



Moodle-Based Online Learning Management in Higher Education

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The COVID-19 pandemic gives a big impact on various aspects of human life, including higher education institutions. Institut Agama Islam Negeri (State Institute for Islamic Studies) Surakarta (IAIN Surakarta) as one of the Islamic higher education institutions in Indonesia has developed online learning management using Moodle platform. This study tries to measure the level of implementation of learning management in three dimensions of Moodle-based online learning; planning of learning, implementation of learning and evaluation. This study used a quantitative approach with a sample of 718 students from five faculties based on the descriptive analysis, report showed that planning of learning was in the high category with an average of 4.06 (in scale 5), the implementation of learning was in the medium category with an average of 3.35 and evaluation of learning was also in the medium category with an average of 3.14. It meant that it was necessary to optimize the implementation and evaluation of learning. While the results of CFA showed that the three manifest variables were below 0.4, namely the use of Zoom, Google Meet or others (outside Moodle) for synchronous ($\lambda = 0.01$, mean = 3.86), the use of Google Classroom, WhatsApp or others for asynchronous ($\lambda = 0.04$, mean = 4.31), and the examination in the form of assignments ($\lambda = 0.11$, mean = 3.86). So, it can be concluded that the use of e-learning based Moodle has less optimal in implementation and evaluation of learning. Therefore, it is necessary to improve the quality of applications, supporting facilities and user capabilities.

Keywords: moodle-based learning, planning of learning, implementation of learning, evaluation of learning, higher education

INTRODUCTION

Online learning in higher education like university during the Covid-19 pandemic might probably reduce the quality of education in Indonesia. Recent research reports that under 50% of students in Indonesia are not ready for online learning because of various

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aspects (Giatman et al., 2020). One condition is caused by the readiness of the university, which has been conducting offline learning, must change or switch to an online mode. This new shift gives also new problems because of the inadequacy of infrastructure, human resources, and e-learning applications for the implementation of full online lectures. Although higher education institutions generally have information technology infrastructure for academic services and learning, they cannot support the implementation of full online learning, which basically require adequate servers, a stable internet network, and integration of e-learning application systems with existing academic service systems. This does not only happen in Indonesia, but in other countries such as in Romania, Philippine and other countries (Radu et al., 2020), (Joaquin et al., 2020). In addition, aspects of human resources such as academic and IT staff and lecturers have not get ready to carry out services or online learning processes. Lecturers and staff have not had the skills or abilities to use IT technology for online classroom management because they used to undertake traditional learning (Zainal Ilmi et al, 2020).

The concept of on-line learning during the Covid-19 pandemic can currently be used by education providers as a solution to improve face-to-face lectures which have had weaknesses including limited duration, weak facilities in classrooms and weak flexibility in learning process. Such technologies are expected to provide ease of learning for students and also lecturers. Today's technologies combine asynchronous and synchronous learning experiences (Keren-kolb, 2013). Asynchronous provides material, instruction and course, and synchronous provides interactive communication to give positive reinforcement to students at home using digital media (Mantasiah, 2021). Therefore, such services can improve the quality and efficiency of learning and teaching process in the university (Mlotshwa et al., 2020). In other words, the on-line learning should not reduce the criteria for face-to-face learning, and if it is managed properly, it will add to the positive side of face-to-face lectures. Moodle-based online learning is one of many online platforms that offer synchronous and asynchronous modes with following tips.

Management of Moodle-Based Online Learning

Moodle-based online learning management has long been used as a support for classroom learning. In its history, the development of Moodle was started in 1999 by Martin Dougiamas, who worked as a WebCT administrator at Curtin University of Technology (Kats, 2010). This platform has complete features, flexible, and widely used by universities in various countries. It was claimed that Moodle has been used by more than 30,000 educational institutions in the world (Cole & Foster, 2007) such as in Hong Kong and other countries in Asia (Luk et al., 2018). The choice of Moodle as an online learning platform is based on its ability to create great, flexible and engaging learning experiences. Moreover, Moodle is a free open source learning management platform that makes it very attractive to users (Nash & Rice, 2018). Moodle-based online lecture management uses following basic dimensions of the management system same as face-to-face teaching.

