

A Study on Implementing Moodle Learning Management System (LMS) into the Classroom

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INTRODUCTION

COVID-19 has spread to nearly every country globally; the pandemic has impacted virtually all workplace sectors, especially education. While the outbreak is sweeping worldwide, ICT has been more paramount than ever in our daily lives. In academia, it has become a vital and essential component for learning and has profoundly impacted how the distribution of learning resources is presented (Wieland & Kollias, 2020). Inside the setting of web-based learning, academic institutions have become more open and versatile. This is communicated in the accessibility of data, the fast sending of online shared video conferencing stages, mobile applications, and the fast improvement for viable learning of an effective learning management system (LMS) software.

A learning management system provides features that support learning activities, for example, on-demand discussions, supplemental textbook modules, quizzes and exams, interactive elements, both available either online or offline. Initially, the idea of augmenting an LMS into a classroom was mainly focused on complementing course materials to students for easy access (Lyashenko & Frolova, 2013); however, it became evident after COVID-19 that an effective system needed to be in place (Blinov & Esenina, 2020). A sound LMS requires good planning and execution that is well-organized to distribute learning objectives and resources thoroughly. The shift from face-to-face instruction to online learning, Blinov and Esenina argues, requires that the classroom environment also be digitized to aid in the instruction and support of teachers. While there are many different academic LMS software available for end-users, this paper will focus on the learning management system Moodle, its standard features that have helped support the classroom both face-to-face and online remote learning, its advantages and improvement over other comparable systems, and the paper will present some of the challenges users face. Finally, predicting the future of Moodle and e-Learning systems will be

discussed.

GENERAL TECHNICAL BACKGROUND OF LMS MOODLE

Modular Object-Oriented Dynamic Learning Environment (Moodle) is an open-sourced LMS designed to assist end-users in creating online courses and content focused on collaboration and interaction of digital resources. Moodle is an ongoing development source project designed to support LMS provided free of charge under the GNU Public License. Although implemented in various workplace sectors, it is often linked to academia (Surjono, 2014). Since its first version was released in August 2002, it has been deployed in more than 240 countries, with almost 300 million registered users. (Moodle, 2021). It remains one of the top-ranked LMS in the world and the most popular open-sourced software available.

Moodle LMS can run on virtually all operating systems, including Microsoft Windows, Mac OSX, Linux, Unix, or other systems that support database source codes and PHP. Users and ICT administrators can download the entire source code and install it on their platform of choice, such as commercial hosting servers, private or cloud-based web servers, and through Moodle's certified partners' web host solutions. Accessing Moodle is also conveniently available through all device platforms, whether PC or Mac-based computers, iOS or Android-based phones and tablets, and browser integrations such as Internet Explorer, Google Chrome, or Safari.

THE MAIN STANDARD FEATURES OF MOODLE AND DEPLOYMENT IN THE CLASSROOM

Many institutions and organizations use Moodle's framework to implement various solutions to digital e-Learning or online instruction. Due to its open-source availability and adaptability, the software of the LMS can be integrated uniquely into each infrastructure (Zabolotniaia & Cheng, 2020). As such, extending the functionality is possible through its modules, plug-ins, and source packages. This paper will focus on how Moodle's main features were utilized in the author's classroom.

a. Modern and easy to use graphic user interface (GUI)

Arguably one of the more essential aspects of the e-Learning

environment, a clean & innovative GUI is recommended for accessing materials and navigating through courses in a hassle-free manner (Metros & Hedberg, 2002). Moodle provides end-users with a variety of different templates and themes to personalize the LMS. Because the Moodle LMS is open-sourced, ICT administrators can also write cascading style sheets (CSS) and implement them alongside their designs.



