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USING LEARNING MANAGEMENT SYSTEM FOR COLLABORATIVE LEARNING: STUDY CASE OF BIOLOGY TEACHERS

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ABSTRACT

By exploring learning management systems, it is possible to obtain new insights into the education system in the 2nd century. Biology teachers in developing countries typically depend on Learning management systems, with up to 67% of such teachers using Learning management systems. The key purpose of using Learning management systems in biology teaching is to deliver conceptual and collaborative learning using media in online-based learning management systems. One example of a globally popular learning management system is Moodle, flexible with extensive open-source capabilities. It is also free to download and can facilitate the download of 1000 subjects. In the present work, the key aim is to explore the use of Learning management systems and how they support collaborative learning in science subjects, focusing on biology teaching. Reviews and a meta-analysis will serve as the research methodology. Finally, the research has shown that interactive features can support collaboration between students and teachers.

1. Introduction

Learning management systems are crucial in facilitating the implementation of additional learning classes for students and achieving the objectives of the 2013 curriculum (Castro & Tumibay, 2021). In recent years, rapid and significant advancements to information and communication technology have taken place, completely transforming the learning techniques used in classrooms (Barahona & Darwin, 2021; M. Liu, Zwart, Bronkhorst, & Wubbels, 2022). The social scientific study of digital phenomena long ago moved past understanding the internet as an e-elsewhere, instead emphasising how digital technologies are part of a web of social, cultural, and economic ties that crisscrossed and outnumbered the internet (Araya, Dahalan, & Muhammad, 2021a). Previously, most curricula focused on teacher-centred learning practices, whilst nowadays, there has been a significant move towards student-centred learning (Lau, 2021; Y. Liu & Ren, 2021; Surender & Principal, 2021). Students can now search for information or knowledge independently on the internet, and the role of the teacher has shifted to a facilitator who is no longer a dominant force but instead supervises the class the help students find the right resources to learn about the subject matter (Daub et al., 2021).

The use of collaborative learning models can help students acquire desired knowledge faster and more detailed. In essence, collaborative learning is critical in the digital age (Herrera-Pavo, 2021). Moreover, Learning management systems are crucial because they contain a great deal of content that many people can participate in (i.e., discussion forums) (Nguyen & Le Thi, 2021; Ramos, Ramos, Gadelha, & de Oliveira, 2021). Wentworth and Middleton (2014) conducted a study in various schools and found that collaborative learning involving different technologies increased student focus by 72.9%-82.1%. Thus, technology positively influences collaborative learning. Moreover, collaborative learning using technology has become an increasingly popular and necessary activity. Additionally, it compiles content connected to books or e-publishers (Ddungu, Nakijoba, Awobamise, & Merab, 2021; Soler-Costa, Moreno-Guerrero, López-Belmonte, & Marín-Marín, 2021).

In recent years, technology has advanced significantly, leading to substantial changes in Learning management systems. Learning management systems has evolved into an online system that can be used for administrative purposes, to produce and store documents, report activities and facilitate teaching and learning (Sáiz-Manzanares et al., 2021). This has been revealed in work provided by (Bancha & Tongtep, 2021; Zaidi, Osmanaj, Ali, & Zaidi, 2021). Additionally, as per the findings of (Almareta, 2021), teachers can use Learning management systems to manage their classrooms and share important information with students regarding the subject matter at hand within a specified period (White, 2021). The Statistical Centre Body found that approximately 84% of secondary schools use computers connected to the internet in Indonesia. However, only 13% of teachers have the skills and knowledge to use ICT at a secondary school level. Thus, this highlights the importance of teachers having the skills and knowledge to support IT-based learning activities in the modern world.

There are many different types of Learning Management Systems, and Moodle is a prominent example. Moodle stands for Modular Object-Oriented Dynamic Learning Environment (Stojanović et al., 2021). It is an open-source Learning management systems system that is 80% more effective than other Learning Management Systems providers. Additionally, it can accommodate 1000 lessons (Lossec & Millar, 2021). It is a ready-to-use system with many benefits and serves as a social network system facilitating communication and interaction between teachers and students (Desai, Ramasamy, & Kiper, 2021). It also has advanced features that improve the teaching and learning process, making it more organised and efficient (Zinovieva et al., 2021). The platform enables activities such as quizzes to be carried out and contains files, links, workshop features, polls, surveys, chats, discussion forums and free online resources (Insorio & Olivarez, 2021).