Planning of Moodle-based online learning

Planning on the Moodle-based online learning system is an initial process of its use with stages including; creating e-learning accounts, determining course activities, time schedules and so on. This step requires extra time where a teacher must determine what material and methods will be used in learning (Nash & Rice, 2018). This strategy is an important effort to make class activities visible in e-learning. In asynchronous learning, for example, video clips, PDF documents and any other open educational resources are usually prepared earlier (Nichols, 2016). Moreover, lecturers can provide Massive Open Online Course (MOOC) to design new teaching strategies, methods and techniques in the platform (Aljaraidh, 2019). So, lecturers can bring informal ways of learning into formal setting.

E-learning is one way to integrate student learning needs with technology (De Clunie et al., 2013). It was also explained that in the learning management system, planning needs to pay attention to performance expectancy, effort expectancy, social influences and facilities (Ramllah & Nurkhin, 2020). These expectancies are made in a structured schedule design that regulates the learning sequence, learning methods and learning materials. Thus, the students will be ready to follow lesson in every meeting. Based on this concept, Moodle-based learning planning can be measured through the following aspects; 1) uploading the learning plan of semester on Moodle facilities, 2) explaining the learning plan of semester at the beginning of the semester, 3) making a learning contract between lecturer and students and 4) uploading the learning contract on Moodle facilities.

Implementation of Moodle-based online learning

Moodle-based online learning is the same as face-to-face learning which also expects active and effective learning. This mode allows synchronous and asynchronous use of the learning support system provided by the campus (Chourishi, 2015). With this system the use of e-learning, such as students can study anywhere and anytime without having to come to class. Several previous studies reported that e-learning ability can increase learning effectiveness (Goyal & Tambe, 2015). Other studies have specifically found that Moodle-based learning management systems make it easier for students to adapt to learning technology (Umek, Keržič, et al., 2015). In addition, e-learning can significantly increase teacher and student creativity (Gunawan et al., 2019).

Besides having a positive impact, Moodle-based online learning was also found to be ineffective in this learning which was caused by a lack of interaction between students and lecturers. This interaction problem can actually be minimized by connecting the social interaction between lecturers and students with a technological approach (Wood, 2010). This interactive model places a combination of synchronous and asynchronous simultaneously. In the flipped learning class, for example, students are in class at a predetermined hour, and then the lecturer gives explanation directly. Lecturer directions will lure students to participate actively (Abar & Carnevale de Moraes, 2019). Such

model increases students' cognitive abilities to think creatively and communicate actively outside of the classroom (Algayres & Triantafyllou, 2020).

Moodle platform can even bridge institutions to control directed learning policies. The quality of the implementation of learning can be reviewed by the institutional coordinator (the person in charge of the program), whether the rules have been implemented by the users or not (Umek, Aristovnik, et al., 2015). This system also allows to regularly see the presence of lecturers and students in lectures. This control is needed to monitor the quality of the learning pedagogy and to determine future technology development and learning management systems. Based on this concept, the implementation of Moodle-based learning can be measured through the following aspects; 1) Setting attendance, 2) Utilizing of Bigblue for synchronous, 3) Utilizing Zoom, Google meet, or others for synchronous activity, 4) Utilizing of e-learning for asynchronous activity, 5) Utilizing of Google classroom, WhatsApp (WA), for asynchronous activity 6) Making assignment and delivery of assignments using Moodle facilities, 7) Uploading teaching materials (PDF, PPT, Documents, Videos, etc.) on e-learning and 8) Linking teaching materials on Moodle facilities.

Evaluation of Moodle-based online learning

Evaluation is the process of obtaining data to determine whether students can achieve goals according to the determined learning. This process should be able to measure student performance and provides steps to give feedback (Koneru, 2017). This evaluation management system does not only assess and mark students, but it is expected to be able to assess whether the learning method can improve student competence or not. Moodle-based learning management system offers various final assessment modes such as assignments, choice modules, forums and others. Recent data states that such evaluation by e-learning is rarely done by lecturers, because they are more likely to use e-learning for the needs of delivering material (Deepak, 2017). The ideal evaluation should be able to show indicators of student skills and learning quality.