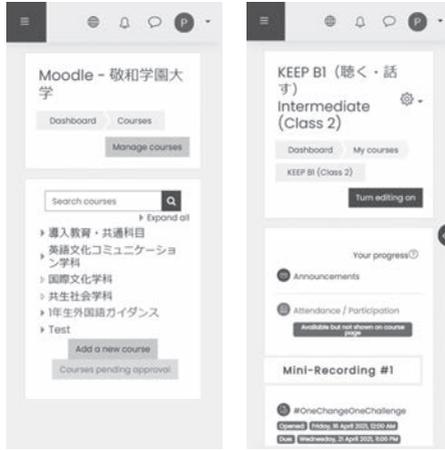
(Figure 1. Keiwa College Moodle Login Portal)



(Figure 2. Moodle Home Dashboard Page)

The browser and mobile app-based Moodle LMS can be used on-demand regardless of a user's location or terminal. In addition to compatibility across virtually all internet browsers, Moodle also adapts to users accessing the system through phones and tablets. A free Moodle Mobile App is also available for download with additional features and options (i.e., offline access,

push notifications, improved visibility, in-app messaging).



(Figure 3. Moodle in iOS browser [Safari])

b. Multi-Language Support

At the time of this paper, Moodle supports over 100 different languages. (Moodle, 2021). At the author's institution, all foreign languages taught on campus are installed. Students taking a foreign language course can quickly and easily change their language settings. Teachers have the option in their courses to force a language onto users, depending on their needs. Users can also submit and help edit any language strings that may be missing or incorrect.



(Figure 4. Korean Language & Available Language Packs)

c. Collaborative and blended learning tools and activities

Perhaps one of the most prevalent tools Moodle has to offer is its wide range of interactive and collaborative activities. There are online activity modules such as assignment submissions, surveys, multiple choice quizzes, and downloadable multimedia content like other LMS software. What sets Moodle apart from other LMS is the inclusion of additional plug-ins and advanced interactive content that can be used to supplement the classroom (Morell, 2018). One of the more increasingly popular interactive content modules is the augmentation of H5P, a fully customizing authoring tool to develop and design activities. With almost 40 different modules to choose from, almost any kind of activity can be used to suit virtually all courses from any department.



(Figure 5. H5P Interactive & Collaborative Activities)

Students can access the on-demand activities from virtually any device. In addition, teachers and instructors can import and export all created content to any of their courses, offering significantly reduced preparation time and the ability to hot-swap questions and topics to other coursework.

d. Attendance Tracking

To assist teachers in tracking attendance, the Attendance activity module in Moodle allows them to maintain a record of attendance. This can effectively replace or supplement a paper-based attendance registration system. It is configurable to each instructor's classroom attendance rules

and allows for optional grading subroutine rules and reporting. Moodle can then send periodic warnings to users who have been absent or not regularly attending courses, depending on each subroutine rule.

Another significant feature of the attendance module is that students can take their attendance through the activity's QR dynamic Login code. This can eliminate the need to take attendance at the beginning of a class session or if a teacher has forgotten to take it.

The screenshot shows a Moodle dashboard for attendance tracking. At the top right, there are filter buttons: 'All', 'All past', 'Months', 'Weeks', 'Days', 'Below 100%', and 'Summary'. The main table is titled 'Status set 1' and is divided into four sections: 'Over taken sessions', 'Over all sessions', and 'Maximum possible'. Each section has sub-columns for 'Sessions', 'Points', and 'Percentage'. The data rows show individual student records with their ID, name (PI P L E A), and their respective attendance statistics.

Status set 1						Over taken sessions			Over all sessions			Maximum possible	
P2	PI	P	L	E	A	Sessions	Points	Percentage	Sessions	Points	Percentage	Points	Percentage
18	6	6	0	0	0	30	102 / 120	85.0%	30	102 / 120	85.0%	102 / 120	85.0%
22	3	5	0	0	0	30	107 / 120	89.2%	30	107 / 120	89.2%	107 / 120	89.2%
23	3	3	0	0	1	30	107 / 120	89.2%	30	107 / 120	89.2%	107 / 120	89.2%
9	2	17	2	0	0	30	78 / 120	65.0%	30	78 / 120	65.0%	78 / 120	65.0%
11	2	12	0	0	5	30	74 / 120	61.7%	30	74 / 120	61.7%	74 / 120	61.7%
9	3	13	1	0	4	30	72 / 120	60.0%	30	72 / 120	60.0%	72 / 120	60.0%
14	6	10	0	0	0	30	94 / 120	78.3%	30	94 / 120	78.3%	94 / 120	78.3%
15	8	4	0	1	2	30	93 / 120	77.5%	30	93 / 120	77.5%	93 / 120	77.5%
20	4	2	0	3	1	30	99 / 120	82.5%	30	99 / 120	82.5%	99 / 120	82.5%
12	6	11	0	0	1	30	88 / 120	73.3%	30	88 / 120	73.3%	88 / 120	73.3%

