrument is valid for measuring student achievement. For implementation of the flipped classroom was supported by worksheets, modules, and a short video developed by the teachers.

3 Result and Discussion

Table 1. Description data

Learning outcome	Mean	Median	Varians	Standar deviasi
Treatment 1 (virtual class+LMS)	54.31	50	694.52	26.35
Treatment 2 (virtual class only)	48.75	37.5	879.80	29.66
Treatment 3 (face to face+LMS)	74.8	85	819.31	28.62
Treatment 4 (face to face only)	52.70	52.5	325.48	18.01

Based on the data, it is known that the four treatments have differences in the mean and median. Based on the average scores, it is known that the highest mean score, namely 74.8, and the median, namely 85, were obtained by treatment 3 using face-to-face classes and LMS. Then, it was continued with tests using non-parametric statistics using the Kruskall Walis test on 180 samples used in 4 different classes. The data is shown in Table 2.

Table 2. Table Ranks

Treatment	N	Mean Rank
1	42	83.36
2	40	71.60
3	50	119.86
4	48	81.92

The data above shows the average rank in each treatment group, the data shows that the four classes have different mean ranks, the data shows that the highest mean rank was achieved by treatment 3. The Kruskall Walis results table is shown in Table 3. The value in table 3 shows Asymp. Sig. is 0.00. A p-value < 0.05 indicates a significant effect using various treatments.

Table 3. Test Statisticsa

	Score
Chi-Square	23.440

	Score
Df	3
Asymp. Sig.	.000
a. Kruskal Wallis Test	
b. Grouping Variable: TREATMENT	

Hybrid learning is a combination of face-to-face learning with online learning. This combination learning aims to combine the characteristics of the internet-based learning model, namely time efficiency, low costs, and ease of access for students at any time. The nature of the face-to-face learning model or conventional model, namely helping students to learn the learning material that has just been presented, as well as interacting with other students and teachers in the class. The hybrid learning learning model can be used to deliver learning anytime and anywhere because this learning occurs online and face-to-face, both of which complement each other so that it is easier for students to access learning materials.

Based on research data which shows that the scores from the pretest and posttest experimental class learning results show that there is an influence from the application of digital handouts on student learning outcomes in the sub-concept of vertebrate animals, this is also supported by the responses of students who agree with the use of digital handouts because the content is easy. understood and can help students think more deeply and systematically about the material being taught. This there is an influence from implementing CLDW-based digital modules on students' learning independence on Mushroom material. In addition, the use of attractive flipbook-based electronic teaching materials can influence student learning outcomes [13].

At the time of conducting the research, the researcher also carried out hybrid learning, where the implementation of this research coincided with the month of Ramadan and the Covid-19 pandemic so that the face-to-face learning process only took place once in each subject with 50% of the students. total students in each class, while another 50% of students take part in online learning via Google Classroom. Learning in the month of Ramadan is also combined with online learning via Google Classroom for one meeting. Apart from that, WhatsApp Group is also used as a medium to convey information to students, while Google Classroom is used for the learning process such as uploading materials, assignments, attendance lists, a place to collect assignments and as a discussion forum if students want to ask questions.

Based on data collected by researchers, the number of students in the experimental class was 30 people and in the control, class was 29 people. In filling in the pretest and posttest student learning outcomes in the sub-concept of vertebrate animals in the experimental class there were only 25 people and in the control class there were 23 people. This is because there is still a lack of participation from students who do not fill in the pretest or posttest and there are also some students who do not fill in the pretest but only fill in the posttest, there is still a lack of awareness among students to carry out their obligations as students, and is due to environmental factors during the learning process. carried out using hybrid learning.

Learning outcomes are evidence of success that students have achieved where each activity can cause a unique change, in this case learning outcomes include activeness, process skills, motivation and learning achievement [14]. From this explanation, it can be interpreted that learning outcomes are the result of the learning process experienced by students, which is measured by the students' abilities according to their learning experiences.

Based on research conducted, student learning outcomes are measured by giving pretest questions before learning and posttest questions after the learning process has been carried out. The learning outcomes obtained by each student appear to be very different, this is because each person has a different level of ability, different learning styles, and other different habits. This is supported by literature, the determining factors in improving student learning outcomes in schools include feedback, learning models, self-motivation, learning styles, interactions, and instructor facilitation [15].