From the explanation above, e-learning is expected to improve the three dimensions of face-to-face lectures without reducing the basic concepts of ideal learning in general. Basically, e-learning courses only replace approach (conventional to digital media), not replace the basic principles of learning. Based on this concept, Moodle-based learning evaluation can be measured through the following aspects; 1) using Moodle facilities, 2) given by the lecturer in the form of assignments and 3) using Moodle facilities for submitting assignment.

Implementation of Learning Management System Using Moodle

Several research results indicated the use of various applications of e-learning (Samudi et al., 2020). La Consolacion University Philippines developed a web-based classroom named *Eliademy*, this platform besides having benefits in learning management, also has its own challenges, especially regarding the need for a strong internet connection (Francisco & Barcelona, 2020). There are many learning management platforms in use around the world, among which the ones that are also popular are the use of the Moodle and ALTO platforms (Kats, 2010). The naming of the Moodle application for online

learning appears varies in several universities. For example, the University of Indonesia named it with *Student Centered e-Learning Environment (SCELE)* (Santoso et al., 2018), Universiti Sains Islam Malaysia (USIM) used *Online Distance Learning (ODL)* (Zainuddin et al., 2016), IAIN Surakarta has developed *SiKulon (Sistem Kuliah On-Line/online learning system)* at <https://elearning.iain-surakarta.ac.id> and many others.

The use of a learning platform is a central point in determining the success of online learning. Based on the recent research (Rakic et al., 2020), he found that there was a significant correlation between the abilities of students and the platform used. In addition to the ability, other research showed positive progress from students (Chung & Ackerman, 2015). The learning impact was different in the level of education (Miller et al., 2020). Higher education is the institution that gets the biggest positive impact compared to other education levels. However, in practice in higher education, it was found that many lecturers had not optimally utilized Moodle in various learning activities (Ghilay, 2013). Under these conditions, evaluation of implementing online learning is very important in order to improve the quality of the learning process and output during the pandemic and post covid-19 recovery.

During the Covid-19 pandemic, learning management system in IAIN Surakarta has developed Moodle-based online learning to increase the effectiveness of online learning management. In line with the philosophy of this platform, Moodle is designed to support the creation of interactive learning styles. This concept is supported by the philosophy of social construction which believes that people learn best when they interact with learning material, build new material for others, and interact with other students about the material (Nash & Rice, 2018). Based on the recent research, learning management system using Moodle was perceived to be web-based flexible learning that offer interactive learning similar to traditional learning (Coman et al., 2020). Therefore, researcher tries to find the effectiveness of using Moodle developed by IAIN Surakarta by assessing the use of features on Moodle.

Based on preliminary research, it was found that some lecturers gave negative and positive responses to the use of Moodle in learning management during a pandemic. Some lecturers were not familiar and need a different time in mastering Moodle-based learning management (*SiKulon*). During the Covid 19 pandemic, which prompted a social distancing policy from the government, socialization of *SiKulon* to both lecturers and students was carried out online with various limitations. Support capacity, such as infrastructure, stability of the internet network in each region, as well as technological literacy from students and lecturers were critical aspects of implementing Moodle-based learning management.

METHOD

Design, Data Collection Techniques and Analysis of Research

This research was conducted with a quantitative approach or quantitative research in the form of an online survey (Stephen Gorard, 2001) (Creswell, 2012). As a quantitative research, this study uses objective measurements to collect numerical data that is used to answer predetermined questions (Ary et al., 2010). The form of the instrument used in

this study was a questionnaire. This research data collection using a questionnaire by utilizing google form facilities. The questionnaire was distributed to students through the student and faculty WhatsApp group. Only questionnaires that received a perfect response were included in the data analysis.

Data analysis in this study used descriptive techniques and CFA (Confirmatory Factor Analysis) using SEM AMOS (Byrne, 2010). Descriptive techniques are intended to describe student responses in the form of mean answers and standard deviation. Meanwhile, the CFA analysis in this study is intended to describe which factor (indicator) is the strongest and weakest in each dimension.