(Figure 6. Teacher's Attendance Tracking Dashboard)

e. Proctoring Quizzes & Examinations

The shift from face-to-face instruction to online learning has perhaps changed how to distribute and monitor conventional assessments, including quizzes and tests (Cramp et al., 2019). Moreover, using online assessments may have raised critical issues and challenges about academic integrity and plagiarism; Moodle has adopted several online proctoring tools to assist teachers.

The SafeExamBrowser(SEB) is most commonly utilized in the workplace sector. This module prevents other websites and applications from being used and prevents unauthorized access during an assessment. The main challenge with the module is that it needs to be installed on physical machines, which may not work in an online classroom setting.

Moodle's Quiz Proctoring module will take random screenshots from a user's webcam to ensure the person is the correct user for online assessment. This requires the user to enable access to their webcams and accept the agreement based on the instructor's rules and class settings. The module will take random screenshots and be placed on the site Moodle's web server. In most cases, the images are deleted within three weeks, but schools can also modify the time settings.

▼ Extra restrictions on attempts

Require password ? *Click to enter text*  

Require network address ?

Enforced delay between 1st and 2nd attempts ? minutes Enable

Enforced delay between later attempts ? minutes Enable

Browser security ?

Webcam identity validation ?

I am aware that a proctoring plugin is used for this quiz. To continue with this quiz attempt you must open your webcam, and it will take some of your pictures randomly during the quiz. The teacher can review the pictures after submitting the quiz to identify possible violations. Other information (such as video, keyboard touches, or what's happening on the screen) isn't recorded. Images are stored on the university's Moodle server and are automatically deleted after three weeks.

[View proctoring report](#)

Grading method: Highest grade

(Figure 7 & 8. Proctor Examination Settings & ToS Agreement)

f. Gradebook and Assessment

A gradebook is a core tool for teachers to assess scores, grade information, and distribute the feedback to students. Most instructors have an assessment tool. One of the common issues that persist is the time-consumption of organizing data accessible for both the teacher and students, such as class course breakdowns, formative and summative assessments, weight-grade calculations, and cumulative benchmarks for further evaluation (Anasse & Rhandy, 2021; Falcao & Soeiro, 2019). Having a digital gradebook that can automate grading assignments and tests can significantly reduce the time needed for evaluation.

Moodle's gradebook is an effective and time-saving tool with many features available, including weighted point values, separation of categories,

manual grade overriding, extra credit allocation, and automatic warning notifications.

		Attendance / Participation	Assignments	Presentations	
ID number	Σ Attendance / Participati...	Σ Assignments total	Σ Presentations total	Σ Course total	
		85 %	100 %	94 %	92 %
		89 %	100 %	93 %	94 %
		89 %	94 %	96 %	93 %
		65 %	94 %	82 %	79 %
		62 %	38 %	78 %	59 %
		60 %	38 %	83 %	60 %
		78 %	94 %	88 %	86 %
		78 %	88 %	82 %	82 %
		83 %	88 %	96 %	88 %
		73 %	100 %	90 %	86 %
		88 %	88 %	92 %	89 %
		74 %	91 %	89 %	84 %
		84 %	74 %	90 %	83 %
Overall average		74 %	77 %	88 %	79 %

(Figure 9. Teacher's Gradebook Dashboard [Weight-grading shown])

Much like other gradebooks, the initial setup can be overwhelming. However, one of the central core features of Moodle is that most applications and modules within the LMS can be configured to be as straightforward or as complex as possible. Each teacher can modify their settings to complement their classroom environment.