Nowadays, educators must be more aware of the various factors causing low-quality education. They must also understand that students perform worse in lessons that they find difficult to understand or become boring (Nazir & Khan, 2021). Teachers thus play a vital role in the learning process and must ensure that lessons are exciting and easy to follow. The National High-School Biology Exam results in 2019 indicated that the average score was 50.03, which falls into the poor category. Thus, further efforts are required to enhance learning using Learning Management Systems to promote interactive and collaborative learning, using the internet to find and share information. Biology professors can use Learning Management Systems to provide educational materials via links (Kloepper & Young, 2021). The platform enables an infinite number of links to be used, connecting studies with vast amounts of biological information on the internet. Learning Management Systems is a valuable resource in biology learning because it contains around 1.430.000.000 pages of biology material (Kristyana et al., 2021). Biology education is plagued with abstract materials that students are unfamiliar with, making it challenging to teach and understand. There are also numerous materials on Biology learning that cannot be visualised directly, and thus different media must be used (Yang, Yu, & Buehler, 2021). Visualisation through learning media can be employed [20]. The key objective of biology education is to teach students about scientific processes and enhance their attitudes towards science. Biology is a mainly conceptual subject, which makes it very complex. However, it can be simpler if presented in different technological formats. However, this requires using a system (Rahmi, Birgoren, & Aktepe, 2021). In the present review, the following research questions will be addressed:

1. Which type of Learning Management system is used in biology education?

2. How is Learning Management Systems implemented in biology curricula?

3. Which learning model does Learning Management Systems use?

2. Research Method

The preferred reporting items for systematic reviews and meta-analyses will be used as guidelines in this systematic review. The use of meta-analysis as a technique for quantitative research syntheses of multiple studies has become increasingly popular since Gene Glass introduced the term at the annual convention of the American Education Research Association in 1976 (Shelby & Vaske, 2008). Although the term was new, the concept of statistically integrating studies already existed (Tippett, 1931). In the social sciences, meta-analysis was rarely seen until the 1970s, when several social scientists applied quantitative synthesis techniques to their respective disciplines, such as social psychology (Schmidt & Hunter, 1977). The primary research method used in this study is meta-analysis, with a literature review being performed based on the guidelines put forward by Baki and Birgoren (2018) (Ejdys, 2021; Rahmi et al., 2021; Salem & Nor, 2021). The study review advanced statistical methods for meta-analysis as used in bivariate meta-analysis (Van Houwelingen, Arends, & Stijnen, 2002). The bivariate regression method used in meta-analysis has been extensively used in psychology and social science, such as economics and finance (Araya & Miras, 2015) (Araya, Dahalan, & Muhammad, 2021b). the bivariate regression methods have also been used in marketing strategies , . Meta-analysis is put in mixed models using (approximate) likelihood methods to estimate all relevant parameters (Van Houwelingen et al., 2002).

2.1 Discussion Area and Literature Search

The first step involved in any research is the establishment of research objectives. When literature reviews are being performed, the keywords used to search for articles must also be identified. In this study, the researcher used the following terms to search for relevant articles: Learning Management Systems in learning biology, collaborative learning, and the use of Learning Management Systems biology/science in collaborative learning. The databases used for the keyword searches were ERIC, Pro-Quest, the Directory of Open Access Journal (DOAJ), Science Direct, Google Scholar and Semantic Scholar. A variety of criteria are then used to evaluate the identified articles.

2.2 Considering the Criteria

Several criteria must be met for an article to be included in the review. Firstly, all articles must be scientific, and most focus on exploring the use of Learning Management Systems in collaborative learning. Secondly, all articles must have been published between 2014-2019. Thirdly, the articles must come from proceedings and indexed international journals

Scopus. Fourthly, the studies must use experimental research methods or surveys, and finally, the studies must be investigating the topics of science/biology at the secondary and tertiary education levels. Once these criteria were examined in the present review, 20 articles about using LEARNING MANAGEMENT SYSTEMS to enhance Scopus Indexed collaborative learning were deemed suitable for the application.