Research Sample

The research was conducted at IAIN Surakarta with a population of 15.824 students (based on data on pddikti.kemdikbud.go.id on October 30, 2020). Samples were determined randomly by distributing questionnaires in the form of *google forms* to students via the WhatsApp group at each faculty. The questionnaires were distributed between 20th until 30th October 2020. There are 822 respondents and then eliminated respondent out of the criteria's including only respondents who are in semesters 3 – 7, they are taking online lectures with *SiKulon*, and filling out the latest form on October 30th, 2020. From the results of data elimination, a sample of 718 students was obtained or as much as 4.5% of the population spread over 5 (five) faculties with details as in tables 1 and 2 below:

Table 1

Distribution of respondent

Faculty	Frequency	Percent
Faculty of Adab and Language (FAB)	114	15.88
Faculty of Syari'ah Law (FASYA)	244	33.98
Faculty of Economy and Islamic Business (FEBI)	104	14.48
Faculty of Science Education (FIT)	135	18.80
Faculty of Ushuludin and Da'wah (FUD)	121	16.85
Total	718	100.00
Semester	Frequency	Percent
3 (three)	177	24.70
5 (five)	464	64.60
7 (seven)	77	10.70
Total	718	100.00

Respondents in the study came from five faculties with 718 total students (respondents). The distribution of respondent data based on faculty is FAB 15.9% (114 students), FASYA 34% (244 students), FEBI 14.5% (104 students), FIT 18.8% (135 students) and FUD 16.9% (121 students). So, it can be concluded that the respondents in this study were evenly distributed across all faculties and the highest response came from the Syari'ah Faculty (FASYA). While the distribution of respondents based on the semester, the highest came from the fifth semester students (64.50%) followed by the third semester (24.70%) and the least came from the seventh semester (10.70%). The distribution based on faculty can be seen in table 2 below:

Table 2
Respondents by faculty and semester

Faculty	Semester 3		Semester 5		Semester 7		Total	
	F	P	F	P	F	P	F	P
Faculty of Adab and Language (FAB)	45	25%	64	14%	5	6%	114	16%
Faculty of Syari'ah Law (FASYA)	63	36%	157	34%	24	31%	244	34%
Faculty of Economy and Islamic Business (FEBI)	27	15%	53	11%	24	31%	104	14%
Faculty of Science Education (FIT)	18	10%	96	21%	21	27%	135	19%
Faculty of Ushuludin and Da'wah (FUD)	24	14%	94	20%	3	4%	121	17%
Total	177	25%	464	65%	77	11%	718	100%

Based on table 2 above, it can be concluded that the most respondents from all existing faculties came from 5th semester students in the following order; FASYA (157 or 34%), FIT (96 or 21%), FUD (94 or 20%), FAB (64 or 14%), FEBI (53 or 11%). The lowest response from each faculty came from 7th semester students except for the Faculty of Science Education (FIT), the lowest response came from 3th semester students with 18 respondents.

Research Instruments

In compiling the research instrument, researcher used the following steps: identifying the variables in the title formulation, describing these variables into sub-variables, looking for indicators in the sub-variables, listing descriptors of each indicator, formulating each descriptor into instrument items, complete the instrument with filling instructions and a preface (Riduwan, 2003). This study uses an instrument developed by combining the concept of learning management with Moodle technology (Kats, 2010)(Bach et al., 2007). In learning, there are three main dimensions, namely learning planning, learning implementation and learning evaluation. Learning planning includes; submission of learning plan, explanation of learning plan, Preparation and submission of learning contracts. Learning implementation includes; recording attendance, synchronous and asynchronous explanation of material, assignments, and delivery of teaching materials and learning resources. While the learning evaluation includes; conducting and submitting exams, tests or assignments. This research instrument uses a Likert scale with 5 answer categories (Strongly Agree, Agree, Doubt, Disagree, Strongly Disagree).

