High School Students' Experience Using Learning Management System on Chemistry In Age of Pandemic

Tomas Istantyo Putro1), Suryadi Budi Utomo1), and Nurma Yunita Indriyanti1, a)

1) Master Program of Chemistry Education, Faculty of Teacher Training and Education, Universitas Sebelas Maret, Indonesia

a) Corresponding author: nurma.indriyanti@staff.uns.ac.id

Abstract. During the pandemic, LMS is getting popular for facilitating learning. LMS is a software application for network or online activity and an electronic learning program (e-learning program). This study aims to identify high school students' learning chemistry experience with the Learning Management System (LMS) in the Pandemic Era. Fifty-four high school students of 12th grade from high schools in Karanganyar, Indonesia, participated in this research. The survey was used as the methodology. The survey instrument consists of 33 items, which are divided into six parts: student profile, analysis of the needs of internet, analysis of the needs of mobile phones, analysis of the implementation of learning chemistry during the pandemic, LMS application that has been used, and the mobile learning design expectations. The finding shows that most students use the internet more than 5 hours a day with the main priority for online learning, so they are consuming 10-20 GB of internet data per month. In online learning, most students use mobile phones. During the pandemic, the learning majority only consisted of assignment to practice problems via Whatsapp Group, Google classroom, Microsoft Teams, Google form, or watching videos via YouTube. With LMS, students feel sufficient and comfortable to support learning during this pandemic. Chemistry LMS is expected to contain a collection of materials, virtual, practice questions, a set of formulas, and animation.

1. Introduction

Pandemic COVID-19 era, this outbreak has changed operational conditions worldwide as the consequences of this outbreak cannot be controlled and cannot be stopped from spreading to the whole world. All areas of human life on earth are disturbed; one of the areas affected is education, nearly 120 countries have stopped conducting face-to-face learning to reduce people's contact with each other. This pandemic's impact is divided into two impacts; the first is the short-term impact felt by many families who have never studied at home. Usually, parents are busy with work outside the home and suddenly have to take care of their children's learning at home. It also affects children's psychology, which used to be face-to-face learning but is no longer possible today. Besides, the infrastructure is inadequate to support online learning. The long-term impact is on the aspect of justice and increasing inequality between regions [1]. The learning system is currently being implemented through e-learning as an emergency action to stop the spread of the COVID-19 virus [2].
Technology has changed the way of education worldwide from the traditional way to the modern way of learning. Information and communication technology (ICT) has now become one of the Indonesian government strategies to support the implementation of the online learning process. Through the use of ICT, students can now have the opportunity to learn from home, without direct or face-to-face meetings between actual teachers and students, only using the e-learning model [3], which is useful to facilitate the learning process during a pandemic [4]. E-learning is not only technology-based learning through websites, video conferences, learning portals, YouTube, mobile applications, but also as a learning tool [5-6]. ICT has many advantages in online learning, learning application, which is usually used, is widely offered through learning management systems (LMS).

A learning management system (LMS) is software used to deliver, track, process training/learning. LMS contains a system for processing training with software for distribution over the internet and offers online collaboration features [7]. Internet and web-based LMS's have been widely used in recent years to support learning, including face-to-face learning, distance learning, and hybrid / blended learning [8] [9]. LMS can be applied in science, that is for the representation of phenomena, encouraging experimental studies, and enabling modeling and application of problem-solving [7]. According to a study by Ekici (2012) [10] using Moodle LMS to improve the effectiveness of primary physics teaching. In his research, it shows that prospective teachers have positive ideas about teaching and using Moodle. According to research by Nababan (2019) [11], the development of teaching materials on blended learning that utilizes the LMS application is believed to attract more student interest and motivation so that it can generate positive feelings towards chemistry and can improve students' metacognition skills. This LMS is used to support learning and teaching activities. LMS consists of various features that allow students to share learning material and interact between teachers and students, synchronously and asynchronously [12].

Online learning or distance learning is very much needed during the COVID-19 pandemic. However, there is still a lack of assurance, and without infrastructure support, this distance learning must be implemented so that the teaching and learning process continues. Given this lack of infrastructure, many teachers must use the online platform available at each institution and are considered to have supported online learning. However, this online-based platform does not provide pedagogical clues as to how, when, and why to use the platform [13]. Likewise, many teachers who do online teaching only focus on the learning material used to fill online learning independently because, during the pandemic, teachers are required to continue to carry out the teaching and learning process [13]. Therefore, this study aims to determine the experiences of high school students in learning chemistry with the Learning Management System (LMS) in the Pandemic Era, starting from why students prefer to use cell phones to access the learning management system, what students have used LMS, and the expectations of Mobile learning design. This study involved fifty-four high school of twelfth-grade students in the Karanganyar Regency. Students were selected according to their experiences who have done online learning due to the COVID-19 pandemic [13].

2. Research methods
The research aimed to identify high school students' experience in learning chemistry with the Learning Management System (LMS) in Pandemic Era. This research was using a quantitative approach with survey methods as data collection. Survey performed as in Shahzad's research (2020) [2] via a Google form, links shared with students through the WhatsApp group.