3. Result and Discussion

Very few biology teachers in Indonesia use Learning Management Systems because the information is still lacking about Learning Management Systems and technology and internet devices. Teachers must learn Learning Management Systems to manage the learning process effectively. One key advantage of Learning Management Systems is that it is not limited by time and space. Nonetheless, the availability of ICT devices and internet connections are critical in applying Learning Management Systems in learning. Learning management systems have been widely adopted in developed countries in recent years, with various types of Learning Management Systems being developed. Not only is Learning Management Systems employed to distribute subject matter, but it also serves as a forum to facilitate online discussions.

Research shows that learning management systems have been implemented in 66.67% of developed countries, although only 33.33% use them. The most prominent reason for this is that teachers in developing countries lack the knowledge and skills to implement Learning Management Systems in teaching. Moreover, internet networks are still extremely limited in developing countries, impacting the adoption of Learning Management Systems.
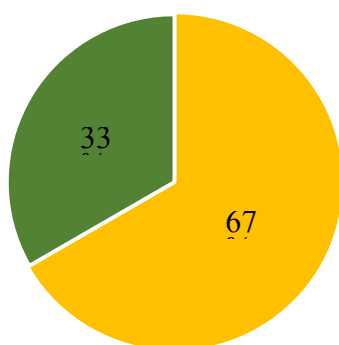
67% Developed countries and 33% Developing country
Figure: 1 The distribution of Learning Management Systems application throughout the world

Learning Management Systems platforms must facilitate the uploading and sharing of materials, discussions, resources, quizzes, and resources. It must also be able to record scores and grades. Moodle is an example of a software package that can develop systems and deliver learning using computer devices (laptops) and mobile phones. Students can access the Moodle platform via the internet network. Thus, Moodle can be considered a Learning Management System. Studies investigating the student attitudes towards Moodle Learning Management Systems indicate that, on average, student response rates are 95.52%, with a very positive category. One study that examined student activities on Moodle revealed that most students use Moodle to download teaching materials (12 students), upload assignments (11 students), fill in questionnaires (11 students) and complete quizzes (11 students).

Table: 1 The most common types of Learning Management Systems employed in teaching

No.	Type of Learning Management Systems	Total	Percentage
1.	Moodle	11	55%
2.	Blackboard	1	5%
3.	CKBiology	1	5%
4.	NeuroK	1	5%
5.	MOOC	2	10%
6.	Rubric	1	5%
7.	Google Classroom	1	5%
8.	Edmodo	1	5%
9.	Learning Path type MGL (Mayer Guidelines)	1	5%
	Total	20	100%

Table 1 shows that nine different Learning Management Systems used by biology teachers have been identified in 20 articles. Moodle is a common type of Learning Management system employed by 55% of teachers and students. Its popularity is that it is open-source software that can hold 1000 subjects. It also contains student-centred tools and a collaborative learning environment with easy-to-use features supporting the teaching process. Today, Moodle has approximately 90 million users worldwide, making it the most used Learning Management Systems platform globally. There are many ways Moodle has been used in biology teaching. For example, it can facilitate discussions, group assignments, independent training, and distribute subject matter in images or videos.

Moreover, teachers can use Learning Management Systems to monitor students' progress and help them complete tasks throughout their studies. The availability of peer and self-assessment elements make it easy for students or teachers to view and assess members of their groups. Moodle has been primarily developed based on version 3.3, which has several new features, including tag word lists, forum posts and book chapters to facilitate better searching. Although it is basic enough to be used by teachers and students, Moodle is also flexible and adapted to suit various demands.

Table: 2 Using Learning Management Systems in biology learning

No.	Use of Learning Management Systems in biology learning	Total	Percentage
1.	Exercise, independent task	11	23,91%
2.	Distribution of teaching material	11	23,91%
3.	Group task	7	15,21%
4.	Submitting a concept map	1	2,17
5.	Download videos, animations, images, schematics	3	6,52%
6.	Discussion	13	28,26%
	Total	46	100%

In Table 2, the different ways students and teachers can use Moodle. The table shows that 28.26% of users use the system for discussion purposes. This enables students to interact and collaborate to share information and support biology learning. The teacher thus acts as a facilitator and confirmer of the information acquired by students. What is more, 23.91% of teachers reported using Moodle to distribute assignments to students. Nonetheless, Moodle can be used for other purposes, such as sharing biology teaching resources in soft files, which students can directly download.