FINDINGS AND DISCUSSION

Moodle-based online learning management at IAIN Surakarta was reviewed in three main dimensions, namely planning of learning, implementation of learning and evaluation of learning. The results of respondent are studied using following review:

Planning of Learning

Moodle-based online learning planning is measured by four criterias, namely; uploading the learning plan of semester on *SiKulon*, explaining the learning plan of semester at the beginning of the semester, making a learning contract between lecturer and students, and uploading the learning contract on *SiKulon*. An overview on *SiKulon* of the responses from students can be seen in table 3 below:

Table 3
Planning of learning

Dimension	Criteria	Average (SD)	Category
Planning of Learning	uploading the learning plan of semester on Moodle facilities (X1)	3.58 (0,996)	High
	explaining the learning plan of semester at the beginning of the semester (X2)	4.17 (0,981)	High
	making a learning contract between lecturer and students (X3)	4.35 (0,886)	High
	uploading the learning contract on Moodle facilities (X4)	4.16 (0,951)	High
Total		4.07	High

Based on table 3 above, it can be concluded that the learning planning carried out by the lecturer using an online learning system through e-learning is in the high category (average response is 4.07 on a scale of 5). The willingness of lecturers to upload learning plan on e-learning received the lowest response compared to the other three criteria, with an average rating of 3.58 (Standard Deviation (SD) = 0.886). Based on the standard deviation, it can be concluded that there is no SD that exceeds the average. It means that the data is in the good category and is not biased.

Implementation of Learning

The implementation of learning is a form of action from planning that has been prepared in a comprehensive manner in learning plan format. In describing how learning planning is implemented in Moodle-based teaching and learning activities, it is described by criteria or characteristics including: the use of e-learning for student presence, the use of Bigblue for face-to-face lectures (synchronous), the use of applications outside of e-learning such as Zoom, Google meet, or others for Synchronous mode by lecturers, the use of e-learning to support asynchronous learning, use of Google classroom, WhatsApp or other applications for asynchronous and sending student assignments, using e-learning to upload teaching materials, and using e-learning to linking teaching materials. The average students' response to the criteria for implementing Moodle-based learning is explained in following statements:

Table 4
Implementation of learning

Dimension	Criteria	Average (SD)	Category
Implementation of learning	Setting attendance (X5)	3.53 (0,974)	High
	Utilizing of bigblue for synchronous (X6)	2.13 (1,077)	Low
	Utilizing Zoom, Google meet, or others for synchronous activity (X7)	3.86 (0,895)	High
	Utilizing of e-learning for asynchronous activity(X8)	3.25 (1,076)	Moderate
	Utilizing of Google classroom, WhatsApp (WA), for asynchronous activity (X9)	4.31 (0,681)	High
	Making assignment and delivery of assignments using Moodle facilities (X10)	3.18 (1,013)	Moderate
	Uploading teaching materials (PDF, PPT, Documents, Videos, etc.) on e-learning (X11)	3.58 (1,024)	High
	Linking teaching materials on Moodle facilities (X12)	2.98 (1,085)	Moderate
Total		3.35	Moderate

From the eight indicators above, the total average respondent's answer is 3.35, meaning that the implementation of learning is in the moderate category. With the following description:

- a. Based on the standard deviation, it can be concluded that there is no SD that exceeds the average, meaning that the data distribution is in the good (normal) and unbiased categories.
- b. The use of presence through e-learning by lecturers in the high category with an average of 3.53 respondents' answers.
- c. The use of *Bigblue* by lecturers in supporting synchronous lectures is still low (the average respondent's answer is 2.13).
- d. The use of synchronous activity using zoom, google meet, or others are in the high category with an average of 3.86.
- e. The use of asynchronous learning is carried out by lecturers in e-learning *SiKulon* (in the form of discussion or other) in the medium category, with an average of 3.25
- f. The use synchronous learning using WhatsApp, Google Classroom, or others are in the high category, with an average of 4.31
- g. The use of assignments and assignments using e-learning is in the medium category (average 3.18)
- h. Uploading teaching materials in e-learning in the form of PDF, PPT, Documents, Audio, Video or other is in the high category, with an average of 3.58
- i. Linking teaching materials on *SiKulon* is in the medium category, with an average of 2.98

Based on the result above, it can be concluded that video conferencing applications such as Zoom, Google Meet or others are more preferred by lecturers to *Bigblue* button, which is available in e-learning with an average ratio of $3.86 > 2.13$. Likewise, Google Classroom, *WhatsApp* or others are preferred by lecturers to e-learning with an average ratio of $4.31 > 3.25$. The use of e-learning by the lecturer to provide an explanation of the material by uploading on a YouTube linked on the e-learning model has not been optimal (response is in the medium category).