This content questionnaire of three twenty-three items was divided into six parts, that is the profile of students, the analysis of Internet needs, the analysis of mobile phone's requirements, the analysis of the implementation of learning chemistry during the pandemic, the LMS applications that have been used and the expectations of Mobile learning design. This study involved fifty-four high school of twelfth-grade students in the Karanganyar Regency. Students were selected according to their experiences who have done online learning due to the COVID-19 pandemic [13].
3. Result and Discussion

During the pandemic, almost all teaching and learning activities were carried out using the online learning method; we were interested in investigating students' actual experiences in online learning. In the first part, this survey contains students' profiles, where students came from five high schools. The environment significantly affects online learning fluency, as in Anand's research (2012) [14]. The constraints that arise are mainly on the availability of bandwidth, inadequate infrastructure, and the students' willingness and ability to access online learning.

The second part is analyzing students' Internet needs during online learning. The frequency of students' Internet usage mostly uses more than five hours a day—the amount of Internet data consumed at most 10-20 GB in a month. Most students' goal using the Internet is to use it for online learning, rather than accessing social media in this pandemic era.

The third part contains an analysis of the student's mobile phone needs. All students have mobile phones that are used to access online learning applications. During the pandemic, they used an average mobile phone 4-6 hours a day, mainly online learning. Nearly 87% of students prefer to use a mobile phone instead of using laptops to access the entire platform. It is because several reasons have fast, easy and flexible access; supporting for learning facilities; can access information from anywhere; can do individual learning; be able to watch useful learning videos; fun and visual; figure 1 shows the reasons why they prefer mobile phones over laptops in accessing online learning platforms:

![Figure 1. The advantages of using a mobile phone compared to a laptop in accessing the LMS application](image)

From Figure 1, students prefer the mobile phone to access the LMS application. Students think mobile phones can provide convenience in accessing information anywhere, and mobile phones have fast access. Mobile phones are also more flexible or can be carried anywhere easily [15]. In Papadakis research (2018) [16], most students’ access Moodle using a mobile phone if needed; with a mobile phone, they can do Moodle assignments and access learning material. With mobile phones, students reveal that it is more users friendly.

The fourth part of the survey explores information about the implementation of learning chemistry during a pandemic. Teachers mostly use assignments and practice questions/quizzes with available applications such as WhatsApp group, Google Classroom, and Google Form. Besides, the teacher also uses videos from YouTube to deliver material to students. The majority of teachers use the google classroom application, WhatsApp Group, Google Form, and Microsoft 365/Teams in the online teaching and learning process. Of the many applications used, the average student prefers to use google classroom because it is easier to use, timely notifications, more comfortable to receive material and send assignments, easier in presence, and lighter to use. This finding is consistent with Al-Marooof (2018) [17] that google classroom is an application that provides ease of use as a feature of google classroom. Most teachers only do live face-to-face online learning using the Microsoft 365
application, an average of fewer than 15 minutes in an hour of lessons, because to save the quota, so that learning becomes more effective and saves internet data used [18].

The fifth part is about the LMS application that is used to support online learning. Students prefer to access the learning management system application in online learning using cellphones rather than laptops because they can be carried anywhere easily. Students are now new generation students who are familiar with the latest technology, such as smartphones. It is not uncommon to see students in high school already using smartphones to access Moodle and other LMS [16]. The LMS applications that are often used by teachers are google classroom, google form, and Microsoft 365. From the LMS applications that have been used, students feel that they are right, easy to use, quite helpful in the teaching and learning process, and simple. Although the use of LMS in schools increases, concerns remain as to whether existing LMS can be used as a useful learning tool or only as a repository of electronic documents rather than as an active learning tool, and students take a passive role rather than be active [19]. Ssekakubo (2013) [20] states that LMS is still lacking in supporting interaction, personalization, and student involvement in learning.

The fifth part of this content questionnaire's expectations about mobile learning designs can be used as a learning management system. The LMS development that students expect is a collection of materials, virtual / tutorials, quizzes/practice questions, and a collection of formulas and additional animation/virtual to make it easier to understand. The LMS must be able to manage tracks and report on interactions between students and content and students and teachers. LMS can enroll students, track student progress, record test scores, and show completion of assignments [21]. Each LMS has standard components such as making class rosters (student records), control or registration processes, and the ability to create waiting lists, upload and process documents containing content, submission of assignments, and discussion forums [7].

4. Conclusion
Using data from fifty-four students, we investigated their experiences of taking online learning during the pandemic era. From this, it is known that students prefer to use mobile phones to access the LMS used in online learning because there are several reasons, that is having fast, easy and flexible access; support for learning facilities; can access information from anywhere; can do individual learning; be able to watch useful learning videos; fun and visuality. Most of the LMS applications used by teachers are already available applications, there has been no development of a specific LMS for learning, so the standards for evaluation in each LMS application are different. The LMS that students expect consists of a collection of materials, virtual / tutorials, quizzes/practice questions, and a collection of formulas, as well as additional animations/virtu-als to make it easier to understand. It is expected that this study could be a reference material for research on LMS development of an effective and friendly LMS for students.