Table: 3 Learning Models Based on Learning Management Systems

No.	Learning Model	Total	Percentage
1.	Collaborative	8	50%
2.	Blended learning	1	6,25%
3.	Computer-Supported Collaborative Learning	4	25%
4.	Flipped Classroom	1	6,25%
5.	Active Learning	1	6,25%
6.	Flipped problem-based learning	1	6,25%
	Total	16	100%

One review investigated 20 articles and found that four articles did not use a learning model. In table 3, six types of learning models that can be incorporated into Learning Management Systems have been identified in 16 articles. The most common learning model was the cooperative learning model (50%). Collaborative learning requires students to work in small groups to accomplish common goals. Each group has different characteristics, enabling other students to participate in lessons. For example, some students find it hard to understand certain subjects, and thus working together in groups can help them to solve issues and understand the subject matter.

4. Conclusion

Although Moodle is a welcome addition to education, it is still vital that teachers interact with students. Moodle is an overall Learning Management system used in many countries and can be used by teachers to facilitate interaction between teachers and students. Users can access a wide variety of resources on Moodle, including quizzes, activities, group discussions, and teaching materials. This ultimately enables students to interact with their teachers and each other.

References

Almareta, R. (2021). Biology teachers used Learning Management System (LMS) for collaborative learning. Paper presented at the Journal of Physics: Conference Series.

Araya, A., Dahalan, J., & Muhammad, B. (2021a). Blockchain technology and regression methods: A case of conceptual framework. International Journal of Business Society, 5(11), 450-463. doi:10.30566/ijo-bs/2021.11.66

Araya, A., Dahalan, J., & Muhammad, B. (2021b). Model of heterogeneous agents and noise traders' risk: A case of conceptual framework. International Journal of Business Society, 5(12), 493-502. doi:10.30566/ijo-bs/2021.12.70

Araya, A., & Miras, H. (2015). Determinant risk factors on valuation of banks' stock return: A case of financial institutions management. International Journal of Accounting and Business Management, 3(1), 353.367. doi:10.24924/ijabm/2015.04/v3.iss1/353.367

Bancha, W., & Tongtep, N. (2021). Enhancing Vocabulary Memorization and Retention through LMS and MultiEx Game Platforms among Thai Tertiary Students. International journal of learning, teaching and educational Research, 20(10).

Barahona, M., & Darwin, S. (2021). Exploring tensions in integrating core practices into initial EFL teacher education programs in the Chilean context. Language Teaching Research, 13621688211054145.

Castro, M. D. B., & Tumibay, G. M. (2021). A literature review: efficacy of online learning courses for higher education institution using meta-analysis. Education and Information Technologies, 26(2), 1367-1385.

Daub, A. C., Villanueva, S., Flores Vasquez, M., Soares, M. C., Erdem, K., & Huber, T. (2021). Educators' Experiences With Teaching During COVID-19: Journey of a Participatory Action Research Inquiry Team. Journal of Multicultural Affairs, 6(2), 2.

Ddungu, R. M., Nakijoba, R., Awobamise, A., & Merab, A. (2021). ASSESSMENT OF SOCIAL MEDIA'S INFLUENCE ON THE ACADEMIC PERFORMANCE OF TERTIARY INSTITUTION STUDENT. Annals of Spiru Haret University. Economic Series, 21(3).

Desai, U., Ramasamy, V., & Kiper, J. (2021). Evaluation of student collaboration on canvas LMS using educational data mining techniques. Paper presented at the Proceedings of the 2021 ACM Southeast Conference.

Ejdys, J. (2021). Factors affecting the adoption of e-learning at university level. WSEAS Trans Bus Econ, 18, 313-323.

Herrera-Pavo, M. Á. (2021). Collaborative learning for virtual higher education. Learning, Culture and Social Interaction, 28, 100437.

Insorio, A., & Olivarez, J. (2021). Utilizing Facebook and Messenger Groups as Platforms for Delivering Mathematics Interventions in Modular Distance Learning. International Journal of Professional Development, Learners and Learning, 3(1).

Kloepper, L. N., & Young, V. K. H. (2021). Foundations of form and function: A synthesis-based curriculum for introductory-level organismal biology. Ecology and evolution.

Kristyana, K., Wahyuni, S., Pieter, R., Purba, V., Sitepu, M. K., Simatupang, R., & Ariawan, S. (2021). Reorganizing Christian Education After the Pandemic in Indonesia: A Need for Learning Management. IJECA (International Journal of Education and Curriculum Application), 4(2), 58-63.