Evaluation of Learning

Learning evaluation is an activity to measure the achievement of the planned learning objectives. The results of this evaluation will show the level of effectiveness in achieving learning objectives. Learning evaluation using Moodle-based learning applications is seen from three criteria, namely; examination Moodle facilities according to a set schedule, lecturers gives assignments to assess learning outcomes, and lecturers use e-learning to collect students' works. The description of the average respondents' answers is as shown in table 5 below:

Table 5

Evaluation of learning

Dimension	Criteria	Average (SD)	Category
Evaluation of learning	Using Moodle facilities for examination (X13)	2.66 (1.202)	Moderate
	Giving assignments (X14)	3.78 (1.014)	High
	Using Moodle facilities for submitting assignments (X15)	2.97 (1.142)	Moderate
	Total	3.14	Moderate

Based on table 5 above, it can be concluded that;

- Based on the value of the standard deviation, it can be concluded that there is no SD that exceeds the average. It means that the data distribution is in the good and unbiased category.
- Examination using Moodle platform by lecturers according to schedule is in the medium category, with an average of 2.66. This means that the lecturer has not carried out an exam or evaluation in accordance with the academic calendar set by the university.
- Giving the examination in the form of assignments is in high category, with an average of 3.78. This means that most lecturers prefer to use this evaluation rather than the others.
- Assignment collection using e-learning is in medium category, the average is 2.97. This means that lecturers have not used the existing Moodle facilities to collect students' works.

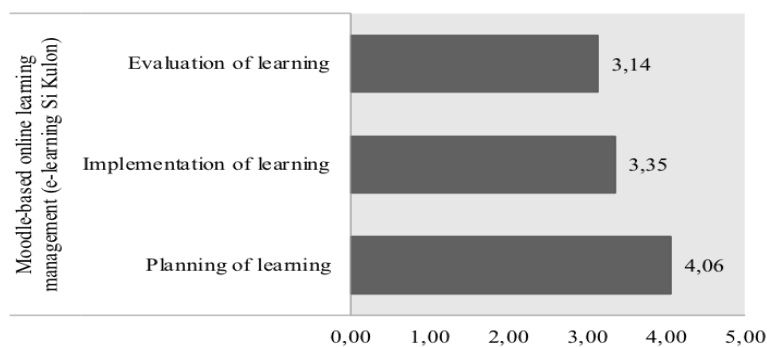


Figure 1
Description of moodle-based online learning management

Descriptive analysis of Moodle-based online learning management in three main dimensions, namely planning of learning, implementation of learning and evaluation of learning above (see figure 1), shows that planning of learning using Moodle is stated in the dimension with the highest average response compared to the other two dimensions. It is reported with value 4.07 on a scale of 5. It can be concluded that the learning management in the dimensions of implementation and evaluation of learning are in the moderate category. In other words, these two dimensions are not optimally used.

Analysis of Factors in Moodle-Based Online Learning Management

Although the average-based descriptive analysis above has provided an overview of Moodle-based online learning management, it needs further analysis using CFA (Confirmatory Factor Analysis) to find out which indicators or aspects are dominant (high) and which are low, based on the factor weight coefficient. The factor weight coefficient basically shows the closeness of the relationship or correlation between the

latent variable and the manifest variable (Bachrudin & Tobing, 2003). The minimum limit of factor weight coefficient (λ) can be considered feasible not less than 0.4.