4 Conclusion

Based on the research results, it is known that there are differences in the cognitive learning outcomes of students with Asymp scores. Sig. (2-tailed) was 0.000<0.004, apart from that, based on the results of further tests carried out, the class that used LMS and face-to-face learning had a better average cognitive score than the other three classes. Apart from that, the use of LMS and virtual face-to-face learning can help students to improve cognitive learning outcomes when compared to classes that only use virtual face-to-face learning. This shows that the use of LMS can help students improve cognitive learning.

References

1. Safitri, A. P., Putra, A., Ajiz.: Hasil Belajar dan Keterampilan Generik Sains pada penggunaan CLDW konsep Vertebrata di SMA kelas X. Jurnal Banua Science Education **2**(2), (2022).
2. Bradley, V. M.: Learning Management System (LMS) Use with Online Instruction. International Journal of Technology in Education **4**(1), 68 (2020).
3. Hikmawati, H., Sutrio, Wahyudi, K., Syahidi.: Effects of Learning with Ethnoscience Context on Learning Outcomes in Cognitive Aspects of Prospective Physics Teacher Students. Jurnal Penelitian Pendidikan IPA **8**(6), 2793-2801 (2022).
4. Hidalgo, B. G., Rivera, L. A., R. S. Delgadillo.: Integration of learning management system technology and social networking sites in the e-learning mode: A review and discussion. Computer Education Journal **10**(2), 1-13 (2019).
5. Aldiab, A., Chowdhury, H., Kootsookos, A., Alam, F., H. Allhibi.: Utilization of Learning Management Systems (LMSs) in higher education system: A case review for Saudi Arabia. Energy Procedia **160**, 731-737 (2019).
6. Tseng, H.: An exploratory study of students' perceptions of learning management system utilisation and learning community. Research in Learning Technology **28**(1063519), 1-18 (2020).

7. Putra, A. P., N. H. Utami. Pengaruh Penggunaan Flipped Classroom Terhadap Hasil Belajar dan Kemandirian Peserta Didik Kelas X pada Pembelajaran Biologi. Quantum: Jurnal Inovasi Pendidikan Sains **13**(2), 271 (2022).
8. Nurdiyanti, N., Wajdi, M.: Flipped Classroom Assisted with Schoology Applications to Support Student Metacognition Skills. Jurnal Penelitian Pendidikan IPA **9**(7), 4977-4982 (2023).
9. Putra, A. P., Kaspul, K., Utami, N. H.: Implementasi CLDW Peningkatan Keterampilan Generik Sains pada Pembelajaran Biologi di SMA. In: Prosiding Seminar Nasional Lingkungan Lahan Basah, pp. 238-242, (2022).
10. Utami, N. H., Kaspul, K., Mispa, R., Aprilliana, I., Jannah, N. Bimbingan teknis representasi visual pada pembelajaran biologi sma secara kolaboratif. Bubungan Tinggi: Jurnal Pengabdian Masyarakat **3**(3), 255-261 ((2021)).
11. Amaliyah, F., Sukestiyarno, Y. L., Asikin, M.: Analisis Kemandirian Belajar Siswa pada Pembelajaran Self Directed Learning Berbantuan Modul pada Wacana Pencapaian Kemampuan Pemecahan Masalah Matematis. In: Prosiding Seminar Nasional Pascasarjana UNNES **2**(1), pp. 626-632. Semarang (2019).
12. Deratama, D., Surahman, E., Fitriani, R.: Pengaruh model problem based learning terhadap keterampilan proses sains dasar dan hasil belajar siswa pada konsep sistem pencernaan makanan pada manusia. Assimilation: Indonesian Journal of Biology Education **3**(2), 46-50 (2020)
13. Kobesi, Y. M., Warsono, W., Zakwandi, R., Kurnianto, F.: The iSpring Ebook Learning Media for Online Learning Physics: In Case for Improving Student Conceptual Understanding. JIPF (Jurnal Ilmu Pendidikan Fisika) **7**(3), 288-298 (2022).
14. Purwasih, D., Wilujeng, I., Membalik, V., Hasan, S.: Learning instructional using webbed models based on local potential" Pulau Kembang" to enhance ecological literacy skill. Jurnal Inovasi Pendidikan IPA **8**(2), 131-141 (2022).
15. Hermarini, R.: Application of the guided inquiry learning model based on contextual approach to the subject of parabolic motion to students' learning outcomes in SMA Negeri 2 Indramayu. WaPFi (Wahana Pendidikan Fisika) **8**(1), 35-42 (2023).