Lau, N. (2021). CREATING THE COLLABORATIVE MATHEMATICS CLASSROOM OF THE FUTURE. Gazette-Ontario Association for Mathematics, 60(1), 45-30.

Liu, M., Zwart, R., Bronkhorst, L., & Wubbels, T. (2022). Chinese student teachers' beliefs and the role of teaching experiences in the development of their beliefs. Teaching and Teacher Education, 109, 103525.

Liu, Y., & Ren, W. (2021). Task-based language teaching in a local EFL context: Chinese university teachers' beliefs and practices. Language Teaching Research, 13621688211044247.

Lossec, N., & Millar, N. (2021). Learning Management System Adoption in Schools: A consideration of the impact on teachers' professional ethics.

Nazir, M. A., & Khan, M. R. (2021). Exploring the Barriers to online Learning During the COVID-19 Pandemic. A case of Pakistani Students from HEIs [Higher Education Institutions]. GIST–Education and Learning Research Journal, 23, 81-106.

Nguyen, B. D., & Le Thi, H. V. (2021). EFL Learners' Perceptions of the Impact of Learning Management System on Learner Autonomy in Vietnam. International Journal on E-Learning Practices (IJELP), 4, 10-21.

Rahmi, B., Birgoren, B., & Aktepe, A. (2021). IDENTIFYING FACTORS AFFECTING INTENTION TO USE IN DISTANCE LEARNING SYSTEMS. Turkish Online Journal of Distance Education, 22(2), 58-80.

Ramos, I. M. M., Ramos, D. B., Gadelha, B., & de Oliveira, E. H. T. (2021). An Approach to Group Formation in Collaborative Learning Using Learning Paths in Learning Management Systems. IEEE Transactions on Learning Technologies.

Sáiz-Manzanares, M. C., Marticorena-Sánchez, R., Rodríguez-Díez, J. J., Rodríguez-Arribas, S., Díez-Pastor, J. F., & Ji, Y. P. (2021). Improve teaching with modalities and collaborative groups in an LMS: An analysis of monitoring using visualisation techniques. Journal of Computing in Higher Education, 1-32.

Salem, M. A., & Nor, K. M. (2021). A meta-analysis of continuous technology usage behaviour. International Journal of Business Continuity and Risk Management, 11(2-3), 172-193.

Schmidt, F. L., & Hunter, J. E. J. J. o. A. P. (1977). Development of a general solution to the problem of validity generalization. 62(5), 529.

Shelby, L. B., & Vaske, J. J. J. L. S. (2008). Understanding meta-analysis: A review of the methodological literature. 30(2), 96-110.

Soler-Costa, R., Moreno-Guerrero, A.-J., López-Belmonte, J., & Marín-Marín, J.-A. (2021). Co-Word Analysis and Academic Performance of the Term TPACK in Web of Science. Sustainability, 13(3), 1481.

Stojanović, J., Petkovic, D., Alarifi, I. M., Cao, Y., Denic, N., Ilic, J., . . . Khan, A. (2021). Application of distance learning in mathematics through adaptive neuro-fuzzy learning method. Computers & Electrical Engineering, 93, 107270.

Surender, B., & Principal, U. (2021). TEACHER EDUCATION: RELEVANCE OF ICT IN TRANSFORMING TEACHING AND LEARNING.

Tippett, L. H. C. J. T. M. o. S. (1931). The methods of statistics.

Van Houwelingen, H. C., Arends, L. R., & Stijnen, T. J. S. i. m. (2002). Advanced methods in meta-analysis: multivariate approach and meta-regression. 21(4), 589-624.

White, S. (2021). Developing credit based micro-credentials for the teaching profession: An Australian descriptive case study. Teachers and Teaching, 1-16.

Yang, Z., Yu, C.-H., & Buehler, M. J. (2021). Deep learning model to predict complex stress and strain fields in hierarchical composites. Science Advances, 7(15), eabd7416.

Zaidi, S. F. H., Osmanaj, V., Ali, O., & Zaidi, S. (2021). Adoption of mobile technology for mobile learning by university students during COVID-19. The International Journal of Information and Learning Technology.

Zinovieva, I., Artemchuk, V., Iatsyshyn, A. V., Popov, O., Kovach, V., Iatsyshyn, A. V., . . . Radchenko, O. (2021). The use of online coding platforms as additional distance tools in programming education. Paper presented at the Journal of Physics: Conference Series.