Acknowledgment
The author appreciates the Ministry of Research and Technology / National Research and Innovation Agency of the Republic of Indonesia who has provided funding for research through a master thesis research grant in 2020.

References
[1] A. Shahzad, R. Hassan, A. Y. Aremu, A. Hussain, and R. N. Lodhi, “Effects of COVID-19 in E-learning on higher education institution students: the group comparison between male and female,” Qual. Quant., no. 0123456789, 2020.
[2] A. Shahzad, R. Hassan, N. I. Abdullah, A. Hussain, and M. Fareed, "COVID-19 impact on e-commerce usage: An empirical evidence from Malaysian healthcare industry," Humanit. Soc. Sci. Rev., vol. 8, no. 3, pp. 599–609, 2020.
[3] M. Masud, “Collaborative e-learning systems using semantic data interoperability,” Comput. Human Behav., vol. 61, pp. 127–135, 2016.
[4] K. Alone, “Adoption of e-learning technologies in education institutions/organisations: A literature review,” Asian J. Educ. Res., vol. 5, no. 4, pp. 63–71, 2017.
[5] D. Adams, B. Sumintono, A. Mohamed, and N. S. M. Noor, “E-learning readiness among students of diverse backgrounds in a leading Malaysian higher education institution,” Malaysian J. Learn. Instr., vol. 15, no. 2, pp. 227–256, 2018.
[6] G. Chopra, P. Madan, P. Jaisingh, and P. Bhaskar, “Effectiveness of e-learning portal from students’ perspective: A structural equation model (SEM) approach,” Interact. Technol. Smart Educ., vol. 16, no. 2, pp. 94–116, 2019.
[7] N. Cavus and M. S. Alhih, “Learning Management Systems Use in Science Education,” Procedia - Soc. Behav. Sci., vol. 143, pp. 517–520, 2014.
[8] T. M. Connolly, E. MacArthur, M. Stansfield, and E. McLellan, “A quasi-experimental study of three online learning courses in computing,” Comput. Educ., vol. 49, no. 2, pp. 345–359, 2007.
[9] B. El Mansour and Davison M. Mupinga, “Students ’ Positive and Negative Experiences,” Colledge studen J., vol. 41, no. 1, pp. 242–249, 2004.
[10] F. Ekici, I. Kara, and E. Ekici, “The primary student teachers’ views about a blended learning application in a basic physics course,” Turkish Online J. Distance Educ., vol. 13, no. 2, pp. 291–310, 2012.
[11] K. Nababan, B. Hastuti, and N. Y. Indriyanti, “Blended learning in high school chemistry to enhance students’ metacognitive skills and attitudes towards chemistry: A need analysis,” AIP Conf. Proc., vol. 2194, no. December, 2019.
[12] Y. Vovides, S. Sanchez-Alonso, V. Mitropoulou, and G. Nickmans, “The use of e-learning course management systems to support learning strategies and to improve self-regulated learning,” Educ. Res. Rev., vol. 2, no. 1, pp. 64–74, 2007.
[13] C. Rapanta, L. Botturi, P. Goodyear, L. Guàrdia, and M. Koole, “Online University Teaching During and After the Covid-19 Crisis: Refocusing Teacher Presence and Learning Activity,” Postdigital Sci. Educ., pp. 1–23, 2020.
[14] R. Anand, S. Saxena, and S. Saxena, “E-Learning and Its Impact on Rural Areas,” Int. J. Mod. Educ. Comput. Sci., vol. 4, no. 5, pp. 46–52, 2012.
[15] P. Zhang and S. Bhattacharyya, “Students’ Views of a Learning Management System: A Longitudinal Qualitative Study,” Commun. Assoc. Inf. Syst., vol. 23, no. May 2014, 2008.
[16] S. Papadakis, M. Kalogiannakis, E. Sifaki, and N. Vidakis, “Access Moodle Using Smart Mobile Phones. A Case Study in a Greek University,” Inst. Comput. Sci. Soc. Informatics Telecommun. Eng. 2018, pp. 376–385, 2018.
[17] R. A. S. Al-Maroof and M. Al-Emran, “Students acceptance of google classroom: An exploratory study using PLS-SEM approach,” Int. J. Emerg. Technol. Learn., vol. 13, no. 6, pp. 112–123, 2018.
[18] N. Cavus, “Distance Learning and Learning Management Systems,” Procedia - Soc. Behav. Sci., vol. 191, pp. 872–877, 2015.
[19] A. Carvalho, N. Areal, and J. Silva, “Students perceptions of Blackboard and Moodle in a Portuguese university,” Br. J. Educ. Technol., vol. 42, no. 5, pp. 824–841, 2011.
[20] G. Ssekakubo, H. Suleman, and G. Marsden, “Designing mobile LMS interfaces: Learners’ expectations and experiences,” Interact. Technol. Smart Educ., vol. 10, no. 2, pp. 147–167, 2013.
[21] W. R. Watson and S. L. Watson, “An argument for clarity: What are learning management systems, what are they not, and what should they become?,” TechTrends, vol. 51, no. 2, pp. 28–34, 2007.