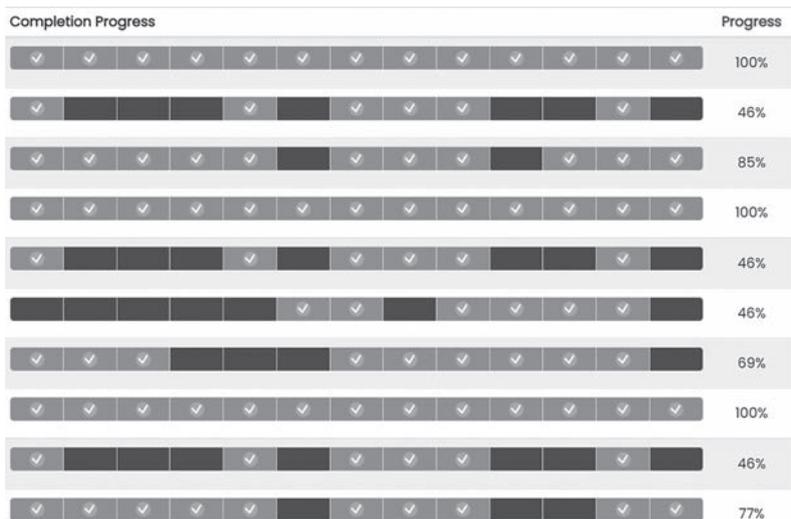
g. Track Progress and Completion

With the shift to online learning, tracking a student's progress or attention span has unique challenges. An instructor can monitor a face-to-face classroom setting and check for comprehension; being virtual now suddenly becomes more challenging. Moodle's Completion Progress module allows teachers to track students' progress and completion online closely. A marker will be placed to indicate completion whenever a student completes an assignment, reads an assigned website, uploads coursework, or finishes an online quiz or test. There are multiple colors for the author's classroom to indicate progress, including blue for assigned, yellow for in progress, green for

complete, and red for incomplete. A summary of all students' progress can be easily accessed in Moodle for further evaluation.



(Figure 10. Student Completion Tracking Progress Module)



(Figure 11. Teacher's Student Completion Tracking Progress Dashboard)

These features can help the teacher engage students, monitor progress, and identify potential areas of concern.

h. Secure authentication login

Today, online security and privacy are arguably among the top discussions in the ICT world (Korać, Damjanović, & Simić, 2021). It is vital to protect a user's data and information and keep it as secure as possible. To deploy and maintain an adequate security level, multiple layers of security are available for each Moodle system.

The author's institution is using Google Education G-Suite as its main digital workspace. One of the features used is having a secure authentication system that identifies a user to an account. Students have to log in using their Google ID OAuth 2 credentials to access their cloud resources. Although the Moodle LMS has its authentication system, it can augment itself with Google's secure login (i.e., two-factor authentication, single sign-on) to further enhance the security and privacy of a user's login credentials. This also eliminates an additional step in the login process, lowering the risk of potential threats and security flaws.



(Figure 12. Keiwa College's Moodle SSO w/Google Oauth login)

MAIN ADVANTAGES OF USING MOODLE

Many practical benefits from these e-Learning systems can promote beneficial learning. Using an LMS to supplement a course is highly recommended. By using Moodle, students and teachers have the advantage of accessing a wide range of educational material to interact with each other that other LMS software may not provide. The main drivers of Moodle are that it is highly rated, has a high grade of acceptance in community institutions, and has a wide variety of active courses available in many different languages. While numerous enhancements comprise Moodle of being one of the more popular systems to use in academia, there are a few advantages that are highlighted:

a. Free and Open-source

Online and distance learning can be costly, and cost-effectiveness and sustainability become more important as schools and institutions become

the forefront of distance education. Cost, which is perhaps the most critical disadvantage of online learning when compared to traditional learning environments, can be alleviated with the extensive and interactive features of Moodle (Abad-Segura & Ruipérez, 2020).