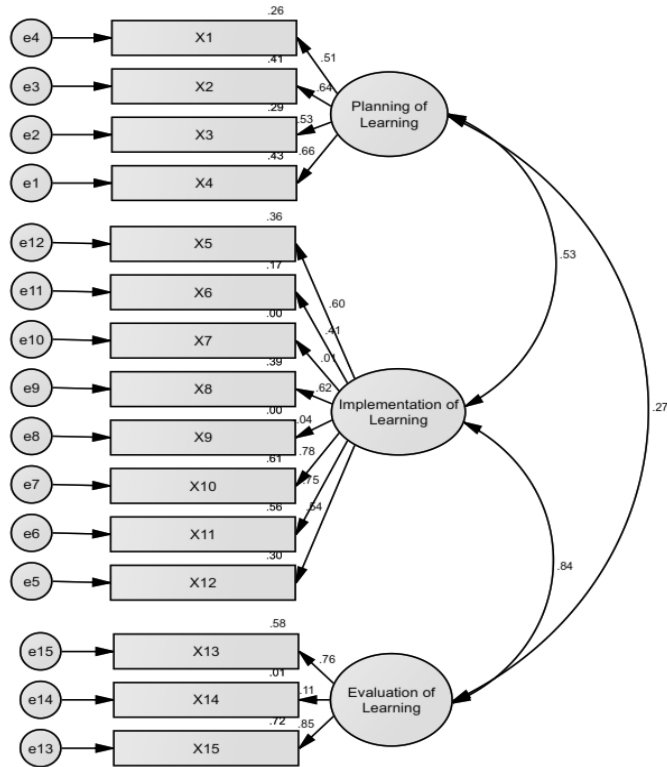


Figure 2
 Confirmatory factor analysis (CFA) moodle-based online learning management

Figure 2 shows that the manifest variable (observed factor or indicator) of the latent variable (dimension) of Moodle-based learning management, namely planning, implementing and evaluating (regression weigh) below 0.4 is the indicator number X9, X7, and X14. This means that the use of Zoom, Google meet, or others for synchronous (X7), the use of Google classrooms, WhatsApp, for asynchronous (X9), and examinations given by lecturers in the form of assignments (X14) cannot explain Moodle-based learning management or it can be said not part of from the indicator or variable manifest. It can be concluded that of the five observed factors (manifest variables) of the learning planning dimensions all have a loading factor weight of above 0.4. It means that all indicators can explain the planning dimensions significantly and the highest indicator is X4 (uploading learning contracts on page of *SiKulon*).

			Estimate	S.E.	C.R.	P	Label
X4	<---	PL	1.000				
X3	<---	PL	.757	.068	11.089	***	par_1
X2	<---	PL	1.011	.083	12.238	***	par_2
X1	<---	PL	.812	.104	7.791	***	par_3
X12	<---	IL	1.000				
X11	<---	IL	1.295	.094	13.835	***	par_4
X10	<---	IL	1.337	.097	13.816	***	par_5
X9	<---	IL	-.048	.047	-1.025	.305	par_6
X8	<---	IL	1.137	.091	12.460	***	par_7
X7	<---	IL	.009	.061	.141	.888	par_8
X6	<---	IL	.746	.082	9.140	***	par_9
X5	<---	IL	.992	.082	12.039	***	par_10
X15	<---	EL	1.000				
X14	<---	EL	.111	.043	2.590	.010	par_11
X13	<---	EL	.939	.049	19.276	***	par_12

Figure 3
Regression weights

In the dimensions of learning implementation (EL) there are two indicators whose loading factor weight (λ) is below 0.4, namely the use of Zoom, Google meet, or others for Synchronous (X7) with P-Value = 0.888 (see figure 3.), utilization Google classroom, WA, for asynchronous (X9) with P-Value = 0.305. These two manifest variables have an average of X7 = 3.86 and an average of X9 = 4.31. It means that the lecturers used other applications instead of using *Bigblue* which has been provided in *SiKulon's* e-learning. They tend to use other applications such as Google Classroom, WhatsApp or others to support learning implementation.

In the dimension of learning evaluation (EL) in the form of assignments (X14) it has a loading factor weight of 0.11 (P-Value = 0.305) with an average of 3.78. It means that this indicator unable to explain dimension of learning evaluation. The indicator of collecting students' works using *SiKulon* e-learning (X13) are on average of 2.66. It can be concluded that the assignments carried out by lecturers are not all collected using e-learning.

Based on research findings, it can be concluded that the existing Moodle-based learning management is less than optimal, especially in the dimensions of implementation and evaluation of learning. Ideal implementation of learning management system is determined by the availability of technical infrastructure, reliable physical installations, bandwidth, management system, and academic staff' and lectures' capability (Kats,

2010). The use of synchronous learning using external platform like zoom, google meet and other is bigger than the use of internal feature. It is caused the limited use of Bigblue Button. Therefore, the capacity of this system is a crucial factor in increasing its effectiveness of higher education operation. There must be advanced development on technical infrastructure of Moodle platform. Learning management system must provide reliable documentation, administration, tracking, reporting and automation (Naz & Khan, 2018). It seems that the large use of external usage caused none of documentation, administration, tracking, reporting and automation.