The entire source-code package of Moodle can be downloaded from its website for free. The LMS itself does not have any "freemium" (limited features) or "pro" packages; it can be installed on virtually any capable device or cloud system. In addition, because it is open-sourced, end-users are welcome to modify the source code to encode it best to their system needs. Having an open-sourced LMS system helps with scalability with smaller schools and larger organizations that may need to expand their ICT resources.

b. Global Community Support

Moodle has one of the top global network support communities in the world (Moodle, 2021). Because the system is used all across the globe, there are online community members available for discussion. Users can also contact "Moodle Partners," certified Moodle users who can provide support and expertise in customizing the LMS or providing training to create or transition an institution's online learning platforms.

c. Highly configurable and Feature-rich

There is a common misconception that when a product or software is free, it is limited in functionality or not as powerful as paid e-Learning systems. Paid LMS software is usually closed-source or unable to customize beyond what the administrators limit. However, Moodle LMS is used by some of the largest academic institutions and workplace organizations worldwide (ibid.). Moodle can be augmented with open-source or third-party modifications and plug-ins to customize further and enhance the LMS. Both students and teachers can create and study all kinds of e-learning tutorials and set a learning progression schedule for studying and mastering materials from their coursework.

CHALLENGES AND LIMITATIONS OF MOODLE

Even though Moodle's low barrier to entry, continued global support, and scalability is evident, it does have some limitations that warrant further

analysis and discussion:

a. Higher Learning Curve for IT admins

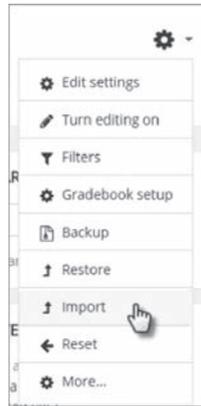
Moodle can be installed on virtually any platform, but some technical knowledge and vocabulary are needed to maintain and continue developing the LMS. Many Japanese institutions employ outside IT companies to provide support and maintenance (MEXT, 2011). The jargon may be difficult to understand for typical users (i.e., teachers, office staff, researchers). A Moodle teacher who can coordinate with teachers and IT support staff to create online resources and courses would be ideal. Contacting local Moodle Partners at an institution's regional area is also an effective method for training and support.

b. Lack of on-demand technical support

One of the most significant limitations of Moodle is perhaps the absence of contact information for technical support. While the Moodle forums and discussions are updated frequently and observed daily by users and administrators, e-mailing or phoning Moodle Support itself is not possible. As stated before, contacting a certified Moodle Partner is the best alternative to get on-demand and real-time technical support. In addition, having multiple teachers or administrators become certified in Moodle IT administration can help bring real-time support internally.

c. Initial time-commitment for teachers to set up and deploy materials

Although Moodle LMS can work "out-of-the-box," there needs to be time allocated to prepare and initialize the course itself; If a teacher does not have previous materials created or saved over, it may take longer for resources to develop and edit. One of Moodle LMS's powerful tools is importing and exporting digital resources and materials from other systems.



(Figure 13. Import/Export function)

The import/export module can apply to almost all areas of Moodle, including test bank questions, gradebook, entire web pages or coursework, and assignments.

THE FUTURE OF LMS AND MOODLE

Further work to improve e-Learning materials and ICT technologies is required. For successful and effective learning management systems, development and collaboration are essential. To fully benefit from these systems, teachers and administrators alike must expand their professional horizons, continue ICT research and expansion, and critically assess the possibilities of augmenting e-Learning systems into their classrooms.

Today, Moodle is considered a promising system that allows teachers to organize and manage digital resources efficiently. Despite its great potential, the majority of academic LMS software is mainly used as a source of repository for educational materials. Moodle's expansive multimedia tools and modules enable interactive and engaging activities that facilitate the students' learning process while equally assisting an instructor's classroom environment. Moodle can provide a full-fledged e-Learning system, knowledge quality and competency assessment, and a wide range of learning content. Moodle is used worldwide by many schools, universities, and institutions; it has excellent potential for creating a successful and effective learning experience.

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