It also shows that the weaknesses of Moodle-based learning management in two dimensions, namely implementation and evaluation of learning. In the same study related to the implementation of Moodle-based online learning by Miller and Edwards; It was found that lectures with Moodle were preferred by postgraduate students than undergraduate students as measured by the three dimensions of the framework Community of Inquiry (CoI); that is, their online learning, perception, and technology delivery of their courses (Miller & Edward, 2020). From the facilitator's point of view, in line with the research conducted by Richardson et al, it is also necessary to see how the short and long term perceptions of the use of Moodle-based learning (Richardson et al., 2012). Besides, students who use e-learning often experience interference with the computer devices and data access they use (Al-ani, 2013). Meanwhile, Dahal and Pangeni also explained the weaknesses of evaluation. It was stated that the facilitator did not realize or take advantage of the assessment features in Moodle, so that students lost this very useful self-assessment tool and peer for studying in higher education. So, the study recommends training for facilitators in designing, creating and utilizing existing assessment features (Dahal & Pangeni, 2019). In line with theory of learning management system stated by (Naz & Khan, 2018), documentation, administration, tracking, reporting and automation needs awareness and digital literacy from all parties. Institutions must provide easy and convenient access so that lecturers and students can use online classes comfortably. The role of institutions in providing massive information and wise policy to users will also increase digital literacy in the use of learning management systems.

Students' perceptions and attitudes towards e-learning are important factors for the success of the system (Hsu & Chang, 2013). Another research was found that students perceive the quality of interaction positively (with themselves, with their lecturers (instructors) and content using Moodle-based learning. The study recommends that higher education institutions should continue to use Moodle and encourage lecturers to apply it in teaching by optimizing Moodle distinctive features (Abdelraheem, 2012). The perfect quality of educational process depends on many factors such as; digital literacy of students and lecturers, teaching strategies, interaction with students, relation between students and faculty, fast feedback, active learning, collaborative learning, technology application and many others (Coman et al., 2020). Moreover, the use of interactive tutorial videos in learning by embedding YouTube links on Moodle is a crucial factor, because it can increase student learning satisfaction (Nagy, 2018). So, it can be concluded that the use of e-learning based Moodle in higher education has less optimal in implementation and evaluation of learning. Therefore, the institution needs to

improve the quality of applications, supporting facilities and user capabilities including students, academic staffs and lecturers.

CONCLUSION

The Covid-19 pandemic has brought new demands and cultures in learning management to universities around the world. Digital platform like online-based learning management becomes new hope. IAIN Surakarta developed the Moodle-based learning (*SiKulon*) to ensure the implementation and assurance of learning quality. Based on the research findings, it shows that online-based learning management is less optimal, especially in the dimensions of learning implementation and evaluation of learning. However, in planning of learning is included in the high or optimal use.

This study has found weaknesses in important dimensions of learning management system, namely; implementation and evaluation of learning. In the implementation of learning, there are still many lecturers who use other platforms outside Moodle, such as Zoom, Google Meet or others to perform synchronous learning (digital face-to-face learning) and Google Classroom, WhatsApp and others for synchronous learning. This selection can be caused by three main factors; system quality, supporting facilities and users' capability. In line with that, it is necessary to optimize the use of applications available in e-learning with a variety of adequate support capacities. Likewise, with the evaluation, the use of the menu in the Moodle-based learning application, especially on students' work collection, needs to be optimized both from the system and the users (students and lecturers). In addition, the utilization of the evaluation or assessment features needs to be improved by maximizing the functionality of the available systems. In line with the research, further studies are expected to evaluate technical problem that experienced by the students and the institutions specifically during online learning. The findings will reflect many aspects of education support. Results showed that online learning facilities, teaching method and role of government are playing important role. However, it requires precise parameters to conduct the research. Institution can conduct an in-depth survey as an internal evaluation step. Positive perceptions of users reflect expectancy of users, but institutions also need to see performance expectancy, effort expectancy, social influences and facilities. The results will determine what the institution must do to develop the learning service.

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